

# Tucuxi, Cananéia estuary, Brazil

Dr Marco Santos is spearheading a WDCS-funded project in Brazil to study these little-known dolphins.

**Location** - Southeastern Brazil

**Species** - tucuxi

**Researcher** - Prof Dr Marcos Santos - Projeto Atlantis/Instituto de Biologia da Conservação, Universidade Estadual Paulista (UNESP), Campus Rio Claro.

## Research Activity

Can the marine tucuxi dolphin (*Sotalia guianensis*) population of the Cananéia estuary, Southeastern Brazil, face the advances of progress?

## Background

The marine tucuxi dolphin, *Sotalia guianensis* (Ván Benéden, 1864), is one of the lesser-studied delphinids. Despite its apparently continuous distribution along most of the eastern South and Central American coasts, many aspects of this species' natural history remain unknown. This species' preference for coastal and estuarine brackish waters; avoidance response when approached by boats; absence of sexual dimorphism; and small body size are the main factors that impede study of this species in its habitat. The species' distribution, restricted to third world countries' waters, is also a barrier to a better understanding of its ecological aspects as financial support to conduct scientific research in such countries is limited.

Marine tucuxis are from 90 to 100 cm long at birth and can grow to 2 meters long when adults. These dolphins resemble bottlenose dolphins (*Tursiops* sp.), but are smaller. They have a grey back and their belly can be a mixture of white and pink. The few studies that have been conducted show that they can live up to 30 to 35 years. Their mating system is promiscuous, and calving intervals probably last from 2 to 4 years. Group size varies from 2 to almost 90 individuals, but groups composed of from 2 to 10 are the most common. They feed mainly on small fishes, which can be found associated with sandy and muddy bottoms. Shrimps and squids were also reported in tucuxi



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The Tucuxi (pronounced "too-koo-shi") is similar to the bottlenose dolphin and relatively common in South America, but very little is known about its behaviour.

stomach contents. A recent study based on genetics has shown that there are two distinct species of the genus *Sotalia*: the marine tucuxi dolphin, *Sotalia guianensis* (Ván Benéden, 1864), and the freshwater one, which is found in the Amazon basin, *Sotalia fluviatilis* (Gervais, 1853).

Until the 1990s, very few studies were conducted with *S. guianensis*. Beginning in the early 1990s, some Brazilian researchers began utilizing photo-identification techniques to gather the first information

***“very few studies have been conducted on marine tucuxis”***

on this species' ecology. Since 1993, *S. guianensis* site fidelity and social structure have been studied in the North Bay (27°30'S), Santa Catarina waters. Using the same technique, researchers in Rio de Janeiro presented estimates of the *S. guianensis* population size in Guanabara Bay (22°40'S). Since May 1996, the coordinator of this project, Marcos Santos, and his team have been studying a population of marine tucuxi in Cananéia estuarine waters (25°00'S, 47°58'W), São Paulo State (SP), Brazil (see details in the following paragraphs). In other South and Central American countries, very few studies have been conducted on marine tucuxis. Most studies were restricted to short-term observations, and though results were presented in scientific meetings, most of the information remains

unpublished.

## Tucuxi in the Cananéia estuary

Tucuxis can be found year-round throughout the Cananéia estuary and the area represents important breeding and calving grounds for this species.

Both land and boat-based photo-identification efforts have been conducted since May 1996. Initial survey efforts were concentrated in a 20 km<sup>2</sup> area however this was expanded to 60km<sup>2</sup> in 2002. To date, data gathered from 1996 through to July 2003 has allowed for a total of 148 individuals to be catalogued through conspicuous notches along their dorsal fins. Data from 2003 onwards (more than 40,000 pictures) has yet to be analysed. Once this has been achieved the intention is to begin investigating abundance estimates, use of area, survival rates, etc.

For the first time in this 190 km<sup>2</sup> estuary; individual movements were reported over time, residency patterns were observed for some individuals, and the first steps were taken to analyze their social organization.

The estimates gathered by our research team suggest that this site may host the largest observed population of this species along its entire distribution. Based on the application of five different mark-recapture models for closed populations between 1999 and 2001, the Cananéia population is estimated to range between 156 to 380 individuals. After analyzing data from 2003 to 2006, we will be able to update these figures.

We also began to conduct acoustic studies in 2002. The preliminary objective of this research is to describe



Two distinct sub-species have evolved; the marine (sea) Tucuxi, and the riverine (freshwater) Tucuxi.



Mother-calf pairs are a common sight, although larger groups of upto 90 animals can be seen.

the vocal repertoire developed by mother-calf pairs engaged in foraging and feeding activities. Recent studies show that the local population is organized in a fission-fusion society.

The biodiversity of the region is impressive and well-known all year round; particularly in Ilha do Cardoso State Park. Tucuxis frequent two different beaches, Ilha do Cardoso and at Ilha Comprida (two 4 km beaches facing one another), for foraging and feeding activities. Female-calf pairs use these beaches on an almost daily basis, as the deep slope of both beaches enables dolphins to catch food close to the beach and enables the mothers to monitor their calves while they are engaged in foraging and feeding activities. Thus, both beaches represent a unique platform of opportunity to study the ecology of marine tucuxi. Moreover, you do not need to travel far away to conduct boat-based observations, as the main entrance of the estuary, where the larger populations can be found, is in front of Ilha do Cardoso.

### Strandings and Threats

The Projeto Atlantis research team observed cetacean strandings along local beaches from 1996 to 1998. After 16 months of efforts to recover dead cetaceans along 115km of beach, tucuxis were the commonest species found. We reported a total of 124 dead cetaceans: 57 tucuxis, 22 bottlenose dolphins (*Tursiops truncatus*), 16 franciscanas (*Pontoporia blainvillei*), 12 Atlantic spotted dolphins (*Stenella frontalis*), 11 long-beaked common dolphins (*Delphinus capensis*), 2 rough-toothed dolphins (*Steno bredanensis*), 2 Bryde's whales (*Balaenoptera edeni*), 1 dwarf minke whale (*B. bonaerensis*) and 1 sperm whale (*Physeter macrocephalus*). Floating and washed up dead marine mammals often show evidence of net entrapment. Around 18 local fishing boats operate in the small Cananéia harbor. They use drift nets to catch sharks in coastal waters, mainly during summer months. Approximately 200 other fishing boats, however, which operate in local coastal waters, come from other bigger fishery centers like Santos (300 km northwards), where you can find the largest harbour in Latin America, and Paranaguá (80km southwards). These foreign boats are responsible for almost all the marine mammal incidental captures. Most boat operators already report cetacean and pinniped

incidental captures during fishing operations however they get rid of the carcasses as soon as possible because they are afraid of being punished by the Brazilian federal nature protection agency (IBAMA). Since October 2004, our research team has been monitoring fishing efforts and cetacean incidental captures by the Cananeia main fleet and from May 2005, fishermen actually started to bring dead incidentally captured dolphins for research purposes. So far, a total of 80 dolphins have been brought; 62 La Plata dolphins (*Pontoporia blainvillei*), 8 spotted dolphins (*Stenella frontalis*) and 11 marine tucuxi dolphin (*Sotalia guianensis*).

Recently, analysis of tucuxi blubber samples collected from dead specimens revealed that the local population is threatened by persistent compounds like chlorinated pesticides and polychlorinated biphenyls (PCBs). These compounds come from the illegal

## *“Habitat degradation has also increased dramatically in the last ten years”*

use of pesticides in agricultural areas close to rivers draining into local estuarine waters, as well as from the industrial complex area of Cubatão, located 200km northwards. Monitoring the concentrations of these compounds is extremely necessary as dolphins represent the top predator in the local aquatic ecosystem. Important information on Delphinidae taxonomy, small cetacean feeding habits and small cetacean age estimation had been gathered from monitoring strandings and analyzing the biological samples.

Another threat to local cetaceans (mainly tucuxis) is the uncontrolled increase in tourist activities (sport fishing, jet-skis, boat traffic), which leads to increased boat collisions with dolphins. The increase in boat-traffic is also responsible for noise pollution, which can be harmful to local dolphins as they depend on the use of sound for communication, feeding, and foraging purposes. Habitat degradation has also increased dramatically in the last ten years. The establishment of gas stations, docks, and projects to build dams in local mangrove areas has been identified as a major cause of concern. The concerns about the described threats are not only relative to marine mammals, but also to the local ecosystem, housing a great degree of biodiversity, and the impoverished human populations that depends on a healthy environment to survive. Dolphins, as a particularly charismatic animal, can be used as a flagship species to spearhead conservation efforts in the region.

### Project Objectives

The main objectives of the Projeto Atlantis research team are to gather information on this species' use of area, their association patterns, seasonal abundance estimates, survival rates and as much information as possible on population dynamics in the Cananéia estuary. We are also beginning to study the impacts of tourism on this local population, quantifying the vessels approach and subsequent consequences (e.g. split groups, increase in diving time, dispersal etc.) to acoustic analyses before, during and after vessel-dolphin encounters.

The photo-identification technique is the preferred method and provides most of the information. We aim to continue gathering information on the occurrence of all catalogued individuals over the coming years at least once during each season (6 consecutive days of fieldwork). Photographs from individual tucuxis are preferably taken from both the left and right side as sometimes their unique notches and scratches on



Bycatch (accidental entanglement and subsequent drowning in fishing nets) is the primary cause of mortality for the Tucuxi.



WDCS-funded research is vital to gaining additional protection for these animals. The Brazilian government does not have the resources to carry out such studies.

their dorsal fins are not always easily recognised. New individuals are cataloged when distinguishable marks can be noted and we are confident that the animal does not already appear in the main catalogue. Each individual has its own data sheet, as well as good quality photographs of both sides of the individual copied to the catalogue.

Currently, we only have information on tucuxis in part of the Cananéia estuary, which represents a small portion of the whole area. We need to gather information on tucuxis at the northern and the southern limits of the whole estuary as they have also been facing problems with mangrove degradation, gas station construction close to the estuary and dam construction. At the northern limit of this estuary, for instance, the construction of a dam in the wrong place changed the majority of the estuarine fauna. Freshwater fish are now common in the northern limit of this estuary that now instead of estuarine water, has only fresh water. Even with this problem, tucuxis are still there, but there is no information on their numbers, if they migrate along the estuary or if they are local residents. These surveys will be relevant to evaluate the possible use of impacted areas by local tucuxis, to confirm if catalogued individuals may use broader areas including the coastal waters rather than only the local inner estuarine waters, to gather information on winter and summer abundance estimates, and to calculate and compare survival rates. Past and present observations have been indicating that part of the catalogued dolphins use small areas which have been impacted by tourism and environmental degradation. We are conducting offshore surveys in order to describe possible movements of local tucuxis to coastal waters, where they may face threats with incidental captures, as well as with potential predators such as orca and sharks.

The findings will be of great help to the federal

government, which has neither the intention nor the resources to conduct this kind of research, but which needs the data for conservation purposes. The creation of specific regulations to control dolphin-watching operations in the near future is urgently needed. Additionally, regulations must be urgently created to prevent the practice of hand-feeding of dolphins by tourists in local waters, as shown by Santos et al. (2000). One of our catalogued dolphins (KN #86) still follows a local fisherman to be hand-fed, but no specific laws exist to stop this kind of impact in Brazil. Information on pollutant contamination loads in dolphins can serve as an indicator of the health of the local environment. Analyzed blubber samples will provide information for reports to be submitted to the Brazilian Environmental Agency. The aim is to give a continuum to the steps taken after the first analyses conducted previously. It will now be possible to monitor contamination loads of this local population of dolphins and thereby evaluate the evolution of chemical pollution in the local ecosystem.

The local community (around 15,000 people) will benefit from the gathered information as time passes. Our research team has already conducted training specifically for local educators and more recently, newsletters were prepared for the local community and handed out at Ilha do Cardoso, at the Cananéia main museum and in three local elementary schools. They

***“the construction of a dam in the wrong place changed the majority of the estuarine fauna”***

can serve as important elements for conservation of the local ecosystem in the future.

**Project Update – November 2006**

Our team is in the process of analyzing dorsal fin photographs (around 30,000) and waiting for appropriate sea conditions to conduct surveys along the shore. However, two important observations have recently been made. The first one is related to the use of area. Nine surveys were conducted in the northern area of the Cananéia estuary and no tucuxi dolphins were found. In the past, humans have dug a channel through this part of the estuary changing the chemical, physical and biological characteristics of the estuary. As a consequence, the food web has also been affected and mainly freshwater fish can now be found; not a component of the diet of marine tucuxi dolphins. Thus, it is possible that tucuxi dolphins are no longer using these waters, a sad consequence on the way humans have been using that estuary.

The second interesting finding was related to the movements tucuxi dolphins make in local waters. Previously, no-one knew if tucuxi dolphins found in the inner estuarine waters would/could move to coastal waters. In one of the coastal water surveys, two individuals which were first catalogued in inner estuarine waters were found in coastal ones. This is the first time such information has been gathered for the local population. More surveys are needed to better comprehend these movements and these are planned through until July 2007. ■