

# Core areas changes in *Sotalia guianensis* (Cetacea, Delphinidae) population in Babitonga Bay, Santa Catarina

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## ABSTRACT:

*Sotalia guianensis* is a small cetacean with a coastal distribution along the southeastern Atlantic ocean. Babitonga bay, located in the north coast of Santa Catarina state, represent on of the most important estuarine areas in the state. Studies that initiated in 1997 revealed a resident population of *S. guianensis* in this area. Systematic samplings for evaluation of the population's distribution in the bay were conducted between December 1997 and November 1998 (focal group sampling method) and between December 2000 and July 2001 (line transect sampling method). In both periods animals presented concentration areas, showing an heterogeneous distribution in the bay. In the first study period two concentration areas were identified: Sector A, in the vicinity of Palmital river, and Sector B, located in the harbour inlet. In the second study period two concentration areas were identified too: Sector C, located in the central inland area of the bay, and Sector D, located in the Linguado Canal entrance. In this way we verify a change in the population concentration areas along the period. Considering that the prey resource is the main factor responsible for the population distribution in the area is probable that changes in the prey distribution have occurred, affecting the dolphin's distribution. Nevertheless, we believe that in Sector B the impact caused by the new cais building in the harbour during this period was the main factor responsible for the dolphin desertion of that area.

## KEYWORDS:

Concentration areas; *Sotalia guianensis*; Baía da Babitonga.

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## INTRODUCTION

*Sotalia guianensis* is a small cetacean that occurs in the east coast of Central and South America, where it is also known as "boto-cinza". Its distribution is continuous, from Florianópolis, Santa Catarina state (SIMÕES-LOPES, 1988), until Nicarágua (CARR and BONDE, 1993). It inhabits preferably protected areas, like inlets, bays and estuaries. Considering its coastal habits, the specie suffers many threats along its distribution. The species' conservation is at risk because of the high incidence of accidental captures in fishing nets, boat traffic, waters pollution and lost of habitat quality (IUCN, 2002).

Babitonga Bay is one of the most important estuarine areas of Santa Catarina state. Nevertheless, its suffer many threats from human activities in the region - harbour activities, overexploitation of fishing resources, p. ex. - that put in direct or indirect danger the cetacean's populations that lives there. The knowledge about this populations life history its necessary for monitoring activities, considered the main factor for the identification of populations reaction in the occurrence of habitat changes (PRIMACK and RODRIGUES, 2001).

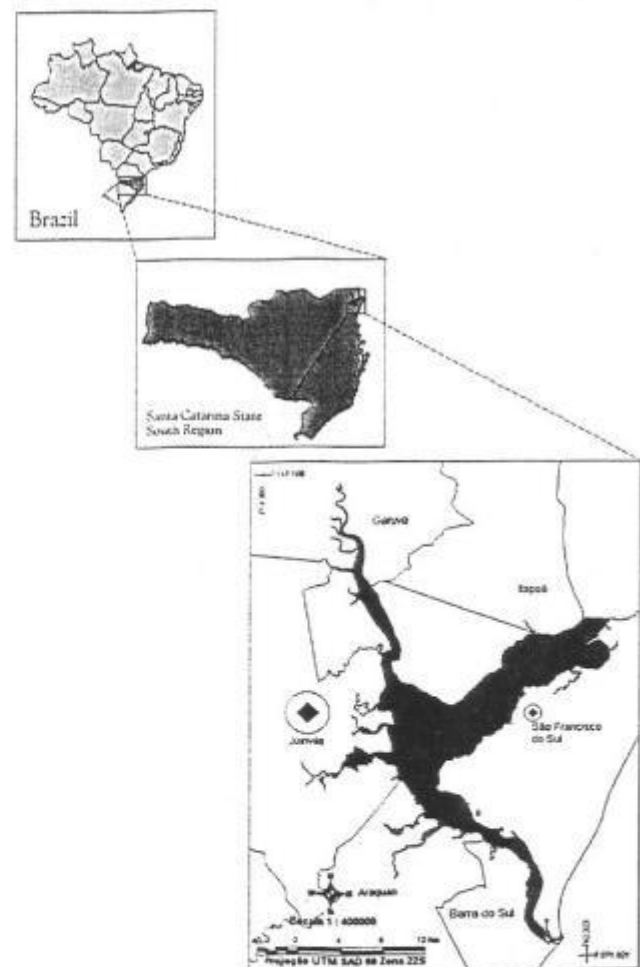
## MATERIAL AND METHODS

### Study area

Babitonga Bay is located in north Santa Catarina state, south region of Brazil ( $26^{\circ}02' - 26^{\circ}28'S$  e  $48^{\circ}28' - 48^{\circ}50'W$ ) (figure 1). The major mangrove area of the state is located in the bay,

with  $160 \text{ km}^2$  of area. The tidal amplitude is approximately 2,3 meters, the deepest area is the access canal with 28 meters, and the mean depth is 6 meters. There are extensive mud banks that became exposed in the low tide.

The shoreline region has a population of about 500.000 inhabitants, including Joinville city, the biggest in the state, that represent a high antropic pressure to the estuary area. In the inner parts of the bay is the harbour inlet of São Francisco do Sul, on of the most importat in the south region Brazil.



**Figure 1** - Babitonga Bay, Santa Catarina State, south region of Brazil ( $26^{\circ}28'S$  and  $48^{\circ}28' - 48^{\circ}50'W$ )

### Data collection

In this work we used data from different research years. In a first step, that correspond to the period between December 1997 and November 1998, *S. guianensis* groups were accompanied monthly for behavior sampling using focal group sampling method (ALTMANN, 1974). Different boats were used, with length varying between 5 and 6 meters and outboard power engine varying between 15 and 40 Hp. In this period 257,6 hours of direct observation of the animals were totalized, corresponding to 5.142 location points for *S. guianensis* groups. The complete data from this period can be found in Cremer (2000).

In a second step, data collection occurred between November 2000 and November 2001 through line transect sampling method, in a monthly frequency (HAMMOND, 1986). The transects were defined aiming to sample maximum area, being established in a distance of 400 meters one of another. Along this period 241 transects were conducted totaling 510,7 km and 38 hours of field effort. With this effort 49 *S. guianensis* groups were located. The complete data of this work are in can be found Hardt (2001).

## RESULTS AND DISCUSSION

Two core areas were identified for *S. guianensis* population in each study period: Sectors A and B (1997/1998) and Sector C and D (2000/2001) (figure 2). The existence of concentration areas representing an

heterogeneous population's distribution and probably reflect prey distribution (SELZER and PAYNE, 1998).

The dolphin desert of the harbour inlet is the most conspicuous question along these studies. In a first moment, the population used the inlet intensively – around 66 % of the day –, representing an important fishing area in the bay (CREMER, 2000). This situation is directly related to the pier harbour of São Francisco do Sul enlargement repairs, that occurred between 1999 and 2000. These repairs used hard machines, like drags and pile-drivers. This fact probably dispersed the fish schools that occurred there and consequently the dolphins too. Another possibility is the damage caused by the intense noise pollution of the machines. In this sense, the damages caused by the disturbance would be higher that the advantages of the fishing activity in the area. Although animals showed tolerance to harbour activities, the area desert may be a species' strategy to reduce de impact caused by the excessive noise that would cause ear damages (RICHARDSON *et al.*, 1995).

Comparing Sector A and C we can verify a decrease in the use of Palmital river area and a more intensive use of the area near the islands in the central area of the bay. This change is probably associated to a variation in the distribution of prey populations. There are no specific data about the fish community distribution in the bay and variations in distribution of fishes are typical for estuarine systems. The same factors would be associated to the occurrence of a concentration area in the vicinity of Linguado canal (Sector D) in 2000/2001 that didn't occurred in the past.

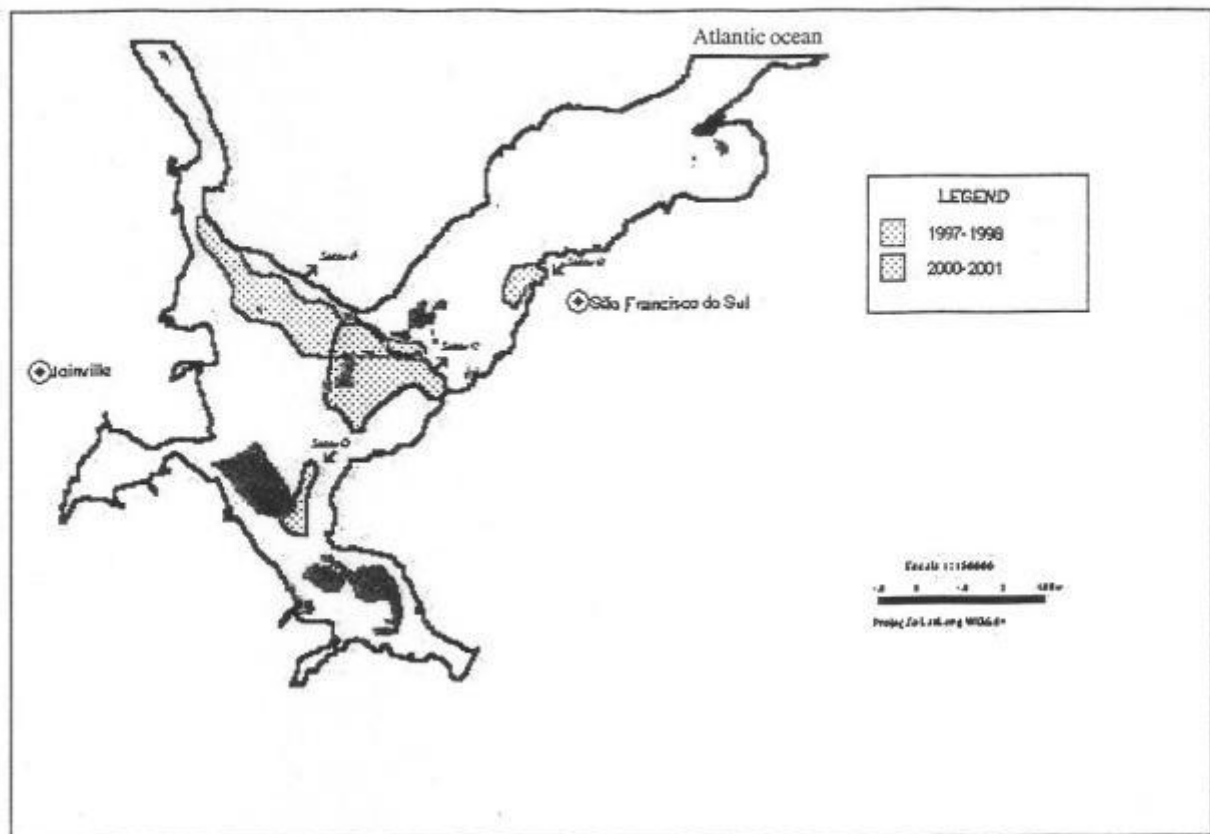


Figure 2 – Concentration areas of *S. guianensis* population in Babitonga bay in two different periods: December 1997 to November 1998 and November 2000 to November 2001

Karczmarski *et al.* (2000) indicated that the knowledge of dolphins concentration areas inside their home ranges is crucial for future conservation strategies for the species. Considering the physiological requirements, many marine mammals don't have an option other than to occupy places that are chronically exposed to disturbances. This fact shows the importance of these areas for the species (RICHARDSON *et al.*, 1995).

The changes in concentration areas confirm the importance of long time researches that can provide important information for species conservation. In this way, monitoring is efficient for demonstrating population reactions to environmental changes (PRIMACK and RODRIGUES, 2001). *In situ* conservation strategies, like area zonation need

temporal data that can indicate changes associated to anthropic impacts so as natural changes, associated to the habitat dynamic. Wedekin *et al.* (2002) verify that the *S. guianensis* population of Baía Norte, Florianópolis, stayed most of the time out of the protected area of Anhatomirim APA, created with the aim to protect this population. So that is necessary to improve mechanisms for the species conservation.

The long time monitoring of the species will allow a better understanding about its natural history too. In the same way it can provide information to control the vicinity activities that influence the habitat. This question is more evident when the species has a long life cycle and great home ranges.

## BIBLIOGRAPHY

- ALTMANN, J. Observational study of behavior: sampling methods. *Behaviour*, n. 48, p. 227-267, 1974.
- CARR, T.; BONDE, R. K. Northern distribution record for the tucuxi dolphin. In: BIENNIAL CONFERENCE ON THE BIOLOGY OF MARINE MAMMALS, 10, 1993, Gavelston. Abstracts... p. 35.
- CREMER, M. J. Ecologia e conservação do golfinho *Sotalia fluviatilis guianensis* (Cetacea, Delphinidae) na Baía da Babitonga, Litoral Norte de Santa Catarina. São Carlos, 2000. Dissertação (Mestrado em Ecologia e Recursos Naturais) – Universidade Federal de São Carlos (PPG-ERN).
- CURREY, D. *et al.* The global war against small cetaceans. London: Environmental Agency, 1990. 58 p.
- HAMMOND, P. S. Line transect sampling of dolphins populations. In: BRYDEN, M. M.; HARRISON, R. (eds.). *Research on dolphins*. Oxford: Clarendon Press, 1986.
- HARDT, F. A. S. Ocorrência e distribuição de *Sotalia fluviatilis guianensis* (Cetacea; Delphinidae) e *Pontoporia blainvillei* (Cetacea; Pontoporiidae) na Baía da Babitonga, Santa Catarina, Brasil. Joinville, 2001. 64 p. Monografia (Bacharelado) – Universidade da Região de Joinville.
- IBAMA. Proteção e controle de ecossistemas costeiros: manguezal da Baía da Babitonga. Coleção Meio Ambiente. Série Estudos: Pesca, 25. Brasília: Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis, 1998. 145 p.
- IUCN. Dolphins, whales and porpoises: 2002-2010. Conservation action plan for the world's cetaceans. International Union for Conservation of Nature and Natural Resources, Gland, Switzerland, 2002. 30 p.
- KARCZMARSKI, L.; COCKCFORT, V. G.; McLACHLAN, A. Habitat use and preferences of indo-pacific humpback dolphins *Sousa chinensis* in Algoa Bay, South Africa. *Marine Mammal Science*, v. 16, n. 1, p. 65-79, 2000.
- PRIMACK, R. B.; RODRIGUES, E. *Biologia da conservação*. Londrina: E. Rodrigues, 2001. 327 p.
- RICHARDSON, W. J. *et al.* Marine mammals and noise. San Diego: Academic Press, 1995. 576 p.
- SELZER, L. A.; PAYNE, P. M. The distribution of white-sided (*Lagenorhynchus acutus*) and common dolphins (*Delphinus delphis*) vs. environmental features of the continental shelf of the northeastern United States. *Marine Mammal Science*, v. 4, n. 2, p. 141-53, 1998.
- SILVA, V. M. F. da; BEST, R. C. Tucuxi, *Sotalia fluviatilis* (Gervais) 1853. In: RIDGNAY, S. H.; HARRISON, R. J. (eds.). *Handbook of marine mammals*. London: Academic Press, 1994. v. 5, p. 43-69. 416 p.
- SIMÕES-LOPES, P. C. Ocorrência de uma população de *Sotalia fluviatilis*, Gervais 1853 (Cetacea, Delphinidae), no limite sul de sua distribuição, Santa Catarina, Brasil. *Biotemas*, v. 1, n. 1, p. 57-62, 1988.
- WEDEKIN, L. L.; DAURA-JORGE, F. G.; SIMÕES-LOPES, P. C. Desenho de unidades de conservação marinhas com cetáceos: estudo de caso do boto-cinza, *Sotalia guianensis*, na Baía Norte de Santa Catarina, sul do Brasil. In: CONGRESSO BRASILEIRO DE UNIDADES DE CONSERVAÇÃO, 3, 22-26/9/02, Fortaleza. *Anais...* 2002, p. 56-62.