



SHORT COMMUNICATION

## Ethnobiology and photo-identification: identifying anthropic impacts on boto-cinza dolphin *Sotalia guianensis* in Sepetiba Bay, Brazil

Camilah Antunes Zappes<sup>1\*</sup>, Mariana Freitas Nery<sup>2</sup>, Artur Andriolo<sup>3</sup> and Sheila Marino Simão<sup>4</sup>

Received: August 07 2009

Received after revision: September 28 2009

Accepted: October 30 2009

Available online at <http://www.ufrgs.br/seerbio/ojs/index.php/rbb/article/view/1289>

**ABSTRACT:** (Ethnobiology and photo-identification: identifying anthropic impacts on boto-cinza dolphin *Sotalia guianensis* in Sepetiba Bay, Brazil). This study aimed to identify the possible impact of fishing activities and boat collision on the population of the estuarine dolphin (*Sotalia guianensis*) through the methodologies of ethnobiology and photo-identification the Bay of Sepetiba, Rio de Janeiro State, Brazil. Data were collected through interviews with fishermen ethnobiological local sightings by photo-identification. The results show that occurs enmeshing of animals with nets used in fishing and accidents among the dolphins and vessels used in this activity. Furthermore, the results confirmed that the uses of these techniques are complementary methods for the identification of possible impacts caused by artisanal fisheries. The information gathered in this study contributes to define strategies for dolphin conservation in order to reduce the negative anthropic impacts on the species' natural population. **Key words:** artisanal fisherman, conflicts, dolphin's behavior, human ecology.

**RESUMO:** (Etnobiologia e foto-identificação: identificando impactos antrópicos sobre o golfinho boto-cinza *Sotalia guianensis* na Baía de Sepetiba, Brasil). Este estudo teve como objetivo identificar o possível impacto das atividades de pesca e a colisão com embarcações sobre a população do golfinho boto-cinza (*Sotalia guianensis*) através das metodologias da etnobiologia e da foto-identificação na Baía de Sepetiba, Estado do Rio de Janeiro, Brasil. Os dados foram coletados através de entrevistas etnobiológicas com pescadores artesanais locais e avistamentos por foto-identificação. Os resultados mostram que ocorre emalhamento dos animais com as redes usadas na pesca e acidentes entre os golfinhos e as embarcações utilizadas nesta atividade. Também os resultados confirmaram que o uso dessas técnicas são métodos complementares para a identificação dos possíveis impactos causados pelas atividades de pesca artesanal. As informações geradas neste estudo contribuem para definir estratégias para a conservação do golfinho a fim de reduzir os impactos antrópicos negativos na população natural da espécie.

**Palavras-chave:** pescador artesanal, conflitos, comportamento de golfinhos, ecologia humana.

### INTRODUCTION

*Sotalia guianensis* (van Bénédén, 1864) is a small dolphin that inhabits coastal and shallow waters along the coast of Central and South America, from Honduras (14°35'N, 83°14'W) to southern Brazil (27°35'S, 48°35'W) (Silva & Best 1996). Along its coastal habitats, the boto-cinza dolphin is subject to a variety of human activities that threaten its conservation (habitat loss, pollution, boat traffic) and it is one of the cetacean species that is most vulnerable to fishery artifacts (Ferreira Hanazaki & Simões-Lopes 2006). Accidental capture in fishing nets is the main cause of negative interactions between humans and cetaceans (Wedekin *et al.* 2005). The magnitude of potential impacts caused by human activities on the estuarine dolphin species is still unknown (Machado 2001).

Traditional folk information may contribute to studies about the environment (Pires *et al.* 2009) and management strategies involving fisheries activities (Silvano & Begossi 2002, Souza & Begossi 2007) because this knowledge must be viewed as information sources for

research programs related to the preservation of coastal species such as the estuarine dolphin.

Studies involving the interaction of artisanal fishermen and dolphins are scarce and little deepens the issues ethnobiological and conservationists. So this article aims to identify the possible impact of fisheries activities and boat collisions on the population of boto-cinza dolphin in southeastern Brazil by using data obtained with ethnobiology and photo-identification studies.

### MATERIAL AND METHODS

This study was conducted in Sepetiba Bay (22°54'S 43°12'W), located in Rio de Janeiro State, south-eastern Brazil, which has a total water surface area of 519 km<sup>2</sup> (Fig. 1).

Ethnobiologicals data were collected in the Z-15 Fishermen Colony (artisanal fishery), on March 2006. Information was collected through interviews (Rempel *et al.* 2008), based on a previously prepared standard questionnaire, and through the recording of statements. As suggested by Sanches (2004), the selection of informants

1. Universidade Estadual do Norte Fluminense. Avenida Alberto Lamego, 2.000, Parque Califórnia, CEP 28013-602, Campos dos Goytacazes, RJ, Brazil.

2. Instituto de Ecología y Evolución, Universidad Austral de Chile. Box 567, Valdivia, Chile.

3. Departamento de Zoologia, Instituto de Ciências Biológicas. Universidade Federal de Juiz de Fora, CEP 36036-900, Juiz de Fora, MG, Brazil.

4. Departamento de Ciências Ambientais, Universidade Federal Rural do Rio de Janeiro, CEP 23890-000, Seropédica, RJ, Brazil.

\* Author for correspondence. E-mail: [camilahaz@yahoo.com.br](mailto:camilahaz@yahoo.com.br)

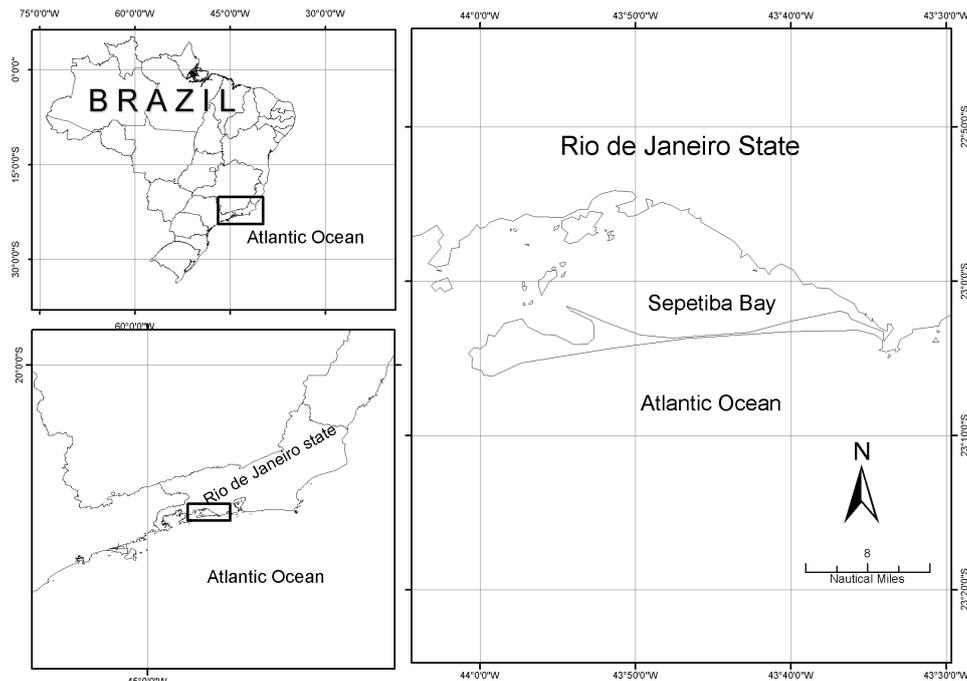


Figure 1. Map of study area - Sepetiba Bay, Rio de Janeiro, Brazil.

was made with the help of the president of the fishermen colony, since he was typically the one resident who knew all the local fishermen. Twenty fishermen aged between 22 and 72 years were interviewed. Nineteen people were selected and described the characteristics which clearly identified *S. guianensis*. This selection occurred based on some characteristics defined by the fishermen about the dolphin, such as: coloration (grey dorsum; white, brownish or pinkish venter) according to Silva & Best (1996); body length (adult: 1-2.5meter); overall behavior (as to vessels and bathers: evasive behavior) and the animal's occurrence site (shore, river, estuary and coastal sea). Data were analyzed as to the occurrence of entanglement or not and frequency of the occurrence and the area where entanglement occurs.

From March 2006 to April 2007, 14 boat surveys were conducted for photo-identification purposes in the study area. The boat maintained a random route until one or more groups of dolphins were sighted, and then approaches were made, always at lower speeds. A digital camera fitted with zoom EF 75-300 mm lens was used to take the pictures. Photographs were obtained from as many animals as possible, in every group of boto-cinza encountered.

## RESULTS AND DISCUSSION

From 19 fishermen who identified the animal as *S. guianensis*, 5.3% (N=1) had between 18 and 30 years old; 68.4% (N=13) between 31 and 50 years old; 15.7% (N=3) between 51 and 70 years old; 5.3% (N=1) above 70 years and 5.3% (N=1) not respond. In artisanal fishing practiced in Sepetiba Bay are used the artifacts gillnet, ballon, longline and line. With respect to interactions between fishing and the estuarine dolphin, 31.57% (n=6)

described that there are some kind of negative interactions between fishermen and the animals that affects their activity described bellow. The interviewers (47%, n=9) said that entanglement of these animals occurs in the study area. Gillnet was described as the artifact in which accidental entanglement of estuarine dolphin most occurred. The entanglement areas mentioned were inside the bay (15.78%, n=3) and at the open sea (11%, n=2). The fishermen were unable to quantify the number of entanglement and accidents that have occurred in the region. Only reported that they occurred and still occur. It was not possible to estimate the magnitude of the impact based on the results of the questionnaire.

During the photo-identification study, approximately 59.3 h were spent in direct observations. Three hundred and eighty two individuals were identified, and from these, 19 (4.9%) dolphins exhibited dorsal fins with scars and wounds as a result of interaction with gillnets or other



Figure 2. A fishhook attached to the dorsal fin remains in a boto-cinza dolphin.

fishery artifacts or boat collisions. A fishhook attached to the dorsal fin remains in two of these 19 dolphins, and one of them is showed in figure 2.

In March 2007, a calf with a fresh wound was encountered. Its wound was most likely caused by a boat. The straight cuts and wound on its body suggest that the engines' propeller had caused the incident. It swam normally alongside its mother and the freshness of the wound suggests that it had been struck within the previous two-three days. In this case, the young age and inexperience may have contributed to the collision.

Through this study is not possible to say whether the number of accidents between the estuarine dolphin and the fishermen of Sepetiba Bay may be considered small or large, since it was not possible to measure accidents through the accounts. Freitas-Netto (2003), Oliveira (2007), Reis (2002) and Siciliano (1994) also reported collisions and accidental capture by gillnet for *S. guianensis*. Like this study, these authors were also unable to quantify these accidents, as the interviewed did not describe quantitatively, but remember sporadic cases.

It is still uncertain just how severe the impacts will potentially affect the survivorship of the animals. The number of individuals affected could be greater if some of them do not survive after an accident.

The fishermen do not consider their activity as a contributing factor impacting the dolphins, but an impact to the fishery. The conflict arises because the animals interact negatively with their activity. According to the interviewees, the entangled animals can cause damage to the fishing artifacts. When they get trapped in the net, the dolphin pierces the material or tears it apart with subsequent loss to the owner (Zappes 2007). Besides losing the material, the fishermen to lose the fish and some days of work repairing the artifact.

The photo-identification study confirmed that the negative impact caused by anthropogenic activities in the dolphin population does occur. In spite of the apparent small number of individuals identified to be suffering these anthropogenic threats, they do occur. There is also a concern that, as human activities increase, dolphin injuries and deaths may increase as well.

The results obtained in the present work suggest that fishermen have empiric knowledge of the estuarine dolphin in Sepetiba Bay and of the impacts caused by fishery in this population of *S. guianensis*. This information, acquired through traditional knowledge and the daily contact between the actors and the animals, became evident when comparing citations of the interviewees with the scientific literature described to the region.

Thus the use of two methodologies allowed a complement of other information. Some of the accidents described by the fishermen were confirmed through photos. It was then possible to compare the subjective and qualitative data described by the local community with real data displayed in the photos.

The ecological and social-economic importance of this population, and the great anthropogenic pressure that it

apparently suffers, demands conservation efforts in the studied area. This will be achieved only by conducting educational programs with the active participation of local communities.

In addition of biological and ecological informations about species, the approach with the fishing community can assist in monitoring illegal activities in the area and animals stranded or entanglement contributing to the conservation of estuarine dolphin on region.

## CONCLUSIONS

This work shows how photo-identification and ethnobiology can be complementary in identifying potential impacts of the artisanal fishery's activities on dolphins' population in the studied area. The results of the former corroborated the results of the latter.

The information obtained from the fishermen can even suggest new research methods which complement gaps in the knowledge of cetacean ecology. They still can contribute valuably by creating conservation strategies and their participation assures the consideration and respect to the local culture.

## ACKNOWLEDGEMENTS

We thank Sérgio Moreira for helping with the figures, Natália Mamede, Carlos Botti for helping on questionnaire, Luiz Cláudio Alves for review in English and Romildo Silva for his skill in maneuvering the research boat. Part of this research was funded by Fundação O Boticário de Proteção à Natureza and Instituto Aqualie. CAPES (Coordenação de Aperfeiçoamento de Pessoal de Nível Superior) granted a graduate fellowship to first and second authors.

## REFERENCES

- FERREIRA, M. C. E., HANAZAKI, N. & SIMÕES-LOPES, P. C. 2006. Os conflitos ambientais e a conservação do boto-cinza na visão da comunidade da Costeira da Armação, na APA de Anhatomirim, Sul do Brasil. *Natureza & Conservação*, 4(1): 64-74.
- FREITAS NETTO, R. 2003. *Levantamento das Artes de Pesca no Litoral do Estado do Espírito Santo e suas Interações com cetáceos*. 116f. Dissertation (Master in Biosciences and Biotechnology) – Centro de Biotecnologia e Biotecnologia. Universidade Estadual do Norte Fluminense Darcy Ribeiro, Campos dos Goytacazes, 2003.
- MACHADO, L.C. (Coord.). 2001. *Mamíferos Aquáticos do Brasil: Plano de Ação*. 2nd. ed. Brasília: MMA / IBAMA. 96 p.
- OLIVEIRA, F. 2007. *Conhecimento tradicional e etnoconservação de cetáceos em comunidades caiçaras no município de Cananéia, litoral sul de São Paulo*. 111f. Dissertation (Master in Ecology) – Centro de Energia Nuclear na Agricultura. Universidade de São Paulo, Escola Superior de Agricultura Luiz de Queiroz, Piracicaba, 2007.
- PIRES, M. V., ABREU, P. P., SOARES, C. S., SOUZA, B., MARIANO, D., SILVA, D. C. & ROCHA, E. A. 2009. Etnobotânica de terreiros de candomblé nos municípios de Ilhéus e Itabuna, Bahia, Brasil. *R. bras. Bioci.*, 7(1): 3-8.
- REEVES, R.R., B.D. SMITH, E.A. CRESPO & G.N. DI SCIARA. 2003. *Dolphins, Whales and Porpoises: 2002-2010 Conservation Action Plan for the World's Cetaceans*. IUCN/SSC Cetacean Specialist Group: Gland and Cambridge.

- REIS, M.S.S. 2002. *O Boto Sotalia fluviatilis (Gervais, 1853) (Cetacea, Delphinidae) no litoral de Ilhéus, Bahia: Comportamento e Interações com as atividades pesqueiras*. 84f. **Dissertation (Master in Regional Development and Environment Sub area of Concentration: Conservation Biodiversity)** - Departamento de Ciências Biológicas. Universidade Estadual de Santa Cruz, Ilhéus, 2007.
- REMPEL, C., MÜLLER, C.C., CLEBSCH, C.C., DALLAROSA, J., RODRIGUES, M.S., CORONAS, M. V., RODRIGUES, G.G., GUERRA, T. & HARTZ, S.M. 2008. Percepção Ambiental da Comunidade Escolar Municipal sobre a Floresta Nacional de Canela, RS. *R. Bras. Bioci.*, 6(2): 141-147.
- SANCHES, R.A. 2004. Caiçaras e a Estação ecológica de Juréia-Itatins. Histórico de ocupação no contexto político, econômico, social e ambiental do Vale do Ribeira. In: MARQUES, O.A.V. & DULEBA, W. (Eds.) *Estação Ecológica Juréia-Itatins. Ambiente Físico, Flora e Fauna*. Ribeirão Preto: Holos Editora. p. 349-359.
- SICILIANO, S. 1994. Review of small cetaceans and fishery interactions in coastal waters in Brazil. *Rep. Int. Whal. Comm.*, 15: 241-250.
- SILVA, V.M.F. & R.C. BEST. 1996. *Sotalia fluviatilis*. *Mammalian Species*, 527:1-7.
- SILVANO, R.A.M. & A. BEGOSSI. 2002. Ethnoichthyology and fish conservation in the Piracicaba River (Brazil). *J. Ethnobiol.*, 22(2):285-306.
- SOUZA, S.P. & A. BEGOSSI. 2007. Whales, dolphins or fishes? The ethnotaxonomy of cetaceans in São Sebastião, Brazil. *Journal of Ethnobiology and Ethnomedicine*, 3: 9.
- WEDEKIN, L.L., DA-RÉ, M. A., DAURA-JORGE, F. G. & SIMÕES-LOPES, P. C. 2005. O uso de um modelo conceitual para descrever o cenário de conservação do boto-cinza na Baía Norte, Sul do Brasil. *Natureza & Conservação*, 3(1): 59-67.
- ZAPPES, C.A. 2007. *Estudo etnobiológico comparativo do conhecimento popular de pescadores em diferentes regiões do litoral brasileiro e implicações para a conservação do Boto-cinza (Sotalia guianensis) (van Bénédén, 1864) (Cetacea, Delphinidae)*. 161f. **Dissertation (Master in Biologics Science Behavior and Biology Animal)** - Instituto de Ciências Biológicas. Universidade Federal de Juiz de Fora, Juiz de Fora, 2007.