

MONITORING THE INCIDENTAL MORTALITY OF CETACEANS IN THE ARTISANAL FISHERY OF BAIXADA SANTISTA (SP, BRAZIL) WITH EMPHASIS ON THE FRANCISCANA (*PONTOPORIA BLAINVILLEI*).

Introduction and background

The identity of the franciscana stocks has been recently clarified and recently biological and genetic evidences led to the establishment of four management areas (hereafter referred to as FMA [Franciscana Management Areas] 1 to 4) (Secchi *et al.*, 2001). Recent studies have proved that monitoring of franciscana mortality is imperative for the conservation of the species and results have provided substantial information for improving the management of the species. Monitoring fishing activities is also important for its conservation, to obtain fresh specimens for life history, pathological analyses, stock identity, and several other biological studies.

This project represents the first long term monitoring of franciscana mortality in fishing gear in São Paulo State, which is FMA2, the less known among all franciscana management areas. And only with long term data we will be able to estimate franciscana by-catch and season/areas of greater mortality.

Since late 1998, the artisanal fishing community of 'Boutique dos Pescadores, in Praia Grande (24°00'S e 46°24'W) (Figure 1) has been monitored in order to obtain information on the characteristics of the fishing fleet and levels of incidental mortality of marine mammals (Bertozzi and Zerbini, 2002). The monitoring efforts was extended in January 2001 to "Ocian" fishery community (located south of Praia Grande) and in January 2002 to the Mongaguá community. A total of 15 fishing boats are monitored right now, 6 in "Boutique de Peixes", 7 in "Ocian" and 2 in "Mongaguá", in the central coast of São Paulo State (Figure 1). This area is also known as "Baixada Santista", and it is characterized by being highly urbanized, with highly populated areas, such as the cities of São Vicente, Santos and Cubatão. The area is also recognized by the most important Brazilian harbor, located in Santos, and one of the biggest iron and steel industry areas of the country, the Cubatão pole (CETESB, 1985). The region of Baixada Santista is one of the most productive marine ecosystems of the Brazilian coast. Despite the intense pollution, still is a zone of production and growth of many species of commercial interest (Secretaria de Agricultura e Abastecimento, 1989).

Fisheries monitoring

The fishing communities studied here are essentially artisanal, with small boats (length = 5.8-7.8m) that do not have any navigational equipment or mechanization (Figure 2). Preliminary information indicates that fishermen use primarily gillnets and that target species are commercial valuable fish of the families Sciaenidae, Carangidae, Mugilidae, Centropomidae and some species of sharks (Figure 3). During the first year of regular monitoring, the franciscana was the only cetacean taken as bycatch in the fishery of Praia Grande. Other species (e.g. Atlantic spotted dolphins, *Stenella frontalis*, and rough toothed dolphins, *Steno bredanensis* [Bertozzi and Zerbini, 2001]) have been regularly reported in the area, but none were found entangled during the study period. There is no evidence to suggest that franciscanas are intentionally taken in Praia Grande. The species has no commercial value and is not used as bait, or for human or animal consumption, as it is in other areas.

The fishery is monitored regularly through interviews with fishermen and onboard observations whenever possible (Figure 4). Information about the fishery is obtained according to the recommendations of the International Whaling Commission Scientific Committee (IWC, 1994 – Annex E). These include data on gear characteristics, effort, fishing operations, and composition of target and not target species in the captures.

Catch per unit of effort (CPUE) is calculated as a function of the size of the net and the time it spends in the water. It is expressed as the number of individuals captured $\times 1000/(\text{km} \times \text{day})$. CPUE indexes is stratified according to the fishing gear and season. The fishing operations at Praia Grande and Mongaguá occur throughout the year. Net types used varied presenting therefore its own dynamics. Increase in the total fishing effort is observed in summer months (november, december and january) and is related to the greater search for fish because of the presence of tourists in the region and better sea conditions.

Fishermen also receive disposable photographic cameras to document entanglement events and sighting of cetaceans or any other unusual animal (Figure 5). Fishing boats also receive copies of the government permit issued to the researchers to collect entangled animals and therefore they are in compliance with the local legislation.

Biological samples

Cetacean captured alive are released from the nets, while dead animals are landed for biological studies. They are measured and sampled according to Norris (1961) and Geraci and Lounsbury (1993). Necropsies are performed by a team of biologists and veterinarians at the College of Veterinary Medicine in the University of São Paulo (FMVZ-USP) (Figure 6).

The samples taken on necropsies are being held at the LAPCOM marine mammal tissue bank that has been developed by and is maintained at Laboratório de Patologia Comparada de Animais Selvagens, Universidade de São Paulo (LAPCOM-VPT-FMVZ-USP), coordinated by three major researchers (two of them belonging to the NGO BioPesca). Which the goal is to provide long-term storage of tissue samples, histological slides, pathogens and images originated from the material for current and future studies (Ruoppolo et al., 2002). Investigations on the diseases affecting franciscanas is been performed for the first time (see Pathology in Danilewicz et al., 2002). Osteological material is being held at the Museu de Zoologia, Universidade de São Paulo. Intestines are being analyzed for metazoan parasites that can be used for franciscana stock identity studies (Marigo et al., 2002 A and B; Secchi et al., 2002). Fixed brains are being studied aiming to describe de anatomy of the blood supply in franciscanas. Subsamples of different organs have already been sent to other research projects for analyses of DNA, virus, bacteria, contaminants, reproduction and osteological studies.

Environmental education

It is important to carry out environmental education and divulging work on several levels, ranging from the fishermen to their communities, and the local population. Two kinds of work are being conduced: 1) A continuous divulging work is carried out with the fishing community focusing on encouraging the fishermen to interact with researchers by showing them the importance of their cooperation to improve the conservation of protected species. The daily contact of researchers and fishermen communities allows them to learn and participate effectively on the study. Newspapers, magazines, pictures and other project results are constantly presented to the fishermen.

2) Exhibitions destined to the general public are conducted during the months where tourists visit the region (austral summer) to bring to the general public's attention the natural world and its problems, aiming to develop values and feelings of concern for the nature and motivation for people's participation in environmental improvement and protection.

Foundation of the non governmental organization Projeto BioPesca

In 2002, aiming to legalize the development of our project we founded the non governmental organization Projeto BioPesca. Our main objective is to encourage

research and the conservation of the brazilian marine fauna, with special emphasis in the franciscana and marine turtles. The NGO Projeto BioPesca is coordinated by the following researchers: MSc. Carolina P. Bertozzi (Biologist), MSc. Valéria Ruoppolo (DVM), Juliana Marigo (DVM), Érica Barbosa (Biologist) and Janaína Ribeiro (Biologist). Other affiliated researchers and people from the local communities belong to the institution. The foundation of the NGO Projeto BioPesca and the continuity of the research projects developed were only accomplished because of the support given by Yaqu Pacha and FAPESP (Fundação de Apoio à Pesquisa do Estado de São Paulo).

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