

CETACEANS AND FISHERY INTERACTIONS ALONG THE ESPÍRITO SANTO STATE, SOUTHEASTERN BRAZIL DURING 1994-2001

Ricardo de Freitas Netto^{1,*} and Lupércio Araújo Barbosa¹

The incidental capture of cetaceans in passive fishing gears such as gillnets represents the major threat to their conservation (Perrin *et al.*, 1994). Along the Brazilian coast the franciscana, *Pontoporia blainvillei*, and marine tucuxi, *Sotalia fluviatilis*, are the most vulnerable species. Confined to coastal waters, they are often incidentally caught in fisheries (e.g. Siciliano, 1994; Secchi *et al.*, 1997; Di Benedetto *et al.*, 1998; IBAMA, 2001; Ott *et al.* 2002). Information on the occurrence of cetaceans along the Espírito Santo coast, southeastern Brazil, is limited to a few reports of species incidentally caught during fishing activities (e.g. Di Benedetto *et al.*, 1990; Siciliano, 1994), stranded on beaches (e.g. Barros, 1991; Borobia *et al.*, 1991; Gasparini and Sazima, 1996; Barros *et al.*, 1997a,b; Barbosa *et al.*, 2000) or occasionally sighted (e.g. Lodi *et al.*, 1996). The objective of this report is to provide new data on the incidental capture of cetaceans along the Espírito Santo coast from 1994 to 2001 and to compile previous information for this region. Recent data on the incidental captures were obtained opportunistically by collecting stranded carcasses along the coast with indicative marks of interactions with fisheries (e.g. wounds, scars and fishing gear fragments on the animals' body) (Perrin *et al.*, 1994). One stranding report published by the local media was also included. Species identification, sex and standard length of the animals, as well as locality and date of stranding were recorded. The skeletons of all small cetaceans were deposited at the ORCA collection (Table 1).

Between 1994 and 2001 twelve stranded cetaceans with wounds that indicate interaction with fishery were collected along the Espírito Santo coast. The highest number of specimens was observed for *S. fluviatilis* (n=8), followed by the rough-toothed dolphin (*Steno bredanensis*) (n=3) and the humpback whale (*Megaptera novaeangliae*) (n=1) (Table 1). When reviewing the information on cetacean and fishery interactions in Brazil, Siciliano (1994) reported the stranding and incidental catch of 44 specimens along the Espírito Santo coast between 1983 and 1994. During that period, *S. fluviatilis* was also the species most commonly found (n=28), followed by *P. blainvillei* (n=13), *M. novaeangliae* (n=1), *Tursiops truncatus* (n=1) and *Physeter macrocephalus* (n=1).

The coastal habitat of *S. fluviatilis* is likely the main factor that makes the species more vulnerable to incidental captures in the area. The lower number of animals reported in this study in relation to the previous period (1983 to 1994) compiled by Siciliano

(1994) is probably due to a lower monitoring effort of the fishing villages and beaches rather than a marked decline in the by-catch or any change in the abundance of the species. Although Barros (1991) reported the incidental catch of a female tucuxi in the region, all individuals of known gender in the present study were males. Though sample sizes are small, this could suggest a higher vulnerability of male tucuxis to fishing activities. Assuming that Espírito Santo tucuxis exhibit similar growth patterns as those from adjacent northern Rio de Janeiro waters, where animals reach maturity at 180cm in length (Di Benedetto *et al.*, 2001), at least five specimens in this study can be considered adults (see Table 1).

Although this study presents the first indications of incidental take of rough-toothed dolphins along the Espírito Santo coast, several other captures of this species have been reported elsewhere along the Brazilian coast (e.g. Siciliano 1994, Lodi and Hetzel, 1998, Di Benedetto *et al.*, 2001). The lower ratio of *S. bredanensis* versus *S. fluviatilis* observed in this study might be partly due to the relatively low abundance of rough-tooth-dolphins in coastal areas off Espírito Santo, and therefore may be less vulnerable to coastal fishing activities. Dedicated surveys are needed to address this question.

The incidental capture of a humpback whale in fishing gears along the Espírito Santo coast has been previously reported by Barros (1991). Other cases of fishery interactions involving this species, especially juveniles, have also been observed in southeastern and southern Brazil (e.g. Siciliano, 1987, Pizzorno *et al.*, 1998, Danilewicz *et al.*, 2002) and may represent an increasing threat to the recovery of the species.

Although interactions of *P. blainvillei* with fisheries have been reported previously for this area (Di Benedetto *et al.*, 1990; Siciliano, 1994), none was recorded during this study. Despite some logistical constraints, the lack of any record of the species in the region in the last few years was unexpected. Considering that the Espírito Santo coast represents the northernmost limit for franciscanas and possibly contain an isolated population (Ramos *et al.*, 2002; Secchi *et al.*, 2002, Siciliano *et al.*, 2002), a better understanding of the current distribution and abundance of the species in the region is particularly important.

The present number of cetaceans incidentally caught and recorded along the Espírito Santo coast probably represents an underestimation of the problem in the

¹ Organização Consciência Ambiental (ORCA). Rua São Paulo, 21, Praia da Costa, Vila Velha, ES, 29101-300, Brazil.

* Corresponding author: Rua Celso Calmon, 445, Praia do Canto, Vitória, ES, 29055-590, Brazil.

E-mail: nettoricardo@hotmail.com.

Table 1. Records of cetaceans stranded along the Espírito Santo coast presenting wounds that may suggest interactions with fisheries

SPECIES (COLLECTION NUMBER)	Nº	SEX	TOTAL LENGTH (cm)	LOCAL	GEOGRAPHIC COORDINATES	DATE
<i>Megaptera novaeangliae</i> ^{1,2}	1	♀	490	Ponta da Fruta – Vila Velha	20°31'S; 40°22'W	28 October 1987
<i>Megaptera novaeangliae</i> (MN008)	1	-	700	Pontal do Ipiranga – Linhares	19°04'S; 39°44'W	3 November 2000
<i>Physeter macrocephalus</i> ²	1	-	-	Meaípe – Guarapari	20°39'S; 40°27'W	6 August 1981
<i>Pontoporia blainvillei</i> ³	1	-	-	Regência – Linhares	19°38'S; 39°49'W	1987
<i>Pontoporia blainvillei</i> ⁴	2	-	-	Regência – Linhares	19°38'S; 39°49'W	1987
<i>Pontoporia blainvillei</i> ⁵	5	-	-	Regência – Linhares	19°38'S; 39°49'W	February 1989
<i>Pontoporia blainvillei</i> ⁴	2	-	-	Regência – Linhares	19°38'S; 39°49'W	September 1989
<i>Pontoporia blainvillei</i> ⁴	1	♀	-	Itaúnas	18°25'S; 30°42'W	12 February 1991
<i>Pontoporia blainvillei</i> ⁴	1	♀	-	Guriri – São Mateus	18°42'S; 39°51'W	28 February 1991
<i>Pontoporia blainvillei</i> ⁴	1	-	-	Guriri – São Mateus	18°42'S; 39°51'W	17 January 1992
<i>Steno bredanensis</i> (SB002)	1	-	245	Praia de Itaparica – Vila Velha	20°21'S; 40°16'W	5 June 1996
<i>Steno bredanensis</i> (SB004)	1	♀	270	Praia de Setiba – Guarapari	20°38'S; 40°26'W	22 May 1999
<i>Steno bredanensis</i> (SB007)	1	♀	265	Porto de Tubarão – Vitória	20°18'S; 40°14'W	19 April 2000
<i>Sotalia fluviatilis</i> ²	1	♀	206	Praia de Itapuã – Vila Velha	20°22'S; 40°17'W	05 June 1983
<i>Sotalia fluviatilis</i> ³	2	-	-	Regência – Linhares	19°38'S; 39°49'W	1987
<i>Sotalia fluviatilis</i> ⁵	6	-	-	Regência – Linhares	19°38'S; 39°49'W	January-March/1989
<i>Sotalia fluviatilis</i> ⁵	3	-	-	Conceição da Barra	18°38'S; 39°51'W	March 1989
<i>Sotalia fluviatilis</i> ⁴	4	-	-	Regência – Linhares	19°38'S; 39°49'W	1987-1990
<i>Sotalia fluviatilis</i> ⁴	12	-	86-190	Guriri – São Mateus	18°42'S; 39°51'W	December 1988-August 1993
<i>Sotalia fluviatilis</i> (SF003)	1	♂	200	Praia do Sol – Guarapari	20°38'S; 40°26'W	18 May 1994
<i>Sotalia fluviatilis</i> (SF004)	1	♂	209	Ponta da Fruta – Vila Velha	20°31'S; 40°22'W	25 July 1995
<i>Sotalia fluviatilis</i> (SF006)	1	♂	222	Barra do Jucú – Vila Velha	20°25'S; 40°19'W	21 March 1996
<i>Sotalia fluviatilis</i> (SF009)	1	-	188	Praia Grande – Fundão	20°02'S; 40°11'W	30 January 1997
<i>Sotalia fluviatilis</i> (SF011)	1	♂	175	Praia de Itapuã – Vila Velha	20°22'S; 40°17'W	6 August 1997
<i>Sotalia fluviatilis</i> (SF012)	1	♂	173	Praia da Costa – Vila Velha	20°20'S; 40°16'W	24 November 1997
<i>Sotalia fluviatilis</i> (SF013)	1	♂	170	Ponta da Fruta – Vila Velha	20°31'S; 40°22'W	25 July 2000
<i>Sotalia fluviatilis</i> (SF014)	1	-	-	Praia de Itapuã – Vila Velha	20°22'S; 40°17'W	28 February 2001
<i>Tursiops truncatus</i> ²	1	-	-	Guarapari	20°39'S; 40°27'W	23 April 1984

(1) Siciliano and Lodi, 1989, (2) Barros, 1991, (3) Geise and Borobia, 1987, (4) Siciliano, 1994, (5) Ramos *et al.*, 1994.

region and likely reflects the low monitoring effort on the fishing ports and beaches. Systematic beach surveys and monitoring of fishing fleet are clearly needed to properly evaluate the effects of fisheries on the coastal cetacean species inhabiting this area.

Acknowledgements

We kindly thank the "Environmental Police" from Espírito Santo State for informing us about the strandings. We also thank César Meyer Musso, Margareth Peixoto Maia, Márcio Amorim Efe, Francisco Pedro da Fonseca Neto and Benedito Valadares, all scientists at AVIDEPA, for helping in strandings. We warmly acknowledge Dr^a Ana Paula Madeira Di Beneditto for the guidance during this work and Dr Nélio B. Barros for his technical support. Two anonymous referees provided valuable comments on the early drafts of this manuscript.

References

- Barbosa, L.A., Netto, R.F., Moraes, C.S. and Barros, N.B. (2000) *Registros de cetáceos para o litoral do Espírito Santo, Brasil*. Page 29 in Abstracts, V Simpósio de Ecossistemas Brasileiros: Conservação, 10-15 Outubro, Vitória, ES.
- Barros, N.B. (1991) Recent cetacean records for Southeastern Brazil. *Marine Mammal Science* 7(3): 296-306.
- Barros, N.B., Barbosa, L.A. and Gasparini, J.L. (1997a) *Distribuição e Biologia de Mamíferos Marinhos no Litoral do Espírito Santo, Brasil*. Page 72 in Abstracts, II Encontro de Preservação e Pesquisa de Mamíferos Aquáticos do Norte e Nordeste do Brasil - XI Encontro de Zoologia do Nordeste, Fortaleza, Ceará.
- Barros, N.B., Barbosa, L.A., Gasparini, J.L., Netto, R.F. and Moraes, C.S. (1997b) *Ingestão de plástico como provável causa mortis de uma baleia-piloto-de-peitorais-curtas, Globicephala macrorhynchus Gray, 1846, no litoral do Espírito Santo*. Page 336 in Abstracts, VII Congresso Nordestino de Ecologia, 27 Julho - 2 Agosto, Ilhéus, Bahia.
- Borobia, M., Siciliano, S., Lodi, L. and Hoek, W. (1991) Distribution of the South American dolphin *Sotalia fluviatilis*. *Canadian Journal of Zoology* 69: 1025-1039.
- Danilewicz, D., Tavares, M., Bornholdt, R., Trigo, C.C. and Moreno, I.B. (2002). *Unusual Record of a humpback whale (Megaptera novaeangliae) incidentally caught with evidence of recent feeding in the waters off Rio Grande do Sul, Southern Brazil*. Pages 72-73 in Abstracts, X Reunión de Trabajo de Especialistas en Mamíferos Acuáticos de América del Sur and IV Congreso de la Sociedad Latinoamericana de Especialistas en Mamíferos Acuáticos de América del Sur, 14-19 October 2002. Valdivia, Chile.
- Di Beneditto, A.P., Capistrano, L. and Ramos, R. (1990) *Captura accidental de pequenos cetáceos na costa dos estados do Rio de Janeiro, Espírito Santo e Bahia, Brasil*. Page 42 in Abstracts, IV Reunión de Trabajo de Especialistas en Mamíferos Acuáticos de América del Sur, Valdivia, Chile.
- Di Beneditto, A.P., Ramos, R. and Lima, N.R. (1998) Fishing activity in Northern Rio de Janeiro State (Brazil) and its relation with small cetaceans. *Brazilian Archives of Biology and Technology* 41(3): 296-302.
- Di Beneditto, A.P.M., Ramos, R.M.A. and Lima, N.R.W. (2001) *Os golfinhos: origem, classificação, captura accidental, hábito alimentar*. Editora Cinco Continentes, Porto Alegre, Brazil.
- Gasparini, J.L. and Sazima, I. (1996) A stranded melon-headed whale, *Peponocephala electra*, in southeastern Brazil, with comments on wounds from the cookiecutter shark, *Isistius brasiliensis*. *Marine Mammal Science* 12(2): 308-312.
- Geise, L. and Borobia, M. (1987) New Brazilian records for *Kogia*, *Pontoporia*, *Grampus* and *Sotalia* (Cetacea, Physteridae, Platanistidae, and Delphinidae). *Journal of Mammalogy* 68(4): 873-5.
- Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis - IBAMA (2001) *Mamíferos Aquáticos do Brasil. Plano de ação*. Ed. MMA/IBAMA, Brasília, Brasil.
- Lodi, L., Siciliano, S. and Bellini, C. (1996). Ocorrências e conservação de baleias-francas-do-sul, *Eubalaena australis*, no litoral do Brasil. *Papéis Avulsos de Zoologia* (São Paulo), 39(17): 307-328.
- Lodi, L. and Hetzel, B. (1998) O golfinho-de-dentes-rugosos (*Steno bredanensis*) no Brasil. *Bioikos* 12(1): 29-45.
- Ott, P.H., Secchi, E.R., Moreno, I.B., Danilewicz, D., Crespo, E.A., Bordino, P., Ramos, R. Di Beneditto, A.P., Bertozzi, C., Bastida, R., Zanelatto, R., Perez, J.E. and Kinas, P.G. (2002) Report of the Working Group on Fishery Interactions. *The Latin American Journal of Aquatic Mammals* 1 (special issue 1): 55-64.
- Perrin, W.F., Donovan, G.P. and Barlow, J. (1994) Gillnets and Cetaceans. *Report of the International Whaling Commission* (special issue 15).
- Pizzorno, J.L.A., Laílson-Brito, Jr., Dorneles, P.R., Azevedo, A.F., Gurgel, I.M.G.N. (1998) Review of strandings and additional information on humpback whales, *Megaptera novaeangliae*, in Rio de Janeiro, southern Brazilian coast. *Report of the International Whaling Commission* 47: 653-658.
- Ramos, R.M.A., Di Beneditto, A.P.M. and Fernandes, L.C.C. (1994) Relatório, Plano de Conservação e Manejo de Pequenos Cetáceos - Projeto Cetáceos. Fundação Brasileira para a Conservação da Natureza (unpublished).
- Ramos, R.M.A., Di Beneditto, A.P., Siciliano, S., Santos, M.C., Zerbini, A.N., Bertozzi, C., Vicente, A., Zampiroli, E., Alvarenga, F.S. and Lima, N.R.W. (2002) Morphology of the franciscana (*Pontoporia blainvillei*) off Southeastern Brazil: sexual dimorphism, growth and geographic variation. *The Latin American Journal of Aquatic Mammals* 1 (special issue 1): 129-144.
- Secchi, E.R., Zerbini, A.N., Bassoi, M., Dalla Rosa, L., Möller, L.M. and Rocha-Campos, C. (1997) Mortality of franciscanas, *Pontoporia blainvillei*, in coastal gillnets in Southeastern Brazil: 1994-1995. *Report of the International Whaling Commission* 47: 635-58.
- Secchi, E.R., Ott, P.H. and Danilewicz, D. (2002) Report of the fourth workshop for the coordinated research and conservation of the franciscana dolphin (*Pontoporia blainvillei*) in the western South Atlantic. *The Latin American Journal of Aquatic Mammals* 1 (special issue 1): 11-20.
- Siciliano, S. (1987) Nota sobre a captura accidental de *Megaptera novaeangliae* na costa sudeste do Brasil. Page 115 in Anais, II Reunião de Trabalho de Especialistas em Mamíferos Aquáticos da América do Sul, 4-8 August 1986. Rio de Janeiro, Brazil.

- Siciliano, S. (1994) Review of small cetaceans and fishery interactions in coastal waters of Brazil. *Reports of the International Whaling Commission* (special issue 15): 241-250.
- Siciliano, S. and Lodi, L. (1989) Observations of humpback whale, *Megaptera novaeangliae*, in the Abrolhos Bank, northeastern Brazil, and a summary of records for the Brazilian coast. Parque Nacional Marinho dos Abrolhos Technical Report. 38pp (unpublished).
- Siciliano, S., Di Benedetto, A.P., and Ramos, R.M.A. (2002) A toninha, *Pontoporia blainvillei* (Gervais & d'Orbigny, 1844) (Mammalia, Cetacea, Pontoporiidae), nos estados do Rio de Janeiro e Espírito Santo, costa sudeste do Brasil: caracterizações dos habitats e fatores de isolamento das populações. *Boletim do Museu Nacional, Nova Série, Zoologia*, 476: 1-15.

Received 16 December 2002. Accepted 22 April 2003.