

REPORT OF THE WORKING GROUP ON DISTRIBUTION AND BEHAVIOR

Pablo Bordino, Salvatore Siciliano, Ricardo Bastida and Marta Cremer

Distribution

Boundaries

The known boundaries for the distribution of franciscana range from Itaúnas (18°25'S, Espírito Santo State, Brazil) in the north (Siciliano, 1994), to the Golfo Nuevo (42°35'S, Chubut Province, Argentina) in the south (Crespo *et al.*, 1998). There is no concrete evidence that the species exists outside these boundaries. However, the distribution appears to be fragmented along the Brazilian coast, above 27°S (Siciliano and Santos, 1994). There are two "gaps", places where sightings, incidental mortality or other evidence of the species' existence have not been documented, and where fishermen do not recognize it, which indicate that the species is absent or rare. These gaps occur in the southeastern Brazilian coast, between Ubatuba (23°20'S), São Paulo State, and Macaé (22°25'S), Rio de Janeiro State, and between Barra de Itabapoana (21°18'S) and Regência (19°40'S), Espírito Santo State. This fragmentation could be attributed to potentially limiting factors in the distribution, such as the impact of the freshwater discharge from the Paraíba and Doce Rivers in the southeast of Brazil, the very narrow continental shelf and the frequent presence of predators (i.e. killer whales, *Orcinus orca*, and sharks) (Siciliano, 2001). In Argentina, the known distribution is continuous, and the species has been documented all year along the entire coast of the Buenos Aires Province (Bordino *et al.*, 1999).

Habitat characteristics

The franciscana is characteristically found in coastal habitats, with sightings as far out as 30 nautical miles (nm) from the coast and 30m deep (e.g. Pinedo *et al.*, 1989). However, the majority of sightings occur only as far out as 5nm from the coast and at a depth of 8-15m (Bordino *et al.*, 1999, Di Benedetto and Ramos, 2000). Incidental captures off the coast of Rio Grande do Sul State occur in waters up to 35m of depth (e.g. Secchi *et al.*, 1997).

In Baía Babitonga (Santa Catarina, Brazil), the species has been recorded in areas inside the estuary at a remote distance from the entrance to the ocean, in an area with depths up to 28m. Generally, the species is recorded in waters with a depth of 5-8m (Cremer, unpubl. data). The marine coastal and estuarine waters that they normally inhabit are quite turbid. Variations in water temperature also appear to be an important factor in limiting the habitat of the species (Bordino *et al.*, 1999; Siciliano, 2001; Di Benedetto and Ramos, 2000).

Migration and seasonal movements

To date, there is no concrete evidence of a migratory pattern for the species. However, seasonal movements have been recorded in Bahía Anegada (40°30'S, Argentina). The species is frequently recorded near the coast during the spring-summer period, with a smaller number recorded during the winter (Bordino *et al.*, 1999). However this pattern has not been observed in the southeast of Brazil, where sightings

wide range of water depths (Secchi *et al.*, 1997; Secchi, 1999). The variations in temperature between the distribution areas of the species also affect the seasonal nature of their movements. To the north of the State of Rio de Janeiro (Brazil), annual surface water temperature ranges from approximately 18° to 24°C, while in Bahía Anegada it varies from 6° to 18°C. Variation in water temperature likely affects the distribution and availability of prey for the franciscana on a seasonal basis.

Habitat use – segregation by sex and age class

Habitat use of the franciscana was studied by analyzing incidental capture rates in Rio Grande do Sul, Brazil (Danilewicz *et al.*, 2000). The results indicated that at the average depth in the water column there were no significant differences in numbers of individuals with regard to sex, age or length, or between numbers of juveniles and adults. However, the proportion of adult males to young males found along the coast in the north was significantly higher than in the south, using Mostardas (31°13'S) as the geographic boundary between the two areas. The overall high number of males in the north suggests that the differences between these areas possibly reflect a different distribution pattern between juvenile males and adult males in Rio Grande do Sul. Also, the sex ratio was biased to males (~ 2:1) to the north and was even (~1:1) to the south of Mostardas (Secchi, 1999; Danilewicz *et al.*, 2000).

In Bahía Anegada, the majority of recorded sightings have been mother-calf pairs and adult individuals near the coast during spring-summer (Bordino *et al.*, 1999). Incidental mortality of females in the coastal artisanal fishery along Cabo San Antonio (36°50'S, Buenos Aires Province, Argentina) has been significantly higher than mortality of males, which is similar to the ratio of juvenile mortality compared to adults (Albareda *et al.*, 1994). These observations suggest a seasonal differential use of habitat by franciscana in both areas.

A pattern of diurnal movement was recorded through systematic observations of the species in Bahía Anegada (Bordino and Thompson, 2000). It has been observed that franciscanas enter the Bahía (bay) during high tide, moving close to the coast of Jabali Island, and leave the Bahía during low tide, moving in the vicinity of Gama Island. This result suggests that the level of the tide to a large extent dictates the species' use of the area. This particular use may also be connected to the movement of prey species, to differences in the speed of the current, and to variations in the depth of the water and type of bottom habitat associated with both islands.

Behavior

Diving

Information on the diving pattern of the species in its natural habitat has been recorded in Argentina (Bordino *et al.*, 1999). Some diving patterns seem to be related to behavioral activity. During feeding and foraging, the dives were short

(3-45s) and long (45-86s), following a bimodal pattern with a ratio between types of 4:1. The average dive time during these behavioral activities was 21-27s. The short dives had an average time of 6-12s by comparison, and were connected to the hyperventilation that is necessary prior to completing a long dive. It should be emphasized that a long dive does not necessarily indicate a deep dive. On the contrary, when the dolphins were traveling they presented a unimodal pattern, with average dive times of 15-21s.

Seasonal variation in dive patterns of the species has also been recorded. A greater number of long dives, as well as dives that are significantly longer in duration, were recorded during the winter. The depth of the water also affected the average values for depth times, with longer dives occurring in areas deeper than 8m.

Similar observations were recorded from an individual in captivity kept under controlled environmental conditions (Bastida *et al.*, 2000). This study reports a greater number of long dives during the night, suggesting that the species could be primarily resting during this period of time.

Acoustics

Information regarding the characteristics of the echolocation system of the species is limited. Busnel *et al.* (1974) recorded clicks at low, high, and very high frequencies but mostly with signals below 30kHz, in individuals in their natural environment. Von Fersen *et al.* (2000) recorded echolocation clicks in the vicinity of 130kHz, similar to the dominant frequency used by an individual in captivity. Whistles or sounds at a lower frequency were not recorded. Some of the differences in the results may be related to differences in the teams of scientists as well as the environment in which they were conducting their studies. However, both papers report similarities in the echolocation system between franciscanas and harbor porpoises (*Phocoena phocoena*).

Group size and composition

Group size of this species is small, generally averaging 2-5 individuals per group (e.g. Bordino *et al.*, 1999; Secchi *et al.*, 2001). However, observations of larger groups have been recorded in Argentina and Brazil (e.g. Junín and Castello, 1994; Crespo *et al.*, 1998; Di Benedetto *et al.*, 2001). These groupings appear to occur during the mating season (spring-summer) and/or to be associated with diving while feeding and cooperative feeding activities (Bordino *et al.*, 1999).

Information on the group composition and social structure of the species is scant. Zanelato and Valsecchi (2000) reported a close familial relationship between four individuals accidentally entangled in the same net, based on nucleic and mitochondrial DNA studies. The four individuals included an adult female and male, a juvenile male, and a male calf. The adult male did not appear to be the father of either of the young individuals. The genetic variation detected in the individuals indicated that they probably formed a social group composed of a female and three offspring, suggesting a matriarchal society for this species, although more investigation on this subject is recommended.

Behavior patterns

Behavioral activities like traveling, slow swimming, cooperative feeding, and foraging in the natural habitat have been described for the area of Bahía Anegada (Bordino *et al.*, 1999). The amount of time taken by distinct behavioral activities was influenced by the tide and the season. A greater amount of time spent feeding was recorded during high tide, strongly related to the movement of prey species in the study area. Cooperative feeding was more common during the colder seasons, probably due to the scarcity of food in the area and/or a seasonal change in diet. In general, the species invested about 75% of its time in diving and capturing food. A greater amount of time spent traveling was recorded during low tide and the colder seasons.

No notable reaction occurred in response to the presence of boats; however, a significantly greater number of sightings per unit of effort were recorded during trips using a sailboat, suggesting that the use of motorboats affects the probability of sighting the species to a certain extent. However, in Baía Babitonga (Brazil), franciscanas are easily observed from motorboats, demonstrating in some cases even some curiosity (Cremer, unpubl. data). It should be pointed out that Baía Babitonga is an area with high boat traffic in comparison with Bahía Anegada, where the use of small boats only occurs in summer.

Von Fersen *et al.* (2000) reported on the behavior of an individual in captivity, recording the animal swimming on its side and upside down close to the bottom. Similar swimming behavior has also been observed for the Baiji, *Lipotes vexillifer*, in captivity (Renjun and Ding, 1989).

Recommendations

Due to the urgent need to reduce the incidental mortality of the species, any new studies must focus on obtaining biological information that will increase the chances of survival for the franciscana in the short term. Some recommendations are listed below:

- Determine the distribution boundaries based on concrete sightings of the species in all areas during all times of the year.
- Investigate the physical and biological characteristics of the habitat of the species.
- Investigate the existence of seasonal distribution and migratory patterns of the species.
- Investigate the occurrence of segregation by sex and/or age throughout the species' distribution.
- Determine areas for protection and management for the species in Brazil, Uruguay and Argentina.
- Conduct studies on the echolocation system in order to understand the species' ability to detect and avoid accidental entanglement in nets.
- Investigate behavior patterns that may be associated with the mechanics of accidental entanglement.

References

- Albareda, D. and Albornoz, N. (1994) Mortalidad de franciscana en la pesquería artesanal de San Bernardo y Mar de Ajo, Buenos Aires, Argentina. Pages 54-60 in Pinedo, M.C. and Barreto, A. (Eds) *Anais do 2º Encontro sobre Coordenação de Pesquisa e Manejo da Franciscana*. Ed. FURG, Rio Grande.
- Bastida, R., Morón, S. and Rodríguez, D. (2000) Estudio preliminar sobre el comportamiento respiratorio de un ejemplar de *Pontoporia blainvillei* rehabilitado en la Fundación Mundo Marino (San Clemente del Tuyú, Argentina). Pages 85-88 in UNEP/CMS (Ed.) *Report of the Third Workshop for Coordinated Research and Conservation of the Franciscana Dolphin (Pontoporia blainvillei) in the Southwestern Atlantic*. UNEP/CMS, Bonn.
- Bordino, P., Thompson, G. and Iniguez, M. (1999) Ecology and behaviour of the Franciscana dolphin *Pontoporia blainvillei* in Bahía Anegada, Argentina. *Journal of Cetacean Research and Management* 1(2): 213-222.
- Busnel, R.G., Dziedzic, A. and Alcuri, G. (1974) Études préliminaires de signaux acoustiques de *Pontoporia blainvillei* Gervais et D'Orbigny (Cetacea, Platanistidae). *Mammalia* 38: 449-459.
- Crespo, E.A., Harris, G. and Gonzales, R. (1998) Group size and distributional range of franciscana, *Pontoporia blainvillei*. *Marine Mammal Science* 14(4): 845-849.
- Danilewicz, D.S., Secchi, E.R., Ott, P.H., Moreno, I.B. and Bassoi, M. (2000) Habitat use patterns in Rio Grande do Sul, southern Brazil, indicated by incidental catch and beach survey data. Technical Paper WP07 presented to the *IV Workshop para a Coordenação da Pesquisa e Conservação da Franciscana*, Pontoporia blainvillei, no Atlântico Sul Ocidental, 05-09 November 2000, Porto Alegre.
- Di Benedetto, A.P.M. and Ramos, R.M.A. (2001) Biology and conservation of the franciscana (*Pontoporia blainvillei*) in the north of Rio de Janeiro State, Brazil. *Journal of Cetacean Research and Management* 3(2): 185-192.
- Di Benedetto, A.P.M. and Ramos, R.M.A. (2000) *Pontoporia blainvillei* (Gervais & D'Orbigny, 1844) in the northern Rio de Janeiro (21°18'S-22°25'S), Brazil. Technical Paper WP11 presented to the *IV Workshop para a Coordenação da Pesquisa e Conservação da Franciscana*, Pontoporia blainvillei, no Atlântico Sul Ocidental, 05-09 November 2000, Porto Alegre.
- Junin, M. and Castello, H.P. (1994) *Avistajes costeros de franciscana, Pontoporia blainvillei, en la Provincia de Buenos Aires*. Page 55 in Abstracts, VI Reunión de Trabajo de Especialistas em Mamíferos Aquáticos da América do Sul, 24-28 October 1994, Florianópolis.
- Pinedo, M.C., Praderi, R. and Brownell, R.L. (1989) Review of the biology and status of the franciscana *Pontoporia blainvillei*. Pages 46-51 in Perrin, W.F., Brownell, R.L., Kaiya, Z. and Jiankang, L. (Eds) *Biology and Conservation of the River Dolphins*. Occas. pap. IUCN SSC 3. Gland.
- Renjum, L. and Ding, W. (1989) The behaviour of the Baiji, *Lipotes vexillifer*, in captivity. Pages 141-145 in Perrin, W.F., Brownell, R.L., Kaiya, Z. and Jiankang, L. (Eds) *Biology and Conservation of the River Dolphins*. Occas. pap. IUCN SSC 3. Gland.
- Secchi, E.R. (1999) *Taxa de crescimento potencial intrínseco de um estoque de franciscanas, Pontoporia blainvillei (Gervais & D'Orbigny, 1844) (Cetacea, Pontoporiidae) sob o impacto da pesca costeira de emalhe*. MSc Thesis. Fundação Universidade Federal do Rio Grande, Rio Grande. 152pp.
- Secchi, E.R., Zerbini, A.N., Bassoi, M., Dalla Rosa, L., Moller, L.M. and Rocha Campos, C.C. (1997) Mortality of franciscanas, *Pontoporia blainvillei*, in coastal gillnetting in southern Brazil: 1994-1995. *Report of the International Whaling Commission* 47: 653-658.
- Secchi, E.R., Ott, P.H., Crespo, E.A., Kinas, P.G., Pedraza, S.N. and Bordino, P. (2001) A first estimate of franciscana (*Pontoporia blainvillei*) abundance off southern Brazil. *Journal of Cetacean Research and Management* 3: 95-100.
- 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. (2001) *Uma abordagem biogeográfica dos cetáceos da costa brasileira*. PhD Thesis. Universidade Federal do Rio de Janeiro, Rio de Janeiro. 122pp.
- Siciliano, S. and Santos, M.C.O. (1994) *Considerações sobre a distribuição da franciscana Pontoporia blainvillei no litoral sudeste do Brasil*. Paper presented in II Encontro de Trabalho sobre a Coordenação de Pesquisa e Conservação da Franciscana, 22-23 October 1994, Florianópolis.
- Von Fersen, L., Kamminga, C. and Seidl, A. (2000) Estudios preliminares sobre el comportamiento de un ejemplar de franciscana (*Pontoporia blainvillei*) en Mundo Marino, Argentina. Pages 30-33 in UNEP/CMS (Ed.) *Report of the Third Workshop for Coordinated Research and Conservation of the Franciscana Dolphin (Pontoporia blainvillei) in the Southwestern Atlantic*. UNEP/CMS, Bonn.
- Zanelatto, R. and Valsecchi, E. (2000) Matrilínea society in the franciscana dolphin? A molecular clue. Technical Paper WP16 presented to the *IV Workshop para a Coordenação da Pesquisa e Conservação da Franciscana*, Pontoporia blainvillei, no Atlântico Sul Ocidental, 05-09 November 2000, Porto Alegre.

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