

ANNOTATED LIST OF THE CETACEANS OF SANTA CATARINA
COASTAL WATERS, SOUTHERN BRAZIL

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Resumo

Lista-se as espécies de cetáceos das águas costeiras de Santa Catarina, sul do Brasil. Apresenta-se informações sobre emalhamento, encalhe e avistagens para as 17 espécies seguintes: *Pontoporia blainvillei*, *Phocoena spinipinnis*, *Steno bredanensis*, *Sotalia fluviatilis*, *Delphinus delphis*, *Tursiops truncatus*, *Stenella frontalis*, *Pseudorca crassidens*, *Orcinus orca*, *Grampus griseus*, *Globicephala melas*, *Hyperodon planifrons*, *Mesoplodon densirostris*, *Physeter macrocephalus*, *Eubalaena australis*, *Balaenoptera borealis* e *B. acutorostrata*. Comenta-se sobre as características da área, aspectos biológicos, distribuição e movimentos. Menciona-se detalhes sobre o material depositado em coleções. Discute-se a informação disponível, apresenta-se registros originais e amplia-se o número de espécimes conhecidos de várias espécies.

Unitermos: Lista, cetáceos, Santa Catarina, sul do Brasil.

Abstract

The living cetacean species of Santa Catarina coastal waters, Southern Brazil, are listed. Data on entanglement, strandings and sightings for the following 17 species are presented: *Pontoporia blainvillei*, *Phocoena spinipinnis*, *Steno bredanensis*, *Sotalia fluviatilis*, *Delphinus delphis*, *Tursiops truncatus*, *Stenella frontalis*, *Pseudorca crassidens*, *Orcinus orca*, *Grampus griseus*, *Globicephala melas*, *Hyperoodon planifrons*, *Mesoplodon densirostris*, *Physeter macrocephalus*, *Eubalaena australis*, *Balaenoptera borealis* and *B. acutorostrata*. Area characteristics, biological aspects, distribution and movements are presented. Details are given on the material deposited in collections. This study discusses the available information, presents original records and increases the number of known specimens of several species.

KEY WORDS: List, cetaceans, Santa Catarina, Southern Brazil

Introduction

The scientific research on cetaceans along the extensive Brazilian coast has increased during the past 15 years. Earlier lists of species were very general and often not supported by good collections (Ihering, 1893; Cunha Vieira, 1955; Voss, 1973; Carvalho, 1983; Bittencourt, 1984).

This paper is a review and checklist of the living cetacean species of the coastal waters of Santa Catarina, an important part of the Brazilian coast that is affected by the mixing of waters at the Subtropical Convergence. We discuss the available information and add recent observations and material.

We have included only species that can be documented on the basis on specimens preserved in collections or by means of concrete sightings. During the past six years, a number of beach surveys were organized in order to locate, dissect and transport carcasses and cetacean bones found along the coast. All this material is deposited and catalogued in the Laboratório de Mamíferos Aquáticos collection at Universidade Federal de Santa Catarina (UFSC) in Florianópolis. Other institutions consulted for cetacean material were the Museu de Zoologia da Universidade de São Paulo (MZUSP) in São Paulo; Museu de História Natural do Capão de Imbuia (MHN) in Curitiba; Museu de Ciências Naturais da Fundação Zoobotânica (NCNRS) in Porto Alegre; Museu do Homem do Sambaqui (MHS) in Florianópolis; Museu de Ecologia Fritz Müller (MEFM) and Museu do Col. Franciscano St. Antônio (MCFSA), both in Blumenau; and Museu da CITUR (MC) in Camboriú. Sightings, photographs and video tapes were made from vantage points along the coast, islands, boats and survey flights.

For classification at the family level and above, we have followed Barnes *et al.* (1985). For classification of genera and species, we have largely followed Honacki *et al.* (1982), the lists adopted by the International Whaling Commission, the United States Marine Mammal Commission, recent revisions of the spotted dolphins by Perrin *et al.*

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(1987) and of the propoises and platanistoid dolphins by Barnes (1985a, b). Treatment of the right whales follows Brownell *et al.* (1987).

We include the main common names of the species. Local names, are placed in parentheses. We also give the junior synonyms used for the specimens pertaining to Santa Catarina state and neighboring areas. These synonyms are followed by its bibliographic reference. The terms between round brackets inform about the content of each paper.

Abbreviations: C = cranium; M = mandibles; Sk = skull (cranium with mandibles); E = earbones; Pt = postcranial; V = vertebrae; R = ribs; S = scapula; COS = complete osteological specimen; TL = total length; v.imm. = very immature; m = male; f = female; Fpolis. = Florianópolis; Sta. = Santa; x = when following an abbreviation it indicates that the specimen is incomplete (i.e. Mx).

Area Characteristics

Sta. Catarina state, in Southern Brazil, has 670 km of continental coast, which is increased to 915 km of coastline when its islands are included (Sierra de Ledo, 1983). It is limited on the north by the Sai-Guaçu River (20°57'26"S) and on the south by the Mampituba River (29°20'32"S). It faces the South Atlantic Ocean southwest, possessing hundreds of sandy beaches, headlands, mangroves, islands and inlets (Fig. 1). Its continental shelf is extensive, with a mean width of 180 km and its waters are influenced by the two largest currents of the southwestern South Atlantic.

Many authors have analysed the dynamics of these masses of water (Emilson, 1961; Lopez, 1963; Hubold, 1980a, b; Ferreira da Silva, 1981; Matsuura, 1986; Pereira, 1989), but their limits still remain poorly defined (Fig. 2). The interface of these masses make the waters of the Brazil Current turns eastward, deviating from the coast, while the Malvinas Current becomes a bottom stream whose influence reaches as far as the latitude of Cabo Frio (23°S). The Subtropical Convergence has enormous importance in the geographical distribution of the South American marine organisms. According to the *Comision Asesora Regional de Pesca para el Atlantico Sudoccidental* (CARPAS, 1964) this Convergence, in the summer located at the latitude of Montevideo, can reach Florianópolis during winter, creating rich fishing areas. Recent studies (Silva *et al.*, 1984) reveal upwelling areas to the north of the Sta. Catarina coast, as well as in the region between Cabo Santa Marta and Florianópolis.

The predominant winds during fall and winter (March to August) proceed from the south and southwest. In spring and summer (September to March) the more frequent winds are in the N/NE quadrant.

In these latitudes, water salinity between 33.0-36.0 ppm and the surface temperature tends to be lower near shore (16-22°C), gradually rising in deeper waters offshore (23-27°C) (Silva *et al.*, 1984).

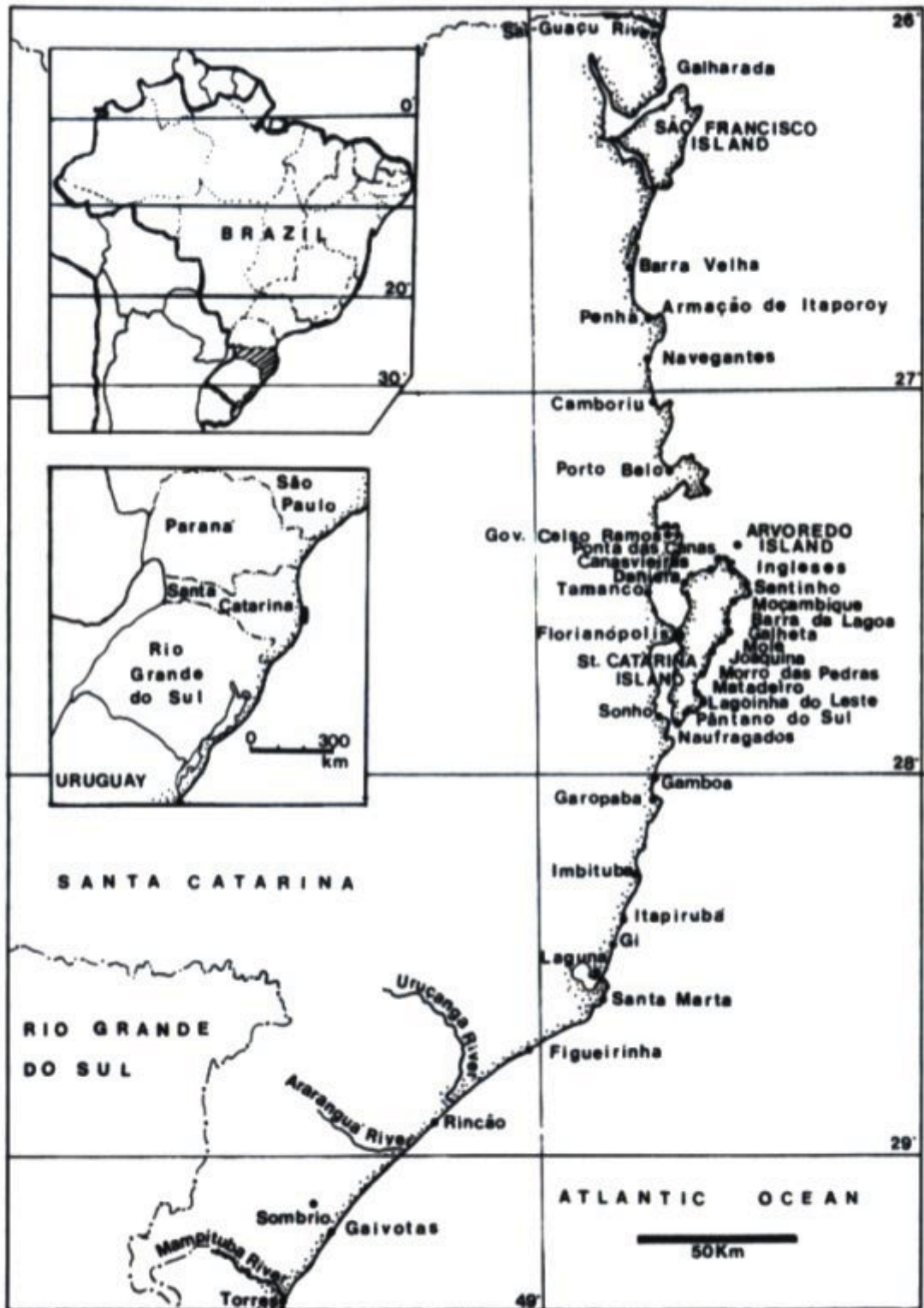


Fig. 1. Coast of Santa Catarina State, Southern Brazil.

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Fig. 2. Southern American Currents. (Modified from Lopez (1963)).

Species Accounts

The subtropical climate of this region does not favour the preservation of dead animals. Contrasting with the "mummified carcasses" of Tierra del fuego (Goodball, 1978), the cetaceans recovered on Sta. Catarina beaches were in an advanced state of decomposition, which usually prevented external measurements, recover of stomach contents, the determination of sex or "*causa mortis*". Fresh animals are often flensed by birds mainly black vultures (*Coragyps atratus*) wich are very common in this region. The collection dates given here do not necessarily indicate the stranding or grill netting date; most animals had been abandoned on the beaches for several days.

Suborder Odontoceti

Family Pontoporidae

Pontoporia blainvillei (Gervais & d'Orbigny, 1844)

La Plata dolphin, Franciscana, (Toninha)

Stenodelphis blainvillei, Cunha Vieira, 1955, Arq. Zool. Dep. Zool. Est. S. Paulo, 13(10):p.439 (Distribution: Southern Brazil)

This species occurs in the coastal waters and estuaries of southeastern South America, from Regência, Espírito Santo, Brazil (Borobia and Geise, 1984) to Península Valdés, Argentina (Lahille, 1899).

Its occurrence in Sta. Catarina waters is well documented (Azevedo *et al.*, 1982; Ximenez *et al.*, 1987), but we have had no opportunity to see this platanistoid dolphin in its natural habitat. Forty specimens from this region are catalogued in Brazilian institutions (Table 1).

Ximenez *et al.* (1972) suggest that during the southern winter, this species migrates northward along the Brazilian coast. This agrees with the fact that 76% of the specimens of known date of death (n=34), died during winter and spring (June-October).

On 28 October 1987 a fresh female dolphin (UFSC 1058) was found in gillnets at Camboriu. This pregnant female aborted a nearterm foetus (skull preserved - UFSC 1059). Six other cases of incidental catches in gillnets are confirmed. The specimens UFSC 1026, 1027, 1028 (June 1984) were part of a group of 30 individuals, while UFSC 1071 (3 July 1988), UFSC 1091 (25 May 1990) and UFSC 1092 (June 1990) were found individually. This is probably the species most affected by commercial and artisanal fishing.

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Table 1 - Specimens of *Pontoporia blainvillei* found on the coast of Sta. Catarina and adjacent zones, southern Brazil (* = collected in Rio Grande do Sul state).

Specimen n°	Locality	Date	Specimen Details	Sex
MCFSA—	Navegantes	—	C	
MEFM —	Navegantes	—	C	
MHS —	Ilha de Sta. Catarina	1940	Skx	
MHS —	Ilha de Sta. Catarina	1940	M	
MCN 0025	Torres - RS*	Jul 1953	C	
MCN 0223	Garopaba	24 Jun 1975	C	
MCN 0529	Torres - RS*	Feb 1976	C	
MCN 1099	Sombrio	Dec 1977	C	
MCN 1100	Sombrio	Dec 1977	C	
MHN 1111	Joaquina, Fpolis	1978	Sk	
UFSC 1006	Naufragados, Fpolis	28 Aug 1983	Sk	
UFSC 1021	Ponta das Canas, Fpolis	Jan 1984	COS (Formol)	
UFSC 1026	Moçambique, Fpolis	Jul 1984	Cx	
UFSC 1027	Moçambique, Fpolis	Jul 1984	C	
UFSC 1028	Moçambique, Fpolis	Jul 1984	M	
UFSC 1003	Pântano do Sul, Fpolis	21 Oct 1984	Cx	
UFSC 1004	Santinho, Fpolis	21 Jun 1985	Sk, E	
UFSC 1005	Canasvieiras, Fpolis	13 Jul 1985	Sk	
UFSC 1007	Matadeiro, Fpolis	27 Jul 1985	C	
UFSC 1008	Ponta das Canas, Fpolis	8 Sep 1985	Sk	
UFSC 1022	Joaquina, Fpolis	30 Aug 1986	Sk	
UFSC 1023	Pântano do Sul, Fpolis	2 Sep 1986	Sk, E	
UFSC 1031	Inglese, Fpolis	Sep 1986	Cx	
UFSC 1054	Santinho, Fpolis	26 Jun 1987	Sk	
UFSC 1039	Galheta, Fpolis	3 Jul 1987	Sk, E	
UFSC 1038	Pântano do Sul, Fpolis	9 Jul 1987	COS	
UFSC 1037	Inglese, Fpolis	13 Jul 1987	Sk	
UFSC 1046	Moçambique, Fpolis	19 Jul 1987	Sk, E	
UFSC 1058	Camboriú	28 Oct 1987	COS	
UFSC 1059	Camboriú	28 Oct 1987	Sk, E (foetus)	
UFSC 1060	Camboriú	28 Oct 1987	Sk, E	
UFSC 1065	Gov. Celso Ramos	—	Skx	
UFSC 1076	Porto Belo	Apr 1988	Skx, E	
UFSC 1071	Inglese, Fpolis	3 Jul 1988	Cx	
UFSC 1066	Joaquina, Fpolis	14 Jul 1988	COS	
UFSC 1070	Mcle, Fpolis	14 Sep 1988	Sk	
UFSC 1078	Matadeiro, Fpolis	23 Apr 1989	Caudal V	
UFSC 1091	Canasvieiras, Fpolis	25 May 1990	Sk	f
UFSC 1092	Joaquina, Fpolis	Jun 1990	COS	
UFSC 1095	Lagoinha do Leste, Fpolis	25 May 1990	Sk	

Family Phocoenidae

Phocoena spinipinnis Burmeister, 1865
Burmeister's porpoise, (Boto-de-dorsal-espinhosa)

On 12 October 1986, on the sandy beaches near the Uruçanga river mouth (28°48'S), we found a carcass of an adult specimen (180 cm) of unknown sex (Simões-Lopes and Ximenez, 1989). This was the first record for the Brazilian coast and the northernmost in the South Atlantic. Its complete skeleton is preserved (UFSC 1025).

Two months later (12 December 1986) a second specimen was discovered near the entrance of Patos Lagoon (32°40'S), Rio Grande do Sul state (Pinedo, 1989).

The status of Burmeister's porpoise in the southern Brazilian waters is unknown, but there is no doubt about its rarity. It may makes short seasonal movements, reaching the warm temperate waters of Sta. Catarina during the southern spring.

Family Delphinidae

Steno bredanensis (Lesson, 1828)
Routh-toothed Dolphin, (Delfim-de-dentes-rugosos)

The routh-toothed dolphin is a tropical and pelagic specie (Leatherwood and Reeves, 1983). It was first recorded based on photograph in Brazilian coastal waters, "... between Cabo Frio and Baía da Guanabara" (Pinedo and Castello, 1980).

Praderi and Ximenez (1987) report the first specimens, confirming the occurrence of this species at the latitude of Sta. Catarina Island.

At present, five specimens are known for the study area (Table 2). In no case was it possible to discern the color pattern. Only one of the specimens (UFSC 1067) was definitely known to have been caught accidentally in gillnets.

Table 2 - Specimens of *Steno bredanensis* found on the coasts of Sta. Catarina, southern Brazil.

Specimen n°	Locality	Date	Specimen Details	TL
MHS - -	Ilha de Sta. Catarina	1940	Sk	
UFSC 1001	Moçambique, Fpolis	12 Feb 1985	COS	236
UFSC 1049	Moçambique, Fpolis	Oct 1987	COS	
UFSC 1047	Moçambique, Fpolis	20 Nov 1987	Cx	
UFSC 1067	Santinho, Fpolis	22 Aug 1988	Sk, E	267

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Sotalia fluviatilis (Gervais, 1853)
Tucuxi, Estuarine Dolphin, (Boto Cinza, Boto-da-Manjuva)

Sotalia brasiliensis, Carvalho, 1975, Bol. Tec. IF. S. Paulo, 16:22
(distribution)

The marine form of *Sotalia fluviatilis* has an extensive distribution on the east coast of Central and South America from Panama on the Caribbean (9°22'N) (Bossenecker, 1978) to the Florianópolis region, Brazil (27°35'S) (Simões-Lopes, 1987). The known records (Borobia *et al.*, 1991), suggest a continuous distribution along the coast.

We presents eight specimens from Sta. Catarina coastal waters (Table 3), including four complete skeletons, three complete or partial skulls and one foetus that has been preserved entire in formol.

All our sightings and the opinions of local residents confirm that *S. fluviatilis* is a common specie throughout the year, inhabiting only shallow and protected waters. Simões-Lopes (1988) has suggested the existence of resident populations in the southern part of its home range, but no marking of dolphins has been carried out. Personal sightings have revealed dolphin pods from 3 to 30 individuals. Large pods used to swim in compact groups.

On 22 February 1989, a fresh female dolphin (UFSC 1074) was recovered bearing a full-term foetus (UFSC 1075) (Simões-Lopes and Ximenz, 1990). This is the only available information on calving times of marine *Sotalia* in these latitudes.

In the artisanal fisheries of Sta. Catarina, there are two cases (UFSC 1073, 1074) in wich the fishermen intentionally killed netted animals (Simões-Lopes and Ximenez, 1990). The proportions of this conflict are unknown.

Table 3 - Specimens of *Sotalia fluviatilis* found on the coasts of Sta. Catarina, southern Brazil.

Specimen n.º	Locality	Date	Specimen Details	TL	Sex
UFSC 1010	Tamanco, Biguaçu	12 Nov 1985	Sk, V		
UFSC 1062	Barra Velha	- -	Cx		
UFSC 1073	Daniela, Fpolis	22 Jan 1989	Sk		
UFSC 1074	Canasvieiras, Fpolis	22 Feb 1989	COS	193	f
UFSC 1075	Canasvieiras, Fpolis	22 Feb 1989	COS*	70	m
UFSC 1079	Fpolis (Ponte)	18 Jul 1989	COS	188	f
UFSC 1082	Fpolis (Ponte)	2 Aug 1989	COS	197	
UFSC 1083	Fpolis (Baía Norte)	18 Aug 1989	COS	194	m

*(foetus, formol)

Delphinus delphis Linnaeus, 1758
Common Dolphin

Stenella cfr plagiodon, Pinedo and Castello, 1980 (not Cope), Bolm. Inst. Oceanogr., 29(2)p.313 (Characters)

This is one of the most common species of these waters. Sightings at the continental shelf edge (29°22'S), indicated groups varying from 2 to 500 individuals (Castello and Pinedo, 1986). We present eight specimens collected on the coasts of Sta. Catarina and surroundings (Table 4).

The common dolphin is a common victim of gillnets. In specimens UFSC 1009, 1030, 1035, the rostrum was cut off when the animal was being taken out of the nets.

Perring *et al.* (1987:160) without examining the specimen MCNRS 026, and based only on the informations given by Pinedo and Castello (1980:313), include it, mistakenly, in the *Stenella* genus. They commit a second error when indicate "Rio Grande" as the place of origin of the specimen. The correct data is: Torres, Rio Grande do Sul state, Brazil.

Table 4 - Specimens of *Delphinus delphis* found on the coasts of Sta. Catarina, southern Brazil. (* = collected at Rio Grande do Sul state).

Specimen n°	Locality	Date	Specimen Details	TL	Sex
MCNRS026	Torres - RS*	Fev 1956	C		
UFSC1009	Barra da Lagoa, Fpolis	- -	Cx		
UFSC1014	Morro das Pedras, Fpolis	30 Nov 1985	COS	178 m	
UFSC1012	Ingleses, Fpolis	20 Dec 1985	Sk, E		
UFSC1030	Santinho, Fpolis	14 Nov 1986	Skx, E		
UFSC1035	Santinho, Fpolis	1987	Cx		
UFSC1036	Navegantes	1987	COS		
UFSC1088	Armação Itapocoroy, Penha	Dec 1989	COS		

Tursiops truncatus (Montagu, 1821)
Bottlenose Dolphin, (Boto-da-Tainha)

Tursiops gephyreus, Carvalho, 1975, Bol. Tec. IF, S. Paulo, 16:p.24
(Sighting, distribution)

The Bottlenose dolphin can be easily sighted in the coastal waters of Sta. Catarina, where it penetrates the mouths of rivers, lagoons and mangroves. Eleven specimens: three complete skeletons and eight complete or partial skulls, from this region have been preserved (Table 5).

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When visible, the color pattern consisted in a dark grey dorsal cape and appendages (often more brown than gray in living animals), a paler grey extending onto the flanks, a off-white ventral region and a well visible spinal blaze. We observed no eye-to-flipper stripes, nor spotting ventral.

Resident dolphins can be seen throughout the year at the mouth of the Mampituba and Araranguá rivers and at the channel at Laguna, where the dolphin/human cooperative fishing takes place (Pryor *et al.*, 1990; Simões-Lopes, 1991).

At least three dolphins died in incidental catches (UFSC 1032, 1072 and 1077). Local fishermen have reported cases of intentional killing by firearms and hand-thrown harpoons.

Table 5 - Specimens of *Tursiops truncatus* found on the coasts of Sta. Catarina, southern Brazil.

Specimen n°	Locality	Date	Specimen Details	TL	Sex
MHS - -	Ilha de Sta. Catarina	1940	C		
UFSC1011	Morro das Pedras, Fpolis	20 Nov 1985	Skx		
UFSC1032	Rio Araranguá, Içara	Jan 1987	C		
UFSC1044	Daniela, Fpolis	13 Oct 1987	Sk		f
UFSC1041	Ilha J.Cunha, Porto Belo	Nov 1987	Sk		
UFSC1072	C.Pirajubaé, Fpolis	9 Oct 1988	COS(v.imm.)	204	m
UFSC1077	Pântano do Sul, Fpolis	16 Apr 1989	Sk, E	301	m
UFSC1081	Mole, Fpolis	17 Jul 1989	Sk, E	300	f
UFSC1085	Gamboa, P.Lopes	27 Jul 1989	COS	265	
UFSC1089	Molhes, Laguna	22 Feb 1990	Sk, E	320	f
UFSC1099	Ingleses, Fpolis	20 Feb 1991	COS		f

Stenella frontalis (Cuvier, 1829) Atlantic spotted dolphin

Ximenez *et al.* (1987) reported the first occurrence of this species in the southwestern South Atlantic, along the Sta. Catarina coast (UFSC 1002). Ximenez and Praderi (1992) mention new specimens and discuss the species' geographical distribution in this area.

We report five complete skeletons and two skulls (Table 6). A damaged cranium (UFSC 1013), from Arvoredo Island, could only be determined to the genus level. The specimen UFSC 1061 had a well marked double melon.

Specimens UFSC 1051 and 1061 were taken together in artisanal gillnets, while UFSC 1097 was taken alone.

Table 6 - Specimens of *Stenella frontalis* found on the coasts of Sta. Catarina, southern Brazil.

Specimen n°	Locality	Date	Specimen Details	TL	Sex
UFSC 1002	Ponta das Canas, Fpolis	13 Sep 1985	COS	230	
UFSC 1029	Ingleses, Fpolis	16 Nov 1986	COS	209	m
UFSC 1033	Galheta, Fpolis	3 Jul 1987	COS		
UFSC 1051	Matadeiro, Fpolis	17 Jan 1988	Sk, E		m
UFSC 1061	Matadeiro, Fpolis	17 Jan 1988	Sk, E	213	m
UFSC 1050	Perequê, Porto Belo	25 Apr 1988	COS		
UFSC 1097	Gi, Laguna	12 Dec 1990	COS		m

Pseudorca crassidens (Owen, 1846)

False killer whale, (Falsa Orca, Galha Torta)

At least ten specimens of this species have been along the Brazilian coast, eight of them in Rio Grande do Sul (Castello and Gianuca, 1976; Pinedo and Rosas, 1989), one in Rio de Janeiro (Geise and Borobia, 1988) and one in Sta. Catarina (Simões-Lopes and Ximenez, 1992).

The skull and complete skeleton of the Sta. Catarina specimen were preserved (UFSC 1048). To our knowledge, this 522 cm adult male is the largest individual recorded off the Brazilian coast. It was collected on 13 November 1987 at Ingleses Beach, Florianópolis, a victim of artisanal fishing nets.

Orcinus orca (Linnaeus, 1758)

Killer whale, (Orca)

The killer whale is known to the Sta. Catarina coast on the basis of one carcass found in August, 1979, near Barra Velha (26°27'S; 48°41'56"W) (Bittencourt, 1983a). The complete skeleton is on display at the Museu de História Natural do "Capão da Imbuia" (MHN 1112).

Castello and Pinedo (1986) mention eight records for the Rio Grande do Sul coast and individual "strandings" in the region of Sta. Catarina, Cabo Frio (23°S) and Cabo de São Tomé (22°S), but they give no details.

Three more records, concerning areas near the Sta. Catarina coast, confirm the idea that the occurrence of *O. orca* at these latitudes is not merely incidental. In April, 1985, a skull and part of a skeleton of an adult specimen were recovered at Farol da Solidão, Rio Grande do Sul (Ximenez *et al.*, 1987). An other skull, without date, and from the same region, is at MCN (number 078). On July 1987, three individuals, one male and two females, were sighted near Vitória Island (23°39'5"S; 44°55'8"W) in Ubatuba, São Paulo state (Daniél *et al.*, 1992).

An adult male killer whale was sighted on 11 May 1991 near the shore in Laguna Beach.

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Grampus griseus (Cuvier, 1812)
Risso's dolphin, grampus

The only record of the Risso's dolphin at these latitudes is that of a young male (164 cm) that was accidentally captured during commercial fishery in June, 1984 (Geise and Borobia, 1987). Its complete skeleton has been preserved at MZUSP.

Globicephala melas (Traill, 1809)
Long-finned Pilot Whale, (Caldeirão)

Globicephala melaena, Castello and Pinedo, 1986, Proc. I. Reun. T. E. Mam. Aq. Sul: p.17 (Sightings); Bittencourt, 1984, Arq. Biol. Tecnol., 27(4):p.546 (Distribution)

The presence of *Globicephala melas* in Sta. Catarina waters is based on sightings made from the research vessel *Atlântico Sul*, on 16 July 1976 (Castello and Pinedo, 1986). These authors mention herds "... of various tens of specimens..." found between 28°50'S - 47°26'W.

On 5 August 1990, a carcass of a young female (543 cm long) was found at Itapirubá Beach. Its complete skeleton is preserved (UFSC 1093).

This species is mentioned for Rio Grande do Sul based on two specimens (MORG 697, 804), and six sightings on board of the *Atlântico Sul* (Pinedo *et al.*, 1987). We can add a skull (UFSC 1069) that was recovered in October, 1987, in Tramandai.

Family Ziphiidae

Hyperoodon planifrons Flower, 1882
Southern bottlenose whale

The southern bottlenose whale recorded for the southern Brazilian coast, due to a carcass recovered 5 km north of Chui, near the frontier with Uruguay (Gianuca and Castello, 1976).

A second specimen mentioned by Boeing and Cimardi (1985) was based only on photographs taken by Joaquim Arantes de Bem at Rincão Beach, Sta. Catarina, on 5 May 1981. We studied these color photographs and confirm that the animal was a southern bottlenose whale. It had a prominent rounded melon and a well defined beak. The skin was completely depigmented and the dorsal region was mutilated.

Mesoplodon cfr. densirostris (de Blainville, 1817)
Blainville's beaked whale

The first record of *Mesoplodon densirostris* concerning southwestern South Atlantic waters was a 440 cm female that stranded 42 km south of Cassino, Rio Grande do Sul, Brazil on 5 May 1977 (Castello and Pinedo, 1980).

On 11 September 1983, a fresh 414 cm female beaked whale, mentioned just as *Mesoplodon sp.*, was found at Ingleses Beach, Florianópolis (Boeing and Cimardi, 1985). As far as we know, its body was buried on the beach and unfortunately lost. We have had the opportunity to analyze some black and white photographs of this specimen by "O Estado" Journal (Fig. 3a,b). The flanks and dorsal region are a uniform medium grey, with a darker zone around the eyes. From the flanks to the ventral region the colour becomes gradually paler until it turns white at the throat, the chest between the flippers, umbilicus and genital area. Its skin shows many circular scars. The specimen's head is flattened with a slight depression near the blowhole. The dorsal fin is nearly triangular and located in the posterior half of the body. The flippers are small and the flukes show no median notch. The mandibular tooth had not erupted and the swelling of the posterior part of the mandible is similar to the specimen described by Castello and Pinedo (1980). We therefore assume that this was the second record of a Blainville's beaked whale (*Mesoplodon densirostris*) on the Brazilian coast. We present this assumption with caution.

Family Physeteridae

Physeter macrocephalus Linnaeus, 1758
Sperm Whale, (Cachalote)

The presence of sperm whales in Uruguayan and southern Brazilian waters is known due to fortuitous strandings and sightings. On Uruguayan waters we have the sightings of September, 1959 and November, 1962 (Ximenez *et al.*, 1972) and the stranding of an adult male in July, 1983 (González de Baccino and Praderi, 1984). For Rio Grande do Sul, Brazil, there was a mass stranding of 33 sperm whales in December, 1972 (Castello and Pinero, 1974), the stranding of a male in August, 1978 (Clarke *et al.*, 1980) and the observation of a dead individual floating at 33°25'S in May, 1983 (Castello and Pinedo, 1986).

At Museo do Homem de Sambaqui (MHS), Florianópolis, three sperm whale teeth (23, 22 and 21 cm in length) are preserved, all of them without date, but collected by J.A. Rohr on Sta. Catarina Island.

We made sightings of sperm whales on board of the research vessel *Almirante Saldanha*, on 22 and 26 October 1985 at 29°06'05"S - 47°51'00"W and 28°06'00"S -

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A



B

Fig. 3. A. B. *Mesophodon densirostris* stranded on Ingleses Beach, Florianópolis in September, 1983 (Photo Journal "O Estado")

46°55'50"W, at 75 and 111 miles from the coast, at sites 1118 and 2181 meters deep (Ximenez *et al.*, 1987). The group, composed of 4 to 5 individuals, were moving northward.

On 2 December 1987, a 800 cm sperm whale stranded alive in Imbituba (according to a photograph by Hécio Toth, "Diário Catarinense" Journal).

Another specimen was found on 13 June 1989, at Figuerinha Beach, Jaguaruna. It was an enormous adult male (1790 cm) from which the left mandible is still preserved (UFSC 1080). Local residents reported that the animal's body floated for several days, being carried to the beach by the winds. As far as we know, this was the largest specimen discovered in southern Brazilian waters.

Suborder Mysticeti

Family Balanidae

Eubalaena australis (Desmoulins, 1822)
Southern right whale, (Baleia Franca)

Balaena glacialis, Carvalho, 1975, Bol. Tec. IF, S.Paulo, 6:p.17
(Distribution)

Balaenoptera physalus, Azevedo *et al.*, 1982 (not Linnaeus), Rev. Nord. Biol., 5(1):p.99 (Characters)

Eubalaena glacialis, Bittencourt, 1984 (not Müller), Arq. Biol. Tecnol., 27(4):p.532 (Distribution)

The southern right whale suffered intense commercial exploitation along all south and southeastern Brazilian coasts, specially in Sta. Catarina waters (Ellis, 1958, 1969). Despite the prohibition imposed by the International Whaling Commission in 1931, this species was being captured in Imbituba until 1973 (Palazzo and Carter, 1983).

A large amount of bones can be found abandoned near old whaling stations or being used as ornamentation at coastal residences. According to this sample, *E. australis* was the only whale species captured during whaling activities on the Sta. Catarina coast. Preserved specimens are listed in Table 7.

Based on the length of the lower jaw, which reaches 25% of the body length in this species (Leatherwood and Reeves, 1983), it was calculated that the Sta. Catarina specimens were 13 to 17 m long.

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Many authors have analysed the occurrence of this whale in this littoral band (Castello and Pinedo, 1979; Palazzo and Carter, 1983; Câmara and Palazzo, 1986; Lodi and Bergalo, 1984; Ximenez *et al.*, 1987). The southern right whale can be seen in these waters during the austral spring and winter, as a result of seasonal migration. Peaks of higher frequencies, during August and September, and the presence of calves in 45% of the cases, indicate that these waters are used as nursery (Simões-Lopes *et al.*, 1992). Through photo-identification flights these authors verified, for the first time, a link between the Brazilian and Argentinean populations. The groups of whales ranged from 1 to 6 individuals, usually mother-calf pairs.

Several fisherman/whale conflicts have occurred each year and the calves are the main victims. We have confirmed entanglements and intentional killing by firearms.

Table 7 - Specimens of *Eubalaena australis* found on the coasts of Sta. Catarina, southern Brazil.

Specimen n°	Locality	Date	Specimen Details
MHS - -	Ilha de Sta. Catarina	1940	M, E, V, R
MHS - -	Ilha de Sta. Catarina	1940	V, R, S
UFSC 1019	Barra da Lagoa	1984	Cervical V
UFSC 1020	Florianópolis	1986	Cervical V
UFSC 1022	Barra da Lagoa	1986	Cervical V

Family Balaenopteridae

Balaenoptera borealis Lesson, 1828 Sei whale

This whale has not been reported previously from Sta. Catarina waters. In November, 1989, we recovered a nearly complete skull (UFSC 1090), left mandible, scapulae and some ribs belonging to a rorqual whale, which was found buried in Santinho Beach, Florianópolis. The tip of the premaxillaries was intact, giving us a fairly accurate measure of the condylo-premaxillary length (3600 mm). On the basis of the long nasal bones (265 mm), convergent supraoccipital margins, mandible with a low and blunt coronoid process, and scapulae with both coracoid and acromial processes, we conclude that this specimen is a Sei whale, *B. borealis*.

B. borealis and *B. edeni* are very close relatives whose skulls show great similarity. In the Bryde's whale the skull is clearly flattened and the inner side of the mandible shows

a prominent deep groove (Omura *et al.*, 1981). The Sta. Catarina specimen has a slightly arched rostrum, a less developed groove on the inner side of the lower jaw, the rostrum edges are straight and the nasal bones are very long, reaching 7,3% of the condylobasal length, all features which belong to the Sei whale (Gambell, 1985).

Balaenoptera acutorostrata Lacépede, 1804
Minke whale

Balaenoptera huttoni, Brandão, 1914, Arch. Mus. Nac. R. de Janeiro, 17:p.15 (Characters, osteology)

Balaenoptera novaengliae, Carvalho, 1975 (part not Borowski), Bol. Tec. IF, S.Paulo, 16:p.20 (Distribution)

Minke whales are widely distributed among tropical, temperate and polar waters of both hemispheres and migrate in a manner hard to predict from year (Leatherwood and Reeves, 1983).

The oldest record concerning Sta. Catarina, is by Brandão (1914), who described a 6 m carcass long, found on 1 September 1912 at Galharada Beach, São Francisco do Sul. In Brandão's paper we can find good illustrations (Plates I-IV) showing the skull, earbone, sternum and some baleen plates, all of them conclusive in the species diagnosis.

Baldás and Castello (1986) mention a young 450 cm specimen at Rincão Beach, Sta. Catarina and suggested the existence of a calving area during winter and spring. This zone would range from Sta. Catarina to Mar del Plata, Argentina, off the continental shelf.

Ximenez *et al.* (1987), based on a photographic record, document a stranding at Barra Velha, in January, 1986.

We present new records of strandings and sightings. On 14 September 1986, the skull and left mandible (UFSC 1024) of a neonate killed by artisanal fishing nets was recovered at Camburiú. A second specimen (320 cm long) was measured by A. Ximenez at Ingleses Beach on 6 November 1987. On 24 December 1987, another calf was caught in fishing nets at Sonho Beach, Palhoça. These records reinforce the hypothesis of a calving area off the Sta. Catarina coast and suggest a mean parturition peak during the austral spring (September-December).

We made sightings from advantage points in January, 1987. we observed two adult Minke whales near Arvoredo Island (27°18'S - 48°26'W), at sites counting 20 to 30 meters depth. The whales stayed there for five days and then went southward.

In June, 1989, a skull (UFSC 1084) of an adult specimen was found on Gaiivota Beach, Sombrio.

Discussion

Seventeen cetacean species are confirmed for Sta. Catarina coastal waters, grouped in sixteen genera and seven families. This figure cannot be considered final, as it may be increased by new collections and sightings. Other species could potentially inhabit these waters, especially those with confirmed records near the study area.

At least four additional cetacean species occur off the Rio Grande do Sul region. Pinedo and Castello (1980) mention the striped dolphin, *Stenella coeruleoalba*, based on a specimen recovered near Rio Grande city and on a photograph of a dolphin pod near the Tramandai coast (30°00'S). Pinedo (1985) reports the occurrence of a male humpback whale, *Megaptera novaengliae* stranded alive 89 km north of the entrance of Patos Lagoon (31°38'S). Species of *Kogia* were found near the entrance of Patos Lagoon: the stranding of a female dwarf sperm whale, *Kogia simus*, bearing a female foetus (Pinedo, 1987), and the stranding of a pygmy sperm whale, *Kogia breviceps*, victim of firearms (Rosas and Pinedo, 1989). Two other females of this specie have recently stranded together at São José do Norte (32°1'S) (Secchi *et al.*, 1990).

To the north of Sta. Catarina, at Superagui Island on the Paraná coast (25°20'24"S), there is a record of a bryde's whale, *Balaenoptera edeni* (1300 cm) of which the skeleton was not kept (Bittencourt, 1983b). For São Paulo state (24°54'S), Schmiegelow and Paiva Filho (1989) presented the first record of the short-finned pilot whale, *Globicephala macrorhynchus* in the western South Atlantic.

The large diversity of cetacean species, as well as the superposition of tropical and cold waters fauna, reflect the special conditions created by the mixing waters of the Subtropical Convergence.

Ten of the seventeen Sta. Catarina species (*Pontoporia blainvillei*, *Steno bredanensis*, *Sotalia fluviatilis*, *Delphinus delphis*, *Tursiops truncatus*, *Stenella frontalis*, *Pseudorca crassidens*, *Grampus griseus*, *Eubalaena australis* and *Balaenoptera acutorostrata*), are captured in commercial or artisanal fishing nets. Drift and demersal gillnets and purse seines, are the mainly responsible for this impact, but hand-thrown harpoons, firearms and propellers also cause damage. The magnitude of this problem has not yet been evaluated. In some cases, the intentional killing of small netted cetaceans has been verified (Simões-Lopes and Ximenez, 1990) and as well as the occasional usage of dolphin meat for human consumption (Paula, 1988).

Several individuals drowned in gillnets did not show any external evidence of entanglement. This fact, also found by N.B. Barros and R.L. Teixeira (*pers. comm.*), tends to mask the results. The presence or absence of nets marks on the skin must not be considered a reliable indicator of entanglement. In addition, some authors use the word "stranding" in a general way for all specimens found dead. These two aspects taken

together reinforce the hypothesis that we are working with an underestimated view of the problem. Based on our own experiences, we suggested that the great majority of the specimens collected in Sta. Catarina were victims of entanglement in the fishing gear.

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