



Reports of strandings and sightings of bottlenose dolphins (*Tursiops truncatus*) in northeastern Brazil and Brazilian oceanic islands

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Abstract. This study revises and updates information on bottlenose dolphin *Tursiops truncatus* strandings and sightings in northeastern Brazil. A total of 72 strandings were recorded from 1992 to 2010, and 51 sightings were recorded from 1988 to 2010 along the states from Ceará to Bahia, including Fernando de Noronha and São Pedro and São Paulo archipelagos, Rocas Atoll and Abrolhos Bank. Most strandings were recorded in the states of Pernambuco, Bahia and Rio Grande do Norte. The number of reports was higher during summer, but no statistically significant difference was found between summer and other seasons. The majority of the stranded animals were adults (70.6%). Stranded calves were not observed. Total body length ranged from 138 to 321cm: 138 to 310cm for males; and 168 to 288cm for females. The average adult body length was 281cm (SD = 0.22). For stranding events where sex was determined (n = 29), a highly statistically significant difference was found between the number of males (n = 21) and females (n = 8). A total of six animals (8.3%) showed evidence of fisheries interactions such as net marks or removal of meat, blubber and eyes. Twenty-two sightings were recorded in the northeastern region, mostly in small islands and Rocas Atoll. This finding shows that the bottlenose dolphin is mainly an oceanic species in the region. More efforts are needed to improve our understanding of the populations and conservation status of bottlenose dolphins in this region.

Resumo. O objetivo deste trabalho foi revisar e atualizar informações sobre encalhes e avistagens do golfinho nariz-de-garrafa *Tursiops truncatus* no nordeste do Brasil. Foram registrados 72 encalhes de 1992 a 2010, e 51 avistagens de 1988 a 2010, desde o Ceará até a Bahia, incluindo os arquipélagos de Fernando de Noronha e de São Pedro e São Paulo, o Atol das Rocas e o Banco de Abrolhos. Os encalhes foram mais frequentes em Pernambuco, Bahia e Rio Grande do Norte. O número de eventos foi maior no verão, mas sem diferença significativa quando comparado às outras estações. Os registros foram mais relacionados a animais adultos (70.6%). Não houve registros de filhotes. O comprimento total dos golfinhos registrados variou de 138 a 321cm, sendo que para machos variou de 138 a 310cm, e para fêmeas de 168 a 288cm. O comprimento total médio dos adultos foi de 281cm (SD = 0,22). Nos eventos em que foi possível determinar o sexo (n = 29), observou-se que o número de machos (n = 21) foi significativamente maior do que o de fêmeas (n = 8). Foram encontradas evidências de interações com a pesca, como marcas de rede ou extração de carne, gordura ou olhos, em seis animais (8,3%). Vinte e duas avistagens foram registradas no nordeste, a maioria em regiões insulares e no Atol das Rocas, indicando que na área de estudo a espécie tem principalmente hábitos oceânicos. Há necessidade de incrementar os estudos sobre a espécie no nordeste do Brasil, identificando as populações e levantando informações para subsidiar a identificação do status de conservação da espécie.

Introduction

Bottlenose dolphins (*Tursiops truncatus*) are found worldwide in tropical and temperate waters in both oceanic and coastal regions, *i.e.* bays, estuaries and inshore lagoons (Wells and Scott, 1999; Reynolds *et al.*, 2000). This species lives in a wide range of habitats (Kenny, 1990; Shane, 1990) and distinct forms have been reported in coastal and pelagic regions¹ (*e.g.* Mead and Potter, 1995). However, whether or not these differences are species-specific should still be evaluated through morphological and molecular studies in areas of their occurrence (Wells and Scott, 2009).

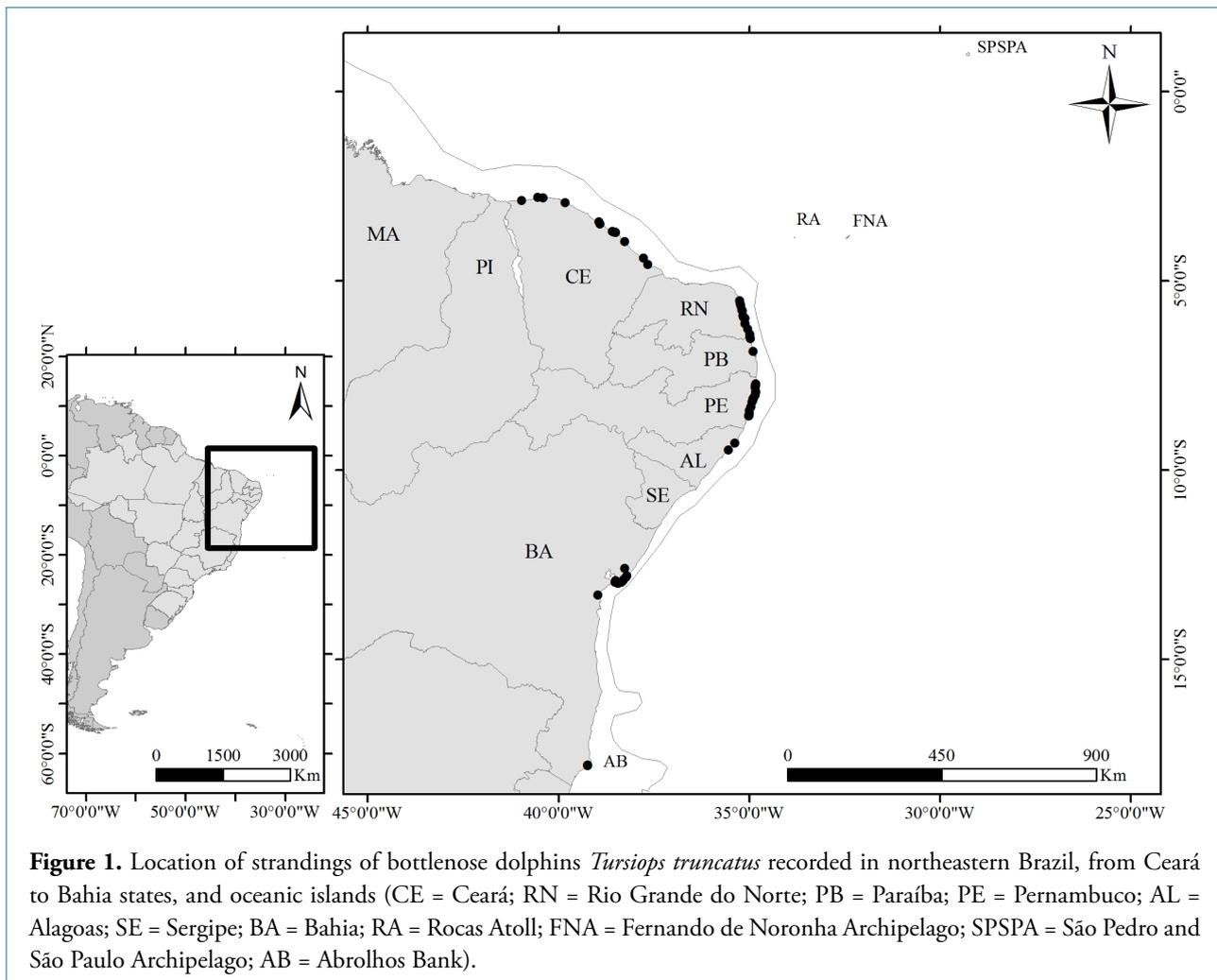
In the Southwest Atlantic Ocean, records of this species have been reported from the state of Pará, northern Brazil (Siciliano *et al.*, 2008), to Tierra del Fuego in Argentina².

Most information available is from the southern region, Santa Catarina State (Brazil) to Argentina, where resident populations of this species are found in bays and inshore lagoons (*e.g.* Simões-Lopes and Fabian, 1999; Fruet, 2008). The species in the northern region seems to have more oceanic habits, and reported information is limited and fragmented. However an organized effort to collect and compile data on aquatic mammal strandings in northeastern Brazil began with the establishment of the Northeastern Aquatic Mammal Stranding Network (REMANE) in the end of the 1990s, and the implementation of the Aquatic Mammal Monitoring System (SIMMAM), an on-line database tool (Barreto *et al.*, 2004). The REMANE is a group of eight institutions engaged in marine mammal studies. Most of these institutions have been collecting stranding information for over ten years, but the collection of information was standardized only after the establishment of the network.

The objective of this study was to revise and to report information concerning bottlenose dolphin strandings and sightings in northeastern Brazil, to analyze geographical and temporal distribution and identify patterns for sex and age classes of stranded specimens.

¹Anchante, H.H., Ormeño, M. and Reyes, J.C. (2002) Utilización del complejo timpano-periótico en la diferenciación de poblaciones costeras y oceánicas de *Tursiops truncatus* en aguas peruanas. Page 26 in Abstracts, 10a Reunión de Trabajo de Especialistas en Mamíferos Acuáticos de América del Sur, 14-19 October 2002, Valdivia, Chile.

²Goodall, R.N.P., Boy, C.C., Pimper, L.E. and Macnie, S.M. (2004) Range extensions and exceptional records of cetaceans for Tierra del Fuego. Page 158 in Abstracts, XI Reunión de Trabajo de Especialistas en Mamíferos Acuáticos de América del Sur y V Congreso de la Sociedad Latinoamericana de Especialistas en Mamíferos Acuáticos, 11-17 September 2004, Quito, Ecuador.



Material and Methods

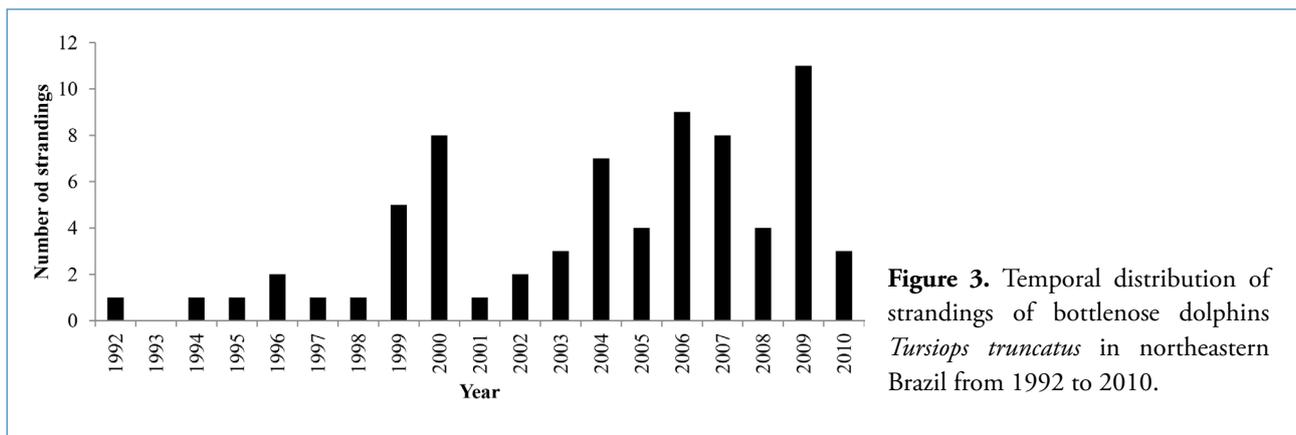
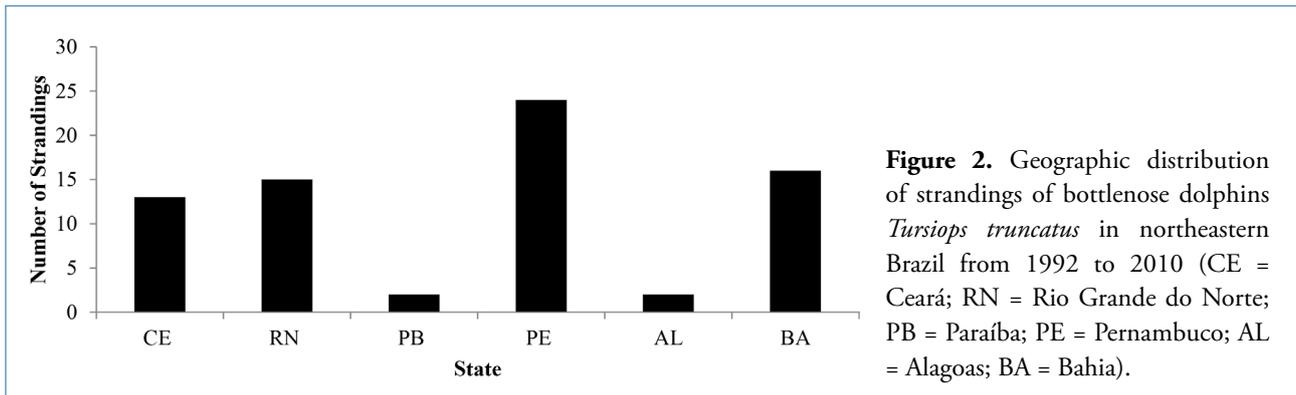
The study area comprised coastal and oceanic waters in northeastern Brazil covering the following parts of the Brazilian territorial sea (Figure 1): the coastline between the western coast of Ceará State (CE, 02°56'S, 41°17'W) to the southern coastline of Bahia State (BA, 18°20'S, 39°40'W), with the exception of the western coast of Rio Grande do Norte State (RN), comprising 2295km. Efforts were made to examine stranded carcasses and record sightings of dolphins in the oceanic region, such as São Pedro and São Paulo Archipelago (SPSPA, 00°56'N, 29°20'W), Fernando de Noronha Archipelago (FNA, 03°50'S, 32°24'W), Rocas Atoll (RA, 03°50'S, 33°39'W) and Abrolhos Bank (AB, 17°20' to 18°10'S, 38°35'to 39°20'W). Published information on strandings and sightings were also obtained from SIMMAM.

In some states, stranding records were made based on phone calls from resident people from coastal communities who became aware of the institution through information campaigns; in other areas a beach monitoring program was used to search for carcasses. Therefore, effort throughout the study area was not uniform.

Information collected in each stranding event included: stranding location (with geographic coordinates), total length [in cm, according to Norris (1961)] and sex of the animal. Information on anthropogenic interactions, such as net marks, stab wounds or removal of meat, eyes and teeth were also collected in some regions.

Age class was determined according to total length of the animals based on information available for bottlenose dolphin of the Atlantic (Fernandez, 1992). Animals were classified according to total length as calves (up to 130cm), juveniles (between 130 and 230cm) or adults (greater than 230cm). Sex was determined by identifying the position of the genital opening or macroscopic gonad observation.

The following variables related to stranding records were analyzed: spatial distribution; temporal distribution in annual, monthly and seasonal scales (summer: January to March; autumn: April to June; winter: July to September; spring: October to December); sex and age class; evidence of anthropogenic interactions (when information was available). The BioStat 5.0 Software (Ayres *et al.*, 2007) was used for the Chi-Square test ($\alpha=0.05$) in order to evaluate statistically significant differences in stranding records for each region, per



month, year and season, and for each sex. In addition, a Kruskal-Wallis (H) test ($\alpha=0.05$) was used to evaluate differences in total length of adult animals recorded in each state.

Sighting data were collected during dedicated (seismic or research cruises) and opportunistic boat surveys. In research cruises and some seismic surveys, sightings were recorded by experienced marine mammal observers. Sightings in FNA reported for the first time in this study were collected during research cruises ($n = 1372$) from 1988 to 2010. During this period, surveillance and research cruises were also performed by experienced observers in RA ($n = 7$), SPSPA ($n = 3$) and AB ($n = 2$). Sightings during seismic surveys in CE and RN were recorded by experienced observers according to Parente (2005).

Results

Strandings

A total of 72 bottlenose dolphin stranding events were recorded in the northeastern region of Brazil from January 1992 to April of 2010 (Table 1).

The occurrence of stranding events was statistically higher in PE (1999 to 2009; $\chi^2=30.8$; $p<0.05$), followed by BA (2004 to 2009), RN (1999 to 2010) and CE (1992 to 2010) (Figures 1 and 2).

The occurrence of stranding events was statistically higher in 2009 (10 events) compared to those in other study years, ($\chi^2=51.5$; $p<0.05$; Figure 3). Monthly distribution showed greater number of stranding events in January ($\chi^2=25.7$;

$p<0.05$) followed by October and September. Although a higher number of stranding events were observed in summer (Figure 4), no statistically significant difference was found in the seasonal distribution ($\chi^2=7.4$; $p>0.05$). Most stranding events in which the identification of total length of the animals was possible ($n = 51$) showed a higher number of adult individuals (70.6%). Calves were never observed and juveniles accounted for 29.4% of the identified animals (Figure 5). Total length of the dolphins ranged from 138 to 321cm ($n = 30$): 138 to 310cm for males ($n = 19$) and 168 to 288cm for females ($n = 7$). Average total length of adults was 281cm (SD = 0.22). No statistically significant difference was observed in total length of adult animals in each state ($H = 9.27$; $p > 0.05$).

Sex identification was possible in 40% of the individuals only, mainly because of the advanced stage of carcass decomposition. In events in which sex could be determined ($n = 29$), the number of males ($n = 21$) was significantly higher than that of females ($n = 8$) ($\chi^2 = 5.82$; $p<0.05$), showing a sex ratio of 2.6 males for each female. From the total ($n = 72$), eight specimens (11.1%) stranded alive. Four of these animals were confined in a tide pool at the Serrambi Beach (PE), and their total length was not measured. They were released to the sea after the tide rose. The other animals were two adults and two juveniles, which stranded in CE and BA states (see Table 1).

Evidence of bycatch and use of meat and blubber was recorded for six animals (8.3%): three in PE, two in southern BA and one in CE.

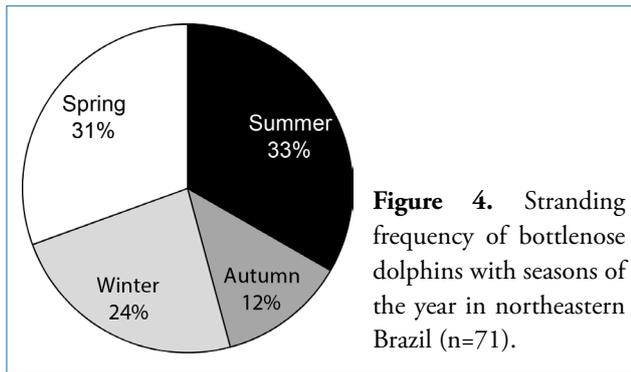


Figure 4. Stranding frequency of bottlenose dolphins with seasons of the year in northeastern Brazil (n=71).

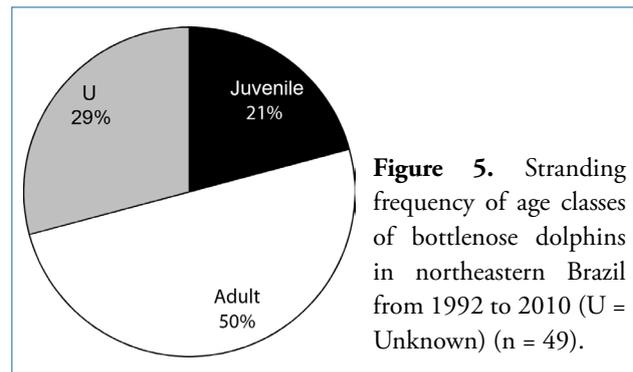


Figure 5. Stranding frequency of age classes of bottlenose dolphins in northeastern Brazil from 1992 to 2010 (U = Unknown) (n = 49).

Sightings

A total of 51 sightings of bottlenose dolphin were recorded in northeastern Brazil, 12 of which occurred in oceanic regions and 25 in islands laying on the continental shelf (Figure 6; Table 2). The only sighting in the archipelago of Fernando de Noronha was a group of bottlenose dolphins seen showing agonistic behavior towards a group of spinner dolphins *Stenella longirostris*.

Six sightings occurred in the coastal region, coastal bays in BA and the mouth of the Vaza-Barris River in Sergipe State (SE). A mixed group of bottlenose dolphin and rough-toothed dolphin *Steno bredanensis* was observed two days in a row in the Todos os Santos Bay (BA)³.

Discussion

The occurrence of *T. truncatus* in the austral region of the Southwest Atlantic Ocean is widely known. There have been reports on resident populations of the species in estuaries, coastal bays and lagoons in southern Brazil such as Norte Bay (Wedekin *et al.*, 2008) and Laguna (Simões-Lopes and Fabian, 1999), in the state of Santa Catarina; Tramandaí/Imbé (Simões-Lopes and Fabian, 1999) and Lagoa dos Patos (Castello and Pinedo, 1977; Fruet *et al.*, 2008), in the state of Rio Grande do Sul (RS). However, information about the species in the northeastern region of Brazil to date has been sparse and fragmented with the exception of its occurrence in the São Pedro and São Paulo Archipelago (Ott *et al.*, 2009).

In this study, a great number of strandings and sightings of bottlenose dolphin were compiled for the northeastern region of Brazil, which showed that the species is present throughout the coast. According to Maldini *et al.* (2005), when no other information is available, data on strandings may be used as indicators of the presence of a species in an area.

In the study area, the species seems to occur mainly in open regions, with the exception of the states of BA - where the species has been seen in coastal bays - and SE. In this

latter state, only one sighting was recorded at the mouth of the Vaza-Barris River, with no records of strandings. However, fishermen from the Mosqueiro Village, at the mouth of the river, claim that a dolphin different from the Guiana dolphin (*Sotalia guianensis*) appears in the region. The description of the dolphin given by many fishermen leads one to believe that it is *T. truncatus*⁴.

The increased effort of stranded carcass investigation since 1999 following the establishment of REMANE may have resulted in an increased number of bottlenose dolphin carcasses recorded. In the states of CE and RN, this increase in stranding records may be a result of greater effort to fish king mackerel *Scomberomorus cavalla* and Spanish mackerel *Scomberomorus brasiliensis*, which is performed using pelagic gillnets⁵. This method of fishing is practiced in regions farther from the coast, in which the capture of pelagic cetacean species like bottlenose dolphin is more likely to happen.

Monthly distribution of the strandings showed that they occur throughout the year and have their peak in the month of January. This peak may be associated with an increase in the number of phone calls reporting strandings, since a large number of people can be at the beaches at this time of the year, and not necessarily due to a higher occurrence of stranding events. Meirelles *et al.* (2009) also reported a greater number of cetacean strandings in CE in the summer.

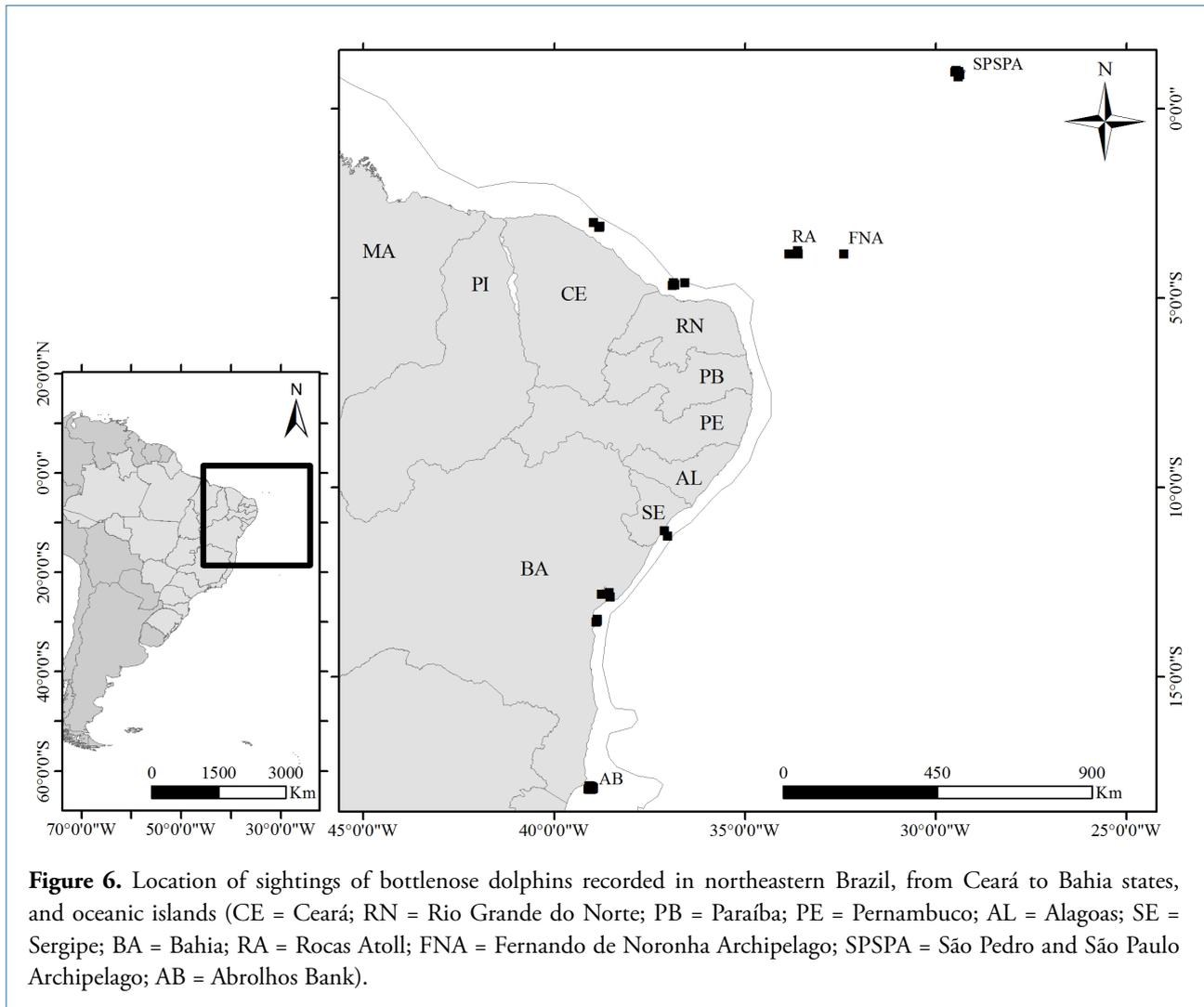
The maximum total length recorded in this study was 321cm for an individual whose sex was not identified. This value is lower than 385.9cm which was reported by Fruet (2008) in the state of RS, southern Brazil, for a male. According to Leatherwood and Reeves (1982), total length of bottlenose dolphin varies inversely proportional to water temperature. In this way, such differences observed in warm waters of northeastern Brazil and in cold waters of RS are in agreement with other studies. Although a small number of females were recorded in this study, their body lengths were shorter than those for males, which is in accordance with findings by Fruet (2008) in RS.

The lack of calf records in this study could be related to the decomposition of the smaller carcass in a shorter period of

³Carvalho-Souza, G.F., Santos, G.R.L., Carneiro, M., Reis, M.S.S., Watanabe-Ferreira, Y. and Maia-Nogueira, R. (2008) Golfinho flipper, *Tursiops truncatus*, e golfinho de dentes rugosos, *Steno bredanensis*, formando grupo misto na Baía de Todos os Santos, Bahia, Brasil. Resumo 10080 in Anais, III Congresso Brasileiro de Oceanografia & I Congresso Ibero-Americano de Oceanografia, 20-24 May 2008, Fortaleza, CE, Brazil.

⁴A. Hubner, pers. comm., 20 February 2011

⁵R. de Salles, pers. comm., January 2009



time, consumption by necrophagous species or rapid sinking. These possibilities make one believe that calves which die in oceanic waters may not wash ashore. Therefore, the likelihood of animal records within this smaller age class would be reduced. A lower frequency of calf strandings was also reported by Fruet (2008) in the state of RS and Mattson *et al.* (2006) in the Gulf of Mexico, but these studies concerned coastal populations.

The frequency of stranded adult animals was higher in the northeastern region (70%) than in southern Brazil. According to Fruet (2008), in the state of RS the majority of carcasses were from immature individuals (61.3%). However, body length of individuals and the interval of total length of age classes used in both studies were different. In addition, the habitat of the species in these areas is different, and the animals are also under different natural and anthropogenic pressures, which may lead to differences in frequency of classes identified.

The fact that most carcasses were identified as males might be related to the easier identification, as the penis is usually exposed, even in carcasses in late stages of decomposition.

Similar findings were reported in CE by Meirelles *et al.* (2009), in Puerto Rico by Mignucci-Giannoni *et al.* (1999) and in Texas (Worthy, 1998). Moreover, sex identification was not possible in many carcasses. Therefore, we cannot conclude that males are dying more frequently than females.

In this study, few cases of interaction with fisheries were recorded and they might be underestimated as most stranded carcasses were in advanced stage of decay. Therefore, evidence of bycatch such as nets and rope marks and lesions were not possible to be identified. The interaction between cetaceans and fisheries in northern Brazil is mainly reported for the Guiana dolphin (Monteiro-Neto *et al.*, 2000; Tosi *et al.*, 2007; Meirelles *et al.*, 2010), but it is also reported for rough-toothed dolphin, *Steno bredanensis*, Clymene dolphin *Stenella clymene*, Atlantic spotted dolphin *Stenella frontalis*, melon-headed whale *Peponocephala electra* and short-finned pilot whale *Globicephala macrorhynchus* (Meirelles *et al.*, 2009). The same authors reported a bottlenose dolphin carcass in which eyes, dorsal fin and meat had been removed. This is a common practice in CE as the meat is used for either bait or human consumption and the eyes are used as a good luck charm.

Table 1. Stranding records of bottlenose dolphins in northeastern Brazil from 1992 to 2010 (AC = Age class; AL = Alagoas; BA = Bahia; CE = Ceará; F = female; M = male; Mo = Month; NI = not identified; PB = Paraíba; PE = Pernambuco; RN = Rio Grande do Norte; S = Status; SP = Stranding place; TL = Total Length; Y = Year).

Code#	Mo	Y	Sex	TL (cm)	AC	State	SP	Latitude	Longitude	S	Source	Deposited
02C1310/06	Jan	1992	NI			CE	Jericoacoara, Jijoca	02°47'43"S	40°31.07'60"W	Dead	Alves-Junior <i>et al.</i> (1996)	Aquasis
02C1311/31	Jan	1994	M	310	Adult	CE	Lido, Fortaleza	03°43'23.9"S	38°30'08"W	Alive	Alves-Junior <i>et al.</i> (1996)	Aquasis
02C1310/56	Dec	1995	NI			CE	Goiabeiras, Fortaleza	03°41'42.5"S	38°34'46.9"W	Dead	Alves-Junior <i>et al.</i> (1996)	Aquasis
02C1310/75	Mar	1996	NI	310	Adult	CE	Almofala, Itarema	02°55'57.08"S	39°49'11.05"W	Dead	Alves-Junior <i>et al.</i> (1996)	-
02C1311/121	Dec	1997	M	138	Juvenile	CE	Pirambu, Fortaleza	03°42'27.6"S	38°33'14.11"W	Dead	Meirelles <i>et al.</i> (2009)	-
02C1311/131	Set	1998	M	290	Adult	CE	Taíba, São Gonçalo do Amarante	03°30'20.13"S	38°54'20.59"W	Dead	Meirelles <i>et al.</i> (2009)	-
02C1310/173	Jun	2000	NI	258	Adult	CE	Piriquara, Paracuru	03°26'55.7"S	38°56'25.7"W	Dead	Meirelles <i>et al.</i> (2009)	Aquasis
02C1310/185	Oct	2000	NI	182	Juvenile	CE	Lido, Fortaleza	03°43'08.5"S	38°30'41.19"W	Dead	Meirelles <i>et al.</i> (2009)	-
02C1310/258	Feb	2005	NI			CE	Maceió, Camocim	02°52'54"S	40°57'49"W	Dead	Meirelles <i>et al.</i> (2009)	Aquasis
02C1310/325	Dec	2008	NI	320	Adult	CE	Quixaba, Aracati	04°34'23.4"S	37°39'09.1"W	Dead	This paper	Aquasis
02C1310/326	Dec	2008	NI			CE	Pontal do Maceió, Fortim	04°24'04.1"S	37°46'11.7"W	Dead	This paper	Aquasis
02C1211/373	Apr	2010	M	217	Juvenile	CE	Barro Preto, Aquiraz	03°57'37"S	38°15'45"W	Alive	This paper	-
02C1310/375	Apr	2010	NI	317	Adult	CE	Praia do Preá, Cruz	02°48'49"S	40°24'6"W	Dead	This paper	Aquasis
07C1310/01	Feb	1999	NI	275	Adult	RN	Barreta Beach, Nísia Floresta	06°07'55.9"S	35°06'13.0"W	Dead	This paper	Ecomar
07C1311/10	Dec	2000	M	259	Adult	RN	Barreta Beach, Nísia Floresta	06°07'55.9"S	35°06'13.0"W	Dead	This paper	Ecomar
07C1312/69	Oct	2004	NI			RN	Jacumã Beach, Ceará-Mirim	05°35'32.7"S	35°13'38.7"W	Dead	This paper	Ecomar
07C1310/74	Nov	2004	NI			RN	Baía Formosa	06°28'47.7"S	34°58'19.7"W	Dead	This paper	Ecomar
07C1310/116	Aug	2006	NI	240	Adult	RN	Barreira Roxa, Natal	05°47'38.41"S	35°10'55.73"W	Dead	This paper	Ecomar
07C1311/119	Sep	2006	M	297	Adult	RN	Cutia Beach	06°25'12.95"S	34°58'27.01"W	Dead	This paper	Ecomar
07C1310/122	Oct	2006	NI			RN	Mirui Beach	05°31'45.62"S	35°14'57.63"W	Dead	This paper	Ecomar
07C1310/133	Jan	2007	F	272	Adult	RN	Sibaúma Beach	06°16'39"S	35°02'7"W	Dead	This paper	Ecomar
07C1312/135	May	2007	NI			RN	Via Costeira, Natal	05°51'33"S	34°54'37"W	Dead	This paper	Ecomar

07C1310/152	Aug	2008	NI	280	Adult	RN	Artistas Beach, Natal	05°46'26"S	35°11'38"W	Dead	This paper	Ecomar
07C1310/163	Jan	2009	M			RN	Pitangui Beach, Extremoz	05°39'00"S	35°13'04"W	Dead	This paper	Ecomar
07C1311/166	Jan	2009	M	280	Adult	RN	Cotovelo Beach	05°55'14"S	35°09'22"W	Dead	This paper	Ecomar
07C1310/179	Set	2009	NI	300	Adult	RN	Tabatinga, Nísia Floresta	06°04'19.98"S	35°06'00.44"W	Dead	This paper	Ecomar
07C1310/185	Nov	2009	NI			RN	B. do Inferno, Parnamirim	05°57'49"S	35°08'46"W	Dead	This paper	PCCB
-	Jan	2010	M	270	Adult	RN	Búzios Beach, Nísia Floresta	06°00'00"S	35°06'42"W	Dead	This paper	PCCB
01C1310/156	Mar	2005	NI	321	Adult	PB	Miriri	06°51'59.81"S	34°54'01.66"W	Dead	This paper	CMA
01C1310/159	Apr	2005	NI	226	Juvenile	PB	Barra de Camaratuba	06°31'59.3"S	34°58'01.9"W	Dead	This paper	CMA
01C1311/06	Mar	1999	M	227	Juvenile	PE	Porto de Galinhas	08°30'28.33"S	35°00'00.12"W	Dead	This paper	CMA
01C1311/07	Mar	1999	M	258	Adult	PE	Boa Viagem, Recife	08°07'35.62"S	34°53'50.02"W	Dead	This paper	CMA
01C1310/75	May	2000	NI	290	Adult	PE	Xaréu, Cabo de Sto Agostinho	08°20'10.04"S	34°57'00.94"W	Dead	This paper	CMA
01C1310/77	Sep	2000	NI	245	Adult	PE	Enseada de Serrambi	08°33'11.30"S	35°00'30.86"W	Dead	This paper	CMA
01C1310/79	Oct	2000	NI	244	Adult	PE	Olinda	08°00'53.62"S	34°50'41.55"W	Dead	This paper	CMA
01C1310/80	Nov	2000	NI	154	Juvenile	PE	Candeias Beach	08°11'46.41"S	34°55'11.23"W	Dead	This paper	CMA
01C1312/82	Jan	2001	F	186	Juvenile	PE	Enseada dos Corais	08°19'42.65"S	34°56'58.36"W	Dead	This paper	CMA
01C1311/95	Sep	2002	M	295	Adult	PE	Sossego Beach, Itamaracá	07°43'25.05"S	34°49'50.99"W	Dead	This paper	CMA
01C1310/111	May	2003	NI	262	Adult	PE	Janga Beach/ Paulista	07°56'22.6"S	34°49'22.6"W	Dead	This paper	CMA
01C1312/123	Mar	2004	F	225	Juvenile	PE	Pilar Beach, Itamaracá	07°44'54.24"S	34°49'24.41"W	Dead	This paper	CMA
01C1310/146	Jan	2003	NI			PE	Forno da Cal Beach, Itamaracá	07°48'30"S	34°50'30"W	Dead	This paper	CMA
01C1310/150	Sep	2004	NI	228	Juvenile	PE	Boa Viagem, Recife	08°07'28"S	34°53'49"W	Dead	This paper	CMA
01C1311/170	Dec	2005	M	282	Adult	PE	Pina, Recife	08°05'32"S	34°52'55"W	Dead	This paper	CMA
01C1310/175	Mar	2006	NI			PE	Boa Viagem, Recife	08°07'28"S	34°53'49"W	Dead	This paper	CMA
01C1311/186	Sep	2006	M	288	Adult	PE	Janga, Paulista	07°55'59"S	34°49'21"W	Dead	This paper	CMA
01C1310/187	Oct	2006	NI			PE	Coroa do Avião, Igarassu	07°48'59"S	34°50'21"W	Dead	This paper	CMA

01C1311/191	Nov	2006	M	294	Adult	PE	Ilha de Itamaracá	07°46'20.3" S	34°49'53.1"W	Dead	This paper	CMA
01C1310/209	Oct	2007	NI	198	Juvenile	PE	Boa Viagem, Recife	08°07'28"S	34°53'49"W	Dead	This paper	CMA
01C1310/247	Jan	2009	NI			PE	Serrambi, Ipojuca	08°34'08.2"S	35°00'26.2"W	Alive	This paper	-
01C1310/248	Jan	2009	NI			PE	Serrambi, Ipojuca	08°34'08.2"S	35°00'26.2"W	Alive	This paper	-
01C1310/249	Jan	2009	NI			PE	Serrambi, Ipojuca	08°34'08.2"S	35°00'26.2"W	Alive	This paper	-
01C1310/250	Jan	2009	NI			PE	Serrambi, Ipojuca	08°34'08.2"S	35°00'26.2"W	Alive	This paper	-
01C1310/257	Oct	2009	NI			PE	Piedade, Jaboatão dos Guararapes	08°10'27.5"S	34°54'36.0"W	Dead	This paper	CMA
01C1310/258	Oct	2009	NI			PE	Porto de Galinhas	08°25'52.4"S	34°59'54.1"W	Dead	This paper	CMA
01C1310/78	Oct	2000	NI	270	Adult	AL	Paripueira, Paripueira	09°27'58"S	35°32'38"W	Dead	This paper	CMA
01C1310/224	Jul	2008	NI	212	Juvenile	AL	Riacho, São Miguel do Milagres	09°16'48.2"S	35°22'42.3"W	Dead	This paper	CMA
05C1310/046	Aug	2004	NI	300	Adult	BA	Caravelas	14°47'55"S	39°13'59"W	Dead	This paper	IBJ
05C1310/086	Sep	2007	NI	283	Adult	BA	Caravelas	17°47'27"S	39°13'34"W	Dead	This paper	IBJ
05C1310/087	Sep	2007	NI	183	Juvenile	BA	Caravelas	17°47'27"S	39°13'34"W	Dead	This paper	IBJ
IMA00026	Oct	1996	F	288	Adult	BA	Ipitanga, Lauro de Freitas	12°54'42"S	38°18'24"W	Dead	This paper	IMA
IA00066	Jan	1999	F			BA	Itapuá, Salvador	12°57'20"S	38°21'00"W	Dead	This paper	-
IMA00098	Nov	1999	M	200	Juvenile	BA	Vilas do Atlântico, Lauro de Freitas	12°53'37"S	38°17'29"W	Dead	This paper	-
IMA00190	Jul	2002	M	292	Adult	BA	Lagos Beach, Arembepe	12°47'39"S	38°11'54"W	Dead	This paper	-
IMA00233	Jul	2003	F	168	Juvenile	BA	Jardim de Alá, Salvador	12°59'40"S	38°26'25"W	Alive	This paper	-
IMA00251	Jan	2004	M			BA	Jauá, Camaçari	12°50'21"S	38°14'06"W	Dead	This paper	IMA
IMA00268	Jul	2004	M	150	Juvenile	BA	Armação, Salvador	12°59'15"S	38°26'04"W	Dead	This paper	IMA
IMA00528	Feb	2006	NI			BA	Guaibim, Valença	13°17'39"S	38°57'54"W	Dead	This paper	IMA
IMA00747	Apr	2006	NI	259	Adult	BA	Comércio, Salvador	12°57'58"S	38°30'37"W	Dead	This paper	IMA
IMA01327	Jun	2007	F	250	Adult	BA	Armação Beach, Salvador	12°59'15"S	38°26'04"W	Dead	This paper	IMA
IMA01521	Aug	2007	M	284	Adult	BA	Lobato, Salvador	12°55'20"S	38°29'31"W	Alive	This paper	IMA
IMA01718	Dec	2007	F	255	Adult	BA	Condomínio São José Beach, Itacaré	14°18'53"S	38°59'24"W	Dead	This paper	-
IMA03005	Jan	2009	M	279	Adult	BA	Jardim Armação, Salvador	12°59'12"S	38°26'42"W	Dead	This paper	IMA

Table 2. Sighting records of bottlenose dolphins in northeastern Brazil from 1988 to 2010 (BA = Bahia; CE = Ceará; PE = Pernambuco; RN = Rio Grande do Norte; SE = Sergipe)

State	Area	Date	Latitude	Longitude	Group size	Source	Effort	Documented
BA	Abrolhos Bank	01 Mar 1988	17°58'S	39°01'W	4 adults	This paper	Dedicated/Oppportunistic - Surveillance and research cruise	Yes
BA	Abrolhos Bank	02 Mar 1988	17°58'S	39°01'W	4 adults	This paper	Dedicated/Oppportunistic - Surveillance and research cruise	Yes
BA	Abrolhos Bank	03 Mar 1988	17°58'S	39°01'W	4 adults	This paper	Dedicated/Oppportunistic - Surveillance and research cruise	Yes
BA	Todos os Santos Bay	Jun 1997	12°57'S	38°57'W	4	Sampaio and Reis ⁶	Dedicated - Revizee Oceanographic cruise	Yes
BA	Abrolhos Bank	1997 to 2004	16°40'S	38°00'W	18 sightings	Rossi-Santos <i>et al.</i> (2006)	Oppportunistic - Humpback whale cruise	Yes
BA	Cairú Island, Tinharé Archipelago	2004	13°32'S	39°01'W	1	L.A. Souto ⁷	Dedicated - Seismic survey	Yes
BA	Cairú Island, Tinharé Archipelago	2004	13°32'S	39°01'W	2	L.A. Souto ⁷	Dedicated - Seismic survey	Yes
BA	Cairú Island, Tinharé Archipelago	2004	13°32'S	39°01'W	2	L.A. Souto ⁷	Dedicated - Seismic survey	Yes
BA	Ribeira Beach, Todos os Santos Bay	Mar 2007	12°55'S	38°30'W	Mixed group with <i>Steno bredanensis</i>	Carvalho-Souza <i>et al.</i> ³	?	?
BA	Aratu Bay, Todos os Santos Bay	?	12°47'S	38°27'W	Mixed group with <i>Steno bredanensis</i>	Carvalho-Souza <i>et al.</i> ³	?	?
RN	Rocas Atoll	27 Oct 2004	03°50'45" S	33°39'35"W	6	Baracho <i>et al.</i> (2008)	Dedicated - research cruise	Yes
RN	Rocas Atoll	28 Oct 2004	03°50'45" S	33°39'35"W	15	Baracho <i>et al.</i> (2008)	Dedicated- research cruise	Yes
RN	Rocas Atoll	Between 17 Aug and 10 Dec 1993	03°45'S	33°37'W	two adults and one calf	Skaf and Secchi ⁸	Oppportunistic - research cruise	?
RN	Rocas Atoll	27 Jan 1999	03°50'S	33°50'W	10	This paper	Dedicated/Oppportunistic - Surveillance and research cruise	Yes
PE	Fernando de Noronha Archipelago	01 Mar 2004	03°50'S	32°24'W	50	This paper	Dedicated research cruise	Yes
PE	São Pedro and São Paulo Archipelago	Between 15 Aug and 10 Dec 1993	00°56'N	29°22'W	15	Skaf and Secchi ⁸	Oppportunistic - research cruise	?
PE	São Pedro and São Paulo Archipelago	16 Aug 2004	01°50'N	29°20'W	10 adults	This paper	Dedicated/Oppportunistic - Surveillance and research cruise	Yes
PE	São Pedro and São Paulo Archipelago	18 Aug 2004	01°50'N	29°20'W	10 adults	This paper	Dedicated/Oppportunistic - Surveillance and research cruise	Yes
PE	São Pedro and São Paulo Archipelago	19 Aug 2004	01°50'N	29°20'W	10 adults	This paper	Dedicated/Oppportunistic - Surveillance and research cruise	Yes
PE	São Pedro and São Paulo Archipelago	20 Apr 2010	01°50'N	29°20'W	20, with adults, juveniles and calves	This paper	Dedicated/Oppportunistic - Surveillance and research cruise	Yes

PE	São Pedro and São Paulo Archipelago	21 Apr 2010	01°50'N	29°20'W	20, with adults, juveniles and calves	This paper	Dedicated/Opportunistic - Surveillance and research cruise	Yes
PE	São Pedro and São Paulo Archipelago	22 Apr 2010	01°50'N	29°20'W	20, with adults, juveniles and calves	This paper	Dedicated/Opportunistic - Surveillance and research cruise	Yes
PE	São Pedro and São Paulo Archipelago	23 Apr 2010	01°50'N	29°20'W	20, with adults, juveniles and calves	This paper	Dedicated/Opportunistic - Surveillance and research cruise	Yes
CE	West Fortaleza	Apr 2003	03°08'12"S	38°48'47"W	2	Parente (2005)	Dedicated - seismic survey	?
CE	West Fortaleza	Apr 2003	03°08'6"S	38°49'28"W	2	Parente (2005)	Dedicated - seismic survey	?
CE	West Fortaleza	Apr 2003	03°07'30"S	38°47'55"W	5	Parente (2005)	Dedicated - seismic survey	?
CE	West Fortaleza	May 2003	03°01'30"S	38°57'29"W	3	Parente (2005)	Dedicated - seismic survey	?
CE/RN	CE/RN	Sep 2002	04°41'46"S	36°53'20"W	3	Parente (2005)	Dedicated - seismic survey	?
CE/RN	CE/RN	Sep 2002	04°37'45"S	36°51'55"W	1	Parente (2005)	Dedicated - seismic survey	?
CE/RN	CE/RN	Sep 2002	04°40'44"S	36°50'18"W	2	Parente (2005)	Dedicated - seismic survey	?
CE/RN	CE/RN	Sep 2002	04°40'50"S	36°50'13"W	2	Parente (2005)	Dedicated - seismic survey	?
CE/RN	CE/RN	Sep 2002	04°40'45"S	36°50'27"W	4	Parente (2005)	Dedicated - seismic survey	?
CE/RN	CE/RN	Oct 2002	04°37'53"S	36°34'06"W	5	Parente (2005)	Dedicated - seismic survey	?
SE	Next to Vaza-Barris Estuary	Nov 2002	11°09'14"S	37°06'27"W	1	Parente (2005)	Dedicated - seismic survey	?
SE	6 miles from Vaza-Barris Estuary	Aug 2006	11°17'04"S	37°01'04"W	7	Okeanus/CGG	Dedicated - seismic survey	?

⁶Sampaio, C.L.S. and Reis, M.S.S. (1998) Registro de cetáceos na costa Nordeste. Page 187 in Abstracts, *VIII Reunião de Trabalho de Especialistas em Mamíferos Aquáticos da América do Sul*, 25-29 October 1998, Olinda-PE, Brazil.

⁷L.A. Souto, pers. comm., 20 May 2011.

⁸Skaf, M.K. and Secchi, E. (1994) Avistagens de cetáceos na travessia do Atlântico: Santos-Tenerife. Page 72 in Abstracts, *6ª Reunião de Trabalho de Especialistas em Mamíferos Aquáticos da América do Sul*. 24-28 October 1994, Florianópolis, SC, Brazil.

The observed percentage of sightings (23%) occurring around oceanic islands resulted from the animals' use of these island areas as a resting and feeding site, as it has already been reported for spinner dolphin *Stenella longirostris* in FNA (Silva-Jr, 2010) and for bottlenose dolphin in SPSPA (Ott *et al.*, 2009).

Although bottlenose dolphin has been the most studied dolphin species in the world, until recently it was considered as 'Data Deficient' by IUCN, *i.e.* data were insufficient to identify if the species was within any category of threat. Due to its wide distribution and great abundance, the species was classified as 'Least Concern' in the red list (Hammond *et al.*, 2012) in spite of several threats to local populations of this species.

In Brazil, the species is not included in the National List of Threatened Species (MMA, 2014). With the exception of resident populations in the south of the country, and in SPSPA, little is known about the species in Brazil. In 2011, the Brazilian government published the Small Cetacean

Action Plan (Rocha-Campos *et al.*, 2011), in which Brazilian researchers and stakeholders indicated important research and actions to increase knowledge and promote the species conservation.

Joint efforts, like those made by stranding networks and REMANE in this study, are very important to obtain solid data for a significant area of the coast in a relevant period.

Information about the occurrence areas of the species is essential so that studies could be developed to help guide effective management, fund conservation actions, as well as evaluate the conservation status of the populations.

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References

- Ayres, M., Ayres Júnior, M., Ayres, D.L. and Santos, A.A. (2007) BIOESTAT Aplicações estatísticas nas áreas das ciências biológicas e médicas. Sociedade Civil Mamirauá, Belém, Brazil. 364 pp.
- Baracho, C., Cipolotti, S., Marcovaldi, E., Apolinário, M. and Silva, M.B. (2008) The occurrence of bottlenose dolphins (*Tursiops truncatus*) in the biological reserve of Atol das Rocas in north-eastern Brazil. *Marine Biodiversity Journal* 1: e75. <http://dx.doi.org/10.1017/S1755267207007920>
- Barreto, A.S., Moraes, C.G., Sperb, R.M. and Bughi, C.H. (2004) Using GIS to manage cetacean strandings. *Journal of Coastal Research* 39: 1643-1645.
- Castello, H. and Pinedo, C. (1977) Botos na Lagoa dos Patos. *Natureza em Revista* 12:46-49.
- Fernandez, S.P. (1992) *Composicion de edad y sexo parametros del ciclo de vida de toninas (Tursiops truncatus) varadas en el noroeste del Golfo de Mexico*. M.Sc. Thesis. Instituto Tecnológico y de Estudios Superiores de Monterrey. Guaymas, Mexico. 109 pp.
- Hammond, P.S., Bearzi, G., Bjørge, A., Forney, K.A., Karkzmarski, L., Kasuya, T., Perrin, W.F., Scott, M.D., Wang, J.Y., Wells, R.S. and Wilson, B. (2012) *Tursiops truncatus*. The IUCN Red List of Threatened Species 2012: e.T22563A17347397
- IBAMA (2003) Lista de Espécies da Fauna Silvestre Ameaçadas de Extinção. Available at <http://www.ibama.gov.br/documentos/listas-de-especies-da-fauna-e-flora-ameacadas-de-extincao>. Consulted on 05 July 2013.
- Fruet, P.F. (2008) *Abundância, mortalidade em atividades pesqueiras e viabilidade da população de botos (Tursiops truncatus) do estuário da Lagoa dos Patos, RS, Brasil*. M.Sc. Thesis. Universidade Federal do Rio Grande. Rio Grande, Rio Grande do Sul, Brazil. 192 pp.
- Kenny, R.D. (1990) Bottlenose dolphins off the northeastern United States. Pages 369-386 in Leatherwood, S. and Reeves, R.R. (Eds) *The bottlenose dolphin*. Academic Press, San Diego, CA, USA.
- Leatherwood, S. and Reeves, R.R. (1982) Bottlenose dolphin, *Tursiops truncatus*, and other toothed cetaceans. Pages 369-414 in Chapman, J.A. and Feldhamer, G.A. (Eds) *Wild mammals of North America, biology, management, and economics*. John Hopkins University Press, Baltimore, MD, USA.
- Maldini D., Mazzuca, L. and Atkinson, S. (2005) Odontocete stranding patterns in the main Hawaiian Islands (1937-2002): how do they compare with live animal surveys? *Pacific Science* 59: 55-67. <http://dx.doi.org/10.1353/psc.2005.0009>
- Mattson, M.C., Mullin, K.D., Ingram-Jr., G.W. and Hoggard, W. (2006) Age structure and growth of the bottlenose dolphin (*Tursiops truncatus*) from strandings in the Mississippi Sound region of the north-central Gulf of Mexico from 1986 to 2003. *Marine Mammal Science* 22(3): 654-666. <http://dx.doi.org/10.1111/j.1748-7692.2006.00057.x>
- Mead, J.G. and Potter, C.W. (1995) Recognizing two populations of the bottlenose dolphin (*Tursiops truncatus*) off the Atlantic coast of North America: morphologic and ecologic considerations. *IBI Reports (International Marine Biological Research Institute, Kamogawa, Japan)* 5: 31-44.
- Meirelles, A.C.O., Monteiro-Neto, C., Martins, A.M.A., Costa, A.F., Barros, H.M.D.R. and Alves, M.D.O. (2009) Cetacean strandings in Ceará coast, north-eastern Brazil (1992-2005). *Journal of the Marine Biological Association of the United Kingdom* 89(5): 1083-1090. <http://dx.doi.org/10.1017/S0025315409002215>
- Meirelles, A.C.O., Ribeiro, A.C., Silva, C.P.N. and Soares-Filho, A.A. (2010) Records of marine tucuxi dolphin, *Sotalia guianensis*, in the state of Ceará, northeastern Brazil. *Latin American Journal of Aquatic Mammals* 8 (1-2): 97-102. <http://dx.doi.org/10.5597/lajam00157>
- Mignucci-Giannoni, A., Pinto-Rodriguez, B., Velasco-Escudeiro, M., Montoya-Ospina, R.A., Jimenez-Marrero, N.M., Rodriguez-Lopez, M.A., Williams Jr, E.H. and Odell, D.K. (1999) Cetacean strandings in Puerto Rico and the Virgin Islands. *Journal of Cetacean Research and Management* 1: 191-198.
- MMA (2014) Portaria no. 444, de 17 de Novembro de 2014. Lista Nacional Oficial de Espécies da Fauna Ameaçadas de Extinção.
- Monteiro-Neto, C., Alves-Júnior, T.T., Ávila, F.J.C., Campos, A.A., Costa, A.F., Silva, C.P.N. and Furtado-Neto, M.A.A. (2000) Impact of fisheries on the tucuxi (*Sotalia fluviatilis*) and rough-toothed dolphin (*Steno bredanensis*) populations off Ceará state, northeastern Brazil. *Aquatic Mammals* 26: 49-56.
- Norris, K.S. (1961) Standardized methods for measuring and recording data on the smaller cetaceans. *Journal of Mammalogy* 42(4): 471-476. <http://dx.doi.org/10.2307/1377364>
- Ott, P.H., Tavares, M., Moreno, I.B., Oliveira, L.R. and Danilewicz, D. (2009) Os cetáceos do Arquipélago de São Pedro e São Paulo, Brasil. Pages 283-300 in Mohr, L.V., Castro, J.W.A., Costa, P.M.S. and Alves, R.J.V. (Eds) *Ilhas Oceânicas Brasileiras: da pesquisa ao manejo*. v.2. Ministério do Meio Ambiente/Secretaria de Biodiversidade e Florestas, Brasília, Brazil.

- Parente, C.L. (2005) *Monitoramento de mamíferos marinhos durante estudos sísmicos no nordeste do Brasil*. M.Sc. Thesis. Universidade Federal de Pernambuco. Recife, PE, Brazil. 88 pp.
- Reynolds, J.E., Wells, R.S. and Eide, S.D. (2000) *The bottlenose dolphin: Biology and conservation*. University Press of Florida, Gainesville, FL, USA. 289 pp.
- Rocha-Campos, C.C., Câmara, I.G. and Pretto, D.J. (2011) Plano de Ação Nacional para a conservação dos mamíferos aquáticos: pequenos cetáceos. Série Espécies Ameaçadas, 18. Instituto Chico Mendes de Conservação da Biodiversidade, Brasília, Brazil.
- Shane, S. (1990) Comparison of bottlenose dolphin behavior in Texas and Florida, with a critique of methods for studying dolphin behavior. Page 541-558 in Leatherwood, S. and Reeves, R.R. (Eds) *The bottlenose dolphin*. Academic Press, San Diego, CA, USA.
- Siciliano, S., Emin-Lima, N.R., Costa, A.F., Rodrigues, A.L.F., Magalhães, F.A., Tosi, C.H., Garri, R.G., Silva, C.R. and Silva-Junior, J.S. (2008) Revisão do conhecimento sobre os mamíferos aquáticos da costa norte do Brasil. *Arquivos do Museu Nacional*, Rio de Janeiro 66(2): 381-401.
- Silva-Jr, J.M. (2010) The spinner of Noronha. Pages 93-159 in Silva-Jr, J.M. (Ed.) *The Dolphins of Noronha*, Bambu, São Paulo, Brazil.
- Simões-Lopes, P.C. and Fabian, M.E. (1999) Residence patterns and site fidelity in bottlenose dolphins, *Tursiops truncatus* (Montagu) (Cetacea, Delphinidae) off Southern Brazil. *Revista Brasileira de Zoologia* 16(4): 1017-1024. <http://dx.doi.org/10.1590/S0101-81751999000400012>
- Tosi, C.H., Magalhães A.F. and Garri, R.G. (2007) Can the estuarine dolphin (*Sotalia guianensis*) be classified as vulnerable species in Maranhão coast, northeastern Brazil? *Whales Alive* 7: 1-3.
- Wedekin, L.L., Daura-Jorge, F.G., Rossi-Santos, M.R. and Simões-Lopes, P.C. (2008) Notas sobre a distribuição, tamanho de grupo e comportamento do golfinho *Tursiops truncatus* (Cetacea, Delphinidae) na Ilha de Santa Catarina, sul do Brasil. *Biota Neotropica* 8(4): 225-229. <http://dx.doi.org/10.1590/S1676-06032008000400023>
- Wells, R.S. and Scott, M.D. (1999) Bottlenose dolphin - *Tursiops truncatus* (Montagu, 1821) Pages 137-182 in Ridgway, S.H. and Harrison, S.R. (Eds) *Handbook of marine mammals* Vol. 6: The second book of dolphins and porpoises. Academic Press, San Diego, CA, USA.
- Wells, R.S. and Scott, M.D. (2009) Common bottlenose dolphin - *Tursiops truncatus*. Pages 249-255 in Perrin, W.F., Würsig, B. and Thewissen, J.G.M. (Eds) *Encyclopedia of marine mammals*. 2.ed. Academic Press, Amsterdam, The Netherlands.
- World Conservation Union (2008) 2008 IUCN Red list of threatened species. Available at www.iucnredlist.org. Consulted on 08 August 2013.
- Worthy, G.A.J. (1998) Patterns of bottlenose dolphin, *Tursiops truncatus*, strandings in Texas. Pages 47-55 in Zimmerman, R. (Ed.) Characteristics and causes of Texas marine strandings. U.S. Department of Commerce, *NOAA Technical Report National Marine Fisheries Science* series of the *Fishery Bulletin* 143: 85 pp.