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Report of the Working Group on the Biology and Ecology of *Tursiops truncatus* in the Southwest Atlantic Ocean

Paula Laporta[†,‡,*], Pedro F. Fruet[§,¶], Salvatore Siciliano[#], Paulo A. Flores[$] and Julio D. Loureiro[&]

[†]Yaqu Pacha Uruguay - Organización para la Conservación de Mamíferos Acuáticos en América del Sur. Orinoco s/n y San Luis, Punta del Diablo, 27204 Rocha, Uruguay
[‡]Centro Universitario Regional del Este, Universidad de la República. Intersección Ruta Nacional no.9 y Ruta Nacional no.15, 27000 Rocha, Uruguay
[§]Museu Oceanográfico 'Prof. Eliézer de C. Rios', Universidade Federal do Rio Grande (FURG). Rua Heitor Perdigão 10, 96200-970 Rio Grande, RS, Brazil
[¶]Laboratório de Ecologia e Conservação da Megafauna Marinha (EcoMega), Instituto de Oceanografia, FURG. Av. Itália km 8, 96201-900 Rio Grande, RS, Brazil
[#]Escola Nacional de Saúde Pública/FIOCRUZ. Rua Leopoldo Bulhões, 1480 - sala 611, Manguinhos, 21041-210 Rio de Janeiro, RJ, Brazil and Grupo de Estudos de Mamíferos Marinhos da Região dos Lagos (GEMM-Lagos)
[$]Centro Nacional de Pesquisa e Conservação de Mamíferos Aquáticos (CMA), ICMBio, MMA. Rodovia Maurício Sirotsky Sobrinho s/n, km 02, Jurerê, 88053-700 Florianópolis, SC, Brazil
[&]Fundación Mundo Marino. Avenida X 157, San Clemente del Tuyú, 7105 Provincia de Buenos Aires, Argentina
*Corresponding author, e-mail: paula.laporta@gmail.com

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Introduction

Here, we review information on the biology and ecology of common bottlenose dolphin (*Tursiops truncatus*) - hereafter referred to as bottlenose dolphin - in the Southwest Atlantic Ocean (SWAO) with emphasis on growth, feeding ecology, epizootics and parasites, predation and pathologies. A total of 34 scientific studies were revised, including 17 reviewed articles, one undergraduate monograph, three master's dissertations, one doctoral thesis, two books, three technical reports and six working papers. The working papers were presented in the *First Workshop on the Research and Conservation of* Tursiops truncatus*: Integrating knowledge about the species in the Southwest Atlantic Ocean,* held in Rio Grande, Rio Grande do Sul (RS) State, Brazil 21-23 May 2010. When necessary, we included personal communications to complement the information provided in this report.

All bibliography examined pertains to coastal bottlenose dolphin populations along the SWAO, and includes observations of free ranging dolphins as well as data collected on animals that stranded or were incidentally caught in fishing gear. Data were examined according to geographical sub-divisions established in the workshop: a) northern Brazil; b) northeastern Brazil; c) southeastern Brazil; d) southern Brazil-Uruguay and e) Argentina (see more details of division criteria in Fruet *et al.*, 2016 Introduction, this volume).

Growth

Asymptotic length

The asymptotic length of bottlenose dolphins in the southeastern Brazil (18°25'S, 25°45'S) was estimated at 301.3cm for both males and females at an age of 20 years (n = 22) fitted by Gompertz model (Siciliano *et al.,* 2007). This estimate included both sexes analyzed together, which may have caused potential downward biases in asymptotic length estimates, since sexual dimorphism has been observed for this species in other regions (see Sergeant *et al.*, 1973; Read *et al.*, 1993; Fernandez and Hohn, 1998), including southern Brazil (Fruet *et al.*, 2012). The low sample size analyzed (n = 22) by Siciliano *et al.* (2007) may also have biased the estimates, however geographical differences in body length are common in this species and have been reported elsewhere (*e.g.* Hale *et al.*, 2000). For southern Brazil, no estimation of asymptotic length was available; however, maximum total length reported for male (384cm) and female (340cm) stranded carcasses (n = 147) (Fruet *et al.*, 2012) suggests that coastal bottlenose dolphins are larger in this region than in some other parts of the world (*e.g.* Cockcroft and Ross, 1990; Read *et al.*, 1993; Fernandez and Hohn, 1998). So far, no data was presented for the other regions in the SWAO.

Physical maturity

Skull growth was measured with the von Bertalanffy's equation in 53 aged bottlenose dolphins of southern Brazil, Uruguay and northern Argentina (27°35'S, 48°34'W-36°49'S, 55°19'W) (Barreto, 2016 this volume). Cranial maturity starts at age two and stabilizes at age five with a condyle-basal length

(CBL) of 575mm approximately (Barreto, 2016 this volume). The physical maturity of the vertebral column (based on the degree of epiphyseal fusion) occurs at 11 or 12 years of age (Costa and Simões-Lopes, 2012). No other data was found for the other regions.

Feeding ecology

The feeding ecology of bottlenose dolphin has been studied mostly in southern[1,2,3] (Pinedo, 1982; Lopez, 2014) and southeastern Brazil (Di Beneditto *et al.*, 2001; Santos *et al.,* 2002; Moura *et al.*, 2016 this volume). No studies on the feeding ecology of bottlenose dolphins were available for northern and northeastern Brazil, or Uruguay and Argentina. However, opportunistic data are found for all regions, except the north of Brazil (Table 1).

Results suggested that the diet of this species in the SWAO is composed of at least 30 food items, including three main zoological groups: 1) teleost (80%) and elasmobranch fishes (3.3%), 2) mollusks (13.3%) and 3) crustaceans (3.3%; Table 1). These studies support the hypothesis that the bottlenose dolphin is an opportunistic predator that feeds primarily on coastal and demersal teleost fishes, Sciaenidae being the most important group found on its diet. Cephalopods are present in the diet of dolphins from southeastern and southern Brazil, where a broader diet was observed.

In northeastern Brazil, one stomach content analyzed contained only one species: Atlantic spadefish (*Chaetodipterus faber*; Gurjão *et al.,* 2004).

In southeastern Brazil, 11 stomach contents were analyzed (Di Beneditto *et al.*, 2001; Santos *et al.*, 2002; Moura *et al.*, 2016 this volume) and included nine prey teleost species and two cephalopod species (Table 1). The Atlantic cutlassfish (*Trichiurus lepturus,* n=4) and the Atlantic toadfish (*Porichthys porosissimus,* n=4) resulted the most frequent teleost species, followed by the barred grunt (*Conodon nobilis,* n=3). Cephalopods (*Doryteuthis plei*, n=5) and octopus (*Octopus vulgaris*, n=1) were also recorded in this region (Table 1). Quantitative studies of bottlenose dolphin's diet resulted in Atlantic cutlassfish being the most abundant species found (Di Beneditto *et al.*, 2001; Moura *et al.*, 2016 this volume).

In southern Brazil, Domit *et al.*[2] registered mullet, Atlantic spadefish, weakfish (*Cynoscion* sp.), as well as unidentified squids in the stomach of a stranded bottlenose dolphin in Paraná state. In RS, a total of 79 stomach contents were analyzed, which included 20 prey species identified[1,3] (Lopez, 2014). According to the Relative Importance Index (RII %), Atlantic white-croaker (*Micropogonias furnieri*), Atlantic cutlassfish, southern king croaker (*Menticirrhus* sp.), banded croaker (*Paralonchurus brasiliensis*) and mullet (*Mugil* sp.) were the most important prey items for bottlenose dolphin from southern Brazil. In this area, bottlenose dolphins' stomach contents included coastal squids (family Loliginidae), octopus (*O. vulgaris*), crustaceans (order Anomura) and shrimps[1,6] (Lopez, 2014).

In Uruguay only two stomachs were analyzed and one of these was empty. The stripped weakfish (*Cynoscion guatucupa*) was the only prey item that could be identified from the second stomach (P. Laporta, unpub. data).

Seasonal fluctuations were observed in the diet composition of bottlenose dolphins in southern Brazil (Lopez, 2014), which seem to relate to changes in prey abundance and availability, mostly occurring in estuaries of the southern Brazil/Uruguay regions (Patos Lagoon, southern Brazil, *e.g.* Haimovici *et al.*, 2006) and La Plata River (Uruguay and Argentina, *e.g.* Barleta *et al.,* 2010). During warm months, Atlantic white-croaker, Atlantic cutlassfish and Lebranche mullet (*M. liza*) were the most frequent species consumed (72.1%, 13.8% and 8.4%, respectively) representing RII of 77.4%, 8.6% and 5.7%, respectively (Lopez, 2014). In comparison, during cold months, banded croaker and southern king croaker (*Menticirrhus* sp.) were the most important prey in number, occurrence (50% and 37.5%) and RII (48.5% and 28.5%), respectively. The southern king croaker (41.3%) and Atlantic cutlassfish (16.1%) were the species with higher biomass (Lopez, 2014). This may suggest that bottlenose dolphins feed opportunistically upon those prey most frequently present in the area[1,3] (Lopez, 2014).

The diet composition of bottlenose dolphins does not seem to vary with the sex or the age-class of individuals[1] (Pinedo, 1982; Lopez, 2014). However, adult dolphins are able to feed on larger fish than juvenile dolphins. Lopez (2014) found that adult dolphins prey on significantly larger Atlantic white-croaker and southern king croaker than those fish captured by juvenile dolphins.

Interestingly, studies conducted in southern RS suggested no significant temporal changes in the diet composition of bottlenose dolphins for over 20 years[1,3] (Pinedo, 1982; Lopez, 2014). However, an important increase in the frequency

[1]Mehsen, M., Secchi, E.R., Fruet, P.F. and Di Tullio, J.C. (2005) Feeding habits of bottlenose dolphins, *Tursiops truncatus*, in southern Brazil. Paper SC/57/SM09 presented to the *International Whaling Commission Scientific Committee* 2005, Ulsan, South Korea. [Available at www.iwcoffice.org].

[2]Domit, C., Weber Rosas, F.C., Rosso-Londoño, M.C., Ougo, G., Bracarense, A.P.F.R., Domiciano, I.G., Beloto, N. and Monteiro-Filho, E.L.A. (2010) Ocorrência de *Tursiops truncatus* (Montagu, 1821) no litoral do estado do Paraná, no período de 1997/1999 e 2007/2009. Working Paper 15 presented during the *First Workshop on the Research and Conservation of* Tursiops truncatus*: Integrating knowledge about the species in the Southwest Atlantic Ocean*, 21-23 May 2010, Rio Grande, RS, Brazil

[3]Lopez, L.A., Di Tullio, J.C., Fruet, P.F. and Secchi, E.R. (2010) Alimentação do boto *Tursiops truncatus* no litoral sul do Rio Grande do Sul, Brasil. Working Paper 59 presented during the *First Workshop on the Research and Conservation of* Tursiops truncatus*: Integrating knowledge about the species in the Southwest Atlantic Ocean*, 21-23 May 2010, Rio Grande, RS, Brazil

[6]Bassoi, M., Lucato, S.B., Santos, R.A. and Santos, M.C.O. (1998) Novas informações sobre hábitos alimentares de cetáceos nas regiões norte do Paraná e sul de São Paulo, Brasil. Page 20 *in* Abstracts, *8ª Reunião de Trabalho de Especialistas em Mamíferos Aquáticos da América do Sul* and *2º Congresso da Sociedade Latinoamericana de Especialistas em Mamíferos Aquáticos*. 25-29 October. Olinda, Brazil.

[7]Bassoi, M. and Secchi, E.R. (2000) Temporal variation in the diet of franciscana *Pontoporia blainvillei* (Cetacea, Pontoporiidae) as a consequence of fish stocks depletion off southern Brazil. Working Paper 9 presented to *IV Workshop para a Coordenação da Pesquisa e Conservação da Franciscana,* Pontoporia blainvillei*, no Atlântico Sul Ocidental*. 5-9 November, Porto Alegre, Brazil. 5 pp.

Table 1. Prey species found in the stomach content of bottlenose dolphin (*Tursiops truncatus*) specimens in different localities and time periods in the Southwest Atlantic Ocean. Percent frequency of occurrence (FO%) and numeric frequency (NF%) are shown whenever available. 'x' denotes presence of prey species for which FO% and NF% data are unavailable.

Geographic Area/ region	North Brazil	Northeast Brazil	Southeast Brazil	Southeast Brazil	Southeast Brazil	Southeast Brazil	South Brazil/ Uruguay	South Brazil/ Uruguay	South Brazil/ Uruguay	South Brazil/ Uruguay	South Brazil/ Uruguay	South Brazil/ Uruguay	South Brazil/ Uruguay	Argentina
Authors	-	A	B	C	D	E	B	F	G	H	I	J	K	L
Number of stomachs	-	1	1	6	1	3	2	3	3	35	12	46	2	1
FISH SPECIES														
Sciaenidae														
Cynoscion guatucupa										FO = 25%; NF = 4.9%	FO = 16.7%; NF = 3.6%	FO = 9.7%; NF = 1.2%	x	
Cynoscion jamaiscensis										FO = 3.1%; NF = 0.3%				
Cynoscion sp.								x						
Macrodon ancylodon										FO = 15.6%; NF = 1.1%	FO = 0.1%; NF = 1%	FO = 11.8%; NF = 0.8%*		
Macrodon atricauda												FO = 12.9%; NF = 1.2%		
Menticirrhus sp.										FO = 28.1%; NF = 3.8%		FO = 35.4%; NF = 9.3%		
Micropogonias furnieri				x						FO = 6.2%; NF = 1.1%	FO = 83.3%; NF = 76.6%	FO = 54.8%; NF = 35.3%		x
Paralonchurus brasiliensis										FO = 37.5%; NF = 34.2%	FO = 25%; NF = 2.1%	FO = 32.2%; NF= 19.9%		
Pogonias cromis											*FO = 0.1%; NF = 0.5%*			
Stellifer rastrifer										FO = 6.2%; NF = 0.4%		FO = 6.4%; NF = 1.3%		
Umbrina canosai										FO = 9.4%; NF = 2%	FO = 0.1%; NF = 0.5%	FO = 6.4%; NF = 0.3%		
Engraulidae														
Engraulis anchoita										FO = 6.2%; NF = 0.3%		FO = 5.9%; NF = 32.1%*		
Lycengraulis grossidens										FO = 6.2%; NF = 1.3%	FO = 0.1%; NF = 0.5%			
Mugilidae														
Mugil liza											FO = 25%; NF = 4.4%	FO = 32.2%; NF = 6.0%		
Mugil curema									x					
Mugil sp.								x		FO = 15.6%; NF = 3.5%		FO = 29.4%; NF = 4.4%*		
Atherinidae														
Odonthestes bonariensis											FO = 16.7%; NF = 1.6%			
Odonthestes sp.										FO = 9.4%; NF = 6.9%				
Sparidae														
Diplodus argenteus				x										
Pagrus pagrus				x						FO = 3.1%; NF = 0.3%				
Stromateidae														
Peprilus paru										FO = 6.2%; NF = 1.8%		FO = 6.4%; NF = 0.6%		
Pomateidae														
Pomatomus saltatrix										FO = 9.4%; NF = 0.6%				

Geographic Area/ region	North Brazil	Northeast Brazil	Southeast Brazil	Southeast Brazil	Southeast Brazil	Southeast Brazil	South Brazil/ Uruguay	South Brazil/ Uruguay	South Brazil/ Uruguay	South Brazil/ Uruguay	South Brazil/ Uruguay	South Brazil/ Uruguay	South Brazil/ Uruguay	Argentina
Authors	-	A	B	C	D	E	B	F	G	H	I	J	K	L
Number of stomachs	-	1	1	6	1	3	2	3	3	35	12	46	2	1
Batrachoidae														
Porichthys porosissimus				x		FO = 33.3%; NF =18%				FO = 6.2%; NF = 2.4%				
Ephippidae														
Chaetodipterus faber		x				FO = 33.3%; NF = 4%		x						
Trichiuridae														
Trichiurus lepturus				x	x	FO = 66.7%; NF = 78%				FO = 75%; NF = 20.2%	FO = 25%; NF = 8.3%	FO = 29%; NF = 7.9%		
Phycidae														
Urophycis brasiliensis										FO = 34.4%; NF = 4.9%	FO = 16.7%; NF = 3.6%	FO = 9.6%; NF = 1.7%		
Haemulidae														
Conodon nobilis				*x*										
Orthopristis ruber				x										
Ophidiidae														
Raneya fluminenscis				x										
SQUID SPECIES								x				x		
Octopodidae														
Octopus vulgaris					x		x							
Argonautidae														
Argonauta nodosa										FO = 22.2%; NF = 9.1%				
Loliginidae														
*Doryteuthis plei**			x	x	x	FO = 33.3%; NF = 2%	x			FO = 33.3%; NF = 9.1%				
*Doryteuthis sanpaulensis**										FO = 55.5%; NF = 81.8%				
CRUSTACEANS														
Peneidae										x		x		
Anomura												x		
ELASMOBRANCH														
Rajidae										x				

References: (A) Gurjão *et al.* (2004); (B) Santos and Haimovici (2001); (C) Di Beneditto *et al.* (2001); (D) Santos *et al.* (2002); (E) Moura *et al.* (2016 this volume); (F) Domit *et al.*[2]; (G) Emerin (1994); (H) Carvalho *et al.*[4] (I) Pinedo (1982); (J) *Lopez *et al.*[3]; Lopez (2014); (K) P. Laporta[5]; (L) Mermoz (1977). ** *Doryteuthis* (=*Loligo*) *plei*; *Doryteuthis* (=*Loligo*) *sanpaulensis*.

[4]Carvalho, L.M., Moreno, I.B., Tavares, M., Santos, R.A and Ott, P.H. (2010) Ecologia alimentar do boto, *Tursiops truncatus* (Montagu, 1821), no litoral norte do Rio Grande do Sul, sul do Brasil. Working Paper 54 presented during the *First Workshop on the Research and Conservation of* Tursiops truncatus*: Integrating knowledge about the species in the Southwest Atlantic Ocean*, 21-23 May 2010, Rio Grande, RS, Brazil.

[5]P. Laporta, pers. obs.

of occurrence of the Atlantic cutlassfish (25% to 50%), and the banded croaker (25% to 41.67%) and a decrease in the occurrence of the Atlantic white-croaker (83.33% to ~50%) were observed[1] (Lopez, 2014). A similar shift in diet was observed in franciscana dolphins (*Pontoporia blainvillei*) in southern RS. This change was attributed to overfishing of prey species throughout their distribution[7] (Bassoi, 1997).

Epizootics and parasites

Only few species of crustaceans are known as epizootics of bottlenose dolphin in the SWAO. The sessile barnacle, *Xenobalanus globicipitis* (Cirripedia: Coronulidae), which is commonly found attached along the trailing edge of the flukes (Brownell, 1989), has been reported in two occasions on bottlenose dolphins from the northern coast of Rio de Janeiro (Brazil)[8] (Di Beneditto and Ramos, 2001).

Endoparasites

Anisakis sp. (Nematoda: Anisakidae) and *Bolbosoma* sp. (Acanthocephala: Polymorphidae) were found in the intestine and stomach of two specimens of bottlenose dolphin in northeastern Brazil (Carvalho, 2009; Carvalho *et al*., 2010).

Analyses of two bottlenose dolphins from Rio de Janeiro (southeastern Brazil) (Santos *et al.,* 1996) resulted in specimens of *Nasitrema* sp. (n = 30) and *Braunina cordiformis* (Trematoda, n = 24) found in their nasal cavity and stomach.

In Paraná State, southern Brazil, one bottlenose dolphin was infected with *Hadwenius tursioni* (Digenea: Campulidae)[9]. However, it was concluded later that this was in fact *Synthesium tursionis*[10]. This species was re-described (Marigo *et al.,* 2008).

Helminths as *Braunina cordiformis* and *Nasitrema* sp. were found in two bottlenose dolphins from southeastern Brazil (Santos *et al*., 1996). *Synthesium tursionis* were found in bottlenose dolphins of southern Brazil (Marigo *et al*., 2008; Luque *et al*., 2010).

No information exists about parasites in bottlenose dolphins from Uruguay. However, in Argentina, *Nasitrema* sp. and *B. cordiformis* were found in the nasal cavity and stomach of stranded dolphins in Samborombón Bay (J. Loureiro, unpub. data). A stranded bottlenose dolphin on the Patagonian coast presented its digestive tract infested with *Anisakis simplex*, *Pseudoterranova* sp., *B. cordiformis* and *Corynosoma australe* (Sánchez *et al.,* 2002).

Predation

No confirmed record of predation on bottlenose dolphins exists for Brazil and Uruguay. However, there is a suspicion of shark predation for one female bottlenose dolphin calf washed ashore with bite scars on 12 December 2008 in southern Brazil (Laboratório de Ecologia e Conservação da Megafauna Marinha - Ecomega, unpub. data). However, examination of the bite scars suggested that most likely the calf was bitten after it had died. It is possible that broadnose sevengill shark (*Notorynchus cepedianus*) or the bluntnose sixgill shark (*Hexanchus griseus*) caused the scar bites[11].

In Argentina, there are two records of bottlenose dolphins preyed upon by killer whales (*Orcinus orca*) in Samborombón Bay[12] and in Patagonia (Lichter, 1992).

Pathology

i) Skin diseases

Van Bressem *et al.* (2007) reviewed skin and skeletal diseases and trauma in small cetaceans from South American waters. Particularly, they found that the bottlenose dolphin presented at least three types of skin diseases: tattoo-like skin lesions, lobomycosis and lobomycosis-like diseases.

Tattoo-like skin lesion

One record of tattoo-like skin lesions was found in an individual stranded in winter 1997 in Patagonia, Argentina (Sánchez *et al*., 2002; Van Bressem *et al*., 2007).

Lobomycosis and Lobomycosis-like disease

Lobomycosis or lacaziosis is a chronic, localized, cutaneous and subcutaneous infection caused by a dimorphic fungus such as *Lacazia loboi* (syn. *Loboa loboi*), that naturally affects humans and at least two species of dolphins, the bottlenose and the Guiana dolphin (*Sotalia guianensis*) (Van Bressem *et al*., 2007). Lobomycosis-like disease (LLD) consists on verrucous lesions, often in pronounced relief that may ulcerate and evoke lobomycosis (Migaki *et al*., 1971).

In the SWAO the first case of lobomycosis confirmed by histological analysis was reported for one stranded female bottlenose dolphin from the Laguna population in the early 1990s (Simões-Lopes *et al*., 1993). Thereafter, only one additional case of lobomycosis was histologically confirmed in one male bottlenose dolphin stranded in 2005 in the Tramandaí Estuary, southern Brazil[13] (Van Bressem *et al*., 2007). On the other hand, LLD has been reported since the 1990s from both live sightings and beach stranded carcasses. Early studies compiling information on the occurrence of LLD revealed at least five cases for the SWAO, including

[8]Azevedo, A.F., Soares, M.P., Castro, M.C.T., Lailson-Brito Jr, J. and Gurgel, I.M.N. (1996) Ocorrência de epizoítos em cetáceos na costa do estado do Rio de Janeiro – Brasil. Page 254 *in* Abstracts, *21ª Congresso Brasileiro de Zoologia*. 5-9 February. Porto Alegre, Brazil.

[9]Andrade, A.L.V., Marigo, J. and Rosas, F.C.W. (1999) Intestinal trematodes of dolphins from Paraná State, Brazil. Page 6 *in* Abstracts, *13th Biennial Conference on the Biology of Marine Mammals*, 28 November-3 December. Maui, Hawaii.

[10]Marigo, J. and Catão-Dias, J.L. (2001) Parasitos de cetáceos (Cetacea: Delphinidae). Page 57 *in* Abstracts, *V Congresso* and *X Encontro da Associação Brasileira de Veterinários de Animais Selvagens*. 31 October-4 November. São Paulo, Brazil.

[11]Santiago M. Quijano, pers. comm. 11 March 2009

[12]Beade, M., Loureiro, J.D. and Mendez, G. (1988) Avistajes de *Orcinus orca* en Bahía de Samborombón y un caso de ataque sobre *Tursiops gephyreus*. Page 11 *in* Abstracts, *3ª Reunión de Trabajo de Especialistas en Mamíferos Acuáticos de América del Sur*. 25-30 July. Montevideo, Uruguay.

[13]Moreno, I.G., Ott, P.H., Tavares, M. and Oliveira, L.R. (2008) Mycotic dermatitis in common bottlenose dolphins (*Tursiops truncatus*) from southern Brazil, with a confirmed record of lobomycosis disease. Paper SC/60/DW1 presented to the *Scientific Committee, International Whaling Commission*, Santiago, Chile, 23-27 June. [Available at www.iwcoffice.org].

individuals regularly sighted in waters of Baía Norte (n = 1), and Mampituba (n = 1) and Tramandaí (n = 1) rivers and two stranded dolphins of unknown population origin, one found dead in Florianópolis, north of Laguna (SC), and the other near Lagoa do Peixe, south of Tramandaí river (RS)[13] (Van Bressem *et al.*, 2007).

Daura-Jorge and Simões-Lopes (2011) mentioned new cases of LLD in free-ranging bottlenose dolphins from the Laguna population. Examining a photo-identification dataset collected between September 2007 and September 2009, they found five dolphins with evidence of LLD from a total of 47 adults and 10 calves examined, resulting in 9% of prevalence in Laguna. More recently, two new cases of LLD were reported. The first reported a stranded bottlenose dolphin of unknown population origin found dead 80km south of Patos Lagoon Estuary in January 2009 while the second described a live sighting of a transient solitary adult-sized bottlenose dolphin photographed with extensive LLD lesions in September 2013 in Sepetiba Bay, RJ (Van Bressem *et al.*, 2015). These two records are the most southern and northern records of LLD in bottlenose dolphins for the SWAO, respectively. There are no records of lobomycosis or LLD in bottlenose dolphins from Uruguay and Argentina.

It appears that there is a re-emergence of lobomycosis and LLD in southern Brazil bottlenose dolphins' populations, after nine years of the first reported cases[13]. However, it is possible that the disease never disappeared but it was rarely detected. Biological and chemical pollution, overfishing and boat traffic seem to play a role in the emergence and pathogenicity of lobomycosis and LLD, as well as tattoo skin disease found in coastal and pelagic cetaceans (Van Bressem *et al.*, 2007; 2009; 2015).

Moreno *et al.*[13] also described new cases of skin lesions caused by an unidentified fungus in two bottlenose dolphins from southern Brazil.

ii) Digestive Diseases

Bacterial diseases

Helicobacter cetorum was reported in two captive bottlenose dolphins at Mundo Marino Oceanarium (Goldman *et al.*, 2002). This bacterium might play a role in the development of gastric ulcers (Harper *et al.*, 2002).

iii) Skeletal diseases

Skeleton lesions and trauma of small cetaceans in South America were reviewed by Van Bressem *et al.* (2007). In southeastern Brazil, a malformation and osteolysis (bone destruction or dissolution) was found in an immature female from northern RJ coastal waters. The spinal processes of some thoracic and caudal vertebrae were abnormally curved.

Furtado and Simões-Lopes (1999) described a case of discarthrosis (intervertebral disc osteochondrosis, osteoarthrosis) affecting the thoracic vertebrae T1 to T12 in 11 bottlenose dolphins in southern Brazil. Although osteochondrosis is related to a normal aging process, as well as the degeneration of the intervertebral discs, such secondary alterations seem to be an adaptive response to maintain stability in the aquatic environment (Furtado and Simões-Lopes, 1999).

Laeta *et al.*[14] presented new records of skeletal diseases related to thoracic vertebrae and rib lesions in one dolphin stranded in Búzios, southeastern Brazil. Fracture, strangulation and bone loss in meta-apophyses of vertebrae T4 and T5 were found, as well as fractures and pseudo arthrosis. The authors suggested that the clash with objects could explain the injuries; however it is also possible that these lesions are the result of intra or interspecific aggressive behavior (Herzing *et al.*, 2003; Wedekin *et al.*, 2004; Van Bressem *et al.,* 2007).

iv) Other pathologies

An endometrial adenocarcinoma with areas of squamous differentiation and generalized metastasis was observed in the uterus of a bottlenose dolphin stranded in northern Patagonia in winter 1997 (Sánchez *et al.*, 2002). This is the second report of a uterine adenocarcinoma in a free-living cetacean and the first reported in Delphinidae.

Histopathology of parasitic granulomatous pneumonia with nematode centralized in the abscess was observed in an adult male bottlenose dolphin stranded in southern Brazil (Ruoppolo, 2003). The parasites were not identified.

Conclusions

1. Most information available on the biology and ecology of bottlenose dolphins correspond to data collected in southern Brazil, particularly RS. Only occasional and opportunistic information exist for the rest of Brazilian regions, as well as Uruguay and Argentina;

2. Asymptotic length is estimated at 301.3cm for 20 year-old dolphins from southeastern Brazil. The total length reported for individuals from southern Brazil (TL= 385cm) is one of the largest reported for coastal bottlenose dolphins so far. Skull growth starts at two years of age and stabilizes at five years. Physical mature animals (vertebrate fusion) are estimated at 11-12 years;

3. Bottlenose dolphins are considered opportunistic predators mostly preying upon demersal fishes of the family Sciaenidae. At least 30 prey items of teleost and elasmobranch fishes, mollusk and crustaceans are described in the diet of bottlenose dolphins;

4. Atlantic white croaker, Atlantic cutlessfish, southern king croaker, mullet and banded croaker are the most important prey items for dolphins of southern Brazil. There is insufficient data for the other regions;

5. The composition of the diet of bottlenose dolphins varies seasonally, coinciding with fluctuations in prey abundance mostly for estuaries on the southern Brazil/Uruguay region (Patos Lagoon, southern Brazil) and La Plata River (Uruguay and Argentina);

[14]Laeta, M., Souza, S.M.F.M. and Siciliano, S. (2010) Lesões ósseas traumáticas em um exemplar de *Tursiops truncatus* da costa centro-norte fluminense, Rio de Janeiro, Brasil – nota prévia. Working Paper 33 presented during the *First Workshop on the Research and Conservation of* Tursiops truncatus: *Integrating knowledge about the species in the Southwest Atlantic Ocean*, 21-23 May 2010, Rio Grande, RS, Brazil

6. Diet composition does not vary in relation to sex and age classes in bottlenose dolphins from southern Brazil. However, adult dolphins are able to catch larger fishes than juvenile dolphins;

7. Epizoic and parasites in bottlenose dolphins are still poorly understood in the SWAO;

8. Skin diseases such as lobomycosis and lobomycosis-like disease seem to occur exclusively in southern Brazil and are apparently expanding since the first record in 1993.

Recommendations

1. Increase effort to collect data (body length, growth, age, feeding ecology, etc.) from areas such as northern Brazil, Uruguay and Argentina, where there is not sufficient biological data available;

2. Efforts should be made to investigate sex-specific growth patterns, since there are evidences of sexual dimorphism in this species. The use of analysis allowing modeling multiple growth phases should be preferred over single-pulse growth models;

3. The collection of basic biometric data (especially corporal and cranial measurements) from incidentally caught and/or stranded dolphins in a standardized way will allow comparisons between areas and/or populations (*e.g*. Norris, 1961; Perrin, 1975; Geraci and Lounsbury, 2005). Sex of dolphins should be identified by external and internal examination when possible. For decomposed specimens the sex could be identified using genetic analyses of tissue samples;

4. More studies should be conducted with free-ranging animals to infer trophic relationships and diet composition from tissue samples (stable isotopes, fatty acids) throughout the range of species distribution. In resident populations, it may be useful to consider biopsy sampling of individuals during different times of the year to evaluate potential variation in diet composition and trophic relationships according to changes in the environment;

5. Conduct specific histological studies for those bottlenose dolphin populations affected by LLD in southern Brazil and evaluate the water quality of their habitat. Long-term monitoring is highly recommended in those populations where cases of LLD have been reported, especially in Laguna bottlenose dolphins, as well as in neighbouring populations such as Baía Norte, Tramandaí and Mampituba rivers, southern Brazil.

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