



## The northernmost stranding of rough-toothed dolphins on the Brazilian coast

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On 30 June 2017, three dolphin carcasses were seen floating on the water some 300 m from shore and at a depth of 50 cm on the northern Brazilian state of Amapá, at approximately 04°25'41.65" N 051°33'07.52" W (Figure 1). Only one individual was more closely examined, as it showed no signs of decomposition. No wounds were observed, and no further examination or necropsy was performed, so cause of death could not be determined. The animal was an adult based on an estimated total body length of 2.5-3 m (Carwardine, 2020). Only six photographs of the event were recovered but they unequivocally confirm these stranded animals were rough-toothed dolphins *Steno bredanensis*. The examined individual had a narrow and conically-shaped head and elongated and moderately long rostrum (Figure 2), considered diagnostic for the species (Lodi and Borobia, 2013). The body was grey with part of the lips and throat white, the latter with a pinkish hue. The ventral surface was white with irregular specks and patches. The eyes were encircled in dark coloration and the mouth gape was long and extended up to almost under the eye (Lodi and Borobia, 2013). The pectoral fins were long and slightly pointed at the extremities, and caudal flukes were large and moderately pointed at the ends, with a distinct median notch (Lodi and Borobia, 2013).

The state of Amapá has the most preserved and least populated coastal zone in Brazil. The northern portion of the coast, directly exposed to the Atlantic Ocean, is characterized by a sedimentary cover with *várzea* floodplains, tidal plains, muddy sediments, and coastal lagoons (Torres and El-Robrini, 2013). The coastal plain is low, 10-120 km wide, more or less straight with few recessions. Annual average air temperatures are 26-27°C. The northwest flow of waters



**Figure 1.** Rough-toothed dolphin records around the Brazilian coast 1981-2019, highlighting the stranding site in Amapá state.



**Figure 2.** A. Rough-toothed dolphin carcass being examined. B. Detail of flukes. C. Detail of head and throat. Photos by P. Silvestro.

from the continental shelf is concentrated in the North Brazil Current (Torres and El-Robrini, 2013). Meteorological and oceanographic conditions at the time of the event were not unusual. The president of the local fishing association in Amapá informed one of the authors (PS) that dolphins commonly and incidentally entangle in nets and die, and fishermen typically discard their carcasses at sea.

The life history parameters of rough-toothed dolphins are poorly studied (Hammond *et al.*, 2012). This species is classified as Data-Deficient by the Brazilian environmental agency ICMBio (Rocha-Campos *et al.*, 2011) and as of Least Concern by the IUCN (Kiszka *et al.*, 2019). Formally protected in several countries, the species is listed under CITES Appendix II, but there are no specific conservation efforts (Kiszka *et al.*, 2019).

The species is found in warm waters, including the Atlantic, Pacific and Indian oceans, Gulf of Mexico and Caribbean Sea, and Mediterranean Sea, usually in pelagic waters, in at least 1 km depth, where fish and squid prey tend to concentrate (Miyazaki, 1980; Leatherwood and Reeves, 1983; Watkins *et al.*, 1987; Maigret, 1994; Miyazaki and Perrin, 1994; Ritter, 2002; Gannier and West, 2005; Jefferson, 2009; Hammond *et al.*, 2012; Lodi and Borobia, 2013; Carwardine, 2020). In South America *Steno* has been

recorded for Venezuela (Romero *et al.*, 2001), Colombia, Suriname and French Guiana (de Boer, 2015; Martinez *et al.*, 2019). Data on this species in Brazilian waters mostly come from opportunistic sightings, negative fisheries interactions

<sup>1</sup>Best, R.C., Rocha, J.M. and Silva, V.M.F. (1986) Registros de pequenos cetáceos na costa nordeste brasileira. Pages 23-32 in *Actas, Primera Reunión de Trabajo de Expertos en Mamíferos Acuáticos de América del Sur*, 24-29 June 1984, Buenos Aires, Argentina.

<sup>2</sup>Praderi, R. and Ximenez, A. (1987) Presencia del delfín de dientes rugosos, *Steno bredanensis*, en el litoral catarinense, Brasil. Pages 79-80 in *Anais, 2ª Reunião de Trabalho de Especialistas em Mamíferos Aquáticos da América do Sul*, 4-8 August 1986, Rio de Janeiro, Brazil.

<sup>3</sup>Santos, M.C.O. and Siciliano, S. (1994) Novos registros de cetáceos para o litoral do Estado de São Paulo – Brasil. Page 58 in *Anais, 6ª Reunião de Trabalho de Especialistas em Mamíferos Aquáticos da América do Sul*, 24-28 October 1994, Florianópolis, Brazil.

<sup>4</sup>Moreira, L.M.P., Siciliano, S. and Alves, A. (1994) Registros de cetáceos para o litoral do Espírito Santo, Brasil 1992-1994. Page 116 in *Anais, 6ª Reunião de Trabalho de Especialistas em Mamíferos Aquáticos da América do Sul*, 24-28 October 1994, Florianópolis, Brazil.

<sup>5</sup>Cremer, M.J., Simões-Lopes, P.C. and Romanowski, H.P. (1996) Presença de cetáceos na pesca industrial de traineiras em Santa Catarina. Page 61 in *Resúmenes, 7ª Reunión de Trabajo de Especialistas en Mamíferos Acuáticos de América del Sur*, 22-25 October 1996, Viña del Mar, Chile.

<sup>6</sup>Lailson-Brito Jr, J., Pizzorno, J.L.A., Fragoso, M.B.L and Gurgel, I.M.G. (1996) A presença do golfinho de dentes rugosos, *Steno bredanensis* (Cetacea, Delphinidae), em águas costeiras do estado do Rio de Janeiro – Brasil. Page 251 in *Resumos, XXI Congresso Brasileiro de Zoologia*, Porto Alegre, Brazil.

or strandings<sup>1,2,3,4,5,6,7,8,9,10</sup> (Simões-Lopes and Ximenez, 1993; Oliveira *et al.*, 1994; Alves-Jr *et al.*, 1996; Siciliano *et al.*, 1998; 2008; Monteiro-Neto *et al.*, 2000; Lodi and Borobia, 2013; Cardoso *et al.*, 2019). Several authors have reported the occurrence of this species, primarily in coastal areas, including beaches, islands, channels and bays, coral reef systems (Lodi and Capistrano, 1990; Lodi, 1992; Ott and Danilewicz, 1996; Flores and Ximenez, 1997; Lodi and Hetzel, 1998; 1999), coastal bays<sup>11</sup>, and lagoons<sup>12</sup>. Rough-toothed dolphins have been reported during seismic surveys in the Amazon river mouth (Barreto *et al.*, 2019) and strandings were reported from Pará<sup>13</sup> (Siciliano *et al.*, 2008) to Rio Grande do Sul (Lodi and Hetzel, 1998), including the Abrolhos Bank, an enlargement of the Brazilian continental shelf (Rossi-Santos *et al.*, 2006). So far there are no published stranding records for this species in the northern and northeastern states of Piauí, Rio Grande do Norte and Sergipe (Barreto *et al.*, 2019). The information above reported has been validated and accessed to SIMMAM, a Brazilian GIS platform for marine mammal sightings and strandings database (Barreto *et al.*, 2019). The event herein described is the northernmost record of rough-toothed dolphins stranding in Brazil; the lack of previous reports are likely due to limited sampling efforts in the region.

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