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Franciscana, Pontoporia blainvillei, dead stranded and rescued from incidental capture at the Río Negro Estuary, Patagonia, Argentina (2003 – 2023)

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Abstract

There were 34 franciscana dead stranded and rescued at the Río Negro Estuary, Patagonia, Argentina, between 2003 and 2023. The years with the highest stranding records were 2014 and 2020 (n=6). Autumn and spring were the seasons with the lowest and highest number of strandings, respectively. These strandings comprised 15 females, 6 males and 13 unknowns. Total body length of females ranged from 64 cm to 155 cm and males ranged from 70 cm to 138 cm. Five of the strandings involved calves and occurred within birth periods reported previously for the species at the Río Negro Estuary. Only in three *P. blainvillei* was possible to perform a complete necropsy. One of the specimens showed multifocal pneumonic lesions from which *Klebsiella pneumoniae* was isolated and identified microbiologically. In a second specimen, *Pseudomona* sp. and coagulase-negative *Staphylococcus* was identified, and in a third specimen tuberculosis by a member of the *Mycobacterium tuberculosis* complex was found. Despite these results, it was not possible to be certain that they were the causes of death of these three individuals. Three franciscanas had beak deviations. A total of 79 otoliths (38 left otoliths + 41 right otoliths) representing 41 specimens of white croaker (*Micropogonias furnieri*) were found in a stomach content analyzed. Eleven showed signs of being by-caught (four with net marks, four entangled in fishing gears or reported by the fishermen who by-caught them (n=3)). This is the first report of franciscana entanglements in sport fishing gear. The results in this paper should enhance local capacity to conduct research, contribute with baseline information for future studies to determine the status of the population at the FMA IVe and provide useful information that responds to some of the actions identified in the species CMP.

Keywords: by-catch, gillnets, fishing rods, entanglements, diet, disease, necropsy, calves.

Introduction

The franciscana dolphin is a small endemic odontocete that inhabits the coastal waters of the Southwestern Atlantic Ocean from Itaúnas (18°25'S), Espírito Santo State, Brazil, (Siciliano et al., 2002) to Golfo San Matias (42°00'S), Chubut, Argentina, (Denuncio et al., 2019). It is considered the most threatened small cetacean in South America (Secchi, 2021). Incidental mortality in gillnet fisheries has been a main conservation concern for franciscanas for at least 50 years (Ott et al., 2002a; Secchi, 2010; Zerbini et al., 2002; Secchi et al., 2021). However, *P. blainvillei* is also exposed to other potentially concerning threats throughout its range, such as coastal development, marine and agricultural debris, chemical and noise pollution, diseases, and vessel traffic (e.g., Domit et al., 2022; Di Beneditto and Ramos, 2014; Denuncio et al., 2011).

It is listed as *Vulnerable* by the IUCN Red List of threatened species (Zerbini et al., 2017) as well as in the Red List of Argentina (Denuncio et al., 2019). More recently, the province of Buenos Aires has declared franciscana as Monumento Natural Provincial (Law/ Buenos Aires No. 14,992, published in 2018) which is the highest category of protection that a species can have in the province which would be equivalent to the IUCN Habitat/ Species Management Areas (Category IV) (Ott et al., 2022).

Based on scientific information the species distribution range was divided into 11 "Franciscana Management Areas" (FMAs) (Secchi et al., 2003; Cunha et al., 2014; Costa Urrutia et al., 2012; Gariboldi et al., 2016; Nara et al., 2022; Anonymous, 2023). The area under study is the Río Negro Estuary at the Buenos Aires and Río Negro provinces and it is included in FMA IVe (Río Negro) which is the southernmost area of distribution for this species. The Río Negro Estuary is an area of priority for the actions identified in the IWC CMP for franciscana (IWC, 2016; Anonymous, 2023).

The study of stranded specimens allows the collection of morphometric measurements, sampling for genetics, pathologies and pollutants, broadening knowledge for the species studied. The aim of this paper is to respond to some of the recommendations arising from the IWC CMP for franciscana (IWC, 2016), expand on the information presented in Winter et al. (2021) and contribute to knowledge of the species in the FMA IVe.

Material and Methods

-Study area

Data were gathered in the Río Negro Estuary (41°03.6'S, 63°50.4'W), northeastern Patagonia, Argentina. This estuary and its surrounding areas (Figure 1) contain islands, sandbars, channels, and saltmarshes. The warm turbid waters (visibility < 1 m) have a mean annual temperature of 19°C (M. Failla, pers. obs.). Generally, the coast drops off steeply with depths of up to 2 m at only 5m from the coastline. The Río Negro, which terminates in this estuary, is the longest river in Patagonia. The annual mean tidal amplitude is approximately 2.2 m (Servicio de Hidrografía Naval argentino).

-Data collection

Since 2003, information on franciscana strandings has been database reported and plotted into a chart using QGIS 3.30.0 (Figure 1). A stranding event is defined as a cetacean left in a helpless position that falters ashore, ill, weak, or simply lost (adapted from Geraci and Lounsbury, 2005). Information was collected both systematically (when beach monitoring programs were carried out) and opportunistically (telephone calls from local people, coast guard staff, government officials, fishers, nature photographers).
For each stranding event, at minimum, the following information (Geraci and Lounsbury, 2005) was recorded: species, number of animals, location and date of stranding, decomposition state, sex and location; however, when feasible, morphometric measurements were taken following Norris (1961) as well as the corresponding photographs and samples for genetic, toxicological and pathological analysis. In those individuals where it was not possible to identify the species reliably, a sample was taken for subsequent genetic analysis to confirm the species. To maintain as much consistency as possible with previous studies regarding age classification based on length (Danilewicz et al., 2022; Denuncio et al., 2018; Negri, 2010; Botta et al., 2010), we considered calves those individuals of 67-81.6 cm and adults those >129.4 cm. Age determination by sectioning teeth was not available. If a carcass was sufficiently fresh, partial or complete necropsies were performed by veterinarian or veterinarian-trained personnel using standard cetacean necropsy techniques (Geraci and Lounsbury, 2005). Molecular analysis has been conducted but results will not be presented in this paper. To visualize the seasonal variability of strandings, this study considered summer (January, February and March), autumn (April, May and June), winter (July, August and September) and spring (October, November and December). Information on entanglements in fishing gear related to fishing rods or artisanal nets will be described in a review being prepared for Argentina (Failla, pers. comm.).

Results and discussion

Temporal distribution of strandings
Between 2003 and 2023, 34 franciscana dolphin strandings were recorded at the Río Negro Estuary (Table 1, Figure 1). The years with the highest stranding records were 2014 and 2020 (n=6). Nineteen of the events occurred in December (n=8), September (n=6) and February (n=5) (Figure 2). Autumn and spring were the seasons with the lowest and highest number of strandings, respectively, contrary to what was described for the northern zone of FMA IV, where summer and winter were the periods with the highest and lowest stranding records (Cremer et al*.,* 2022). For the years 2005, 2015-2019 and 2021 no catches have been recorded, however this can be explained by the fact that in those years there were no monitoring efforts, therefore it cannot be assured that there were no catches. In any case and based on by-catches of the rest of the years in which there was a concrete search effort for stranded specimens, it could be specified that the figure of 34 stranded specimens for the period 2003-2023 is underestimated.

Sex and Length

Sex was determined for 21 franciscanas, 71% females and 29% males (Table 1). Mortality was found to be higher in females than in males. The same was described for all FMAs, except for FMA III (Cremer et al., 2022). Total body length of females ranged from 64 cm to 155 cm and males ranged from 70 cm to 138 cm (Table 1). These values are within those described for the asymptotic length of marine specimens from FMA IV (Negri, 2010; Botta et al., 2010). The pattern of females being larger than males was also observed for this area and it is consistent with the sexual dimorphism found for other FMAs (Conversani et al., 2020; Botta et al., 2010; Ramos et al., 2002; Kasuya and Brownell, 1979).

Calves

Five of the strandings involved calves, which occurred in December (n=2), January (n=1), February (n=1) and March (n=1). Total body length ranged from 64 cm to 70 cm. Two of the calves stranded alive and were soon later returned to the sea. These strandings occurred in spring and summer, which corresponds to the main birth period of the species (Danilewicz, 2003; Denuncio et al., 2013). Three calves found stranded in December, January and March still bore traces of the umbilical cord. The period in which calves were found in this study falls within birth periods reported for the species from October, sometimes late September, until March (Danilewicz, 2003). For the Río Negro Estuary, it was suggested a breeding season from November to March (Failla et al., 2012). For the FMA IV, a size at birth of 68.8 cm for males and 67.9 cm for females was reported for estuarine franciscanas (Denuncio et al., 2018). Similar results were obtained in the nearby marine area (67 cm for females.). The size at birth found in the waters of Río Negro were within the parameters described by Danilewicz et al., (2022) who using the Borjesson and Read (2003) overlap method estimated it for marine franciscanas of FMA IV in 60.7 cm.

Necropsy findings

According to the decomposition category (Table 1), most specimens (n=10) were classified as 2 (recent death), followed by category 5 (advanced decomposition) (n=8).

Only in three *P. blainvillei* was possible to perform a complete necropsy. In specimen FCRNPB100204 the following findings were reported: Congestion of the left eye conjunctiva. Some bloody fluid (bloody hydrothorax) was seen in the thoracic cavity. Bilateral general congestive parenchyma and frothy serous-bloody exudate in the lung airways were observed. Generalized congestion in gastrointestinal vascular system. Heart did not show gross lesions. The right ventricle did not show clots blood inside. This animal showed multifocal pneumonic lesions from which *Klebsiella pneumoniae* was isolated and identified microbiologically.

Pseudomona sp. and coagulase-negative *Staphylococcus* was isolated and identically microbiologically from blowhole and buccal samples taken from *P. blainvillei* FCRN161211.

A member of *Mycobacterium tuberculosis* complex was isolated and identified microbiologically from dolphin FCRNPB270720, being the first reported record of tuberculosis in franciscana (Winter et al., 2020).

Despite these results, it was not possible to be certain that they were the causes of death of these three individuals.

Three franciscanas had beak deviations (Winter et al., 2020; present report). Beak anomalies of franciscanas from the coastal waters of Argentina were described and quantified in another area of the FMA IV, reporting that 12% showed beak deviations (Denuncio et al., 2016). Natural or anthropogenic causes of these anomalies are still unknown, but some cases are probably associated with lesions caused by fishing gear entrapment (Denuncio et al., 2016). In Brazil, less than 1% of animals had beak deviations (Ott et al., 1996).
One specimen had shark bites, but the species could not be identified, nor could it be determined whether the specimen was alive at the time of the attack. The broadnose sevengill shark (*Notorhynchus cepedianus*) was reported to attack franciscana in Uruguayan waters (Heithaus, 2001; Praderi, 1985).

Diet
A total of 79 otoliths (38 left otoliths + 41 right otoliths) representing 41 specimens of white croaker (*Micropogonias furnieri*) were found in a stomach content analyzed. The same prey species has been found for other FMAs (Rodríguez et al., 2002; Botta et al., 2022).

By-catch
Table 1 shows in detail all recorded cases of by-catch. Out of the 34 franciscanas reported, eleven showed signs of being by-caught (four with net marks, four entangled in fishing gears or reported by the fishermen who by-caught them (n=3)). In addition to the specimens entangled in gillnets, entanglements in fishing rod lines (one on the fishing line and another on the hook of sportfishing rod).and beach seine were also recorded for this area. This represents the first report of entanglement of this dolphin in sport fishing gear.

Conclusions

Cetacean strandings provide an important amount of information on these marine mammal species, hence the importance of strengthening stranding networks, such as the Federal Network of Assistance to Marine Fauna Strandings (RESOL-2019-11-APN-SPARN#SGP) established in 2019 in Argentina. This will allow for more timely field stranding responses to better document and understand causes of morbidity and mortality of franciscana in the Río Negro Estuary.

According to our results, mortality in the area would be higher for females. However, the data presented here are underestimated since the greatest effort has been made on the southern margin of the estuary, which corresponds to the province of Río Negro, and very sparsely in the province of Buenos Aires, where it is necessary to increase the effort. Additionally, the effort has been uneven over the years. To increase the number of records it is necessary to emphasize the importance of citizen participation, which has made it possible to receive and know about records of stranded specimens that otherwise would have been lost. It is also necessary to carry out systematic monitoring on both margins of the estuary and to accompany this with an abundance estimate for the species in the area

under study, to be able to determine the status of this population, which is highly important for the species.

This work responds to the priority actions on research and monitoring of the Conservation Management Plan for franciscana of the International Whaling Commission.
By-catch is the greatest threat to franciscana throughout its range (Secchi et al., 2021), and the Río Negro Estuary is no exception, as this report shows. The information so far published shows them to be genetically distinct and geographically isolated (Gariboldi et al., 2016). Additionally, the presence of live stranded calves raises uncertainty and reinforces the importance of the area for the species. It is therefore important to consider all the mitigation measures that are available. Additionally, to consider the measures suggested by the National action plan to reduce the interaction of marine mammals with fisheries in Argentina (Consejo Federal Pesquero, 2016) as well as the recommendations coming from the IWC, and in particular from the CMP of franciscana, among which the creation and implementation of a protected area in the Río Negro Estuary is recommended (Anonimous, 2023). It is also necessary to evaluate the fisheries that are developed in this area, including both commercial and sporting, to carry out a population estimate of the FMA IVe or, at least, of the estuary and continue with public awareness campaigns to reduce by-catch.

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Figures and Tables

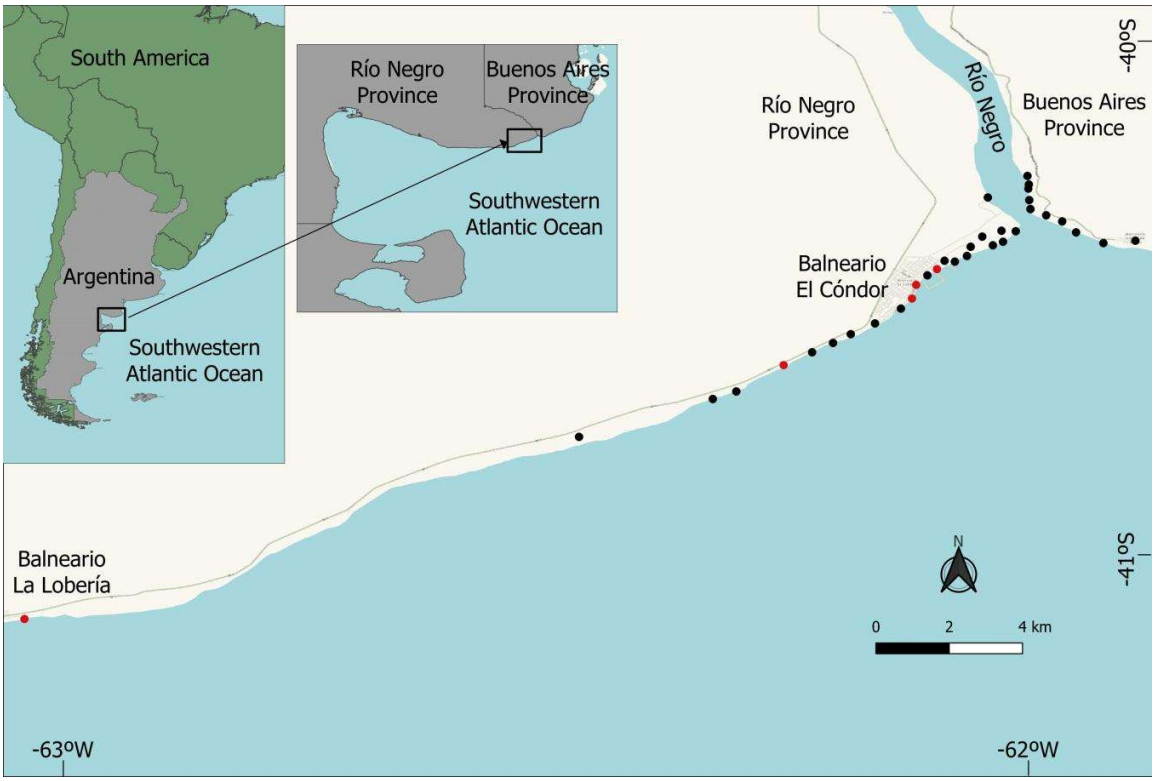

Figure 1. Map showing the Río Negro Estuary and locations of franciscana strandings from 2003 to 2023. Stranded calves are indicated with red dots and the remaining age categories with black dots.

#	ID	Date	Lat (°S)	Long (°W)	Sex	Length (cm)	Stage f decomposition	Notes
1	FCRNPB101203	10 Dec 2003	41°03’	62°49’	M	130	4	
2	FCRNPB100204	10 Feb 2004	41°03’	62°49’	H	113	2	Pneumonia by *Klebsiella pneumoniae.* Weight=16kg. Beak deviation
3	FCRNPB090404	09 Apr 2004	41°02’	62°48’	H	Unk	5	Incomplete skeleton
4	FCRNPB060506	06 May 2006	41°03’	62°49’	H	Unk	5	Incomplete skeleton
5	FCRNPB270307	27 Mar 2007	41°02’	62°48’	H	Unk	4	
6	FCRNPB010907	01 Sept 2007	41°01’	62°47’	Unk	Unk	5	By-caught
7	FCRNPB021208	02 Dec 2008	41°03’	62°51’	Unk	<100	5	
8	FCRNPB021009	02 Oct 2009	41°01’	62°46’	Unk	Unk	5	Fragment of mandibule
9	FCRNPB050210	05 Feb 2010	40º59	62º47´	F	Unk	1	Caught in a hook and release
10	FCRNPB110710	11 July 2010	41°02’	62°48’	M	108,2	2	By-caught
11	FCRNPB200611	20 June 2011	41°01’	62°47’	Unk	Unk	5	
12	FCRNPB161211	16 Dec 2011	41°03’	62°50’	F	70	1	Stranded alive and released, umbilical cord.
13	FCRNPB290212	29 Feb 2012	41°03’	62°50’	Unk	Unk	5	One vertebrae
14	FCRNPB110912	11 Sept 2012	41°02’	62°48’	F	114	2	Presence of net marks
15	FCRNPB160912	16 Sept 2012	41°02’	62°48’	M	138	2	Presence of net marks
16	FCRNPB290912	29 Sept 2012	41°02’	62°48’	F	135	4	
17	FCRNPB121013	12 Oct 2013	41°02’	62°48’	F	154	3	Shark’s beat
18	FCRNPB021213	02 Dec 2013	41º01´	62º47´	M	Ukn	1	Entangled in beaches seine and released alive
19	FCRNPB170114	17 Jan 2014	41°09’	63°07’	M	70	2	Umbilical cord, newborn
20	FCRNPB010214	01 Feb 2014	41°03’	62°52’	F	64	4	
21	FCRNPB040514	30 Apr 2014	41°01’	62°47’	Unk	Unk	4	Presence of net marks
22	FCRNPB110814	11 Aug 2014	41°02’	62°49’	F	132.5	2	Presence of net marks
23	FCRNPB011214	01 Dec 2014	41º01´	62º46´	Unk	Unk	1	Entangled with a fishing line at the beak (fishing line of a sportfishing rod)
24	FCRNPB011214	01 Dec 2014	41º03´	62º49´	Unk	Unk	1	Entangled with a fishing line at the beak and freed itself

25	FCRNPB270720	27 Jul 2020	41°02’	62°49’	F	104	3	Tuberculosis. *Mycobacterium* member of *Mycobacterium tuberculosis* complex
26	FCRNPB250820	28 Aug 2020	41°02’	62°48’	F	143	2	Removed from fishing gears. Beak deviation
27	FCRNPB100920	10 Sep 2020	41°02’	62°49’	F	85	3	Presence of net marks
28	FCRNPB250920	25 Sep 2020	41°02’	62°48’	F	155	2	Presence of net marks. Removed from fishing gears
29	FCRNPB021220A	02 Dec 2020	41°03’	62°51’	M	123	2	Beak deviation.
30	FCRNPB021220B	02 Dec 2020	41°02’	62°48’	Unk	64	2	
31	FCRNPB030322	03 Mar 2022	41°02’	62°49’	Unk	Unk	1	Stranded alive and released.
32	FCRNPB151122	15 Nov 2022	41º02´	60º49´	Unk	Unk	5	Skull
33	FCRNPB060223	06 Feb 2023	41°01’	62°48’	Unk	<100	1	Stranded alive and released
34	FCRNPB130323	13 Mar 2023	41º03	62º50´	Unk	Unk	1	Umbilical cord, newborn, stranded alive and released

Table 1. Franciscana dolphins strandings at the Río Negro estuary from 2003 to 2023

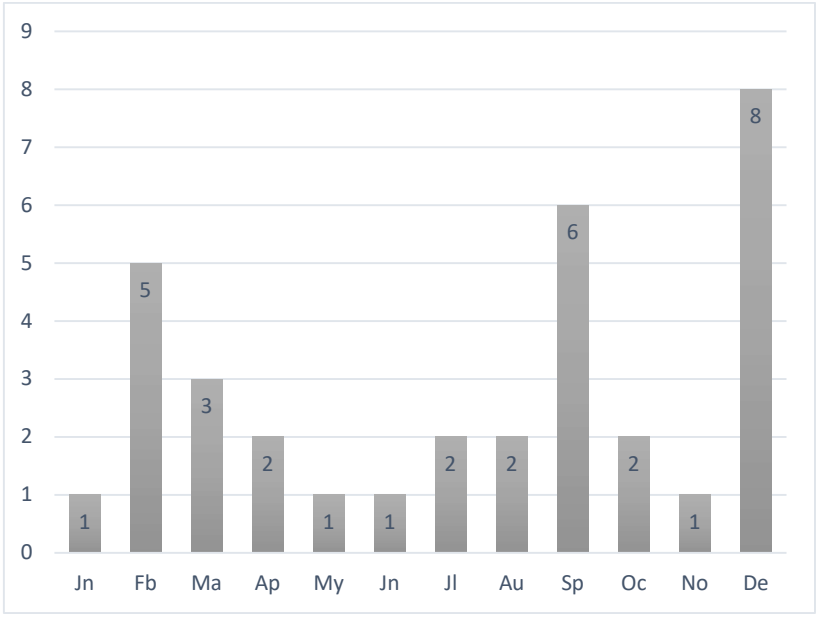

Figure 2. Number of franciscana dead stranded and rescued by month at Río Negro Estuary from 2003-2023.