

# **Incidental mortality of Franciscana dolphin *Pontoporia blainvillei* in coastal gillnet fisheries in northern Buenos Aires, Argentina.**

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## **ABSTRACT**

The Franciscana dolphin *Pontoporia blainvillei* is endemic to the Southwestern Atlantic, and it is perhaps the most impacted cetacean in this region. Artisanal fisheries along coastal Buenos Aires are responsible for higher Franciscana dolphin incidental mortality in Argentina. Since 2000 to 2004, on board observers recorded dolphin bycatch from 7 gillnet fishermen at Cabo San Antonio and Bahía Samborombón. It represented about 22% of the total fleet in northern Buenos Aires. The geographic position, depth, configuration of fishing gear, and soak time was also recorded. In order to compare bycatch rate with other areas, the CPUE values recorded were calculated as the number of dolphins captured per 1000 linear meters of gillnets per day. For analysis, it was assumed constant catch per unit effort. In total, 312 dolphins were captured by those fishermen throughout four consecutive years; which 71% were females and 56% were immature. The mean CPUE was 0.54 (95% CI 0.33 to 0.91). Changes in mean annual CPUE were directly associated with changes in fishery operations. The mean annual incidental mortality was estimated about 410 individuals. By extrapolation, it was estimated a minimum annual incidental mortality of 651 franciscana dolphins by the entire artisanal fleet in Buenos Aires. The current annual mortality must be underestimated because the trawler fleet was not considered.

**KEYWORDS:** FRANCISCANA, *Pontoporia blainvillei*, BYCATCH, GILLNET FISHERIES, CONSERVATION

## **INTRODUCTION**

The Franciscana dolphin, *Pontoporia blainvillei* is an estuarine/marine species inhabiting only the coastal areas of the Southwestern Atlantic Ocean from Espírito Santo State, Brazil (18°25'S) (Siciliano 1994) to Chubut Province, Argentina (41°09'S) (Crespo *et al.* 1998). Along its distribution, Franciscana dolphins have been subject to a significant level of bycatch in gillnets for several years (Corcuera, 1994., Praderi, 1997., Secchi *et al.* 1977., Di Benedetto *et al.* 1998, Bertozzi and Zerbini 2002, Ott *et al.* 2002, Rosas *et al.* 2002), and incidental mortality probably represents the major threat to the species survival. The Franciscana dolphin is listed under the Convention on International Trade in Endangered Species on Appendix II, in Appendix I of the Convention on Migratory Species, and also classified on the IUCN's Red List of Endangered Species as "data deficient", meaning that there is inadequate information to make an assessment of its current status. The species's distribution in Argentine waters is mainly restricted to Buenos Aires Province. Previous studies have shown that in Argentina, small fishing camps situated along coastal Buenos Aires pose more of a threat to the species than operations from large fishing harbors (Corcuera,

1994). This is primarily due to the fact that the artisanal fishing is carried out in shallow waters. A minimum annual catch of 500 dolphins was estimated from the fisheries of the Buenos Aires coastal area in Argentina (Corcuera *et al.* 1998). However, it has been suggested that this bycatch was underestimated in the last decade (Bordino *et al.* 2002).

In order to obtain reliable information about dolphin bycatch, a systematic effort with observers on board was conducted in northern Buenos Aires. This paper presents the results obtained from the first long time observer on board program to estimate Franciscana dolphin bycatch.

## **METHODS**

From 2000 to 2004, Franciscana dolphin bycatch was recorded with independent observers on board from 5-7 artisanal gillnet fishermen at Cabo San Antonio and Bahia Samborombon (Fig. 1). It represented about 22% of the total artisanal gillnet fleet in northern Buenos Aires and boats were considered representative of the total fleet. These fisheries consisted of about 30 fishermen who fished from September to April, although some boats operated throughout the year. The fisheries were conducted by small inflatable, fiberglass and wood vessels 5-8m in length operating between 0.2 to 7 km from the coast. The fishery mainly targeted on Sea trout (*Cynoscion striatus*), Whitemouth croaker (*Micropogonias furnieri*), Parona leatherjack (*Parona signata*), and Patagonian smooth-hound (*Mustelus* sp.). The nets were composed of mono or polyfilament nylon and were set on the bottom anchored in position, placed in waters from 3 to 12 m. The nets were 50-75 m long and 2-6m deep with a stretched mesh size between 10 to 12cm, although fishermen sometimes used 2 to 5 nets together in a string. The observers were randomly rotated from vessel to vessel throughout the course of the experiment recording the number of dolphins captured, sex, geographic position, depth, configuration of fishing gear, soak time and fish catch in every net/string. Multiple entanglements of two or more dolphins in the same net the same day were recorded only four times and assumed as rare events for the analysis. They were considered independent events because it was difficult to know if the dolphins were entangled at the same time, or if there was any parental relationship among them. We also assumed independence among fishing nets/strings and trips, and nets with constant catch per unit effort (CPUE). Due to several differences in nets and strings used by the fishermen, and the different soak times during the experiment, fishing effort was defined in  $m^2 \times h$ . The CPUE was expressed as the number of dolphins caught per fishing effort respectively. In order to compare bycatch rate with other areas, the CPUE was also recalculated as the number of dolphins captured per 1000 linear meters of gillnets per day. The 95% confidence intervals for CPUE were calculated based in a Poisson distribution of data. The CPUE were classified by sex in relation to depth of catch and analyzed with non parametric tests as Kruskal Whalis and Pairwise Multiple Comparison Dunn's test. Where possible, bycaught dolphins were collected for necropsy analysis. Males and females were considered sexually mature based on Kasuya and Brownell (1979).

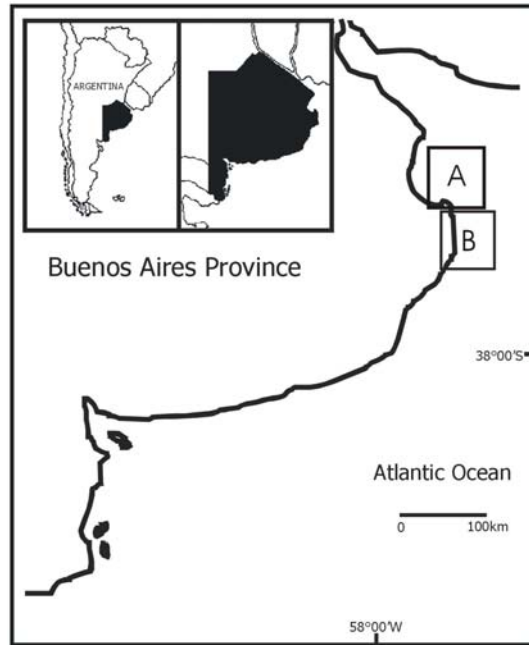


Fig. Location of study areas. A) Bahia Samborombon, B) Cabo San Antonio

## RESULTS

In total, 312 dolphins were recorded from the monitored fishermen during four consecutive fishing seasons. Eighty-seven dolphins were collected and necropsies were performed to determine diet and reproductive condition. Accounting all captured individuals, 71% percent were females, and 56% were immature. The mean depth of captures was significantly higher for male than for female and immature individuals (Kruskal Whalis test,  $P:0.037$ ,  $H: 7.060$ ,  $2 df$ ; Pairwise Multiple Comparison Dunn's test,  $P<0.05$ , Fig. 2)

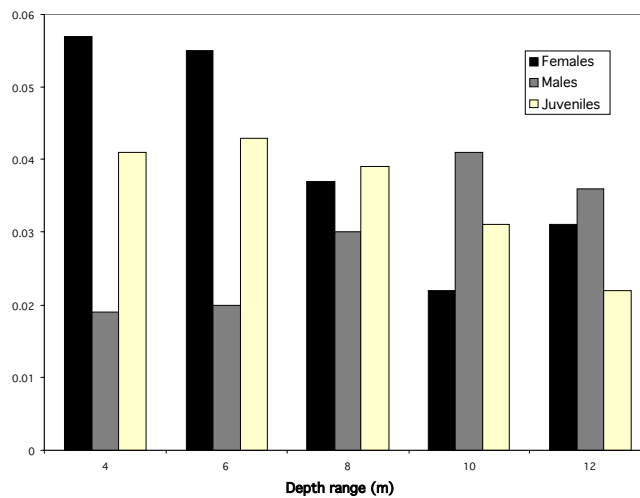


Fig. 2. CPUE by sex in relation to depth range

An estimation of CPUE and annual incidental mortality is shown in Table 1.

	<b>1999-2000</b>	<b>2001-2002</b>	<b>2002-2003</b>	<b>2003-2004</b>
<b>Number of active fishermen</b>	25	33	33	25
<b>Number of monitored fishermen</b>	5	7	7	5
<b>Effective fishing season (days)</b>	168	156	157	105
<b>Effective days monitored</b>	90	78	80	84
<b>Number of observed nets</b>	309	176	282	341
<b>Total fishing effort (m<sup>2</sup> X h)</b>	1454400	1600049	2870068	5040000
<b># of entangled dolphins</b>	45	24	19	76
<b>CPUE (m<sup>2</sup> X h)</b>	0.031	0.015	0.007	0.015
<b>CPUE (1000m X day)</b>	0.40	0.53	0.34	0.9
<b>95% CI (1000m X day)</b>	0.12 - 0.87	0.19 - 0.91	0.10 - 0.69	0.67 - 1.12
<b>Average depth (m)</b>	10.5	7	11.5	10
<b>Annual mortality estimated</b>	420	225	175	475

Table 1. Incidental mortality and CPUE of Franciscana dolphin in northern Buenos Aires. The number of entangled dolphins only represents the individuals captured during the most effective fishing season (n=164).

## DISCUSSION

The artisanal gillnet fishery along coastal Buenos Aires presents the highest CPUE recorded along the entire Franciscana dolphin distribution (see Ott *et al.* 2002). This highest CPUE could be related to a highest density of Franciscana dolphin, however the density in northern Buenos Aires seem to be lower than that recorded in southern Brazil and Uruguay (Bordino *et al.* 2004, Crespo *et al.* 2004). Environmental and oceanographic variations, as well as fishery characteristics should be accounted to understand these apparently contradictory differences.

Changes in mean annual CPUE were directly associated with changes in fishery operations and local economy. These changes seem to be not related with fishing effort, which seems to be similar with exception of the last fishery season. After the economic crisis in the country in 2000, fishermen took care of their equipment because the highest cost of nets, and were using some of their gillnets as driftnets in order to reduce sea lion interactions. The fishing operations were as a consequence different during 2001-2003. Fishing effort from driftnets was included in the analysis because dolphin bycatch was recorded with those nets. However, the sample size was small to analyze data independently.

The bycatch in northern Buenos Aires was previously reported as 200-260 individuals per year (Corcuera *et al.* 2000). Although they reported a similar CPUE, it seems that bycatch was previously underestimated because it was obtained through interviews with fishermen. Interviews have shown to underestimate bycatch, and similar CPUEs not necessarily means a comparative set of data, because interviews can fail in

obtaining reliable information on fishing effort, number of entangled individuals, and even fleet size, although are an important first approach. In spite of the work and concern devoted to the franciscana dolphin bycatch over the last several years, data continue to reveal significant bycatch figures in Argentina (Weiskel et al. 2002).

The Franciscana bycatch is mainly recorded in areas where juvenile sciaenid commercial fish are abundant. The sciaenid are the most common item in the Franciscana diet (Ott *et al.*, 1995, Rodriguez *et al.* 2000). Fishery activities in southern and northern Buenos Aires are targeting mainly on the same sciaenid commercial species, and using basically the same fishing gear. No statistical differences were also recorded in Franciscana dolphin densities at northern and southern areas (Bordino *et al.* 1994, Crespo *et al.* 1994). By extrapolation, current annual incidental mortality along coastal Buenos Aires was calculated as 651 individuals. However, this bycatch must be underestimated because we only have considered a minimum number of active gillnet fishermen by year, and the trawler fleet was not evaluated where additional entanglements are suspected to occur.

The annual Franciscana bycatch in Buenos Aires is of concern because the fishing effort is increasing and it is expected that the incidental mortality will continue in high levels, specially at depths where females and immature individuals are vulnerable. Methods to mitigate the bycatch along coastal Buenos Aires are urgently needed, and prompt management is required to produce any significant change in the status of the Franciscana dolphin

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