

INCIDENTAL CAPTURE OF FRANCISCANA DOLPHINS
***Pontoporia blainvillei* IN ARTISANAL GILLNETING OF THE**
URUGUAYAN COAST

Final Report for The Rufford Maurice Laing Foundation

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INTRODUCTION

Franciscana dolphin (*Pontoporia blainvillei*) is a small dolphin which lives in the coasts of Brazil, Uruguay and Argentine. It inhabits waters located between 25 and 30 nautical miles from the coast with a maximum depth of 30 meters (Pinedo *et al.* 1989), where the artisanal and industrial coastal fishery fleets mainly operate. Because this species is incidentally captured by the fishing nets, is currently the most endangered cetacean in the South western Atlantic Ocean (Praderi *et al.* 1989; Crespo 2000), with an estimated mortality of 2800 individuals/year, along its distribution (Ott *et al.* 2002). Considering that this species has low reproductive potential, by-catch becomes highly negative to the populations, turning it into a species under high extinction risk (Secchi *et al.* 2002). Although it is catalogued as a *data deficient* species in the Red List of Threatened Species of the World Conservation Union (Reeves & Leatherwood 1994) it is remarkable that in the year 2003, the sub-population of Rio Grande do Sul-Uruguay was formally catalogued as *vulnerable* (Secchi & Wang 2003). Besides, the Convention on Migratory Species (CMS) has included franciscana dolphin as part of the Appendix I, which corresponds to *Endangered Migratory Species*.

The earliest records of franciscana mortality in the Uruguayan fisheries were in 1940 and they were related to the development of the fisheries focused on sharks in Punta del Diablo (Van Erp 1969). The first published mortality data for this fishery reached 1500 and 2000 animals in 1969 and 1970 respectively (Brownell & Ness 1970; Pilleri 1971). During the first systematic study carried out in the 5 most important fisheries of the coast of Rocha Department (La Paloma, Cabo Polonio, Valizas, Punta del Diablo and La Coronilla) it was obtained a by-catch of 536 dolphins between 1971 and 1973 (Brownell & Praderi 1974; Brownell 1975) and in the next four years the mean annual by-catch was 279 individuals (Praderi 1976, 1979, 1984, 1985). Praderi (1984) and Crespo *et al.* (1986) estimated the annual capture of franciscana dolphin and reported the levels of capture per effort unit (CPEU), based on a widespread monitoring program of the fisheries in Rocha Department, between 1974 and 1983.

Praderi, during his 20 years study period (1974-1994) registered a franciscana incidental capture of 3683 individuals in the five above mentioned fisheries (Praderi 1997). The annual mortality estimations ranged from 418 individuals in 1974 to 66 in 1994. The main values of incidental mortality were registered in Punta del Diablo and Valizas, due to a higher fishing effort. During the summer season (November-February), the use of big mesh nets, near the shore and the location of nets at depths between 10 and 20 m produced the highest percentages of franciscana mortality in the coast of Rocha Department (Praderi 1997).

Due to the fact that the last studies regarding this species in Uruguay were carried out 10 years ago (Praderi 1997), conservation and management actions were not possible to be developed in Uruguay to improve the situation of franciscana dolphin. It is remarkable that this lack of information has been mentioned in the last regional workshops about Biology and Conservation of franciscana dolphin (Perrin *et al.* 1989; Crespo 1992; Pinedo 1997; Crespo 2000). In 2004, Franciscana Project developed a monitoring program for the Uruguayan artisanal fisheries in order to evaluate the interaction level between this activity and franciscana dolphin. The fisheries which are currently surveyed (San Luis, Playa Hermosa, Piriápolis, Cabo Polonio and La Paloma) were selected from the data obtained during the first sampling period (June, 2004 – May, 2005), because they showed a high level of interaction.

GENERAL OBJECTIVES

- Evaluate the incidental mortality of *P. blainvillei* in artisanal fishing nets in the La Plata River estuary (LPRE) and in the Atlantic Ocean coast (AOC) of Uruguay.
- Integrate the obtained information to the region and coordinate the efforts for the species conservation.

SPECIFIC OBJECTIVES

- Estimate the Capture Per Unit Effort (CPUE) of the franciscana dolphin in LPRE and the AOC
- Inform and aware fishermen and local coastal communities about the species situation.

MATERIALS AND METHODS

Study Area

The study area holds approximately 280km of coast and was divided in two zones, according to socioeconomic, ecologic and productive factors (Figura 1) (Galli 2000; Spinetti *et al.* 2001):

1) La Plata River Estuary (LPRE) - 120km, from the western zone of Montevideo to Piriápolis (Maldonado Department). We worked at the fishing localities Pajas Blancas/ San Luis, Playa Hermosa and Piriápolis.

2) Atlantic Ocean Coast (AOC) - 160km, Rocha Department coast. We worked at the fishing localities of La Paloma and Cabo Polonio.

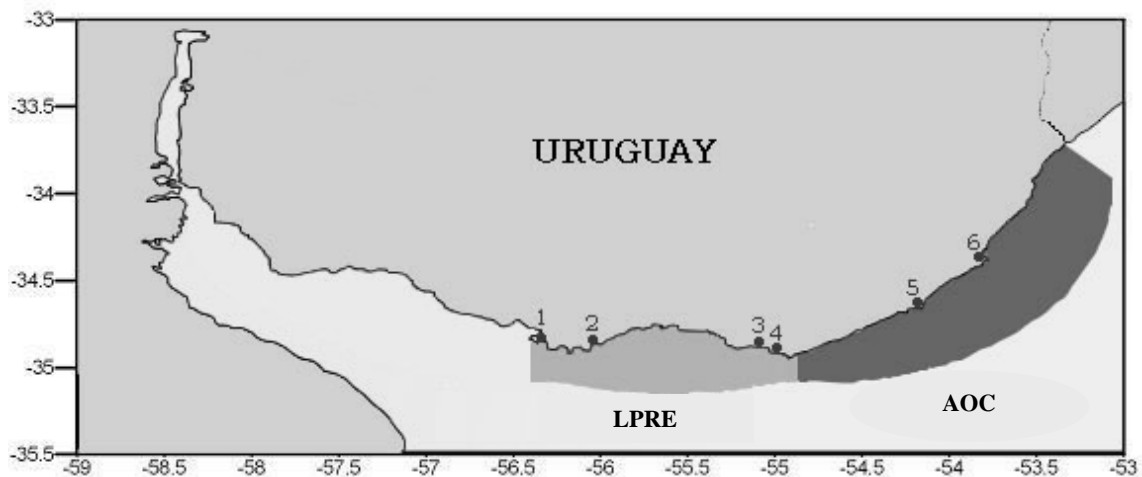


Figure 1 - Chosen fishing localities of the Uruguayan coast. In La Plata River Estuary (LPRE): 1) Pajas Blancas, 2) San Luis, 3) Playa Hermosa, 4) Piriápolis. In Atlantic Ocean Coast (AOC): 5) La Paloma and 6) Cabo Polonio.

Artisanal fisheries monitoring

From October 2005 to September 2006 the chosen fishing localities were visited on a monthly basis. A log-book was given to each fisherman in which to record their fishing operations, including franciscana captures. It is worth noting that we copied the date of such log-book to

ours in each visit, but we never took it away from them. This working strategy allowed them and us to have all their fishing operations recorded.

Data collected was:

- fishing gear : longline or nets
- net characteristics: length, width, mesh size and number of panels
- depth and distance to coast of fishing operations
- soak time
- fishing grounds
- target species and capture (kg)
- number of caught franciscanas

Camera and films were also given to the fishermen in order to record dolphin capture events and fishing operations. Film development was paid with Project funds.

Additionally, information on the biology of the species and conservation issues was given to fishermen, discussing on the current situation of fishing and its interaction with franciscana. In this way it was sought to inform and sensitize fishermen, their relatives and so all the local coastal fishing community, about the species and the problems related to its conservation.

Data were also collected on board in some occasions by members of the research team. Such instances intended to share their activities, deepening and strengthening our relationship with them.

Data analysis

Absolute frequencies of the capture were analyzed versus season, net used, depth and distance to the coast. CPUE was calculated as the number of captured franciscanas divided by the fishing effort (FE), where FE was soaks times by km of nets. CPUE was computed by zone and season, and EP was calculated by depth and distance to the coast. Each season was considered as standard: Summer from 21 December to 21 March, Autumn from 21 March to 21 June, Winter from 21 June to 21 September and Spring from 21 September to 21 December.

RESULTS

It can be said that most fishermen showed willingness to cooperate with our project and interest in it. However, different situations were found in the two zones the study area was divided. Thus, some considerations are made below according to the region, and before showing the overall results of our project.

La Plata River estuary (LPRE)

A total of 12 fishermen were contacted in this zone. The largest fishery in this zone sets at Pajas Blancas (beach in the West)/San Luis (beach in the East), where 80-90 ships operate in withe croaker (*Micropogonias furnieri*) fishing season. This fishery shows a peculiar dynamics as fishermen migrate within the zone from East to West following the white croaker. Most of them go with their families, so the mainly fishing community sets at a different beach. In such fishery, the activity of eighth fishermen was monitored using log-books (Table 1). But the mentioned migration often prevents us from contacting fishermen with whom we work, and thus to give continuity to our work. In addition, this year the community moved to a third location (between those mentioned). Out of the eighth fishermen visited, three of them use the log-book appropriately and the rest fill it out during our visit, with the bills they keep when the fish is sold. Two additional localities were visited, Piriápolis and Playa Hermosa, where four fishermen usually fill their log-books in.

Atlantic Ocean coast (AOC)

A total of 17 fishermen were contacted in this zone. The largest fishery is set at La Paloma, where 28 ships operate and of which we contacted 14 of them (Table 1). Most of them (n=12) recorded every fishing event in the log-book, considering it a good method of having their own

record of the work they do. AOC presents different dynamics to those described from LPRE. The fishermen home are stable facilitating the monthly contact with them. Additional localities were visited, Cabo Polonio where all fishermen (3) were contacted and always fill their log-books in.

In both zones cameras had good acceptance for fishermen took pictures not only of franciscanas but also of several situations of their work.

Table 1. Ships monitored in each fishing locality. The percentages they represent from the fleet operating at the area were calculated using data of local Navy Army when possible, or estimated by direct count (*). LPRE for La Plata River Estuary, AOC for Atlantic Ocean Coast.

Area	Fishing locality	Ships monitored	% of the fleet
LPRE	San Luis /Pajas Blancas	8	10*
	Playa Hermosa	2	10*
	Piriápolis	2	7*
AOC	La Paloma	14	50
	Cabo Polonio	3	100

Franciscana incidental captures

Through the annual cycle, and considering whole the study area, 66 franciscanas dolphin were captured and recorded. According to the season, 25 (37.9%) were captured in summer, 14 (21.2%) in winter, the same in spring and the remaining (13 or 19.7%) in autumn (Fig. 2). As for fishing gears used, 25 (37.9%) captured happened when the stretched mesh size was 18-20 cm (Fig. 3). Regarding the fishing operation, 16 (24.2%) of the franciscanas dolphin caught were recorded when nets were soaked at 21-25 m of depth (Fig. 4) and 45 (68.2%) at 5nm off the coast or less (Fig. 5).

In LPRE, 10 franciscanas dolphin were caught: 8 in autumn, 1 in spring and 1 in summer (Fig. 2). The largest fishing effort was done in autumn (Table 2), at 5nm off the coast or less (86.7%) and between 6-10 m of depth (62.7%), showing that such fishery operates mainly in the coastal region. All incidental captures were recorded when stretched mesh sizes of 10-12cm were used, which is net most used in the zone (Fig. 3).

In AOC, 56 captures were recorded: 24 (43%) in summer, 14 (25%) in winter, 13 (23%) in spring and the remaining 5 (9%) in autumn. In this area the greatest fishing effort is done in summer (Table 2), when sharks are the target species and nets used have a minimum of 18cm of stretched mesh size, remaining soaked in coastal waters. A 77.5% of the fishing effort was recorded between 6 and 10nm, and 34% between 21-25m of depth. Twenty five of the captures (44.6%) happened when nets of 18-20cm of stretched mesh size were used.

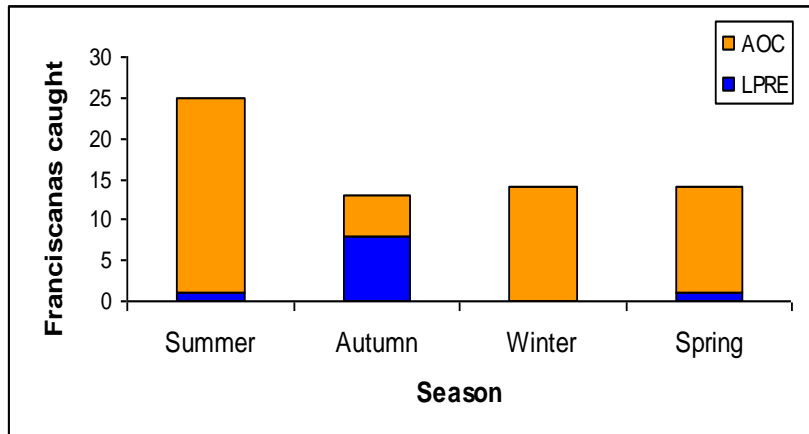


Figure 2- Number of franciscanas caught per season in the Uruguayan coast between October 2005 and September 2006. Reference: orange color represents AOC and blue color represent LPRE.

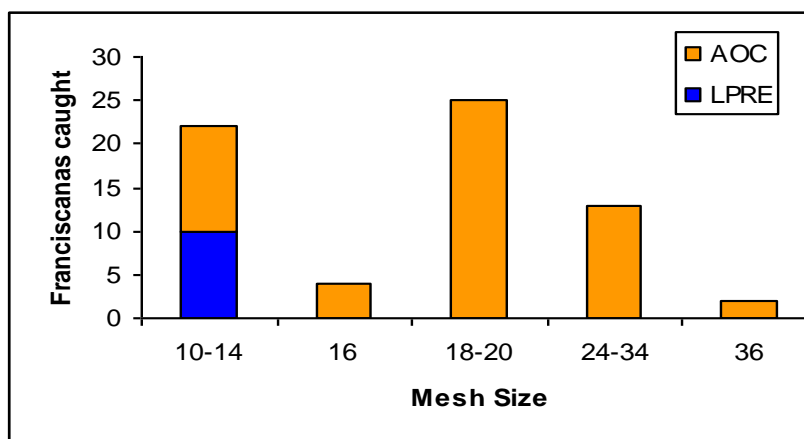


Figure 3- Number of franciscanas caught per net size (stretched mesh size in cm) in the Uruguayan coast between October 2005 and September 2006.

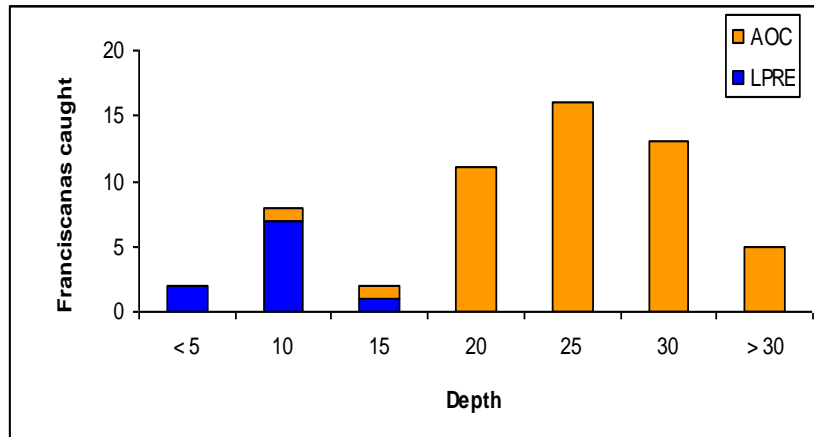


Figure 4- Number of franciscanas dolphin caught per depth in the Uruguayan coast between October 2005 and September 2006. Reference: 5 = from 0 to 5 m depth, 10 = from 6 to 10 m depth, and going on.

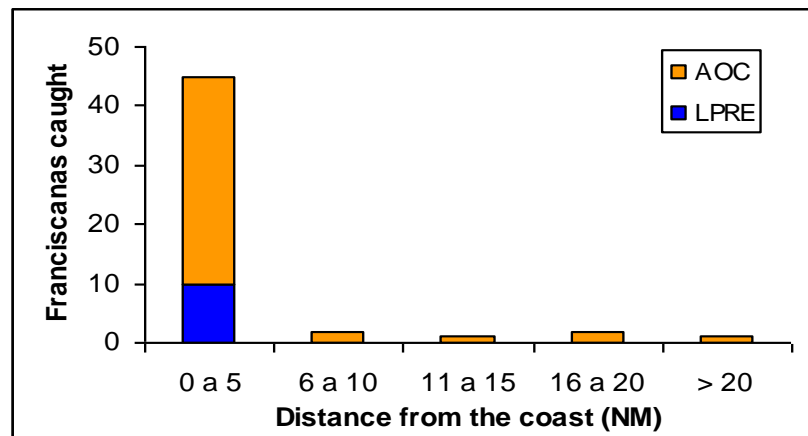


Figure 5- Number of franciscanas caught per distance from the coast in nautical miles in the Uruguayan coast between October 2005 and September 2006.

The annual CPUE for the LPRE was 0.0078 and for the AOC was 0.0017. In both zones the highest CPUE was in the season where the FE was lesser. In Spring LPRE presented the highest CPUE (0.0322) where the FE was 31.1hs.km. However, in winter AOC presented the highest CPUE (0.0025) where the FE was 5637.9hs.km (Table 2).

Table 2. Annual and Seasonal capture per unit of effort (CPUE) and fishing effort (FE) for La Plata River Estuary (LPRE), Atlantic Ocean Coast (AOC). October 2005 - September 2006.

	FE (h x km)		CPUE	
	LPRE	AOC	LPRE	AOC
Summer	144.1	13706.6	0.0069	0.0018
Autumn	1008.7	5931.6	0.0079	0.0008
Winter	105.3	5637.9	0	0.0025
Spring	31.1	8385.8	0.0322	0.0016
Annual	1289.1	33661.8	0.0078	0.0017

DISCUSSION

Usage of the log-books presented difference between the two zones of the study area. In La Plata River estuary (LPRE) out of the 12 fishermen monitored, only 4 recorded their fishing operations during all the year, whereas in Atlantic Ocean coast (AOC) out of 17 fishermen, 15 systematized the record of data. Acceptance of this method of working was straightforward in some cases and in others took some months. The work of some fishermen made others to join, and so in some months 83% of the fishermen visited were recording data.

Giving cameras resulted as a good strategy to make them get more involve with the Project. They would give us the films when finished, and we would develop them and take the best pictures as gifts for them, which undoubtedly helped in generating a more relaxed conversation and increasing their enthusiasm about our monthly visit.

We believe the difference in support of and comitment with the Franciscana Project is a result of the different social, economic, and thus cultural situation that both regions present. In LPRE zone, and particularly San Luis (the largest fishing community of the region), poverty is notorious; this community is far from having their basic needs cover (food, health, education, etc.) and houses are precariously build on the sand. Most homes are not stable, for the migration they do after the white croacker (*Micropogonias furnieri*) causes separation of some families or movement of the whole family twice a year, or even more. Their situation causes rejection from inhabitants and/or tourists at that locality. So, it becomes understandable that generating comitment with our research and consciousness of their own activity results a hard task at least in the short term. For these reasons, LPRE is a complex study zone and hard to work in, making it difficult to establish a tight link in each monthly visit, and loosing continuity of our work. In this region, neither the number of franciscanas caught nor the fishing effort recorded was high. However, we could see that records increased as time passed and fishermen relied more on us. In addition, a number of stranded franciscanas had net marks, suggesting they may have been caught by fishermen although not recorded in the log-book. Both evidences lead us to believe that the numbers of captures obtained is a minimum and that long-term studies are needed to know the real interaction of franciscanas with this fishery. These would embetter and enlarge the data obtained. Besides, it is also worth noting that this is the first time the zone is monitored, so data of the past two years is all what is known about the zone, as far as franciscanas is concern.

In AOC the overall social and economic situation is of humbleness, but it varies among fishermen, with some living in extreme poverty. Homes are stable, and they work in the same locality year-round. Fishermen with higher educational levels consider important to get involve with a scientific research as our project, and regard it as important for their work and for the conservation of the species. Such perspective holds great importance for our work, since it has

positive feedback on other fishermen. Contacting them is favoured by their stability, which is fundamental to strengthen our relationship.

Franciscana incidental captures

During all the year round 66 franciscanas dolphin were caught in Uruguayan coast. This number is smaller than the results obtained in the period 1970-1990 (Praderi, 1997). This could suggest a decrease in mortality of franciscanas in relation to the period mentioned above (Praderi 1997) for the Uruguayan coast. However, in the first period the CPUE was not estimated, thus, the incidental catch of franciscana dolphin is not comparable for both periods in Uruguayan coast. Besides, these results arise from the first two years of monitoring and after a ten-year gap of systematic studies. So it is necessary to continue and deepen data recording to verify this trend.

According to Praderi (Praderi 1984, 1985, 1997; Praderi *et al.* 1989; Praderi *et al.* 1993) using nets of big stretched mesh sizes soaked between 2 and 5 nm off the coast at between 10-20 m of depth produced the highest percentages of mortality of franciscanas in the AOC. As for the records, franciscana distribution range is restricted to coastal areas, between the coastline and 30m isobath, and between the coast line and 30 nm off the coast (Pinedo *et al.* 1989). In our study, 60.6% of the recorded captures occurred between 16 and 30 m of depth, and 4 captures were recorded at 34 and 36 m which might indicate that the franciscana could be distributed in a broader range than that reported.

The highest number of incidental captures of franciscanas was recorded in the season when fishing effort maximizes. When such number is expressed as CPUE, the highest numbers are obtained in the season when least fishing effort is recorded (Table 1). In LPRE most captures of franciscanas dolphin were recorded in autumn when more fishing effort was also recorded caused by the prolonged soaking time of the nets (8 a 72hs). CPUE value was higher in spring when FE is minimized by the use of sonar. In AOC, most franciscanas were captures in summer, season in which fishing targets big sharks (e.g. *Squatina sp*, *Galeorhinus galeus*, *Carcharhinus sp*) using nets of stretched mesh sizes bigger than 18 cm, soaked within 5 nm off the coast and for up to 90 days. Such fishing mode causes the higher FE to be in summer. This agrees with the fact that most franciscanas were caught when nets of 18cm of stretched mesh size were used. And it goes along with what Praderi (1997) found; the highest mortality was recorded in summer months (from November to February) over 20 years, coincidentally with shark fishing season and the usage of big stretched mesh size nets. However, maximum CPUE was obtained when fishing targets gatuzo (*Mustelus schmitti*) and nets are soaked less hours per fishing event (5 h on average).

Fishing efforts are made within the area where the franciscana dolphin frequently uses, which highlights the species' vulnerability. CPUE values calculated are the first in including the LPRE. These data update the figures of CPUE for Uruguay, making substantial contribution to the studies of mortality of franciscanas in Franciscana Management Area III (FMA III).

EXTRA-ACTIVITIES IN 2005-2006

Conservation and Management

Franciscana Project in coordination with Cetaceos Uruguay, public relationships with government organization/institutions and media were with the objectives to:

- a. Exchange ideas and concepts in relation to conservation initiatives towards cetaceans in Uruguay
- b. To inform about the projects on franciscana dolphin and cetaceans conducted by Cetaceos Uruguay.
- c. To provide biological information about franciscana dolphin and cetaceans that can be used towards management actions and plans.
- d. Contact the media (press and television) to inform about the project activities and progress.

Publications and Congress

Invitation to V Workshop for Coordinated research and conservation of franciscana (*Pontoporia blainvillei*), in the Southwestern Atlantic Ocean. Mar del Plata Argentina, November 28th to 30th, 2005.

- Oral exposition: *Captura incidental de Franciscana, Pontoporia blainvillei, en las pesquerías artesanales de la costa uruguaya.* Abud C, Costa P, Dimitriadis C, Franco V, Laporta P & Piedra M.

- Oral exposition: *Pesca de arrastre: un nuevo problema para la Franciscana Pontoporia blainvillei en Uruguay.* Abud C, Costa P, Dimitriadis C, Franco V, Laporta P & Piedra M.

Presentation of a poster at the 12th Working Meeting of Aquatic Mammals of South America, November, 2006, Merida, Mexico, showing results of this project.

Publication of an article: Abud C Dimitriadis C Laporta P & M Lázaro La Franciscana *Pontoporia blainvillei* (Cetacea, Pontoporiidae) en la costa uruguaya: estudios regionales y perspectivas para su conservación. In: Menafra R Rodríguez-Gallego L Scarabino F & D Conde (eds) 2006 Bases para la conservación y el manejo de la costa uruguaya. Vida Silvestre Uruguay, Montevideo. i-xiv+668pp

Financial Information

The items with * indicate the funds of trawler fishery that were used in the elaboration of more sample kits for fishermen, other lab material and two inscription of the 1º Meeting of Latin American Specialist of Aquatics Mammals held in Mérida, México in November 2006, where two posters of the Franciscana Project were presented.

General Category	Quantity	Description	Unit (per survey)	Total
Transport	12	Area 1: Montevideo - Rocha (La Paloma- Polonio) 700 Km	43	516
	12	Area 2: Canelones -Maldonado (San Luis- Playa Hermosa y Piriápolis) 300 Km	20	240
	3	Area 1: 3 tolls	2,5	150
	1	Area 2: 2 tolls	5	

	12	Area 1:3 persons/3 days Rooms and Meals	99	1188
Lodging	12	Area 2: 5 persons/2 days Rooms and Meals	110	1320
Fees	17	Driver of the Faculty's vehicle		204
Stranded animal collection	20	Average of fuel spent	24	480
Field Equipment	48	Log books for fishermen and researchers	1,6	76,8
	40	Sample kits for fishermen	7	280*
	40	Photographic cameras for artisanal fishermen	11	440
	40	Film developments and prints	5,5	220
	3	Sample collection equipment Other laboratoty equipment	62	185 95*
Office Supplies		Paper, Ink cartridges, CDs, Pen, Photocopies, Field Notebooks, Brochures and stickers		51
Vehicle Mantainance	1	Wash, oil change, unexpected		320
1º Meeting of Latin American Specialist of Aquatics Mammals held in Mérida, México November 2006	2	Inscriptions	26,5	53*
Sub total				5818,8
Counterpart		NGO-Yaqu-pacha		800
Total				5018,8

PERSPECTIVES AND PRIORITIES FOR FRANCISCANA DOLPHIN RESEARCH AND CONSERVATION IN THE URUGUAYAN COAST

Research In the short term

1. It is considered essential to establish a long-term working plan in the fisheries localities of La Plata River Estuary region as well as in the Atlantic Ocean coast region as named in this study. Both of them are areas with high mortality of franciscanas and at the same time present complex realities. This would enable tightening links with fishermen, which is crucial for establishing management measures.
2. Franciscana dolphin is the only riverine species that inhabit marine waters. Although in a general manner its population genetic structure was study for all its distribution, the local genetic variation and population structure between the LPRE and the AOC is until unknown. Determinate the degree of differentiation of the two sampling sites will be very important to identify management stocks in a fine scale.
3. Assess the feeding habits of franciscana dolphin in the La Plata River Estuary zone and the Atlantic Ocean coast zone, as it has been suggested that the feeding habits can be different, which would imply a need for different management procedures throughout its distribution on the Uruguayan coast. Additionally, it is also considered important that the diet of the species be evaluated according to sex, age and reproductive status, thus making this

study an important contribution to increase the knowledge on the biology of the species and its conservation.

Conservation and management

1. Publish the results of this study in a scientific journal so as to integrate our data with those available in the region, in order to have a solid base of knowledge in which to base any further management action.
2. Inform the general public through the media (radio, newspaper and television), diffusion material (leaflets, internet) and educational activities about the species, its problems of conservation and the results of our work.
3. Continue working in coordination with governmental institutions through meetings and scientific reports in order to acquire a compromise and to aid in decision-making process of the franciscana dolphin conservation and welfare related issues. The information from this project can be applied to establish management measurements and Marine Protected Areas.

FUTURE ACTIVITIES RELATED

Our capital city, Montevideo, will be the venue for the next Latino American Society of Aquatic Mammals Biennial Conference in 2008 and the VI Workshop for Coordinated research and conservation of franciscana (*Pontoporia blainvillei*), in the Southwestern Atlantic Ocean. Cetáceos Uruguay will be the organizer of both events.

ACKNOWLEDGEMENTS

We are indebted to all fishermen and their families who have cooperated with the Project for their kindness and patience when explaining the dynamics of their activity and its problems. We truly thank Facultad de Ciencias, particularly Sección Etología, for all the support given since the very beginning of the project and through its development. Thanks to Dirección Nacional de Recursos Acuáticos (DINARA) for letting us use some of their facilities to process samples and for living us data on artisanal fisheries. Special thanks to our referees and tutors Marila Lázaro, Kike Crespo, Ignacio Moreno and Daniel Danilewicz for all their unconditional help. Thanks to Proyecto Karumbé for initial contact with some fishermen and good coordination. Thanks to some fishermen of the traler fleet who gave data on franciscanas. We acknowledge Ricardo Praderi for his support and experience in Punta de Diablo and for making available bibliography. Lastly, we would like to thank yaqu pacha and Rufford Small Grants for their support, which made this project possible.

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