

## MAGELLANIC PENGUIN *SPHENISCUS MAGELLANICUS* AND FISH AS BYCATCH IN THE CORNALITO *SORGENTINIA INCISA* FISHERY AT PUERTO QUEQUÉN, ARGENTINA

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Tamini L.L., Perez J.E., Chiaramonte G.E. & Capozzo H.L. 2002. Magellanic Penguin *Spheniscus magellanicus* and fish as bycatch in the cornalito *Sorgentinia incisa* fishery at Puerto Quequén, Argentina. *Atlantic Seabirds* 4(3): 109-114. *Bycatch rates of fish and Magellanic Penguins Spheniscus magellanicus in the cornalito Sorgentinia incisa fishery at Puerto Quequén, Argentina is described. An estimated 100 penguins may be killed annually in the fishery. Although of no likely impact by itself, this bycatch should be placed in the wider context of other impacts on Magellanic Penguin populations in Patagonia.*

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Some fishing gear is very selective in its operations, but most gear catches other, non-targeted organisms (Tillman 1993). During fishing operations the capture of non-target species (bycatch) causes a decrease in fishery efficiency, damages gear, and causes incidental mortality of other species, such as invertebrates, fish, birds and mammals (Hall 1996; Kennelly 1995). Most bycatch is discarded at sea dead or moribund because it has little or no economic value or because its retention is prohibited by law (Hall 1996).

Between 1990 and 1998, total landings in Argentina of cornalito *Sorgentinia incisa* (a silverside species) were over 335 tonnes (t) per year, reaching a maximum of 704 t in 1992 (Anon. 1990–1998). Landings at Puerto Quequén (38°37'S, 58°50'W; Fig. 1) over the same period peaked at 62.3 t in 1994 (14% of total Argentinean landings). As part of a bycatch study on the fleet operating from Puerto Quequén (27 coastal vessels), we worked with a small part of the fleet that fished cornalito when the species was available and there was market demand. This note describes the bycatch in this cornalito fishery.

The cornalito fishery uses a pelagic trawling gear, with a maximum headline length of 15 m and a minimum mesh size of 10 mm. Three sets of pair trawlers (22% of the coastal fleet) worked 11, eight and two fishing days per pair during the 1998 cornalito season (5 May to 5 June), landing 20.3 t (65% of



*Figure 1. Puerto Quequén area; shaded: trawling grounds.*

*Figuur 1. Puerto Quequén; het gebied van de visserij is gearceerd.*

the total landing for Argentina) at Puerto Quequén. One of the pairs was studied during fishing operations on 22 and 23 May by on-board observers. Data from nine fishing tows were analysed. For each tow, the position, duration, speed and depth of the trawl were recorded, as was the total catch, including bycatch. The material was analysed in the laboratory; we recorded the species composition, the weight ( $W$ ) of each individual and, in the case of fish, the standard length ( $S_L$ ). All specimens of fishes were identified using Menni *et al.* (1984). We estimated fishing effort ( $F_E$ ) as

$$F_E = (\text{observed tows/observed fishing trips}) \times \text{total number of trips of the fleet during the season}$$

and the Annual Fishing Mortality of bycatch as

$$A_{FM} = n/\text{observed tows} \times F_E$$



*Displaying Magellanic Penguin, nature reserve Gypsy Cove northeast of Stanley (Falkland Islands) 8 February 2002* Balkende Magelhaenpinguïn in natuurreservaat Gypsy Cove ten noordoosten van Stanley (Falkland Islands) 8 februari 2002 (CJ Camphuysen)

where  $n$  = number of total specimens observed for the study season. In order to relate feeding behaviour of penguins with the target species of the fishery we collected the stomachs of three individuals and analysed their contents.

Trawl operations were diurnal (between 08:00 hrs and 18:00 hrs) and were made between 1.8 and 3.8 nautical miles (nm) from the coast ( $3.2 \pm 0.6$  nm); trawling duration was 80-120 mins ( $104 \pm 15.4$  mins) with a trajectory parallel to the coastline. Each trawl was conducted from 23.6-29.2 m depth ( $27.1 \pm 2.2$  m). The fishing effort of the fleet was 94.5 tows. Total biomass caught in the nine tows was 2817.2 kg. Fishing operations reported a biomass of  $307.7 \pm 73.4$  kg tow<sup>-1</sup> of cornalito. The bycatch biomass (Table 1) was 48.2 kg (1.7% of the total biomass captured) and consisted of fish (1.8 kg tow<sup>-1</sup>) and birds (3.5 kg tow<sup>-1</sup>). The fish identified as bycatch were: another silverside species, locally named pejerrey *Odonthestes* sp. (frequency of occurrence,  $f_o = 100\%$ ,  $n = 46$ ); blue fish *Pomatomus saltatrix* ( $f_o = 55\%$ ,  $n = 67$ ); parona leatherjack *Parona signata* ( $f_o = 33\%$ ,  $n = 7$ ); and the anchovy *Lycengraulis grossidens* ( $f_o = 11\%$ ,  $n = 1$ ). The only bird species identified in the bycatch was the Magellanic penguin *Spheniscus magellanicus* ( $f_o = 55\%$ ,  $n = 9$ ). The  $A_{FM}$  for each species is given in Table 1. The  $S_L$  of the pejerrey was between 250 to 295

Table 1. Overall abundance of bycatch from the cornalito fishery at Puerto Quequén.  $n$  = number of individuals,  $B$  = biomass,  $F_o$  = frequency of occurrence,  $A_{FM}$  = annual fishing mortality.

Tabel 1. Bijvangst in de cornalito visserij bij Puerto Quequén.  $n$  = number of individuals,  $B$  = biomassa,  $F_o$  = frequentie van voorkomen,  $A_{FM}$  = jaarlijkse sterfte door visserij.

Taxon	$n$	%	B (kg)	% B	$F_o$	$A_{FM}$
Silverside <i>Odonthestes</i> sp.	46	35.4	10.4	21.6	1.0	483.0
Blue fish <i>Pomatomus saltatrix</i>	67	51.5	3.2	6.6	0.5	703.5
Parona leatherjack <i>Parona signata</i>	7	5.4	2.6	5.4	0.3	73.5
Anchovy <i>Lycengraulis grossidens</i>	1	0.8	0.1	0.2	0.1	10.5
Magellanic Penguin <i>S. magellanicus</i>	9	6.9	31.9	66.2	0.5	99.2
TOTAL	130	100	48.2	100		

mm and for the blue fish, the sample of which contained a greater proportion of juveniles, between 55 to 300 mm.

The Magellanic penguin comprised 66.3% of total bycatch biomass; of the nine specimens collected three were juveniles. Two of three penguin stomachs analysed contained cornalito exclusively, while the third contained cornalito plus one blue fish. The total weights of the stomach contents were 75, 155 and 270 g respectively. The stomach contents of each penguin comprised five, six and five intact cornalito specimens ( $69 \pm 18$  mm  $S_L$ ,  $2.9 \pm 1.5$  g), and other cornalito specimens partially digested. There were 75 cornalito heads in the stomach weighing 270 g.

This study was developed using data from approximately 22% of the fleet working in the cornalito fishery during 1998. Immature blue fish were numerically the most common species present in the bycatch. Considering the penguin annual mortality associated with this fishery (around 100 specimens/year; Table 1) and the total population estimated for Magellanic penguin in Argentina (about 2 million breeding individuals; Yorio *et al.* 1999), the cornalito fishery studied would not by itself affect the population.

Furness & Monaghan (1987) point out that competition for prey is one of the most important interactions between seabirds and fisheries. Although some kind of interaction is certainly possible between the cornalito fishery and the piscivorous Magellanic Penguin, Frere *et al.* (1996) reported that fish other than cornalito were the principal prey of Magellanic Penguins along the Patagonian coast in summer. *Austroatherina* (= *Sorgentinia*) sp. was a secondary prey item ( $f_o$  7% and 27%) in two of the three localities that were sampled but

they were not found in the samples taken nearest our study area. This is probably due to a combination of the offshore-inshore and north-south movements of the cornalito schools, and the season of the samples - summer in the case of Frere *et al.* (1996) and autumn in the present study.

This kind of fishing is very selective and little bycatch results (1.7% of the total biomass). Compared to other fisheries studied (e.g. Andrew & Pepperell 1992; Fenessy 1994; Liggins *et al.* 1996; McBride & Fotland 1996; Penchaszadeh *et al.* 1984; Pettovello 1999) the cornalito fishery in Puerto Quequén is very efficient and would appear to have a low impact on non-target species. However, other impacts, including fisheries, on Magellanic Penguin populations demand that bycatch should be minimised; several thousand birds are killed each fishing season by gill-net fisheries off the coast of southern Patagonia (Gandini & Frere 2000) and an estimated 40 000+ birds are killed annually by chronic oil pollution off the coast of Argentina (Gandini *et al.* 1994).

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#### BIJVANGSTEN VAN MAGELHAENPINGUÏNS *SPHENISCUS MAGELLANICUS* IN DE CORNALITO-VISSERIJ BIJ PUERTO QUEQUÉN (ARGENTINIË)

In deze bijdrage wordt een overzicht gegeven van de bijvangsten van Magelhaenpinguïns *Spheniscus magellanicus* tijdens de visserij op 'cornalito' *Sorgentina incisa*, een aan koornaarsvissen (Atherinidae) verwante vissoort. Het bleek dat, gecorrigeerd voor de intensiteit van de visserij, jaarlijks ongeveer 100 Magelhaenpinguïns in de visnetten verdronken. Ofschoon dit aantal op het eerste gezicht klein is, betogen de auteurs dat deze sterfte optreedt in een situatie waarin de pinguïns blootstaan aan een flink aantal verschillende bedreigingen, zoals de staand-wantvisserij bij Patagonië en olievervuiling langs de Argentijnse kust. De auteurs bepleiten daarom maatregelen om de bijvangst te beperken.

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