

DISTRIBUTION AND ABUNDANCE OF SEABIRD COLONIES IN THE ARGENTINE

SECTOR OF THE BEAGLE CHANNEL, TIERRA DEL FUEGO

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SUMMARY

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During the breeding seasons of 1992 and 1993, we obtained information on the distribution and abundance of breeding seabirds in the Beagle Channel, an area currently subject to relatively intense human activity. Seabird colonies were distributed in two main areas, separated by 50 km: the islands within Bahía Ushuaia and the islands at the east end of the channel. The islands in Bahía Ushuaia supported the highest seabird diversity. We identified eight breeding species: Magellanic Penguin *Spheniscus magellanicus*, Gentoo Penguin *Pygoscelis papua*, Imperial Cormorant *Phalacrocorax atriceps*, Rock Cormorant *P. magellanicus*, Kelp Gull *Larus dominicanus*, Dolphin Gull *L. scoresbii*, South American Tern *Sterna hirundinacea* and Chilean Skua *Catharacta chilensis*. We present information on colony location and size for each species and comment on some conservation aspects in relation to their distribution and abundance. Our results show that seabirds in the Beagle Channel present a dynamic pattern of distribution and abundance and a high interaction with human activities, mainly ecotourism.

INTRODUCTION

Several seabirds have been reported to breed along the coasts of Tierra del Fuego (Reynolds 1932, 1934, Olrog 1948, 1958, Carrara 1952, Humphrey *et al.* 1970). However, the knowledge about their distribution, abundance, and ecology is poor. The last assessment of seabird abundance in Argentine Tierra del Fuego was made in 1949 (Carrara 1952), but was exclusively aimed at penguin and cormorant colonies. A complete assessment of the size and distribution of seabird colonies in this region has never been conducted.

The Beagle Channel, in particular, is currently subject to relatively intense human activity. Ecotourism is a growing activity, and seabirds breeding along the channel are currently the main tourist attractions for people visiting the area. Additionally, pollution near the city of Ushuaia is increasing, with the main sources of pollution being chronic spilling of fuel at the port, industrial waste water and garbage thrown overboard from ships (A. Schiavini unpubl. data).

Knowledge of seabird abundance and distribution in this region is needed to design conservation and management strategies. In this paper we

present information on the current distribution and abundance of breeding seabirds in the Beagle Channel. Our results reflect distribution and abundance of breeding seabirds only within Argentine territory, given the political difficulties of surveying the Chilean side of the Channel. This information will provide a baseline for monitoring programmes to detect future population changes and help identify their potential causes. In addition, we comment on some aspects of seabird conservation in the Argentine Beagle Channel, particularly in relation to their distribution and abundance.

METHODS

The Argentine Beagle Channel is defined as the portion that extends approximately 110 km from the international border in the west to the Islas Becasses in the east (Fig. 1). To detect seabird breeding sites, we surveyed by air the coastline and islands of this sector of the channel on 5 November 1992. We used a Piper Archer aeroplane, flying along the coast and nearby islands at an altitude of 100-300 m. Additionally, from November 1992 to March 1993 and from November 1993 to January 1994 we surveyed by boat the coastline and islands of Bahía Ushuaia and the area east of Estancia Harberton (Fig. 1). The area between the Les Eclaireurs lighthouse (Islotes Faro, Fig. 2) and the west wall of Isla Gable (Fig. 1) was excluded from these boat surveys, because the aerial survey showed there were no breeding seabirds present. During both seasons, we also made several trips in tour boats to the islands within Bahía Ushuaia and in the vicinity of Bahía Lapataia (Figs 1 and 2), taking advantage of the daily schedules and of their independence from weather conditions. In addition, we used information obtained from an aerial survey and opportunistic observations made in December 1991.

We visited the Magellanic Penguin *Spheniscus magellanicus* colony in early December in both seasons and obtained breeding numbers by a

direct count of nests. Magellanic Penguins bred in both open and forest habitats and, due to logistical difficulties, we estimated the number of penguin nests in the open habitat during December 1992 and in the forest habitat during December 1993. We estimated Imperial Cormorant *P. atriceps* colony sizes by counting nests from aerial photographs, taken just after the peak egg laying. The population size for each location is an average of several counts on each colony photograph. These cormorant colonies consisted mainly of the former *P. albiventer* ("albiventer" colour morph, *sensu* Siegel-Causey 1986, Rasmussen 1991). The relationship between *P. atriceps* and *P. albiventer* is still a matter of discussion and, in this study, we follow Rasmussen (1991) until clarification of the taxonomic status of the species. We obtained Rock Cormorant *Phalacrocorax magellanicus* breeding numbers from a direct count of nests from boats during November and early December. In both seasons, we obtained Dolphin Gull *Larus scoresbii* and Kelp Gull *L. dominicanus* breeding numbers by a direct count of nests during early December and estimated Chilean Skua *Catharacta antarctica chilensis* breeding numbers by counting individuals or pairs showing territorial behaviour.

RESULTS

Magellanic Penguin

Magellanic Penguins bred only at Isla Martillo, 80 km east of Ushuaia (Fig. 1, Table 1). Isla Martillo has been occupied by Magellanic Penguins at least since 1976 (N. Goodall pers. comm.). The penguin colony occurred in two defined habitat types: the main part was located in an open habitat, a terrace characterized by the presence of shrubs of Mata Negra *Chilliostrichum diffusum* and grasses. The other part of the colony extended into a patch of dense coastal Southern Beech forest *Nothofagus* sp. mixed with Winter Bark *Drymis winterii* and Pickwood *Maytenus magellanicus* which grows along the

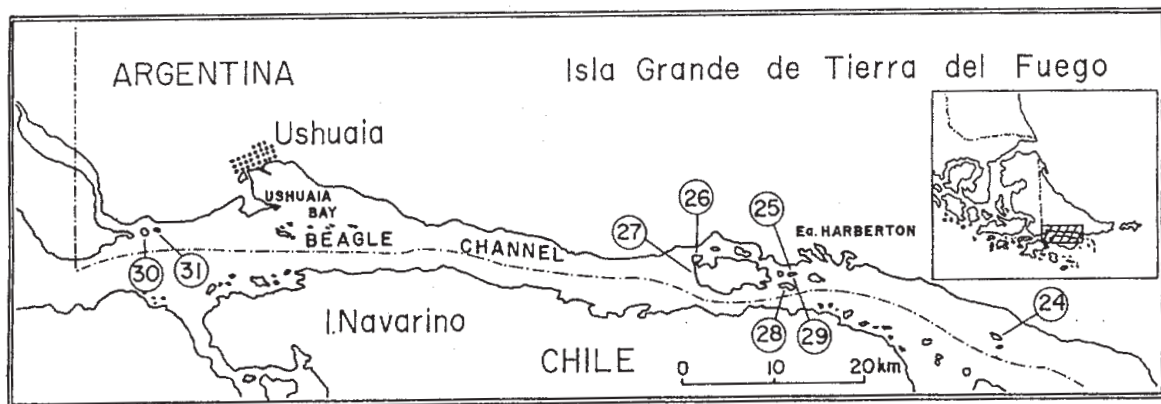


Figure 1

The Beagle Channel, showing localities with seabird colonies mentioned in the text, excluding those of Bahía Ushuaia. See Table 1 for locality names.

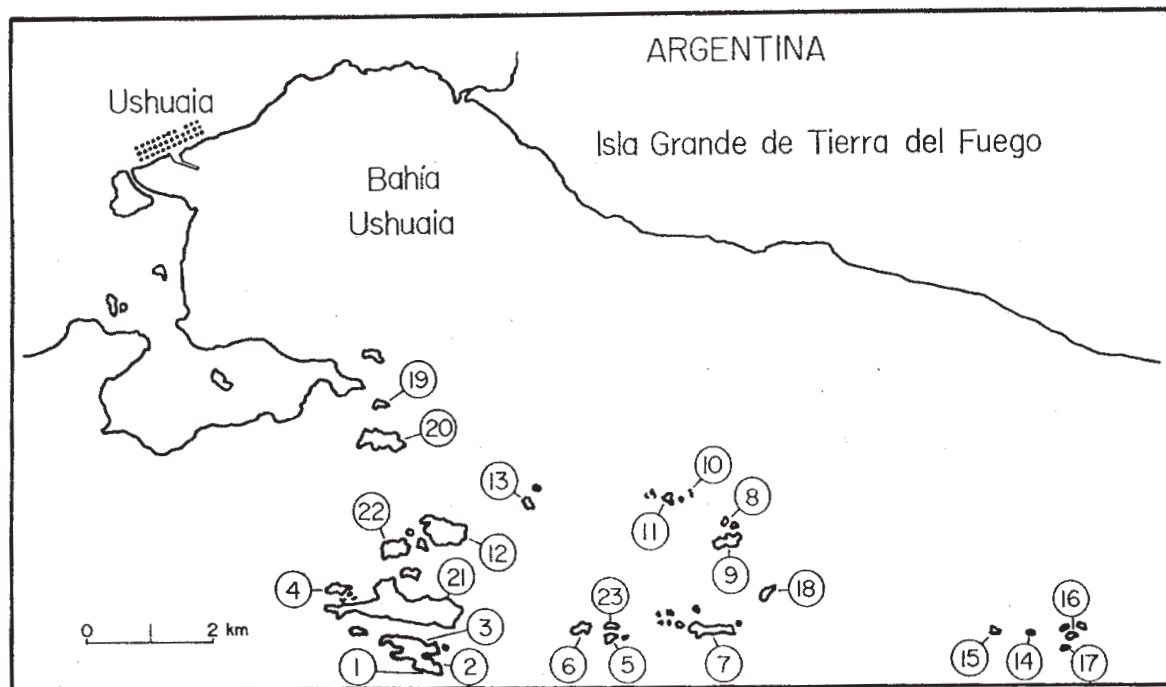


Figure 2

Bahía Ushuaia, showing localities with seabird colonies mentioned in the text. See Table 1 for locality names.

TABLE 1

LOCATION AND SIZE OF SEABIRD BREEDING COLONIES IN THE ARGENTINE SECTOR OF THE BEAGLE CHANNEL DURING 1992 AND 1993

Locality	MG	GP	IC	RC	DG	KG	SAT	CS
1. Baliza Iturrieta				28/17				19/9
2. Puerto Tigre				14/10				
3. Isla H				12/0				
4. Isla Reynolds				59/40		0/10		0/2
5. Isla Lucas E				9/8				8/5
6. Isla Lucas W								3/3
7. Isla Despard				4/0				2/7
8. Isla Willie NW				7/7				
9. Isla Willie				25/13		10/12		4/3
10. Isla Bertha E				17/12				2/3
11. Isla Bertha W				5/1				
12. Isla Mary Ann				21/NC	218/120	12/NC		
13. Isla Alicia			**					
14. Islote Faro E			322/NC					
15. Islote Faro W								
16. Islote Faro S				41/30			**	
17. Islote S Faro S				4/5				
18. Islote Despard NE			1444/NC					
19. Isla Chata						33/NC		
20. Isla Conejo						490/NC		
21. Isla Bridges						110/101		0/2
22. Isla Leelom						29/25		0/2
23. Islote N Lucas E						0/3		
24. Isla Becasses E			4109/NC	NC/NC				
25. Isla de las Cigüeñas				176/168				
26. Isla Gable (NW point)				15/0				
27. Isla Gable (E wall)				12/0				
28. Isla Martillo	519+ *		1	100+/185				0/2
29. Isla Toro				0/2				
30. Isla Redonda				10/7				
31. Isla Estorbo				102/98				

MP: Magellanic Penguin; GP: Gentoo Penguin; IC: Imperial Cormorant; RC: Rock Cormorant; DG: Dolphin Gull; KG: Kelp Gull; SAT: South American Tern; CS: Chilean Skua. Each entry represents numbers of breeding pairs for surveys in the 1992 and 1993 seasons: "1992/1993".

*See text for reference on colony size estimation.

**See text for reference about this colony.

NC: breeding birds present during this season but no census was conducted.

Numbers before location names refer to place numbers in Figs 1 & 2.

hills of the island, an unusual breeding habitat for Magellanic Penguins in Patagonia. The estimated total number of breeding pairs at Isla Martillo during the study was 519, 384 in the open habitat and 135 in the forest habitat.

Historical records mention that a Magellanic Penguin colony existed in the southwest of the Ushuaia Peninsula. This colony disappeared, for unknown reasons, during the mid 1950s (J. Pérez pers. comm.).

Gentoo Penguin

During both seasons, we found a pair of Gentoo Penguins *Pygoscelis papua* nesting at the edge of the Magellanic Penguin colony. A pair of Gentoo Penguins has been seen breeding in the island for the last eight years, rearing one young per breeding season (N. Goodall pers. comm.).

Imperial Cormorant

We located three Imperial Cormorant colonies, totalling 5875 active nests (Figs 1 and 2, Table 1). Between the 1991 and 1992 breeding seasons, we observed changes in the number of individuals and in the spatial distribution of their colonies (Table 1). During the spring of 1992, approximately the same number of cormorants that bred on Isla Alicia during the 1991 breeding season moved and settled on Isla Despard Noreste, which had not been occupied during the previous season. Additionally, during the 1993 season Imperial Cormorants abandoned the north sector of the Isote Faro Este and a new group settled on the neighboring Isote Faro Oeste. On both occasions, birds moved to islands already occupied by Southern Sea Lions *Otaria flavescens*.

Similarly, the colony at Isla Becasses showed a sharp decrease in breeding numbers. An aerial photograph obtained in December 1991 allowed us to estimate that over 1000 occupied nests were not occupied again during the 1992 season.

Rock Cormorant

We located 21 Rock Cormorant colonies and counted more than 600 active nests (Figs 1 and 2, Table 1). Incubating and brooding Rock Cormorants appear to be tolerant to human presence. However, before laying eggs and after chicks fledged, some birds started to abandon the colonies when our boat was 100 m away, causing a chain reaction that resulted in the gradual abandonment of the rest of the colony. Occasionally, Rock Cormorants react in the same way towards tour boats that approach their colonies during these periods. The biggest colonies in the study area, Isla de las Cigüeñas and Isla Martillo (Fig. 1), are subject to daily tour visits by two catamarans during the spring and summer.

Dolphin Gull

Only one Dolphin Gull colony was found in the area, on Isla Mary Ann (Fig. 2). This colony, with 218 active nests during the 1992 breeding season, is the largest known for Argentina (P. Yorio unpubl. data). On 9 February 1993, approximately 80% of the chicks were already forming crèches along the shoreline. Given their high mobility it was difficult to count chicks. However, we estimated a total of 200 chicks. On 4 March 1993, all Dolphin Gulls had already abandoned the island. During the breeding season of 1993, only 120 active nests were recorded, approximately 55% of the nests found in the previous season.

During the breeding season Dolphin Gulls appear to be highly dependent for food on Southern Sea Lions and Imperial Cormorants that breed in Bahía Ushuaia. Outside the breeding season, they are more frequently observed along the coastline near the city and the low number of individuals observed suggests that they disperse outside Bahía Ushuaia.

Kelp Gull

We located eight Kelp Gull colonies, all within Bahía Ushuaia, and counted more than 600 active nests (Table 1, Fig. 2). Two of these colonies were first seen during the breeding season of 1993. We did not find a Kelp Gull colony reported on the southern coast of Isla Gable (R. Gramuglia pers. comm.). We began to observe fledglings near the city of Ushuaia during early February. By early March, most Kelp Gulls abandoned the islands, and we observed aggregations mainly at four locations: a) mouth of the Arroyo Grande (which passes the municipal slaughter house), b) city garbage dump, c) mouth of the Rio Pipo, and d) coastline of the city of Ushuaia. We also observed them in mixed feeding aggregations with Imperial Cormorants, Blackbrowed Albatrosses *Diomedea melanophris* and Southern Giant Petrels *Macronectes giganteus* in Bahía Ushuaia and near Isla Gable.

South American Tern

During the 1988 and 1991 seasons, South American Terns *Sterna hirundinacea* nested in Islote Faro Sur (Fig. 2), whereas in 1989 and 1990 they bred at Isla Casco (R. Gramuglia pers. comm.). During 1992, terns started to arrive on Islote Faro Sur in late October, and settlement and courtship activities continued until early December. By mid December, however, all terns had deserted. A visit to the colony after this abandonment showed the presence of only a few broken eggs. Given this early abandonment, we were unfortunately unable to survey the colony. However, we estimate that approximately 500 pairs had attempted to breed. South American Terns were observed in the area during the 1993 season and, although they showed courtship behaviour, they did not breed in the study area.

During early December 1992, we also found a single South American Tern nest with two eggs within the Kelp Gull colony at Isla Conejo. During January and February we observed

feeding flocks of between 10 and 50 terns in Bahía Ushuaia and near Isla Redonda.

Chilean Skua

We found Chilean Skuas nesting at 10 localities (Table 1, Fig. 2). Most pairs of this species were found on Isla H that, interestingly, is the island located farthest away from other seabird colonies. By the end of March and beginning of April, Chilean Skuas had disappeared from Bahía Ushuaia, suggesting winter dispersal.

DISCUSSION

Seabird colonies along the Beagle Channel are distributed in two main areas separated by 50 km: the islands within Bahía Ushuaia and the islands at the east end of the channel. The islands near the city of Ushuaia showed the highest seabird diversity. For some species, these results underestimate the real population sizes. For example, we know of the existence of at least five more Rock Cormorant colonies on the Chilean side of the Channel and two additional small Imperial Cormorant colonies in Chilean waters in front of Isla Martillo.

In addition, our survey was not suitable for the detection of species such as diving petrels, which nest in burrows and have mainly nocturnal habits. Both Magellanic *Pelecanoides magellani* and Common *P. urinatrix* Diving Petrels have been frequently observed feeding in Bahía Ushuaia (Humphrey *et al.* 1970, A. Schiavini unpubl. data) but we were unable to locate their colonies. Considering that these species are mainly inshore foragers, birds observed in the bay are likely to breed in the Beagle Channel. Magellanic Diving Petrels have been recorded breeding at Isla Navarino near Ushuaia (Reynolds 1935).

Except for Magellanic and Gentoo Penguins, the same species observed in this study were reported breeding in the Beagle Channel two or more

decades ago (Olrog 1948, Humphrey *et al.* 1970). However, our results show that changes in numbers and spatial distribution have occurred in recent years. The reasons for these changes are unknown, although some might have been the result of human activities.

In the past, the abundance of some colonial wildlife led to intense exploitation. Penguins, cormorants, pinnipeds and dolphins were extensively used between the mid seventies and mid eighties for crab bait in the King Crab *Paralomis granulosa* fishery, both in Argentina and Chile (Cárdenas *et al.* 1987, Goodall *et al.* in press.). Fortunately, a progressive decrease in the King Crab fishery during the last 10 years has resulted in the recovery of some of these species, such as the Southern Fur Seal *Arctocephalus australis*. The distribution of colonies close to the city of Ushuaia also favoured the collection of Kelp Gull, South American Tern and Magellanic Penguin eggs. Some old inhabitants have suggested that the Magellanic Penguin colony located on the Ushuaia Peninsula disappeared due to such disturbance.

Recently, the concentration of colonies near the city of Ushuaia has led to a growing ecotourism industry. Seabird and pinniped colonies are visited by approximately 50 000 national and international tourists each year, mostly from September to April. Tour boats that take between 80 and 240 visitors offer daily tours to these colonies. Tourists do not land on any of the visited colonies, but tour boats can approach up to 10 m from penguin and cormorant nests. Birds are apparently accustomed to visitors approaching in tour boats, but may abandon the colony outside the incubation and brooding period when approached by inflatable rubber boats or other vessels. Although no evident detrimental effects on wildlife can be observed at present tourism visitation levels, there has been no detailed evaluation on human-wildlife interactions.

People visiting the area on their own sometimes enter colonies and disturb breeding birds. Recent human visits to the South American Tern colony at Conejo Island during peak breeding season resulted in colony abandonment and relocation at Isla Casco, 11 km away from the former site (A. Schiavini unpubl. data). It is possible that colony abandonment by breeding terns during the 1992 breeding season was also a result of human disturbance. Another source of human disturbance that probably caused recent changes in seabird breeding distribution was the use until the late 1970s of some breeding islands for target practice by the Argentine Navy. Fortunately, these exercises are no longer carried out in Bahía Ushuaia.

Proximity to the city of Ushuaia allows Kelp Gulls to take advantage of supplementary food sources. Kelp Gulls intensively use the city garbage dump as a foraging site and are also regularly observed breaking into garbage bags outside houses. Food pellets found among nests during this study included pieces of plastic bags and other garbage. Interestingly, all breeding colonies are located on the islands closest to the dump, suggesting a close association between this species and artificial food sources.

Our results show that seabirds in the Argentine sector of the Beagle Channel present a dynamic pattern of distribution and abundance and a high interaction with human activities, mainly ecotourism. Therefore, we suggest that monitoring programmes need to be developed, to follow both population trends and human-wildlife interactions. Additionally, thorough complementary surveys are needed on the Chilean sector of the Beagle Channel in order to develop adequate conservation and management strategies.

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