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AUTUMN SEABIRD OBSERVATIONS OFF THE SOUTH SHETLAND ISLANDS

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Observaciones de aves marinas en otoño en las islas Shetland del Sur

Resumen. Los estudios de aves marinas entre las Islas Shetland del Sur y el norte de la península Antártica son numerosos durante el verano, mientras fuera de esta época son escasos en esta zona. El objetivo de este estudio fue registrar las especies de aves presentes en otoño en la zona comprendida entre el norte de la península Antártica y las islas Shetland del Sur. Las observaciones fueron hechas a bordo del Rompehielos Alte. Irizar; se realizaron censos de 10 minutos seguidos de 10 minutos de intervalo, durante el fotoperíodo. Se calculó el índice de diversidad de Shannon. Fueron registradas 13 especies; se relaciona la aparición de estas aves en la zona en esta época con variables ambientales.

Palabras clave: aves marinas, islas Shetland del Sur, península Antártica, otoño.

Key words: Seabirds, South Shetland Islands, Antarctica, Autumn.

INTRODUCTION

Studies of the avifauna of the South Shetland Islands, Bransfield Strait and waters north of the Antarctic Peninsula are numerous, and they have contributed useful data concerning seabird trophic ecology food sources (e.g., Tickell & Woods 1972, Brown *et al.* 1975, Thurston 1982, Starck 1985, Hunt *et al.* 1990). Most of these works have been done between November and March, when seabirds are of their highest densities. Due to hard weather conditions, biological studies during autumn-winter are scarce in Antarctica. Among the few autumn-winter studies of seabird aggregations and their relations with water surface temperature are made by Szijj (1967), Plotz *et al.* (1991), and Ainley *et al.* (1994) who determined the ecological structure of resident and migrating seabirds at the Weddell-Scotia Confluence. There is no previous seabird monitoring done in autumn on South Shetland Is. and north of the Antarctic Peninsula. The aim of this

paper is to report the observations carried out in the area during autumn.

MATERIALS AND METHODS

Between 28 may 95 and 1 june 95, observations were made from the bridge (25 m above sea level) of the Almirante Irizar icebreaker. Cards suggested by the BIOMASS Working Party on Bird Ecology (1984) were used. Censuses were done while the ship progressed at above 6 knots. Census lasted 10 minutes each and were followed by 10 minute intervals. Observers worked in turns during daylight (09:00-17:00 h) covering a scope about 180° ahead and 300 m from each side of the ship. Ship following birds were omitted from counts to avoid errors in abundance estimation. Air and sea-surface temperature, latitude and longitude, distance to land, direction and intensity of wind (Beaufort scale), cloud cover, type and cover ice (%), and course and speed of the ship

were recorded on each card. The study area comprised the South Shetland Islands, Bransfield Strait and north of Antarctic Peninsula (Fig. 1). Two 12 x 50 binoculars were used, and species diversity was obtained by applying the Shannon index. Additionally, observations were made at night to observe seabird behavior, and when the ship stopped near the coast in order to know the inshore avifauna.

RESULTS AND DISCUSSION

1. Account of species

Nine seabird species and 111 individuals were recorded in 11 observations between 61-63°S (Table 1). An additional four species were observed while the ship was stopped near the coasts. As for environmental factors, the water surface temperature and wind speed showed little variation (-1.5°C and 4 respectively); the air temperature $X = -3.1^{\circ}\text{C}$, $S.D. \pm 1.3$ and the ice cover was $X = 18.5$, $S.D. \pm 33.5$. The patterns of distribution for each species were as follows:

- Southern Giant Petrel *Macronectes giganteus*
Two individuals were observed at NE of King George I., South Shetland Is., at 15 nautical miles from the coast. In this area there exist

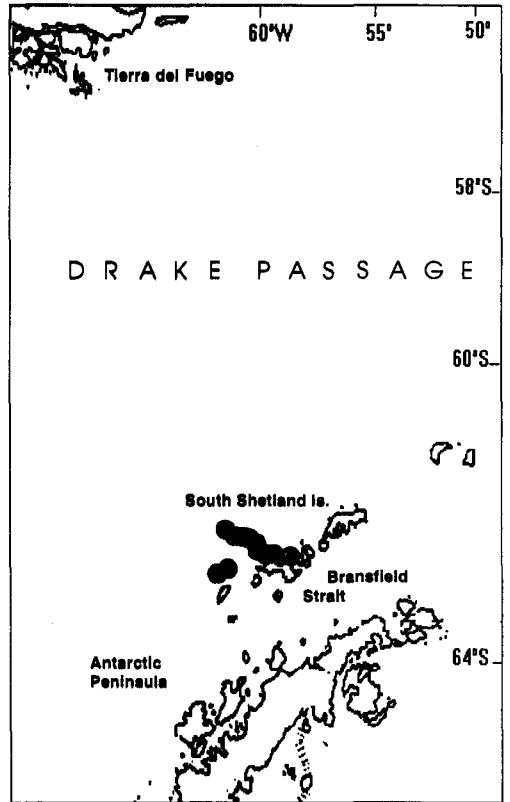


Figure 1. Study area covered in the survey during autumn 1995. Grey points indicate censuses.

Table 1. Abundance obtained in censuses on South Shetland Island, Antarctic Peninsula and Bransfield Strait. MGIG: *Macronectes giganteus*; DCAP: *Daption capense*; TANT: *Thalassoica antarctica*; FGLA: *Fulmarus glacialisoides*; PNIV *Pagodroma nivea*; PASP: *Pachyptila sp*; HCAE *Halobaena caerulea*; LDOM *Larus dominicanus*; STSP: *Sterna sp.* Ic: ice cover (%); H': Shannon's diversity; DI: nearest distance to coast (nautical miles).

Species	Record #										
	1	2	3	4	5	6	7	8	9	10	11
MGIG	2										
DCAP	2	1	1							3	1
TANT	1	1	2	2	2	1			1		
FGLA	1										
PNIV	2	10	1	9	3	17	8	2	9	5	
PASP	5	2									
HCAE	1	2				1					
LDOM						3			7		2
STSP	1										
Ic	2	4	10	10	10	10	80	80	70	0	0
H'	1.76	1.16	1.33	0.47	0.67	0.75	0	0	0.86	0.66	0.63
DI	15	16	15	27	122	27	27	25	16	10	5

some breeding colonies which either remain as residents or haven't started their migratory movement yet. In fact, Watson (1975) pointed out that some adults may remain in their breeding colonies through the whole year. Ainley *et al.* (1994) recorded this species as scarce in autumn and winter both in open waters and packice.

– Pintado Petrel *Daption capense*

Eight individuals were observed, four NE of King George I. and four on Deception I.; Ainley *et al.* (1994) did not record it in autumn 1986, but Plotz *et al.* (1991) observed this species in the marginal ice zone at east of Weddell Sea. Scattered flocks were seen at Drake Passage flying northwards. We can infer that most of the population had already migrated to lower latitudes.

– Antarctic Petrel *Thalassoica antarctica*

Ten individuals were recorded in seven out of eleven censuses made; nine of them NE of King George I. Although this species usually arrives at this region by early-middle October (Watson 1975), in Winter it was one of the most abundant when the pack was present (Ainley *et al.* 1994, Plotz *et al.* 1991).

– Antarctic Fulmar *Fulmarus glacialisoides*

Plotz *et al.* (1991) recorded scarce individuals during winter 1986 at NE of Weddell Sea, but Ainley *et al.* (1994) observed great numbers of Antarctic Fulmar at the Weddell-Scotia Confluence during winter 1988. We recorded just one individual at NE King George I. However, about 900 Antarctic Fulmar were seen two days before in Beagle Channel and scattered flocks in Drake Passage flying northwards, assuming that most of the antarctic population had already migrated to the same direction

– Snow Petrel *Pagodroma nivea*.

It turned out to be the most abundant species recorded (66 individuals), which was continuously related to ridges of icebergs. Most individuals of Snow Petrel remain in Antarctic zone along the whole year; for Szijj (1967), Plotz *et al.* (1991) and Ainley *et al.* (1994) it has been one of the most abundant

species ever recorded.

– Prion *Pachyptila* sp

Seven unidentified prions were seen at NE of King George I. According to del Hoyo *et al.* (1992) prions always migrate northwards after breeding season is over. Ainley *et al.* (1994) recorded *Pachyptila vittata* as Antarctic Prion in open waters at Weddell-Scotia Confluence; according to Watson (1975) and del Hoyo *et al.*'s (1992) distribution patterns, the prions recorded in this study may have been adults of Antarctic Prion *Pachyptila desolata* which remained close to their breeding locations.

– Blue Petrel *Halobaena caerulea*

Four scattered individuals were seen near King George I. Although northward movements usually end by late March, some adults return to their breeding colonies between April-June (Watson 1975). Presumably, our observations may belong to these individuals. For Ainley *et al.* (1994) it was one of the most abundant in open waters during winter 1988. It was not observed by Plotz *et al.* (1991).

– Kelp Gull *Larus dominicanus*.

Twelve individuals were seen, 10 in Bransfield Strait and two in the coasts of Deception I. Ainley *et al.* (1994) recorded few individuals of Kelp Gull. Like other species, it is quite probable that our recordings stand for adults which remain in the area before starting their migration movements.

– Tern *Sterna* sp

One non identified tern was observed at 15 nautical miles north King George I. Ainley *et al.* (1994) recorded both Antarctic Tern *Sterna vittata* and Arctic Tern *Sterna parasdisaea* during autumn 1986. Watson (1975) pointed out that Antarctic Tern may remain in inshore waters near their breeding places all through the year.

2. Another observations

In addition, other observations were made while the ship was stopped on ice or in front of

coasts: two Kelp Gull, one Pintado Petrel and one American Sheathbill *Chionis alba* were seen near Esperanza Station, Antarctic Peninsula (62°24' S, 56°59' W).

On June 1, we had the chance of researching the inner coasts of Deception Island. The species recorded were as follows: one individual of Emperor Penguin *Aptenodytes forsteri* near Argentine Deception base; about 900 Gentoo Penguin *Pygoscelis papua* on Whaler's Bay beach; 12 Imperial Shags *Phalacrocorax bransfieldensis* on Fumarole Bay; five Southern Giant Petrel flying over Port Foster; a flock of 28 Pintado Petrel flying towards S-N over Fumarole Bay and nine on water; 28 American Sheathbill mixed with a group of Gentoo Penguins and 11 on Fumarole Bay; 28 individuals of Kelp Gull, 11 flying over Fumarole Bay, five near Deception Base and 12 in Whaler's Bay; 24 Antarctic Terns flying over Fumarole Bay and American Sheathbill. Antarctic Terns and American Sheathbill were also seen by Plotz *et al.* (1994) in Autumn. The following observations were made at night: on 28 May at 23:00 h, 15-20 Snow Petrels were seen flying over icebergs in Hope Bay; on 29 May at 20:30 h, in Bransfield Strait, about 20 Snow Petrels were seen feeding on ridges of icebergs; other scattered flocks of the same species were recorded in the same area on 30 May at 01:30 h. Also on 28 May at 22:50 h, near 10 Blue Petrels hovered over icebergs; one of them collapsed with an antenna and fell down. Although we didn't see Pintado Petrel flying at night, it is known that they also have nocturnal activities (Szijj 1967).

The nine species recorded while the ship was steaming were also seen by Plotz *et al.* (1991) or Ainley *et al.* (1994). The scarce number of observations (due to ice cover and short daylight periods) does not allow us an exhaustive analysis of data. However, in some aspects we found some similarities with other authors. The literature confirms that, in presence of ice, the diversity is higher on ice edges than in open waters but it tends to decrease within packice (Plotz *et al.* 1991, Ainley *et al.* 1994, Orgeira in press). The highest values of diversity were obtained when ice cover was 2-10%, i. e. where ice edges were continuously present (Table 1). These ice edges (used as foraging areas) could explain the presence of seabirds in the area at this time of the year. Although we couldn't get samples of kri-

ll, the extensive activity of birds observed during daylight and night (specially Snow Petrel) makes us suppose the presence of food associated to ice edge in Hope Bay and Bransfield Strait. The presence of 5 Minke Whales *Balaenoptera acutorostrata* on 29 May at 10:15 h in Hope Bay seems to confirm the existence of food in the area. On the another hand, it is highly probable that the presence of American Sheathbill and Kelp Gull in Hope Bay is related to the existence of galley refuse at Esperanza station (Coria & Montalti 1993). The high diversity found in the inner coasts of Deception I. is remarkable which could be due to the protection that offers the topography of the island, turning the area into a gathering place just before to starting migrating northwards.

We have not data to let us estimate the resources available beneath ice ridges. There may occur similar process like those described by Stretch *et al.* (1988), where ice melting releases algae into the water column which prompts intensive foraging behaviour in krill, and thus, in krill eaters. The scarce number of observations is not representative for the total covered area, but constitutes the unique records for the area by this time of year and could help us understand the species migrating movements or extend the pelagic ranges already set up.

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ECOLOGIA REPRODUCTIVA DEL CORMORAN IMPERIAL (*Phalacrocorax atriceps*), EN ISLA DESEADA (SANTA CRUZ, ARGENTINA)

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Breeding Ecology of the Imperial Shag (*Phalacrocorax atriceps*), in Deseada Island (Santa Cruz, Argentina)

Abstract. We studied the breeding ecology of Imperial Shags (*Phalacrocorax atriceps*) in Deseada Island (Santa Cruz, Argentina), during the breeding season of 1994-95. The shags arrived to the island in early August, they re-built their nests and started to lay eggs during late October, with a peak of egg production in the first two weeks of November. The modal clutch size was three eggs. Hatching started in late November. The maximum mean brood size was observed in mid- December (1.4 chicks). Hatching success was 53%, whereas the survival of chicks was 60%. Neither hatching success nor chick survival differed among nests located in distinct sectors of the colony. In mid- February the juvenile (approximately 60 days of age): adult ratio was 1:3. All the juvenile shags left the island in late March, together with most adults.

Key words: Imperial Shag, *Phalacrocorax atriceps*, breeding, Patagonia, Argentina

Palabras clave: Cormorán Imperial, *Phalacrocorax atriceps*, reproducción, Patagonia, Argentina.

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