

SPRING SEABIRD DISTRIBUTION IN THE STRAITS OF MAGELLAN

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SUMMARY

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Three early austral-spring transects of the Straits of Magellan, Chile recorded 10 seabird species, 60% belonging to three species: Magellanic Diving Petrel *Pelecanoides magellani*, Imperial Cormorant *Phalacrocorax atriceps*, and South American Tern *Sterna hirundinacea*. Group size was <2,0 for all species, suggesting that most food occurs in small patches. Most terns and diving petrels occurred in water >60 m, whereas the reverse was true of cormorants.

INTRODUCTION

Some information exists on the general, broader-scale distributions of seabirds in the Chilean fjords and offshore waters of Chile and Argentina during summer, fall, and winter (e.g. Jehl 1973, Brown *et al.* 1975, Devillers & Terschuren 1978a), but little is known of finer-scale distributions. We report here on seabird distribution in relation to water depth and group size in the Straits of Magellan during the austral spring.

METHODS

We observed seabird distributions during three crossings of the Straits of Magellan in November 1985, between Punta Arenas (53 09S, 70 52W), Patagonia, and Porvenir (53 19S, 70 25W), Tierra del Fuego, Chile (Fig. 1). We counted all birds sitting on the water or passing a line extending 300 m perpendicular to the ship's course, from a ferry of approximately 70-m length, and 8-m observation height. The first transect (T-1), on 21

November, from Punta Arenas to Provenir (35 km), took 150 min, the second (T-2), over the same course, on 23 November, took 194 min, and the third (T-3), also on 23 November, on a reciprocal course, took 156 min. On both days, the weather was overcast with the wind from the southwest. On 21 November, the wind was slight (five knots) and the sea was almost calm. On 23 November, the wind was stronger, (10 knots), with swells of 0,5 - 1,0 m, but conditions did not significantly reduce visibility of birds, either on the water or flying.

Spearman rank-correlations corrected for ties were used to compare the relative abundances of the species on the three transects. Mean numbers per sighting were calculated for each species with two or more sightings. Sixty metres depth was chosen as an arbitrary division between inshore and pelagic feeding areas. The percentage of each species occurring over depths greater or lesser than 60 m were calculated for the three most abundant species, and the results were compared using a percentage test (Sokal & Rohlf 1969).

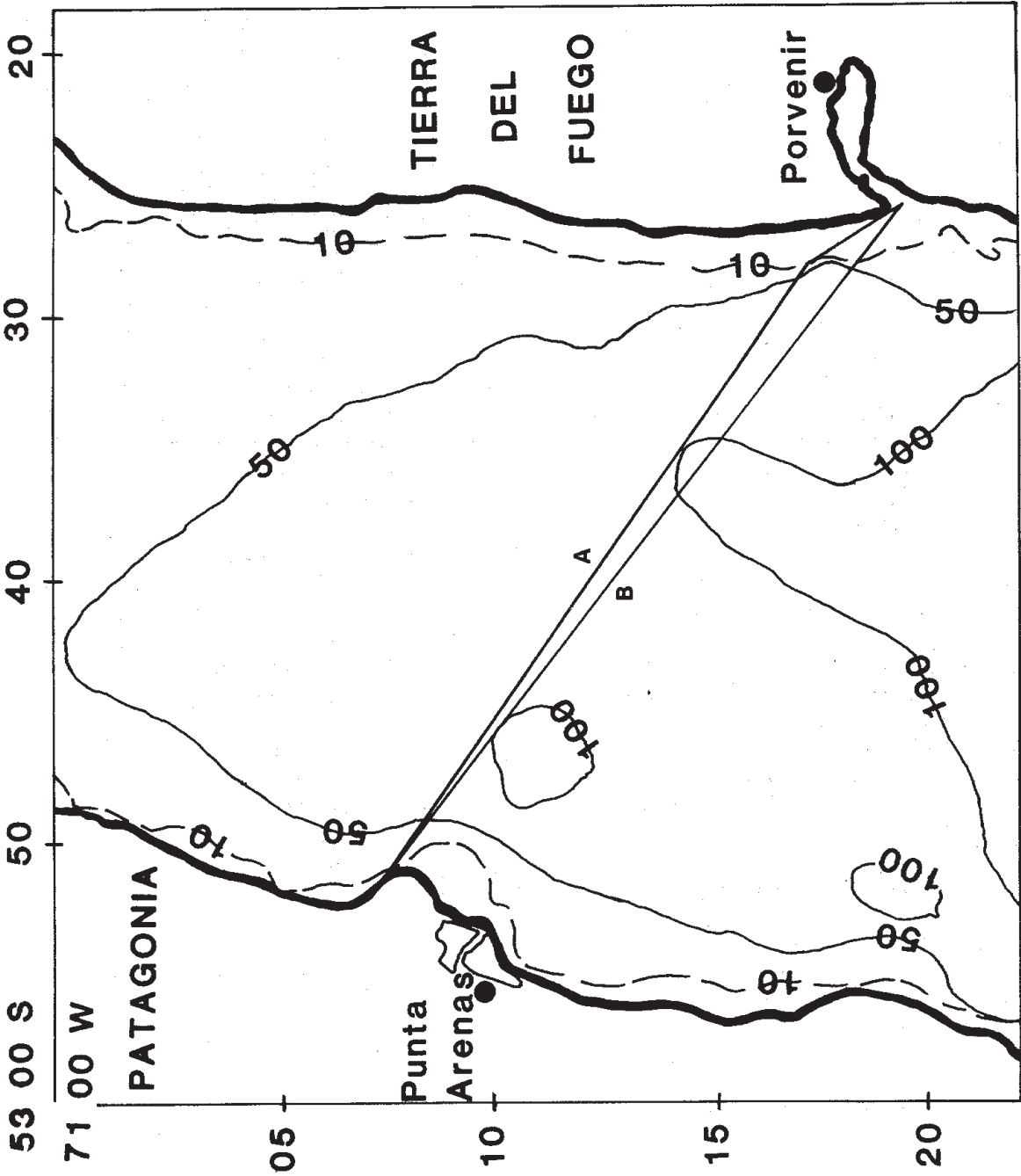


Figure 1
Chart of transect run between Punta Arenas, Patagonia and Porvenir, Tierra del Fuego, Chile on 21 November (a) and 24 November (b) 1985. Bottom contours are in metres.

Water depths were derived from British Admiralty chart 1281 (1961). The oceanography of the study area appears poorly known. Pickard (1971) reported on oceanographic results from a station slightly to the south in the Straits, and suggested that water characteristics in the area are different from those farther to the west. Scientific names are given in Table 1.

RESULTS

Ten species (and an unidentified albatross) were seen on the crossings (Table 1). The most abundant species were Magellanic Diving Petrel, Imperial Cormorant (including *P. albiventer*: cf. Devillers & Terschuren 1978b), and South American Tern. The three transects were similar in their relative abundance of species ($P < 0,05$: T-1 and T-2, $r_s = 0,735$; T-2 and T-3, $r_s = 0,562$; T-1 and T-3, $r_s = 0,713$). The main difference was the large number of Magellanic Diving Petrels on the 21 November transect (T-1).

Most Magellanic Diving Petrels (84,4%) and South American Terns (70%) were seen in water deeper than 60 m, whereas only 10% of Imperial Cormorants occurred in deep water. Cormorants were most abundant in the kelp *Macrocystis pyrifera* beds at Punta Pato, the entrance to Porvenir Bay. The differences in water depth were significant for all three species (percentage test: diving petrel: $t = 5,23$; $P < 0,001$; cormorant: $t = 4,66$; $P < 0,001$; tern: $t = 2,38$; $P < 0,05$).

Group sizes were small, fewer than 2,0 birds/group for all species (Fig. 2). Groups of birds feeding on the water were also small (Imperial Cormorant, $1,9 \pm 1,3$; $n = 28$; Magellanic Penguin *Spheniscus magellanicus*, $1,25 \pm 0,7$; $n = 5$; Magellanic Diving Petrel, $1,3 \pm 0,5$; $n = 10$; South American Tern, $1,5 \pm 0,55$; $n = 6$). Although small, dispersed groups of diving petrels and cormorants apparently formed parts of larger, scattered feeding assemblages, the latter did not appear to be cohesive flocks.

DISCUSSION

Most (60%) of the birds were of three species: Magellanic Diving Petrel, Imperial Cormorant and South American Tern. During fall in the southern inlets of Chile, including the Straits of Magellan, Brown *et al.* (1975: 347) found Imperial Cormorant, Blackbrowed Albatross *Diomedea melanophrys* and South American Tern to be the most abundant species. On a single transect across the Straits, on 3 March 1970, Kelp Gull *Larus dominicanus*, giant petrels *Macronectes* sp. and Magellanic Diving Petrel were the most abundant species (R.G.B. Brown *in litt.*). Devillers & Terschuren (1978a) reported Blackbrowed Albatross, South American Tern and Magellanic Penguin to be the most abundant species on a transect in January 1976. During a single winter (May) transect departing from Punta Arenas south through the Straits, Jehl (1973) found Magellanic Penguin, Antarctic Fulmar *Fulmarus glacialisoides* and Blackbrowed Albatross the most abundant species.

The four studies apparently had different transect methods, although these are not always described, and followed different routes which may have led them through areas preferred by different species. Jehl (1973), Brown *et al.* (1975) and Devillers & Terschuren (1978a) were on passage to other destinations and thus went through the Straits; we went across them. Despite these differences, the results of the four sets of observations can be compared very generally. These suggest that diving petrels were exceptionally abundant, compared to previous work, during one of our three cruises, influencing our aggregate results. Diving petrels were found in deep water during our transects and presumably would have been at depths covered by the other three transects. Jehl's work suggests an influx of southern species during the winter, including Magellanic Penguins from farther south or from the Falkland Islands.

The small numbers per sighting for all species during our transects suggest that food occurs only in small patches, rather than in large patches as in

TABLE 1

NUMBERS OF SEABIRDS SEEN ON TRANSECTS BETWEEN PUNTA ARENAS, PATAGONIA AND PORVENIR, TIERRA DEL FUEGO, NOVEMBER 1985

Species	21 November		23 November	
	Pta A-Porv.	Pta A-Porv.	Porv.-Pta A	Porv.-Pta A
Magellanic Penguin <i>Spheniscus magellanicus</i>	3	5	0	0
Blackbrowed Albatross <i>Diomedea melanophris</i>	3	6	3	3
Unidentified albatross <i>Diomedea</i> sp.	0	1	0	0
Southern Giant Petrel <i>Acronectes giganteus</i>	9	3	2	2
Pintado Petrel <i>Daption capense</i>	1	0	0	0
Sooty Shearwater <i>Puffinus griseus</i>	0	0	3	3
Magellanic Diving Petrel <i>Pelecanoides magellani</i>	82	3	4	4
Imperial Cormorant <i>Phalacrocorax atriceps</i>	43	16	13	13
Chilean Skua <i>Catharacta chilensis</i>	13	6	3	3
Kelp Gull <i>Larus dominicanus</i>	2	0	3	3
South American Tern <i>Sterna hirundinacea</i>	21	10	9	9
Totals	177	50	40	40

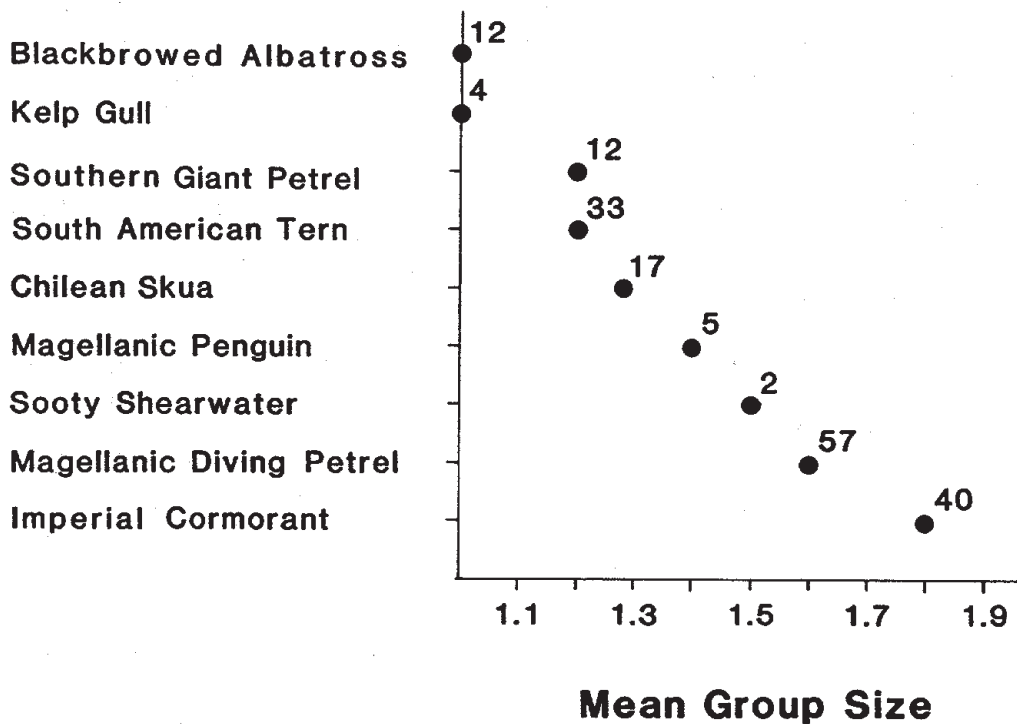


Figure 2

Group size and number of groups observed for species seen at least twice, combined from the three transects.

temperate (Peru) and Alaskan marine ecosystems (e.g. Hoffman *et al.* 1981, Duffy 1983). The small sizes may, however, be an artefact of our transect route. Brown *et al.* (1975) and R.G.B. Brown (*in litt.*) encountered groups of 56 and 26 Blackbrowed Albatross and 75+ Imperial Cormorants in a small area off Cabo Boqueron just south of our transect area in March 1970. R.G.B. Brown (*in litt.*) suggests that a local upwelling may have occurred at a sill in the Cabo Boqueron area, leading to larger groups of seabirds than observed in our transects. During our own study period, groups of Blackbrowed Albatrosses and Antarctic Fulmars were seen feeding just beyond the kelp beds south of Punta Arenas on 20 November 1985, but these areas were not sampled during the transects.

Extensive offshore oil exploitation and military activity now occur in the Straits of Magellan. Commercial fishing appears to centre on the 'centolla' crab *Lithodes antarctica* with little exploitation of fish (Boré & Martínez 1981). We do not know what effects, if any, these activities have on breeding or wintering seabirds. Transects on the ferry from Punta Arenas to Provenir offer an inexpensive way to monitor seabird populations in the Straits of Magellan.

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