

The distribution, population size and foraging behaviour of Kerguelen terns at the Prince Edward Islands

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*A census of Kerguelen terns *Sterna virgata* at Marion and Prince Edward Islands was conducted during August and September 1984. The population size was estimated at 25-30 breeding pairs, of which 20 pairs were on Prince Edward Island. Kerguelen terns were found mostly on the sheltered southeast coast of Prince Edward Island, whereas on Marion Island they were found only on the exposed west and north coasts. The absence of Kerguelen terns from apparently suitable habitat on Marion Island, coupled with the small number of first-year and immature birds counted, suggests that the population at Marion Island may be decreasing. Foraging occurred primarily by dipping, with occasional surface plunge dives. Most foraging occurred at sea, either over beds of *Macrocystis kelp* or over the surf zone.*

*In Augustus en September 1984 is daar by Marion- en Prins Edward-eiland 'n telling van Kerguelen-seesterretjies, *Sterna virgata*, gedoen. Daar was tussen 25 en 30 broeipare, waarvan 20 pare op Prins Edward-eiland. Die Kerguelen-seesterretjies is net aan die kaln suidoostelike kus van Prins Edward-eiland aangetref, maar op Marioneiland was hulle weer slegs aan die onstuimige wes- en noordkus. Aangesien daar geen voëls in die oënskynlik goeie habitat op Marioneiland was nie, en slegs 'n paar jong voëls op albei eilande saam getel is, is die bevolking op Marioneiland moontlik aan die afneem. Die voëls se voeding was hoofsaaklik deur middel van oppervlakkpikking, met 'n aantal vlak duike. Daar is meestal oor die see na kos gesoek of oor *Macrocystis beddings* of oor die branders.*

Introduction

The Kerguelen tern *Sterna virgata* is one of the least known Southern Ocean seabirds (Brooke 1984). It is apparently sedentary at its breeding islands in the Prince Edward, Crozet and Kerguelen Island groups (Watson 1975). Despite this, little is known of the population size at the Prince Edward Islands; Williams *et al.* (1979) estimated fewer than 50 breeding pairs on Marion Island, with an unknown number on Prince Edward Island, and Sinclair (in Brooke 1984) estimated fewer than 10 pairs on Marion Island and fewer than six pairs at Prince Edward Island. Burger (1978) in more than a year at Marion Island made only 22 sightings of Kerguelen terns.

The foraging behaviour and diet of Kerguelen terns at the Prince Edward Islands has not been described in detail. Rand (1954) reported the stomach of a collected bird to be full of crustaceans, whereas Berruti & Harris (1976) observed them to feed over damp *Tillaea* meadows. Studies at the Crozet and Kerguelen Island groups have demonstrated a catholic diet including fish, crustaceans, molluscs, holothurians, spiders, insects and earthworms (Falla 1937, Despin *et al.* 1972, Stahl & Weimerskirch 1981).

Here I report observations of Kerguelen tern numbers and foraging behaviour at the Prince Edward Islands.

Methods

I visited the Prince Edward Islands between 28 August and 16 September 1984. Most time was spent on Marion Island, but Prince Edward Island was visited between 31 August and 6 September. Terns were counted while walking along the coast. Other expedition members surveyed inland areas for birds occupying breeding sites. Repeat counts of individuals were kept to a minimum by only counting birds which passed the observer and by covering large areas of coast at a time. Only sections of coastal cliffs were not surveyed (between McNish Bay and Kent Crater, and between Albatross Valley and Ross Rocks on Prince Edward Island, and at Crawford Bay and Azorellakop on Marion Island). These areas are unlikely to support terns. Where possible, birds were aged as adults, immatures or first-year birds. Adults were in full nuptial plumage with bright red bills and legs. Immatures were identified by a dull red bill and active primary moult. First-year birds had a dark bill, traces of juvenile barred mantle feathering, and the grey wash on the underparts was patchy.

Foraging behaviour was observed at both Prince Edward and Marion Islands, although most observations were made at Prince Edward Island. No foraging observations were made on the west coast of Marion Island. Both the type of feeding technique used (after Harper *et al.* 1985) and the habitat in which foraging occurred (after Stahl & Weimerskirch 1981) were recorded. Large prey items were identified and their length estimated relative to bill length.

Results

Population size

A total of 56 Kerguelen terns was counted during the survey. No Antarctic terns *Sterna vittata* were seen and apparently were absent from the islands at this time of year (cf. Burger 1978). Most Kerguelen terns (45) were at Prince Edward Island, whereas only 11 were seen at Marion Island. All birds at Prince Edward Island were seen along the southeastern side of the island between McNish Bay and the coast opposite Boggel (Fig. 1). However, four adults were seen at a lake near Kent Crater on the west side of Prince Edward Island on 25 May 1983 (J. Cooper *in litt.*).

Kerguelen terns were seen along the west and north coasts of Marion Island, between Kampkoppie and Goney Plain (Fig. 1). Ten birds were counted on the north coast between Cape Davis and Goney Plain. Only one bird was seen on the west coast near Kampkoppie, but the coastal plain is wide in this area and other birds may have been overlooked.

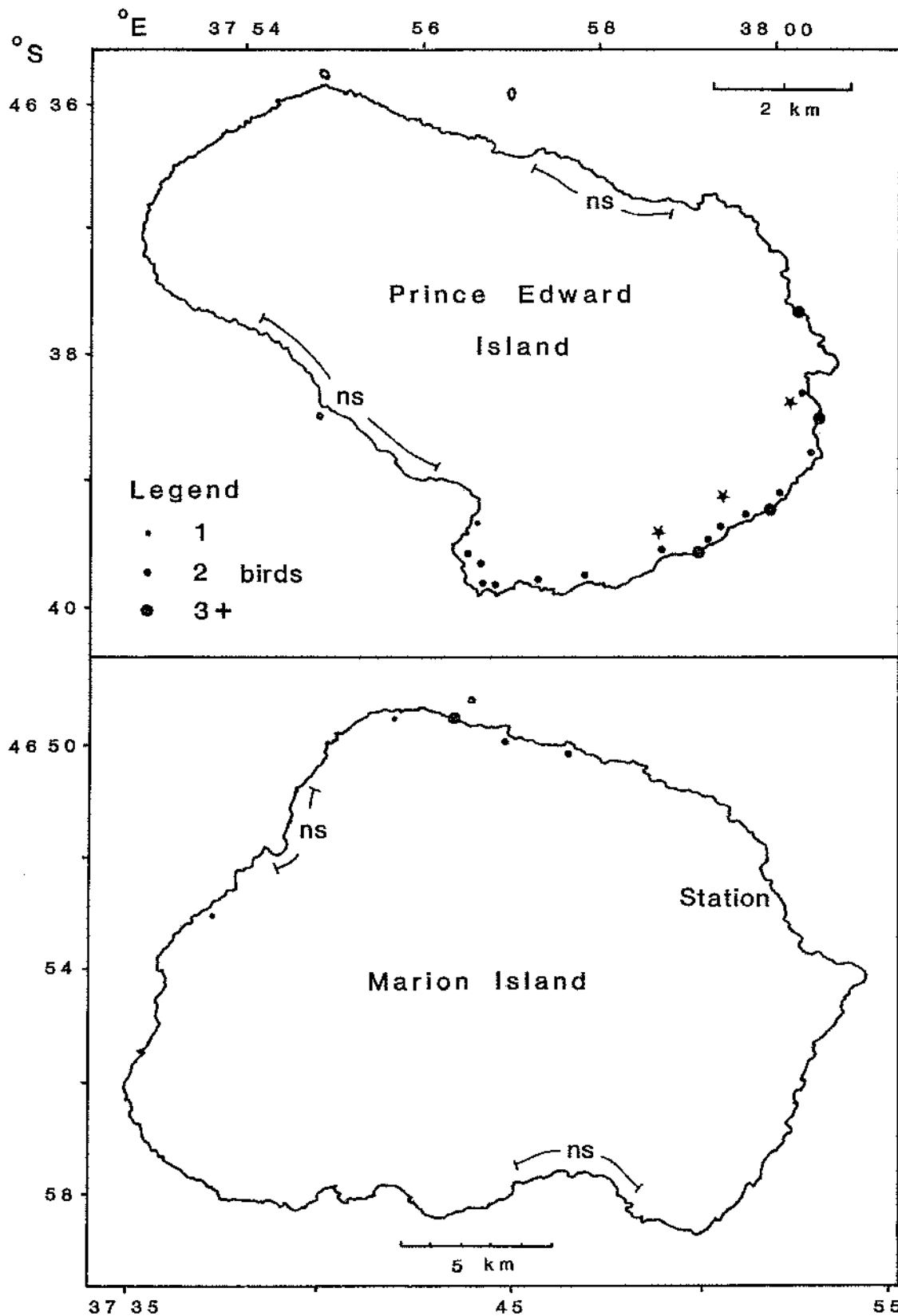


Fig. 1. The distribution of Kerguelen terns at the Prince Edward Islands, August-September 1984. Stars indicate probable nest sites. Cliff areas not surveyed are marked (ns).

Approximately ten birds were seen on the west coast of Marion during July 1984 (C.A. Gilbert pers. comm.). Kerguelen terns are seldom recorded from the east coast of Marion Island. The only recent record is of a single bird flying past the research station in October 1981 (B.P. Watkins pers. comm.).

Only one first-year bird and two immatures were positively identified. Most birds were confiding, allowing close approach, thus probably few first-year or immature birds were overlooked. The only first-year bird seen was on Prince Edward Island, whereas the two immature birds were seen together on Marion Island. Both immature birds were

moulting primaries four and five. A survey of both islands during May 1983 only recorded two immature birds (J. Cooper *in litt.*).

Most adult birds were paired, and courtship feeding and display flights were observed. Three probable breeding sites were located on Prince Edward Island (Fig. 1), where pairs were observed regularly and circled overhead calling when disturbed. The two presumed breeding sites in the south were on well-vegetated black lava flows, whereas the northern site was on a low grey lava ridge above Golden Gate.

Assuming that all individuals not identified as immature or first-year birds were adults, the breeding population is of the order of 25 pairs, 20 on Prince Edward Island and five on Marion Island. However, the number of pairs on Marion Island may be nearer ten if birds were overlooked on the west coast.

Foraging behaviour

A total of 66 foraging attempts was observed. Most attempts were surface dips or picks (86 %, $n = 57$), with only 14 per cent ($n = 9$) of attempts surface plunges. No plunge dives which submerged the entire body were observed. Foraging was observed in five discrete habitats (Table 1). Most foraging occurred in the band of the kelp *Macrocystis* 50 to 200 m offshore and in the surf zone at boulder beaches. On the north coast of Marion Island, all foraging occurred over the surf zone ($n = 12$); *Macrocystis* beds are virtually absent from the north and west coasts of Marion Island.

Table 1
Habitat use by foraging Kerguelen terns at the
Prince Edward Islands (habitat types after Stahl & Weimerskirch
1981)

Habitat type	No. sightings	%
Open sea (beyond the <i>Macrocystis</i> band)	6	9
<i>Macrocystis</i> kelp band	32	48
Calm water (inshore of the <i>Macrocystis</i> band)	4	6
Surf zone (at boulder beaches)	22	33
Stranded kelp wrack	1	2
Coastal marshes	1	2
Total	66	100

The only prey items which could be identified were fish. I observed five fish being caught, all from surface plunge dives. The lengths of the fish ranged between 1.5 and 3.0 times bill length (approximately 40-90 mm). Four of these fish were used in courtship feeding. On three occasions prey swaps occurred on land, whereas on one occasion the bird receiving the fish landed briefly on the water to be fed. No courtship feeding involving non-fish prey was observed.

Discussion

The estimated population size of Kerguelen terns at the Prince Edward Islands of 25 to 30 breeding pairs is of the same order as previous estimates (Williams *et al.* 1979, Sinclair in Brooke 1984). However, it demonstrates the

importance of Prince Edward Island (20 pairs) relative to Marion Island (5-10 pairs, *contra* Sinclair in Brooke 1984). Assuming there is little interchange between the population at the Prince Edward Islands and the other populations at Kerguelen and the Crozet Islands, the population at the Prince Edward Islands may be too small to maintain genetic diversity.

Kerguelen terns were most abundant on the southeast coast of Prince Edward Island where there are extensive *Macrocystis* beds, the favoured foraging habitat at Prince Edward Island. Similar habitat exists on the east coast of Marion Island between Ship's Cove and Green Hill. The absence of breeding Kerguelen terns from this area may be related to disturbance from introduced cats *Felis catus* or the research station. Terns were not recorded in the diet of cats at Marion Island (van Aarde 1980, van Rensburg 1985), but this may be due to the very small numbers of terns. Breeding Antarctic terns are susceptible to predation and other disturbance, and breeding success might have been severely reduced by cat predation at Macquarie Island (Rounsevell & Brothers 1984). Antarctic terns breed on the east coast of Marion Island, but their breeding success is unknown (FitzPatrick Inst. unpubl. data). Disturbance at Prince Edward Island is minimal because the island is seldom visited by people and there are no cats.

Two findings, together with the small total population size at the Prince Edward Islands, suggest that the Kerguelen tern population of at least Marion Island is threatened (c.f. Brooke 1984): 1) the absence of Kerguelen terns from apparently suitable habitat on the east coast of Marion, and 2) the small number of first-year and immature birds counted (unless most non-breeding birds disperse away from the breeding islands). It is not possible to compare present population estimates with those made prior to 1970 (e.g. van Zinderen Bakker 1971), because of the earlier failure to recognize Antarctic terns.

Berruti & Harris (1976) suggested that Kerguelen terns could breed earlier than sympatric Antarctic terns because they forage over land. Breeding Antarctic terns feed almost exclusively at sea (Burger 1978, Stahl & Weimerskirch 1981) and thus time their breeding to coincide with the calmest period of the year (Berruti & Harris 1976). However, Stahl & Weimerskirch (1981) demonstrated that at the Crozet Islands both species forage primarily at sea, with considerable overlap in habitat use. This study suggests that Kerguelen terns at the Prince Edward Islands also forage extensively at sea, in a manner similar to that reported for Antarctic terns at Marion Island (Burger 1978). Little terrestrial foraging was recorded, although it does occur at times, particularly associated with coastal lakes (J. Cooper *in litt.*). Berruti & Harris (1976) made only brief observations of foraging behaviour (A. Berruti pers. comm.).

An analysis of the diet of Kerguelen terns at the Prince Edward Islands is not feasible at present. The wide range of habitats used suggests a catholic diet similar to that reported from the Crozet Islands (Stahl & Weimerskirch 1981). Given the broad overlap in foraging behaviour between Kerguelen and Antarctic terns at the Prince Edward Islands, the factors allowing co-occurrence of these ecologically similar species warrant investigating.

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