

## POPULATION NUMBERS OF FUR SEALS AT PRINCE EDWARD ISLAND, SOUTHERN OCEAN

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During the period 17–22 December 2001, the onshore distribution and the abundance of Antarctic fur seals *Arctocephalus gazella* and Subantarctic fur seals *A. tropicalis* were determined for Prince Edward Island. Two breeding colonies of Antarctic fur seals were located on the south-east coast of the island; the first a mixed (with Subantarctic fur seals) breeding colony with an estimated 24 pups on a vegetated promontory on the northern section of Boggel Beach, and the second, a presumably pure Antarctic fur seal breeding colony with an estimated 380 pups, at Penguin Beach. At a mean intrinsic rate of natural increase of 16.2% per year, Antarctic fur seals appear to be in the rapid recolonization phase of population growth. Breeding colonies of Subantarctic fur seals, largely found on the entire east coast, produced an estimated 15 000 pups, and the population had maintained a mean intrinsic rate of natural increase of some 9.5% per year since 1987/88.

Key words: *Arctocephalus*, distribution, fur seals, population increase, Prince Edward Island, Subantarctic

Both the Antarctic fur seal *Arctocephalus gazella* and the Subantarctic fur seal *A. tropicalis* breed on the Prince Edward Islands in the southern Indian Ocean (Condy 1978), which comprise Marion Island and Prince Edward Island (21 km apart). Sealing began shortly after the discovery of the islands in 1772, and continued intermittently until 1931 (Marsh 1948, Kerley 1987). Population counts were first conducted in 1952 on Marion Island (Rand 1956), and although it was thought that only Subantarctic fur seals were present, one of the skulls collected at the time was that of an Antarctic fur seal (King 1959). On Marion Island more recent censuses of both species have been conducted in 1974/1975, 1981/1982, 1988/1989 and 1994/1995 during and/or at the end of the breeding/pupping season (Condy 1978, Kerley 1983a, Wilkinson and Bester 1990, Hofmeyr *et al.* 1997). However, the three censuses of *A. tropicalis* at Prince Edward Island (1981, 1982 and 1988), subsequent to the partial count in April 1973 (de Villiers and Ross 1976), were sporadic and always took place during March/April (Condy 1978, Kerley 1983a, Wilkinson and Bester 1990), well after the breeding (pupping) season (Kerley 1983b). The estimated number of births was therefore derived from the pup counts, adjusted for undercounting, and a mortality figure to compensate for the later census date (Kerley 1987, Wilkinson and Bester 1990).

Breeding of Antarctic fur seals at Prince Edward Island was first confirmed in 1975 (Condy 1978), but

the late census dates allowed neither an acceptable estimate of the number of births nor the breeding population size (Condy 1978, Wilkinson and Bester 1990), despite an attempt to calculate it indirectly (Kerley 1983a).

This study determines, for the first time, the breeding population size and pup production of Antarctic fur seals at Prince Edward Island. It also updates the available census figures for the Subantarctic fur seal, as an objective of the Prince Edward Islands Management Plan (Prince Edward Islands Management Plan Working Group 1996).

### MATERIAL AND METHODS

The survey of fur seals was conducted from 17 to 18 December 2001 on the northern section (Kent Crater to Ross Rocks Peninsula) and from 20 to 22 December 2001 on the south-eastern section (McNish Bay to Albatross Valley Beach) of Prince Edward Island (44 km<sup>2</sup>; 46°38'S, 37°57'E; Fig. 1). Two inaccessible sections of coastline were not surveyed: a talus strip at the foot of the high bluffs from McNish Bay to Kent Crater, and a stretch of jumbled rocky to intermediate type beaches (terminology after Bester 1982) from Albatross Valley Beach to Ross Rocks (Fig. 1). The census periods represent the height of the breeding season haulout for the Subantarctic fur seal population (pupping only

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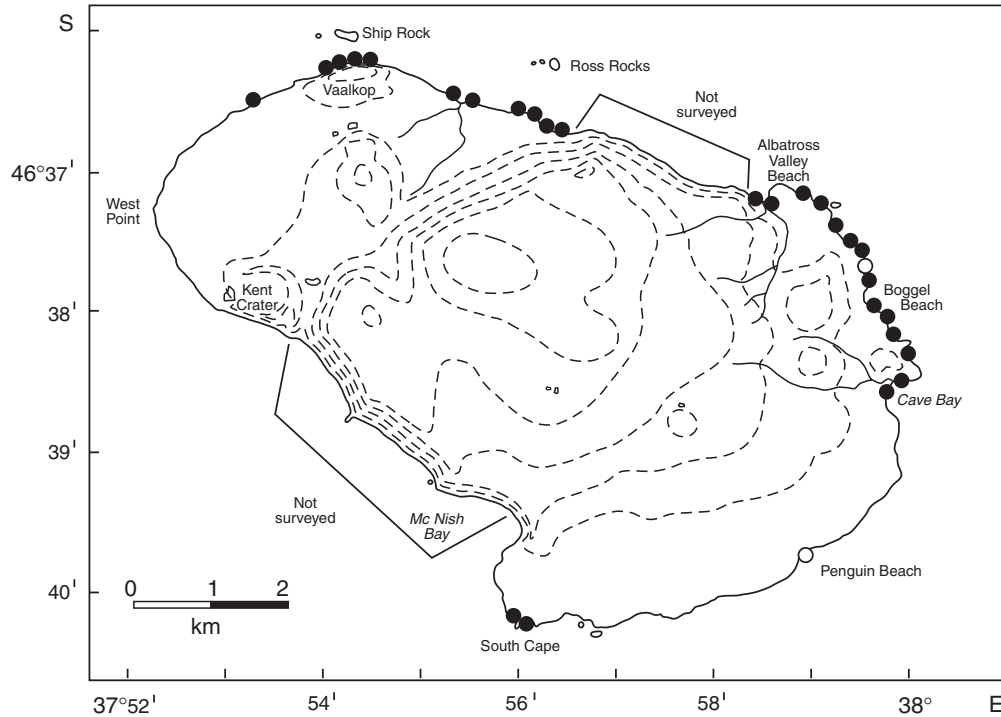


Fig. 1: Prince Edward Island, showing the localities mentioned in the text, the main topographical features and the distribution of breeding colonies of *A. tropicalis* (closed circles) and *A. gazella* (open circles). The distribution of the numerous nonbreeding and idle colonies of *A. tropicalis* are not shown because they occurred virtually everywhere along the coastline

half complete) and the end of the breeding/pupping season for the Antarctic fur seal (Condy 1978, Kerley 1983a). Aggregations of seals were assigned to breeding, nonbreeding and idle colonies following Bester (1982). Identification of the species and assumed hybrids followed descriptions given by Bonner (1968), Condy (1978) and Bester and Wilkinson (1989). The following age-sex-classes of seals were recognized: adult males, adult females, subadults and black pups (after Bester 1977, Condy 1978). Most counts were done by MNB, whereas PGR surveyed the beaches at West Point (Fig. 1), by moving on foot between and at sites, using binoculars when required (Table I). The large area involved in the count, and the time constraint (six days on the island) prohibited repeated counting of all beaches to calculate errors of the estimates. Breeding colonies in particular had to be viewed from raised areas or cliffs (3–200 m) at the back and/or sides of beaches, because of their inaccessibility and

the presence of aggressive territorial males. Similar constraints applied to previous counts at the island (Condy 1978, Kerley 1983a, Wilkinson and Bester 1990). The intrinsic rate of population change was calculated using estimated pup numbers for the various years and the exponential function  $N_t = N_0 e^{rt}$ , following Caughley (1977) as applied to fur seal populations by, for example, Bester (1980), Kerley (1983a) and Hofmeyr *et al.* (1997). The intrinsic rate of population change ( $r$ ) was converted to a mean annual percentage change [ $\% = (e^r - 1) \times 100$ ] following Caughley (1977).

#### *A. gazella*

All adult males (territorial and idle males scored separately), adult females, subadults and black pups were counted directly. No correction for undercounting

Table I: Counts of *A. gazella* and *A. tropicalis* at Prince Edward Island, 17–22 December 2001. Estimated pup numbers for *A. tropicalis* are derived from counts of territorial males (following Bester 1980)

Locality	<i>A. gazella</i>					<i>A. tropicalis</i>	
	TM	IM	AF	SA	P	TM	P
Vaalkop	0	0	0	0	0	129	852
Vaalkop West – Kent Crater	0	0	0	0	0	54	357
McNish Bay – Cave Bay	38	36	163*	30	163	3	20
Cave Bay	0	2	0	0	0	106	700
RSA Point – Boggel Beach	0	0	0	0	0	148	977
Boggel Beach	15	0	24	0	24	463	3 056
Boggel Beach – Albatross Beach	0	0	0	0	0	383	2 528
Albatross Beach	0	0	0	4	0	111	733
Ross Rocks Peninsula	0	0	0	2	0	582	3 842
Ross Rocks – Hope Stream	0	0	0	0	0	93	614
Hope Stream Beach	0	0	0	0	0	119	786
Hope Stream Beach - Vaalkop	0	0	0	0	0	0	0
Total	53	38	187	36	187	2 191	14 465

\* Number of adult females derived from the pup count

TM = Territorial males

IM = Idle males

AF = Adult females

SA = Subadults

P = Pups

was made. Only older black pups in the white-faced stage (Bonner 1968, Bester and Wilkinson 1989) and younger black pups with their mothers in attendance were assigned to this species. All other black pups were assigned to *A. tropicalis* because no morphometric confirmation of the species (Bester and Wilkinson 1989) was possible with lone observers.

### *A. tropicalis*

On rocky beaches, only adult, territorial males were counted directly; adult females and black pups were simply recorded as being either present or absent, because the pupping season continues into the second week of January (Kerley 1983b). On the open vegetated areas behind landing beaches, all fur seals were counted and classified. Pup numbers were derived from three sources: first, an estimate of the degree of polygyny (2.4 pups per adult male) calculated for a Marion Island breeding colony (Kerley 1987) and applied to all beaches where breeding (pupping) took place; second, an estimate based on a conversion factor (1:6.6) of territorial males:numbers of births (corrected for undercounting) at established breeding colonies at Gough Island, following Bester (1980); and third, a conversion factor (1:1.22) using the ratio between adult male numbers (irrespective of social status) and the numbers of pups (corrected for undercounting), which was derived from Marion Island-wide counts

(excluding the Furseal Peninsula and Furseal Bay established breeding colonies, for which no counts of adult males are available) presented by Hofmeyr *et al.* (1997). Total population size was estimated from the pup number:total population size ratio (1:4.8), following Kerley (1987).

### Hybrids

Hybrids other than adult males are very difficult to distinguish from individuals of the two species, so likely hybrid males were noted only.

## RESULTS AND DISCUSSION

### *A. gazella*

The Antarctic fur seal breeding (pupping and mating) season had drawn to a close (median birthdate = 6 December, with all pups born by mid-December – Kerley 1983b), and only two breeding colony sites were found (Fig. 1). The first, on the northernmost part of Boggel Beach, was a small mixed (with Subantarctic fur seals of both sexes and two hybrid males) colony consisting of *A. gazella* males ( $n = 6$ ) on vegetated areas holding aggregations of *A. gazella* ( $n = 24$ ) and/or *A. tropicalis* females. Only 13 positively iden-

Table II: Numbers of *A. tropicalis* pups and their mean annual percentage increase (see text) for beaches on Prince Edward Island between 1980/81 or 1981/82, 1987/88 and 2001/02. Estimated pup numbers for 2001/02 are derived from counts of territorial males (following Bester 1980)

Locality	Pup numbers			Mean annual percentage increase	
	Unadjusted for 1981 and 1982	Unadjusted for 1987/1988	Estimated for 2001 (Method 2)	1982–1987 (%)	1987–2001 (%)
Vaalkop	–	–	852		
Vaalkop West – Kent Crater	5**	12	357	15.7	27.4
McNish Bay – Cave Bay	2**	0	20		
Cave Bay	7*	0	700		
RSA Point – Boggel Beach	90**	155	977	9.5	14.1
Boggel Beach	561**	1 145	3 056	12.7	7.3
Boggel Beach – Albatross Beach	559**	430	2 528	-4.5	13.5
Albatross Beach	125**	155	733	3.7	11.7
Ross Rocks Peninsula	412*	1 643	3 842	21.9	6.3
Ross Rocks – Hope Stream	36*	85	614	13.1	15.2
Hope Stream Beach	503*	561	786	1.6	2.4
Total	2 300	4 186	14 465	12.7	9.3

\* 1981

\*\* 1982

tified “white-faced” *A. gazella* pups were found there, and one black pup that suckled from its *A. gazella* mother. An additional 10 black pups were found in the immediate proximity of *A. gazella* females, and although it could not be ascertained whether they formed mother-pup pairs, the pups were assumed to be *A. gazella*, giving a total of 24 pups for this locality (Table I). The second site contained a large, presumably pure breeding colony of *A. gazella* on a cobble/boulder beach in front, and to the sides of, the king penguin *Aptenodytes patagonicus* breeding colony at Penguin Beach. A total of 163 pups was counted there (Table I), and given the extent of the front part of the beach that could not be viewed close up, another 130–140 pups might have been present. However, seen from a low hillock at some distance that defied pup counts, an estimated 38 territorial males were on site in the Penguin Beach colony. Such a number of territorial males translates into a total of 380 pups, given a male:female ratio of 1:10 on crowded beaches at the peak of female numbers for this species at South Georgia (McCann and Doidge 1987). A total count of 380 pups is probably realistic, given the likelihood of pup undercounting that reaches 14.2–34.3% in the Subantarctic fur seal (Condy 1978, Bester 1980, Kerley 1983a, Hofmeyr *et al.* 1997) and the fact that the ratio of “harem” male:final pup number could be as high as 1:15 (Bonner 1968). Adult female numbers are not given because most were absent on foraging trips (see Bester and Bartlett 1990), but each live pup was assumed to represent a mother. Single Antarctic

fur seal males ( $n = 9$ ) and an assumed male hybrid were present (and presumably held territories) among Subantarctic fur seals on Boggel Beach, with idle adult ( $n = 36$ ) and subadult ( $n = 36$ ) males found singly or in small scattered groups on vegetated areas in the other parts of the south-eastern sector of Prince Edward Island (Table I). The total of 501 is undoubtedly an underestimate, and the population is probably approximately 2 000 individuals, after converting estimated pup numbers to total population size, following Kerley (1983a). Growing at a mean annual intrinsic rate of 16.2% (this study) from the estimated population of about 100 in 1981/1982 (Kerley 1983a), the population appears to be in the rapid recolonization phase (Roux 1987) of population growth similar to its Marion Island counterpart (Hofmeyr *et al.* 1997). However, this increase is possibly augmented by individuals from elsewhere, as postulated by Wilkinson and Bester (1990), most likely from South Georgia (see Wynen *et al.* 2000).

#### *A. tropicalis*

Established breeding colony sites of Subantarctic fur seals were found primarily in the eastern sector of the island from Vaalkop to Cave Bay (Fig. 1). A few small breeding colony beaches were on the southern and western side of the island, mainly around South Cape, and one larger one west of Vaalkop. Large numbers of idle males, mostly adult ( $n = 11 003$ ), were found in

idle colonies, e.g. McNish Bay, but primarily on vegetated areas behind access points from the sea as well as behind breeding colony beaches. Because of (i) the *A. tropicalis* breeding season being only half complete (median birthdate = 17 December; Kerley 1983b), (ii) aggressive territorial males preventing access to beaches for searches of pups and (iii) the broken nature of the terrain (largely jumbled rocky and intermediate type beaches; see Bester 1982), major undercounts of pups and females would have resulted (Bester 1980, Kerley 1983a, Hofmeyr et al. 1997). Therefore, the presence/absence of pups and adult females was scored on all beaches to establish their status (breeding, nonbreeding and idle colony beaches following Bester 1982) and only territorial males on breeding colony beaches were counted (Table II). The three estimates of the number of births over the 2001/2002 pupping season amounted 5 260, 14 465 and 16 097 for Methods 1, 2 and 3 respectively. This realistically suggests a pup population of about 15 000 (Methods 2 and 3).

The estimated minimum pup number, excluding the inaccessible coastline (Kent Crater to McNish Bay and Ross Rocks Peninsula to Albatross Valley Beach; Fig. 1), amounted to approximately 15 000 pups (Table II), representing an estimated minimum total population of 72 000 Subantarctic fur seals. This translates into a mean intrinsic rate of natural increase of some 9.5% annually for the population over the 14 years since 1987/1988, when the last pup counts were made. This is similar to the rate of increase (9.7%) over the preceding six-year (1981/1982–1987/1988) period (Wilkinson and Bester 1990). It suggests that the Prince Edward Island population of Subantarctic fur seals is still in a relatively rapid recolonization phase (Bester 1980, Roux 1987), whereas the neighbouring Marion Island population (increasing at a mean annual rate of 2.0%) had entered the maturation phase (Hofmeyr et al. 1997).

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Populations of Subantarctic (left) and Antarctic (right) fur seals have increased at Prince Edward Island (photos B. M. Dyer)