

# Population trends of Subantarctic fur seals and southern elephant seals at Gough Island

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*The Subantarctic fur seal (Arctocephalus tropicalis) population at Gough Island in the South Atlantic Ocean is continuing to increase rapidly since its recovery from exploitation. The intrinsic rate of increase is however slowing down on established breeding colony beaches in the western sector as congested conditions develop. The rate of increase on the more recently colonised breeding colony sites on the east coast is high but some beaches here remain unexploited by breeders despite the increased density on the west coast. The small breeding population of southern elephant seals (Mirounga leonina) either remained stable, or declined very slowly, over the past 17 years.*

*Sedert sy herstel van ontginning is die Subantarktiese pelsrobbevolking (Arctocephalus tropicalis) te Gough-eiland in die Suid-Atlantiese Oseaan konstant besig om teen 'n vinnige tempo toe te neem. Op gevestigde teelkoloniestrande in die westelike sektor is die intrinsieke tempo in toename egter besig om af te neem namate samedromming toeneem. Op teelkoloniestrande op die ooskus wat meer onlangs gekoloniseer is, is die tempo van toename hoog, hoewel sommige strande aldaar onbenut bly deur telende robbe ten spyte van die toename in digtheid op die weskus. Die klein teelbevolking van suidelike olifantrobbe (Mirounga leonina) het oor die afgelope 17 jaar of stabiel gebly of baie stadig afgeneem.*

## Introduction

Gough Island (40°20' S, 09°54' W) is one of the places where Subantarctic fur seals, *Arctocephalus tropicalis*, and southern elephant seals, *Mirounga leonina*, were found breeding in 1955/56, after the indiscriminate exploitation of pinnipeds had ended earlier this century (Swales 1956, Wace & Holdgate 1976). Subsequent studies showed that the fur seal population was expanding exponentially concomitant with an extension of breeding colony sites (Bester 1980a), while the southern elephant seal breeding population remained small and largely confined to the north-east coast of the island (Bester 1980b). The rate of increase in pup numbers of fur seals on seemingly congested established breeding colony sites (defined in Bester 1982) on the popular west coast beaches appeared to be declining despite east coast beaches remaining largely unexploited by breeding fur seals (Bester 1987).

The present study presents recent census data for both *M. leonina* and *A. tropicalis*, compares it with published records, and reflects on numerical trends of this and other populations within the Southern Ocean.

## Methods

Following Bester (1980a), fur seal pups were counted on Gough Island by suitably briefed personnel. Beaches were selected for their accessibility, their proximity to the base station, their representation of both the western and eastern sectors of the island, and the availability of pre-1978/79 counts, for comparison. Counts were done at least ten days after the median birth dates of pups (9 to 11 December — Bester 1987), and before early March. Dead pups were included in the counts to estimate the number of births, and no undercount correction factors were incorporated. Serial counts which would allow calculation of standard errors around a mean estimate of the number of pups for each beach could not be done in the time available.

Southern elephant seals were counted along the north-east coast between The Glen and North-east Point (Fig 1). Counts of cows with pups, cows without pups (as-

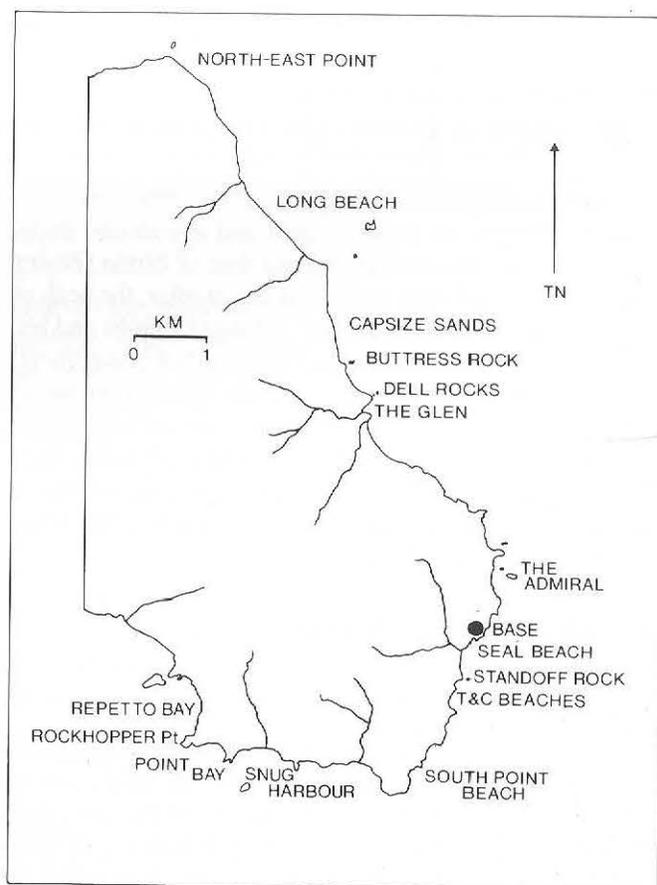


Fig 1: Map of a part of the Gough Island coastline showing localities mentioned in the text and Table 1

Table I

Trends in numbers of fur seal pups at Gough Island

Locality	YEAR								$\bar{r}$
	1975/76*	1977/78*	1978/79	1980/81	1982/83	1987/88	1988/89		
NE**									
Long Beach	—	3	—	—	0	—	—	—	—
Capsize Sands	—	2	—	—	1	—	—	—	—
Dell Rocks-									
Buttress Rock	—	8	—	—	~16	—	—	—	—
The Glen	—	0	—	—	0	—	—	—	—
SE									
Admiral Beach	26	35 (2)	37	42	59	—	418	0,210	
Seal Beach	1	1 (18)	—	—	1	2	2	0,059	
Standoff Rock									
Area	7	7 (45)	—	8	11	13	15	0,061	
Tumbledown-									
Cave Beach	10	24 (1)	14	23	—	—	102	0,168	
South Point									
Beach	42	126 (25)	110	224	—	535	—	0,192	
SW									
Snug Harbour	3 378	4 477	—	—	—	—	4 811	0,020	
Point Bay	—	2 874	—	3 546	—	4 557	—	0,044	
Rockhopper									
Point	410	392	—	491	—	678	—	0,046	
Repetto Bay									
South	865	1 176	—	1 380	—	1 880	—	0,059	

\* Data from Bester (1980a)

\*\* Orientation of coastal section

Culled sample of females older than pups in 1977/78 appear in brackets

sumed to be pregnant), and weaned pups (their mothers absent), along with those of dead and abandoned pups, were combined to estimate the number of births (Bester 1980b). Censuses were conducted on, or after, the peak of the cow haulout (~13 October — Bester 1980b) and before the last cows had departed (first half of November).

Pup numbers are used as an index of the population size, and the mean annual intrinsic rates of increase or decrease ( $\bar{r}$ ) are based on the exponential function  $N_t = N_0 e^{rt}$  (Caughley 1977), as in other seal populations in the Southern Ocean (Roux 1987, Van Aarde 1980, Skinner & Van Aarde 1983).

## Results and discussion

### Fur seals

More fur seals were born on the south-west coast beaches than on the east coast beaches during the study period (Table 1). The rate of increase on the south-east coast beaches is higher where the culling of females in 1977/78 was low in relation to the number of pups. Few pups had been born on the beaches in the north-east by 1982/83 (Table 1), despite a small nucleus of breeding females being present during 1977/78. This suggests that breeding females prefer west coast beaches to the open boul-

der beaches in the north-east despite the congestion on the former, which is explained primarily by specific habitat selection based upon thermoregulatory needs of the fur seals (Bester 1982). The congestion is associated with a marked decline in the intrinsic rate of increase after the initial growth of 15,9% per year between 1955 and 1977 (Bester 1980a). However, since the entire north-western sector of the island was not sampled (where most pups were born in 1955/56 — Swales 1956), the trends observed in the present study may not be entirely representative of the population dynamics of the island as a whole.

The increase in the number of pups on Admiral Beach is exponential. On the other beaches, however, for which at least four separate censuses are available, a linear regression describes the trend better. Two factors may contribute to this: (i) the long-term growth curve for a population is generally sigmoid but over a short period this can be seen as exponential, linear or asymptotic; (ii) the terrain makes accurate counting difficult and where large numbers of animals are present this can lead to significant undercounting so that true exponential growth may be seen as linear. The different trends in population growth between west and east coast sites are illustrated by spline fits of pup numbers ( $\log_{10}$ ) plotted against time (Fig 2). It confirms the existence of differ-

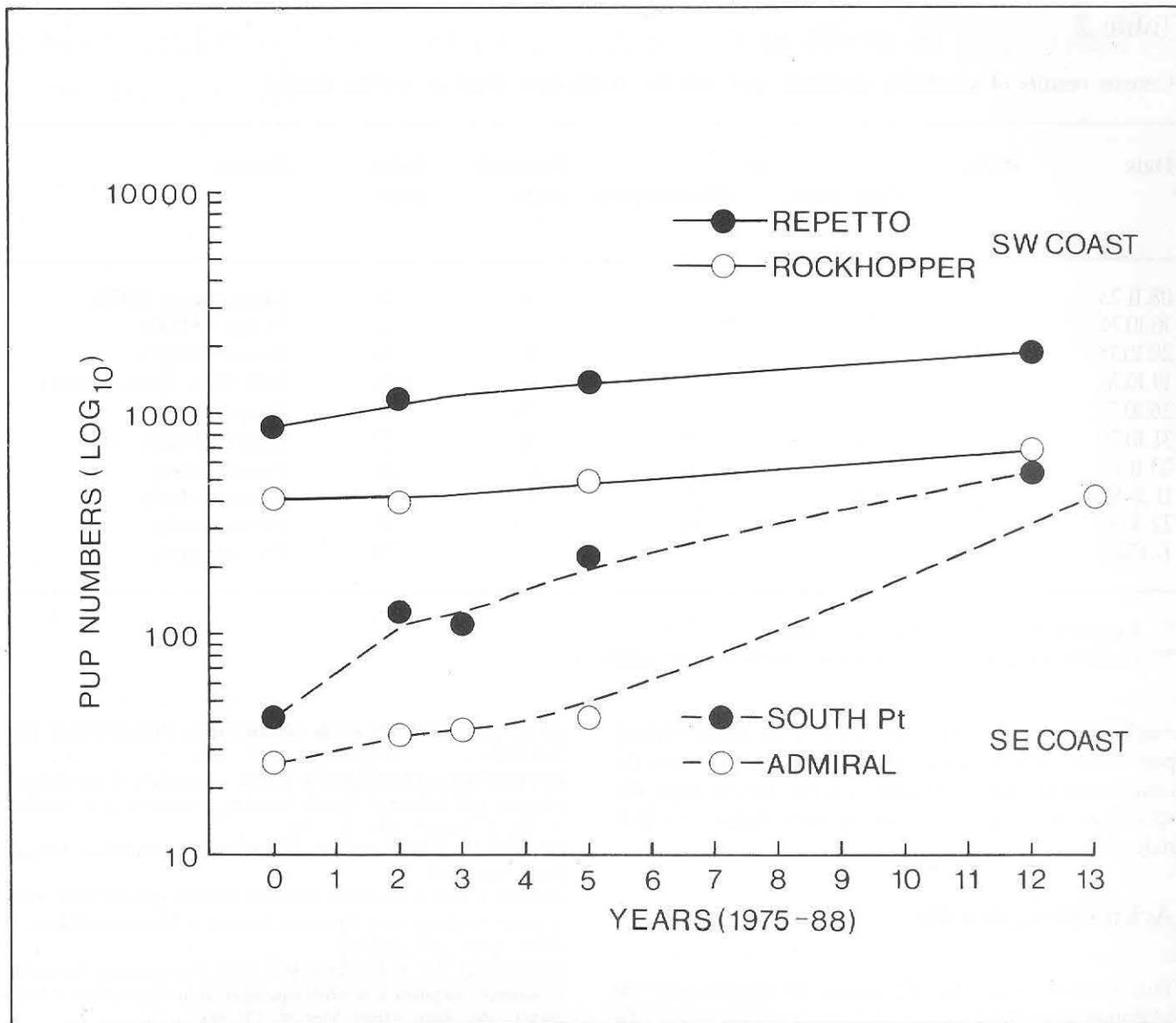


Fig 2: Trends in fur seal pup numbers at four localities on Gough Island for various years between 1975 and 1988

ent phases of population growth in *A. tropicalis* populations, which was first mooted by Bester (1980a) and subsequently described for the Amsterdam Island population (Roux 1987). It also suggests that on the congested beaches in the south-west, where a nucleus of successful breeders was already present in 1955/56 (Swales 1956, Bester 1980a), the asymptote of the expected sigmoid population growth curve is being approached.

### Elephant seals

The number of southern elephant seal bulls present during the breeding season showed no significant trend over 17 years. The observed fluctuations (Table 2) are of a seasonal nature, with bulls being more numerous towards the end of October and fewer in early November, when most cows have departed.

The estimated annual pup yield varied between 26 and 38 and showed no definite trend. Single counts after approximately 5 November in each year, when the post-weaning dispersion phase of underyearlings (moulted, weaned pups) has started (Bester 1980b, Lenglar & Bester 1982), resulted in an undercount (Table 2). Counts

near to the peak in the haulout of cows (in 1974 and perhaps 1989; Table 2) underestimate the pup yield as all cows have not hauled out by this time (only 92,3% to 93,3% of cows at South Georgia and Macquarie Island respectively — McCann 1985, Hindell & Burton 1987). Despite small errors, it would therefore appear that the Gough Island population has either remained stable or declined very slowly over almost two decades. Since the Gough Island population was not much larger in recent (post-sealing) times (Wace & Holdgate 1976), it contrasts with the exponential decline of elephant seal populations within the Southern Indian Ocean at Marion Island (Skinner & Van Aarde 1983) and Iles Kerguelen (Van Aarde 1980, Bester & Lenglar 1982). It is, however, similar to the situation at South Georgia within the South Atlantic sector where the large population has remained stable between 1951 and 1985 (McCann & Rothery 1988).

The present study does not provide new information on the possible causes for the population trends of *M. leonina*, as summarized by Bester (1988), Hindell & Burton (1987) and Taylor & Taylor (1989). It nevertheless

**Table 2**

**Census results of southern elephant seals on the north-east coast of Gough Island**

Date	Bulls	Cows		Weaned* pups	Total pups	Source
		With pups	Without pups			
08.11.73	5	0	0	30	30	Shaughnessy (1975)
16.10.74	13	26	3	3	32	Bester (1980b)
29.10.75	16	12	3	23	38	Bester (1980b)
19.10.76	13	—	—	—	>16	NM Wace (pers comm)
26.10.77	16	12	1	20	33	Bester (1980b)
31.10.78	12	9	0	18	27	Bester (1980b)
03.11.80	10	7	0	22	29	Present study
11.11.85	6	1	1	13	15**	Present study
22.10.86	9	10	10	6	26	Present study
17.10.89	11	16	7	5	28	Present study

\* Includes dead and abandoned pups

\*\* Undercount due to post-weaning departure of weaners

emphasizes the precarious position of the Gough Island population, which may be in equilibrium, although the small numbers now supported by the region leave the species very vulnerable to any adverse factor(s) which may arise.

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