

The southern elephant seal *Mirounga leonina* at Gough Island

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Southern elephant seals *Mirounga leonina* selected mainly the gently sloping, smooth-surfaced beaches and vegetated areas of the sheltered north-east coast. Mainly adults hauled out during the spring breeding season, with all pups being born by late October and the majority of the pups dispersing from their birth sites by December. Subadults were most abundant at the onset of the summer moult haul-out, with bulls and some subadult males being most abundant towards the end of the moulting season. Moulting seals preferred vegetated areas to exposed beaches. During the 1977/78 summer, total population was estimated at 163 suggesting a slight decrease since 1955/56. Harems were small and few in number, and pregnant cows showed fidelity to previous pupping sites. Spatial and temporal separation of the breeding populations of elephant and fur seals (*Arctocephalus tropicalis*) precluded competition for haul-out sites.

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Suidelike olifantrobbe *Mirounga leonina* het hoofsaaklik strande met 'n klein helling en eweredige oppervlakte asook plantbegroeide gebiede aan die beskutte noordoostelike kus verkies. Hoofsaaklik volwassenes het gedurende die lente-teeliseisoen aangekom, en al die welpies was gebore teen die einde van Oktober, die meeste waarvan gedurende Desember vanaf hul geboorteplekke versprei het. Onvolwassenes was die volopste aan die begin van die somer-aankoms, met bulle en 'n aantal onvolwasse mannetjies die volopste teen die einde van die verharingsseisoen. Verharende robbe het die plantbegroeide gebiede bo die oop strande verkies. Gedurende die 1977/78 somer, was die totale bevolking geskat op 163, wat dui op 'n geringe afname sedert 1955/56. Harems was klein en laag in getal, en dragtige koeie het 'n getrouheid aan vorige geboorteplekke getoon. 'n Skeiding in ruimte en tyd tussen telende bevolkings van olifant- en pelsrobbe (*Arctocephalus tropicalis*) het kompetisie vir aankomsgebiede voorkom.

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The southern elephant seal *Mirounga leonina* is one of the best studied phocids and breeds on islands on both sides of the Antarctic Convergence (Laws 1956, 1960; Carrick & Ingham 1962). Elliott (1953) mentioned that elephant seals breed on Gough Island and Holdgate, Le Maitre, Swales and Wace (1956) recorded 200–300 individuals. Shaughnessy (1975) and Wace (*in litt*) counted 40 and 49 during 1973 and 1976 respectively, but gave no indication of the immature segment of the population. The present paper describes population size, habitat selection, local distribution and seasonal cycle of the southern elephant seal at Gough Island.

Methods

Descriptions of Gough Island (40°20'S, 9°54'W) appear in Swales (1956), Wace and Holdgate (1976) and Bester (1977). The only breeding colony, at Long Beach (Fig. 1), was censused during October of 1974, 1975, 1977 and 1978, and re-visited during December 1977 and April 1978.

Observations on local distribution and numbers were made during circumnavigations of the island and during pontoon landings on some east coast beaches during October of each year except 1978, with regular overland visits to beaches on the south-east and south-west coast for further counts after the breeding season. Elephant seals counted were allocated to age and sex classes following Laws (1953) and Condy (1979). Weaned pups were tagged as described by Condy and Bester (1975).

Results

Distribution

The majority of elephant seals occurred along the north-east coastline with some on the eastern and south-eastern coast (Fig. 1). Outside this area only one was seen, on South West Island Beach.

Seasonal cycle

Breeding season

Numbers of bulls hauled out increased during October, although when they first arrived is unknown, and most of them had departed by late December (Table 1). Cows probably arrived in mid-September, as by mid-October at least two pups were already weaned. Elephant seal pups are weaned approximately 23 days after birth while cows pup on average five days after hauling out (Laws 1956). Cow numbers peaked during mid-October and by the end

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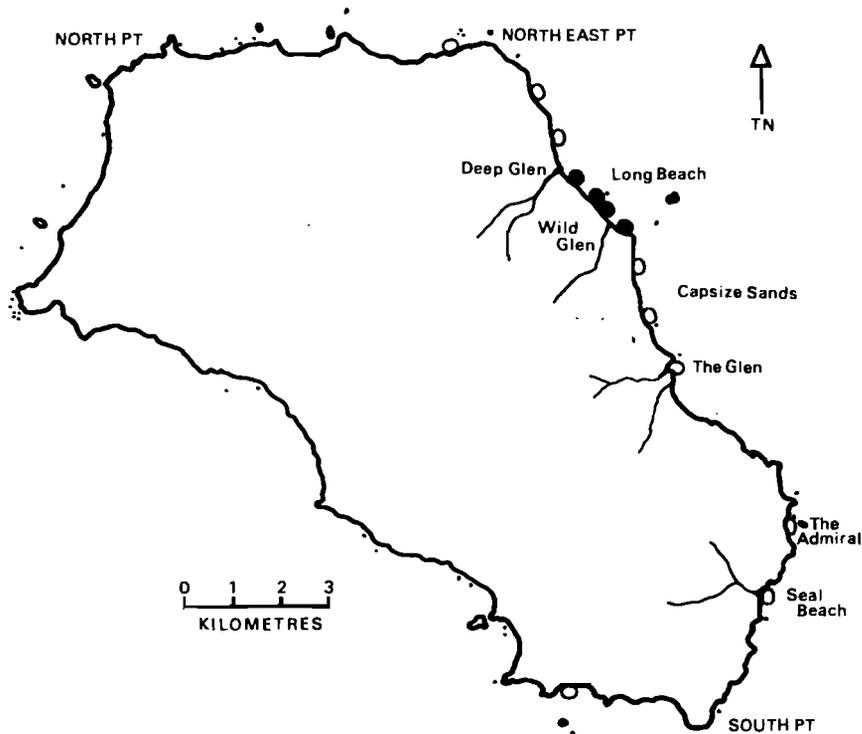


Fig. 1 The distribution of elephant seals at Gough Island, showing sites occupied by breeding seals (●) and non-breeding seals (○).

of the first week in November they had all departed (Table 2). In late October a number of bachelor bulls were found together on the vegetated areas south of Wild Glen (Fig. 1), with a few subadult females and unsexed yearlings also hauled out during October.

By mid-October 84,5% of the total expected number of pups had been born (1974 and 1975), some of them departing by the end of that month to haul-out on other parts of the coastline. By the end of October 68% of the pups were weaned, all being weaned by November 1973 (Shaughnessy 1975).

Moulting season

Since the different age and sex classes of southern elephant seals moult at different times during the moulting season (Laws 1960), cows were absent from the breeding site during December, bull numbers were low, and only 11 under-yearlings remained (Table 1). The majority (79,0%) hauled out were subadults and yearlings of both sexes (Table 1), of which 26,3% and 12,5% respectively were moulting. Throughout the study only 30 subadults and yearlings occurred on beaches elsewhere.

During April bulls were numerous once more, with few subadults and yearlings as all had presumably completed their moult.

Autumn-winter haul-out

By late April most of the population had departed (Table 1). However, infrequent sightings of elephant seals on other east coast beaches showed that a few subadults and occasional under-yearlings at least temporarily hauled out during the winter months.

Population size

The adult breeding population totals are approximate as a number of cows (equal to the number of weaned and dead pups) had already departed when the counts were made. Furthermore, assuming an 82% pregnancy rate (Laws 1960) the presumably absent non-pregnant cows must also be accounted for. Therefore, using the adjusted cow numbers at Long Beach (Table 2), combined with adults sighted elsewhere, the breeding population totals varied from 45 to 68 in different years (1974=54; 1975=68; 1977=58; 1978=45). Expected pup yields for each year are shown in Table 2.

Table 1 Census of southern elephant seals at the Long Beach breeding colony at different stages of the seasonal cycle.

Period	Date	Adults		Subadults			Yearlings			Pups	Total
		Bulls	Cows	M	?	F	M	?	F		
Breeding season	26.10.77	16	14						2	32	64
Moulting season	21.12.77	5	0	24	6	8	4	17	3	11 ^a	78
Autumn-winter season	28.04.78	12	1	12			1	2		2 ^a	30

^aAt this stage classified as under-yearlings.

Table 2 Censuses of southern elephant seals at Long Beach at different stages of the summer breeding season (excluding immatures and unidentified seals). Numbers in brackets represent the adjusted totals.

Date	Bulls	Cows	Pups ^a	Total
13.10.75	11	34 (48)	32 (39)	78 (98)
16.10.74	13	29 (39)	28 (32)	71 (84)
19.10.76 ^b	13	20 ()	16 ()	49 ()
26.10.77	16	14 (40)	32 (33)	62 (89)
29.10.75	16	15 (46)	35 (38)	66 (100)
31.10.78	12	9 (33)	27 (27)	48 (72)
8.11.73 ^c	5	0 (37)	30 (30)	35 (72)

^aDead pups included.

^bData from N.M. Wace, 1977, (*in litt.*).

^cData from Shaughnessy, 1975.

In estimating the total elephant seal population size for the island, the immatures and non-breeding adults hauling out outside the breeding season, must be included. Assuming that the corrected cow number for October represents the total cow population; the December count of immatures represents the total immature population; and bulls present during the breeding season represent different individuals from those counted in December; the 1977/78 population totals 163, comprising 22 bulls, 41 cows, 66 immatures of both sexes, and 34 live pups.

Harem size

During mid-October of 1975, when the maximum number of cows were ashore, only three harems were found with respectively 5, 8 and 19 cows per 'beachmaster'.

Habitat selection

During the breeding season, when only pebble and low profile boulder beaches on the north-east coast and vegetated areas behind these were utilized, 80,8% of elephant seals in the breeding colony occupied the beach itself and 19,2% the vegetated areas (Table 3). During December, however, elephant seals shifted from the boulder beach onto the vegetated areas with 82,1% now found there. Similarly during April the majority (66,7%) were on the vegetated areas. This change in local distribution (habitat selection) applied to all age classes (Table 3).

Onshore mortality

Pre-weaning pup mortality was 4,1% over the whole study period. During the breeding season of 1977 one cow died whilst between December 1977 and April 1978 two bulls out of an estimated total of 22 died.

Tagging and recoveries

During October of 1975, 1977 and 1978, 51 pups were tagged (22 male, 28 female and one unsexed) *i.e.* 51,0% of the potential pup yield for the three years combined. A bull and subadult female were also tagged at Long Beach during 1975. Only five (9,8%) of the elephant seal pups tagged since 1975 were resighted, three as subadults during the moulting season at the same site where they were born.

Interspecific relationships

When elephant seals bred, few fur seals (*A. tropicalis*) were present at Long Beach. Although the fur seal peak haul-out in December coincided with the elephant seal moulting season, the elephant seals were found on the vegetated areas whilst the majority of fur seals hauled out onto the boulder beach. No interactions between the two species were recorded.

Potential predators of elephant seals, *i.e.* the killer whales *Orcinus orca* were only seen twice near Transvaal Bay (October 1974 and January 1978). Scavenging birds, the giant petrels *Macronectes spp.* and the brown skua *Stercorarius skua*, never molested elephant seals and simply fed on seal carcasses when these were available.

Discussion

The occurrence of elephant seals during the breeding season on low profile or pebble beaches is probably related to the ease of access of these beaches, and their sheltered nature in the lee of the island on the north-east coast (*cf.* Carrick, Csordas & Ingham 1962; Condy 1977). Furthermore since a wallowing area is also available at Long Beach, it serves a two-fold purpose (breeding and moulting) and is therefore favoured since moulting elephant seals frequent beaches from which they can move freely to wallowing areas which they prefer (Rand 1962; Carrick, Csordas, Ingham & Keith 1962).

Generally the annual cycle of the Gough Island elephant seal population was similar to that of other southern elephant seal populations. Bulls probably start

Table 3 Occurrence of southern elephant seals at Long Beach during different stages of the seasonal cycle.

	October 1974 – 1977		December 1977		April 1978		
	Vegetated area	Beach	Vegetated area	Beach	Vegetated area	Beach	
Cows with pups	9	62	8	0	1	0	Cows/subadult females
Single cows	0	9	16	8	3	0	Yearlings
Harem bulls	3	12	5	0	9	3	Bulls
Bachelors & challengers	16	22	21	3	7	5	Subadult males
Other	3	5	6	0	0	0	Subadults unid.
Weaned pups	4	37	8	3	0	2	Under-yearlings
Total	35(19,2%)	147(80,8%)	64(82,1%)	14(17,9%)	20(66,7%)	10(33,3%)	

arriving during early August as on Macquarie Island (Carrick *et al* 1962) and Marion Island (Condy 1979). The breeding (pupping) season extended from mid-September to the end of October. The number of cows ashore peaked on 13 October 1975, which coincides with the peak haul-out on main elephant seal breeding grounds north of the Antarctic Convergence (Condy 1979). Since cows were never resighted in appreciable numbers outside the breeding season, and the April count yielded only one, their moult haul-out presumably peaked during January and February (no counts available) as on breeding locations elsewhere (Laws 1960; Carrick *et al* 1962).

Gough Island, well north of the Antarctic Convergence, provides a breeding ground on the fringes of the southern global distribution of this species. Holdgate *et al* (1956) estimated the elephant seal population of the island at between 200 and 300 individuals with no breakdown of the count (1955/56), and the 1977/78 population size was 163 individuals (this study). With 30 pups counted during 1973 (Shaughnessy 1975) no consistent change in the potential pup yield for each season was evident, numbers fluctuating between 27 and 39. It therefore appears that the population is static, possibly being somewhat lower than during 1955/56. It may always have been small but about a 1 000 elephant seal pups were reputedly born on Tristan da Cunha in 1810–1811 (Lambert in: Im Thurn & Wharton 1925) while none was born there during 1967/68 (Wace & Holdgate 1976). It is therefore possible that the Gough Island population was once much larger.

During all four years of study the only large harem was situated on exactly the same location, probably a favoured site since a large expanse of unoccupied boulder beach was available on either side. The small breeding population at Gough Island, coupled with the small harem sizes, probably restricted interference by bachelors (the major cause for cows not to pup in the same harem in successive years at Macquarie Island — Carrick, Csordas & Ingham 1962), since a beachmaster can maintain better control over his harem. This probably gives a cow a chance to select a familiar pupping site and restrict prepartum movements.

Pre-weaning pup mortality in the present study (expressed as the total number of dead pups/the potential pup yield) was estimated as 4,1% with comparable figures of 0,8–6,8% (Laws 1953), 2–12% (Carrick *et al* 1962) and 5,99% (Condy 1977) on the other sub-Antarctic Islands. A minimum of 16,7% of live pups tagged during October 1976 survived to two years of age, showing a fidelity to their birthsite during their moult haul-out.

There is a distinct temporal and spatial separation between the breeding season of *M. leonina* and *A. tropicalis* at Gough Island with the earliest fur seal births occurring during the third week in November (Bester 1977), on beach types not selected by elephant seals during their breeding season which terminated at the end of October. Furthermore only comparatively few fur seals were present during October and even during the moult haul-out of elephant seals, when fur seal numbers had increased substantially, no interspecific strife or competition for beach space was observed. This conforms to Ling's (1969) hypothesis that in the adjusted annual cycles and

different habitat requirements lies the successful coexistence between species with respect to competition on land.

Human interference is negligible. However, an undisclosed number of elephant seals were removed from Gough Island during October 1974, and another three pups during 1976. Considering the present status of the elephant seal population at Gough Island, and without any indication of a positive growth rate, this practice could have a deleterious effect.

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