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S.D. Goldsworthy and P.D. Shaughnessy

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COUNTS OF THE ANTARCTIC FUR SEAL *ARCTOCEPHALUS GAZELLA* AND LOCATION OF COLONIES AT HEARD ISLAND IN THE 1987-88 SUMMER

by

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ABSTRACT

The Antarctic fur seal *Arctocephalus gazella* has increased in numbers at Heard Island since the Australian National Antarctic Research Expeditions (ANARE) station was established in 1947. Increases have also been recorded at other breeding sites in the South Atlantic and South Indian Oceans this century, particularly at South Georgia.

In the 1987-88 summer, fur seals at Heard Island were counted in several age and sex categories. The aims of the project were to determine the location of pupping sites, the extent of the pupping season and the size of the population, and to record the changes in numbers of animals ashore during the summer. Maps of the colonies and main haul-out areas, together with descriptions of census areas and tabulations of counts, provide a basis for future comparison.

1. INTRODUCTION

An objective of the 1987-88 Australian National Antarctic Research Expeditions (ANARE) to Heard Island (53°10'S, 73°30'E) was to determine the status of the Antarctic fur seal *Arctocephalus gazella*. This species breeds on islands in the South Atlantic and South Indian Oceans (Bonner 1981) and has been increasing markedly in numbers this century, particularly at South Georgia (Payne 1977). Few fur seals were recorded at Heard Island while the ANARE station was maintained between 1947 and 1955, but they gradually increased in number during the 1960s and 1970s (Budd 1972 and references therein). A survey of fur seals over most of the island conducted by members of ANARE in 1986-87 indicated that the increase was continuing (Shaughnessy *et al.* 1988).

In this note the authors tabulate detailed counts of fur seals at colonies and major haul-out sites on Heard Island (Map 1) during the 1987-88 summer, and provide descriptions and maps of those locations. These should be useful for comparative purposes in future years when surveys of fur seals at Heard Island are repeated. Analyses of the 1987-88 counts and comparisons with counts made in previous years will be presented elsewhere. The data presented here are supplementary.

The surveys were conducted to achieve three major aims. The first aim was to determine accurately the location of pupping sites. The second aim was to determine the extent of the pupping season, the median date of birth and the number of pups born. The third aim was to census fur seals on as much of the island as possible in order to determine the number of animals ashore and to document changes in numbers during the summer.

2. METHODS

Heard Island has an area of 375 km^2 with a maximum length of 45 km in a north-west to south-east direction. Glaciers descend most of its slopes and many reach sea level. Travel between fur seal sites was mostly on foot and access was sometimes difficult. This, and the multidisciplinary nature of the expedition's work, made synchronisation of counts impossible.

Most of the censuses recorded here were conducted at the eastern end by Goldsworthy and other expeditioners based at Spit Bay. Fur seals at the north-western end of the island were counted by expeditioners based at Atlas Cove. All counts were co-ordinated by Goldsworthy who was at the island from 18 October 1987 to 2 March 1988.

For most of the censuses, attempts were made to classify animals into recognisable age classes, a skill that varied between observers and improved during the expedition. For early counts (to 25 November), animals were classed into simple age categories, but for the major censuses (between 19 December and 25 February), the following eight recognisable age classes were used.

Bulls: fully mature males with well developed mane, chest and shoulders

Large sub-adult males: similar in size to bulls but lacking the well-developed chest, shoulders and mane

Sub-adult males: of similar size to cows, distinguished from them by their shoulder development and dark moustachial vibrissae

Cows: adult females with predominantly white moustachial vibrissae, small head and lack of shoulder development

Juveniles: smaller than cows or sub-adults, but larger than yearlings

Yearlings: of similar size to pups but lacking their black natal coat; older than one year

Under-yearlings: this term was used for yearlings prior to late November

Pups: with a black natal coat

To record the reproductive status of bulls during the pupping season, two classes were recognised.

Territorial bulls: defending territories containing cows

Bachelor bulls: defending territories not containing cows, or challenging territorial bulls

Fur seals of all age classes were counted in four censuses during December, January and February. Most of the sites included in individual censuses were visited within a few days of each other, particularly those with many fur seals.

Isolated sites that were difficult to reach or had few fur seals were visited on an opportunistic basis. Consequently, some of the censuses were conducted over a long period.

In order to determine the duration of the pupping season, pups were counted at 3-day intervals at the eastern end of the island, at Fairchild Beach, Skua Beach, the eastern side of Stephenson Spit to the ANARE field camp, and Spit Bay. Counts were made on nine occasions between 25 November and 19 December; bulls and cows were also counted.

Fur seals were tagged on the fore-flipper with blue Dalton Super-flexi cattle ear tags inscribed INFORM ANTARCTIC AUSTRALIA and given a unique three-digit number between 001 and 500. Most of the pups were tagged; other age classes were tagged on an opportunistic basis. The total tagged was 234 pups, 8 under-yearlings, 9 yearlings, 2 juveniles and 1 sub-adult male. One of the pups was a subantarctic fur seal *A. tropicalis* (Goldsworthy and Shaughnessy 1989).

3. MAPS

Maps of the fur seal colonies, the haul-out areas and census areas are based on the map *Heard Island including McDonald Islands* (3rd edition, 1985) issued by the Division of National Mapping, Australian Department of Resources and Energy, and on aerial colour photographs of the island taken in the 1986-87 summer. Beaches and vegetated areas that included the major fur seal colonies on the north-eastern coastline are shown in Map 2. Areas with higher densities of fur seals are shown in more detail in Map 3 (Fur Seal Creek and part of Fairchild Beach), Map 4 (western end of Skua Beach) and Map 5 (Spit Bay). Map 6 shows pupping areas at the north-western end of the island (Red Island peninsula, Sydney Cove and Atlas Cove).

Boundaries of census areas at the eastern end of the island from Compton Spit on the north coast to Winston Spit on the south coast are shown in Map 7. At Spit Bay (within this range) large numbers of fur seals hauled out and it was necessary to divide the area into smaller census units. Greater detail of boundaries near Spit Bay is provided in Map 8.

Most of the census areas are vegetated beach fronts separated by major topographic features such as rock bluffs, moraine ridges and streams. Boundaries of these areas at the eastern end of the island are described below in a clockwise direction. Because of the dynamic nature of the topography of Heard Island, it may be difficult for future expeditions to locate some of these boundaries. These descriptions and maps should assist in such a search. Names given to census areas are italicised.

Compton Spit, Fairchild Beach, Brown Spit and *Sooty Valley* are separated by well-defined lateral moraine ridges.

Sooty Valley is separated from *Skua Beach* by low-lying bluffs which terminate near the beach.

Skua Beach is a cobble beach which is divided into two areas. The western end (referred to as *West*) rises gently towards the east and extends to a stream mid-way along the length of Skua Beach. East of the stream the terrain rises to a vegetated lava flow 5-10 m above sea level crossed by many gullies. This part of Skua Beach is referred to as *Lava*. The elevated area is inland from the beach and rocky terraces. Fur seals were found on the vegetated lava flow and the terraces. The eastern boundary of the *Lava* area is Rocky Creek, a glacial stream that flows around the eastern slopes of Scarlet Hill, and separates *Skua Beach* from the next census area, *Stephenson Spit*.

Stephenson Spit extends south-east along The Spit to the lateral moraine ridge at the eastern end of Stephenson Lagoon.

The *Stephenson-Camp* area extends from Stephenson Lagoon east to a small stream alongside the ANARE field camp at *Spit Bay*.

The *Spit Bay* area is bounded on the south-east by a line where the vegetation ends and cobbles begin. Near this line is a triangular area of tussock *Poa cookii* with sides approximately 80 m long where many giant petrels *Macronectes* spp. roosted during the summer and fur seals hauled out in January and February. This is referred to as G.P. Triangle.

The *North Spit* area is east of the *Spit Bay* area and separated from *South Spit* by an arbitrary line midway along the length of The Spit.

Spit Point refers to the easternmost point of the island. On the 1985 map of Heard Island, this name refers to a point which is now a small sandy island just east of Heard Island.

South Spit extends from the south side of The Spit west along the beach to *Doppler Hill.*

Doppler Hill refers to a small triangular area of vegetation east of Doppler Hill, bounded on its northern side by the dry bed of King Creek.

The inland boundaries of the three adjoining areas, *Spit Bay, Dovers Moraine Trough* and *Scholes Lagoon - King Creek,* are less obvious (Map 8). The feature that forms the boundary of these three areas follows the ridge top of an old vegetated terminal moraine, east of Dovers Moraine.

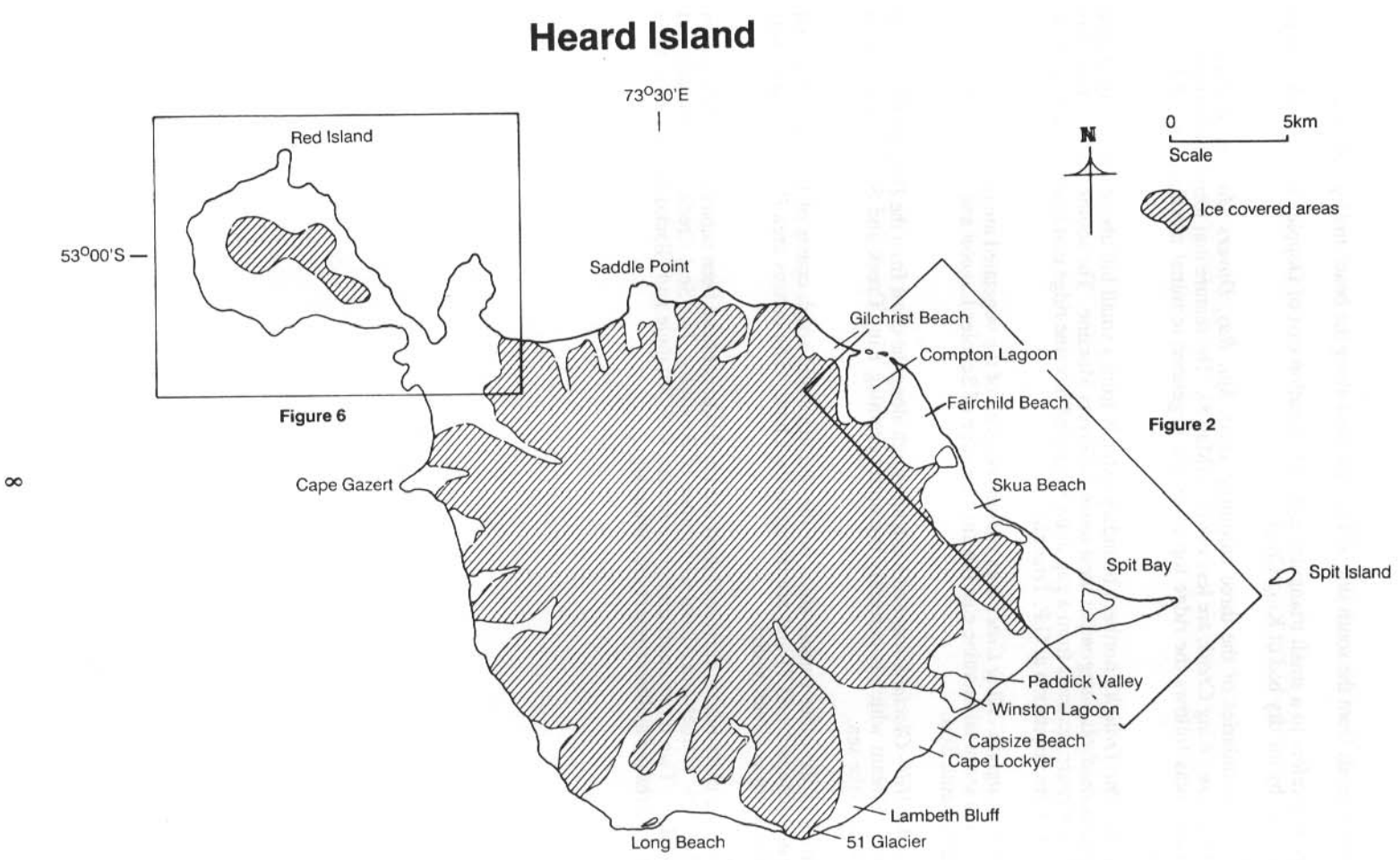
Dovers Moraine Trough's northern boundary extends from a small hill above the colony of king penguins *Aptenodytes patagonicus* west towards Dovers Moraine. The southern inland boundary of the *Spit Bay* area extends from a gap in the vegetated moraine ridge east towards a small stream at the end of the vegetation at G.P. Triangle.

The *Scholes Lagoon - King Creek* area encompasses all of the vegetated area extending from the old vegetated terminal moraine east towards the edge of Scholes Lagoon and south-east towards the sand of South Spit.

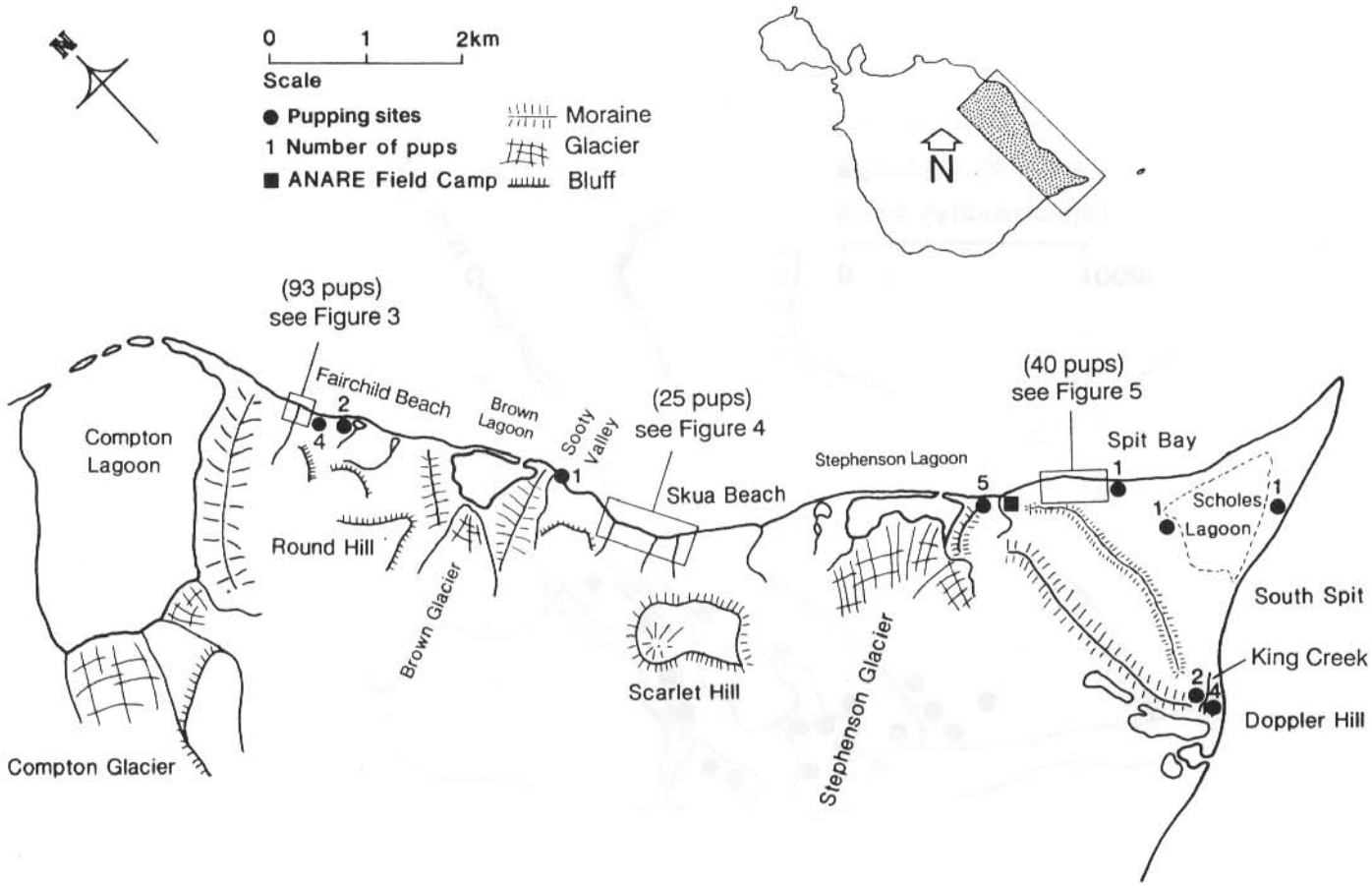
The *Doppler Hill - Glacial Stream* area extends south along the coast from the *Doppler Hill* area to the Glacial Stream which is currently the outlet draining King Creek and Stephenson Glacier southwards to the sea.

Boundaries of the other census areas on the southeast and south coasts of the island are well demarcated (Maps 1 and 7) and are not described here. The census area *Paddick Valley* was formerly known as Green Valley.

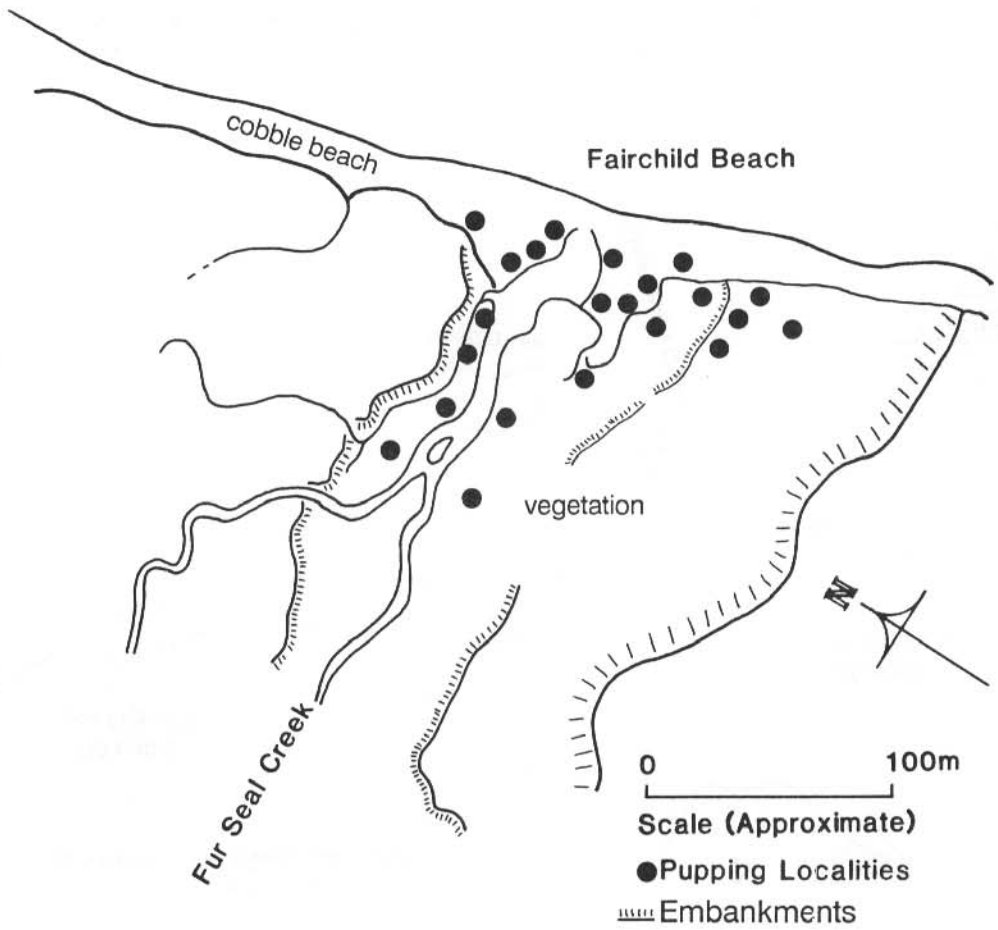
The following place names at Heard Island used in this paper have been submitted for recognition to the Antarctic Names and Medal Committee of Australia: Fur Seal Creek, Rocky Creek and Sooty Valley. Two other unofficial place names, G.P. Triangle and Glacial Stream, have been used for features the authors suspect are temporary.



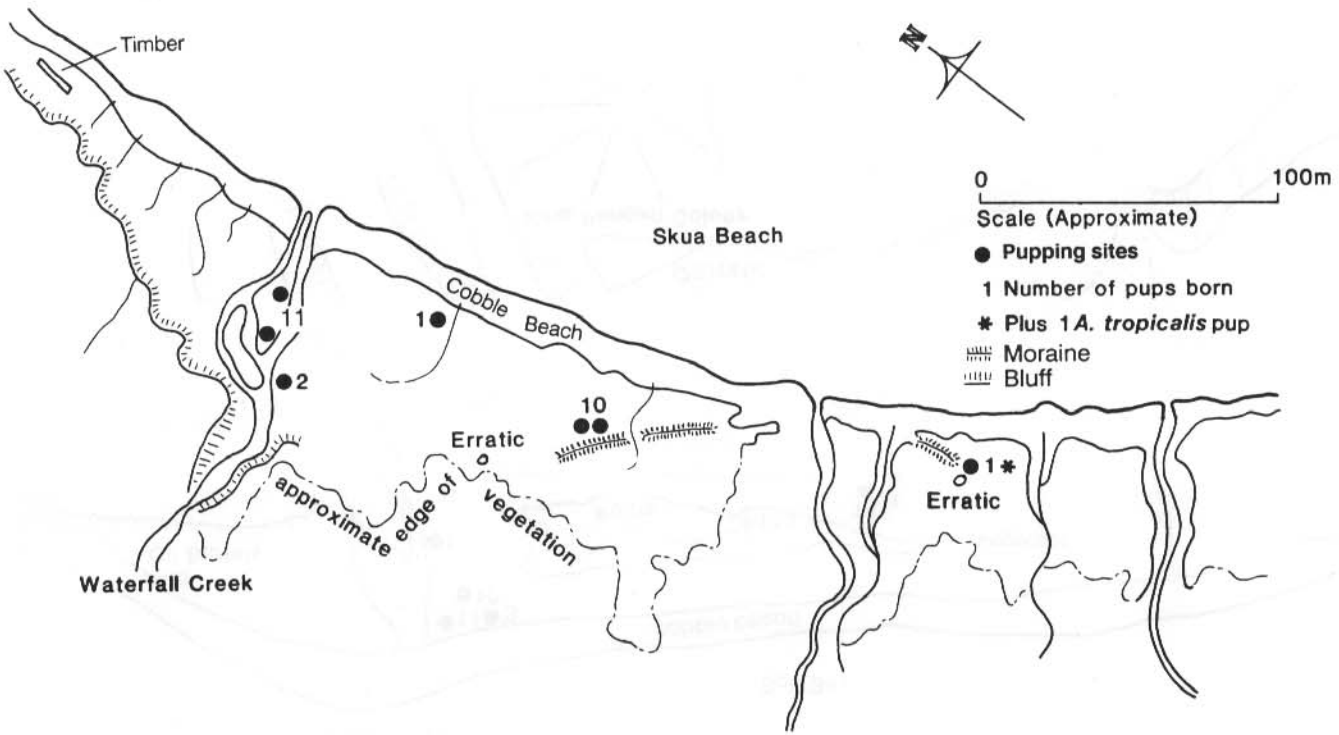
Map 1. Heard Island showing major localities referred to in the text and tables.



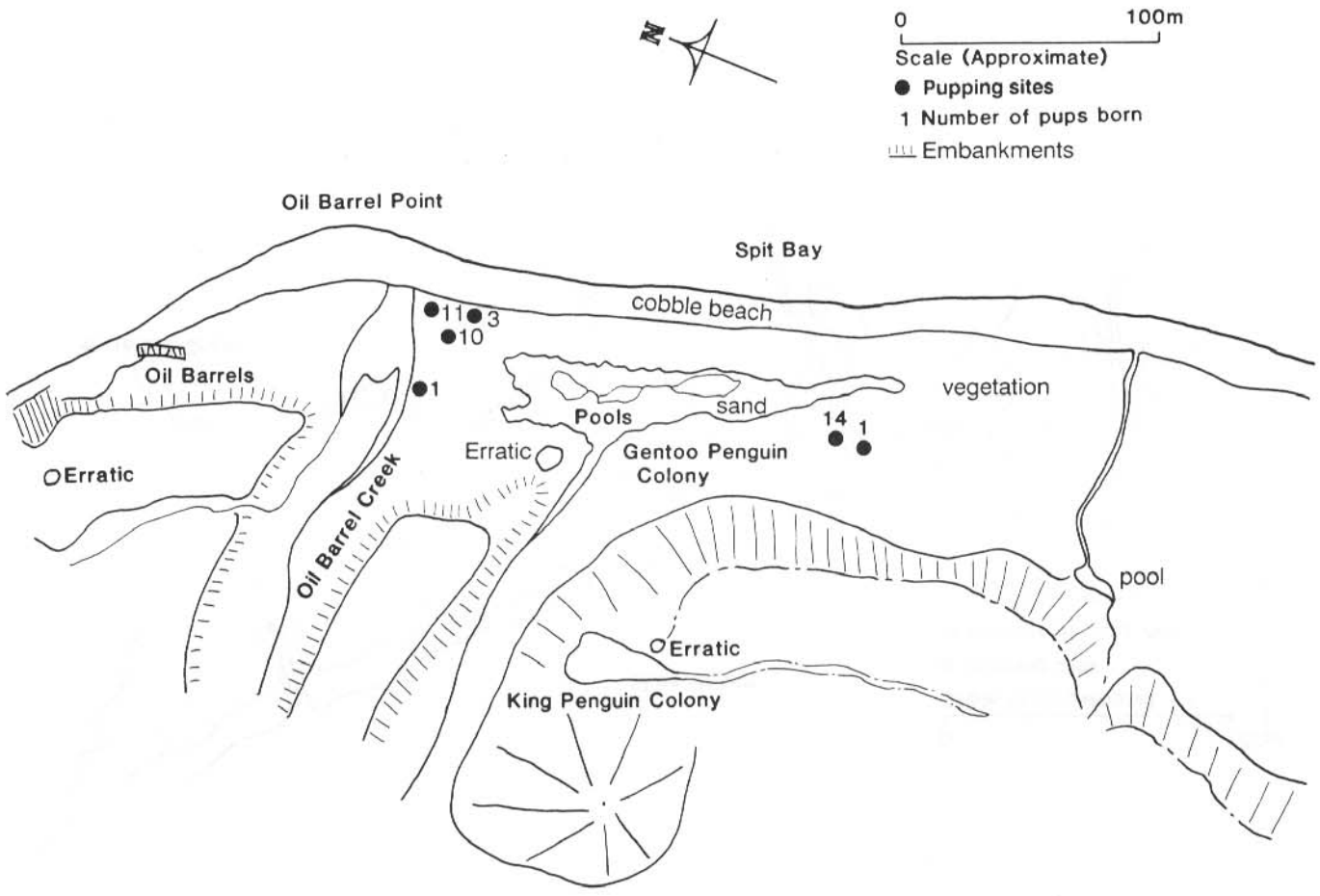
Map 2. North-eastern coastline of Heard Island showing the position of Antarctic fur seal breeding sites and the number of pups born in the 1987-88 summer (totalling 179 pups).



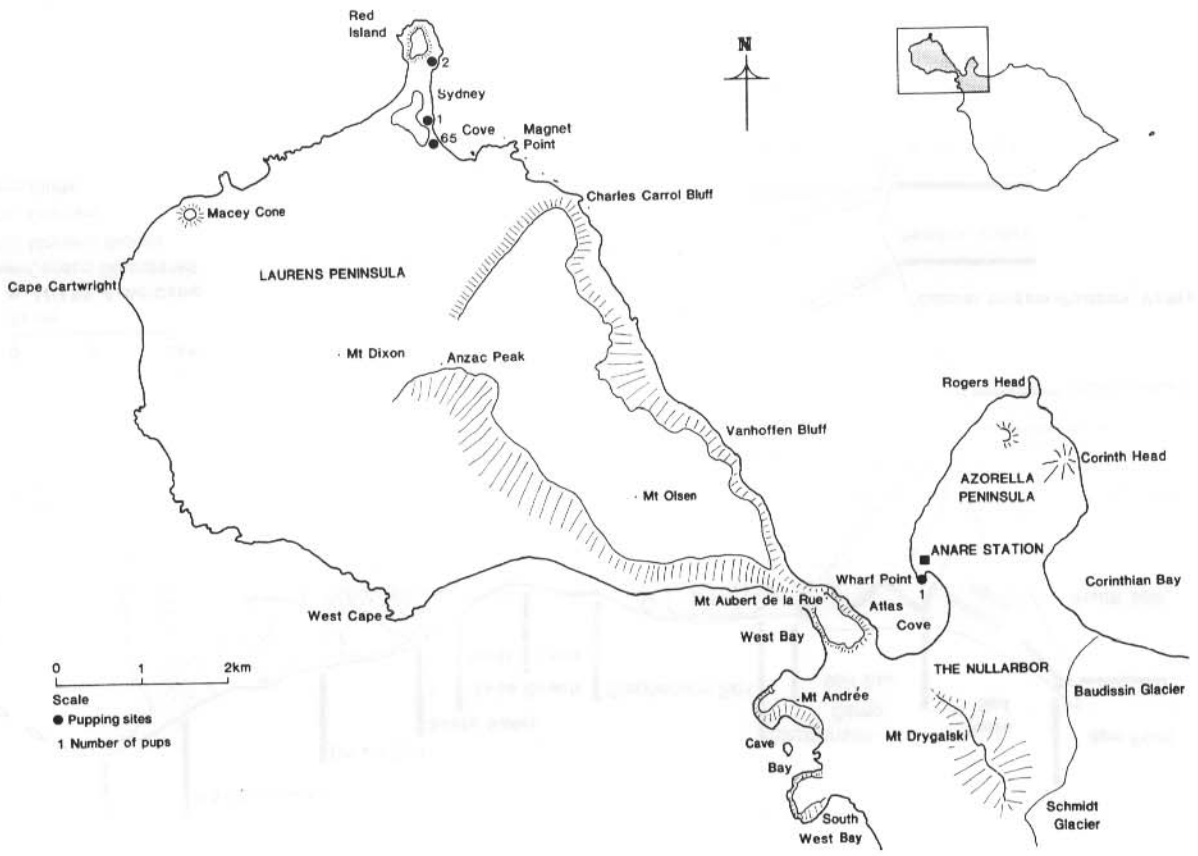
Map 3. Fur Seal Creek (Fairchild Beach), indicating Antarctic fur seal breeding sites where 93 pups were born in the 1987-88 summer.



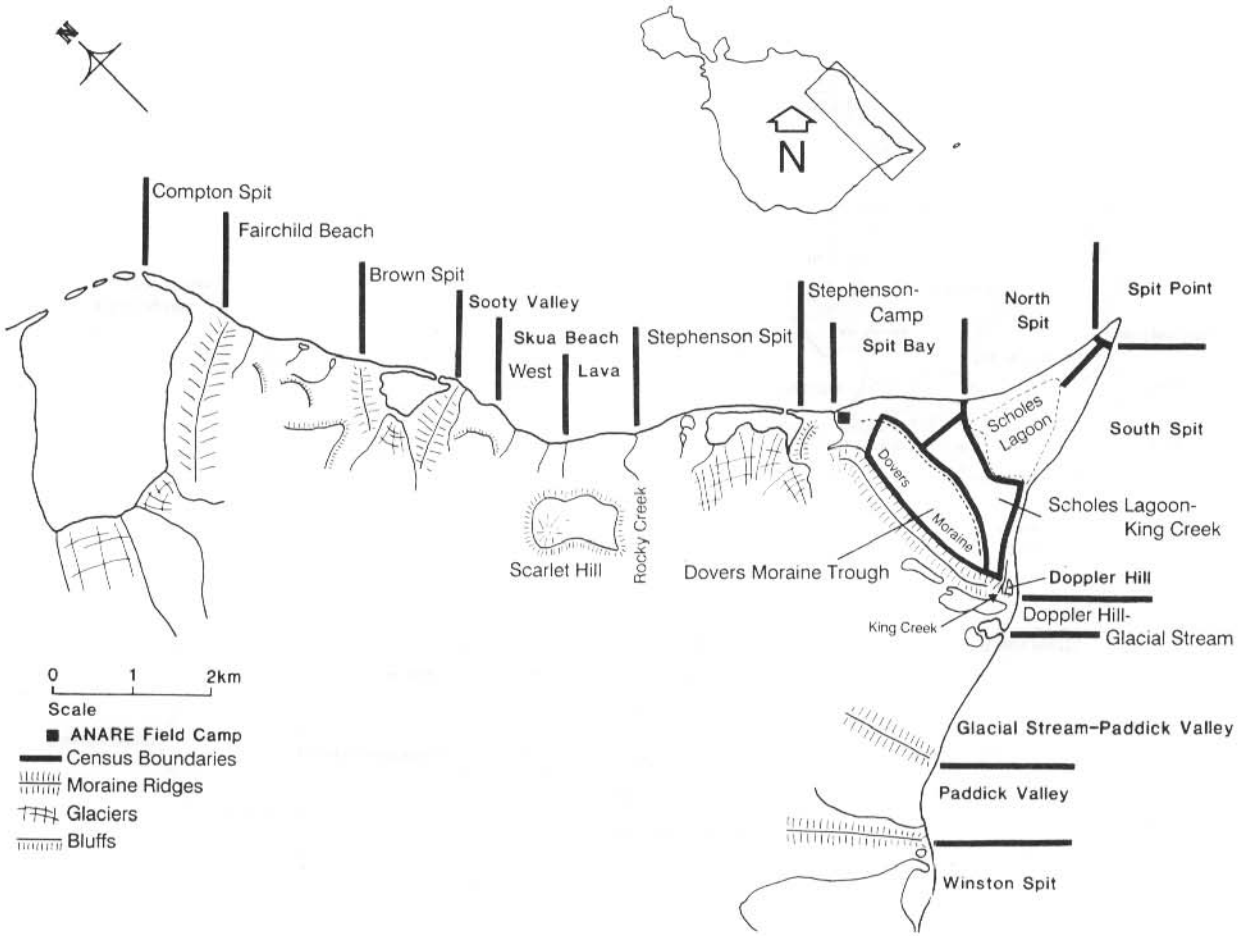
Map 4. Western end of Skua Beach, showing Antarctic fur seal breeding sites and the number of pups born in the 1987-88 summer (totalling 25 Antarctic fur seal pups and 1 subantarctic fur seal pup).



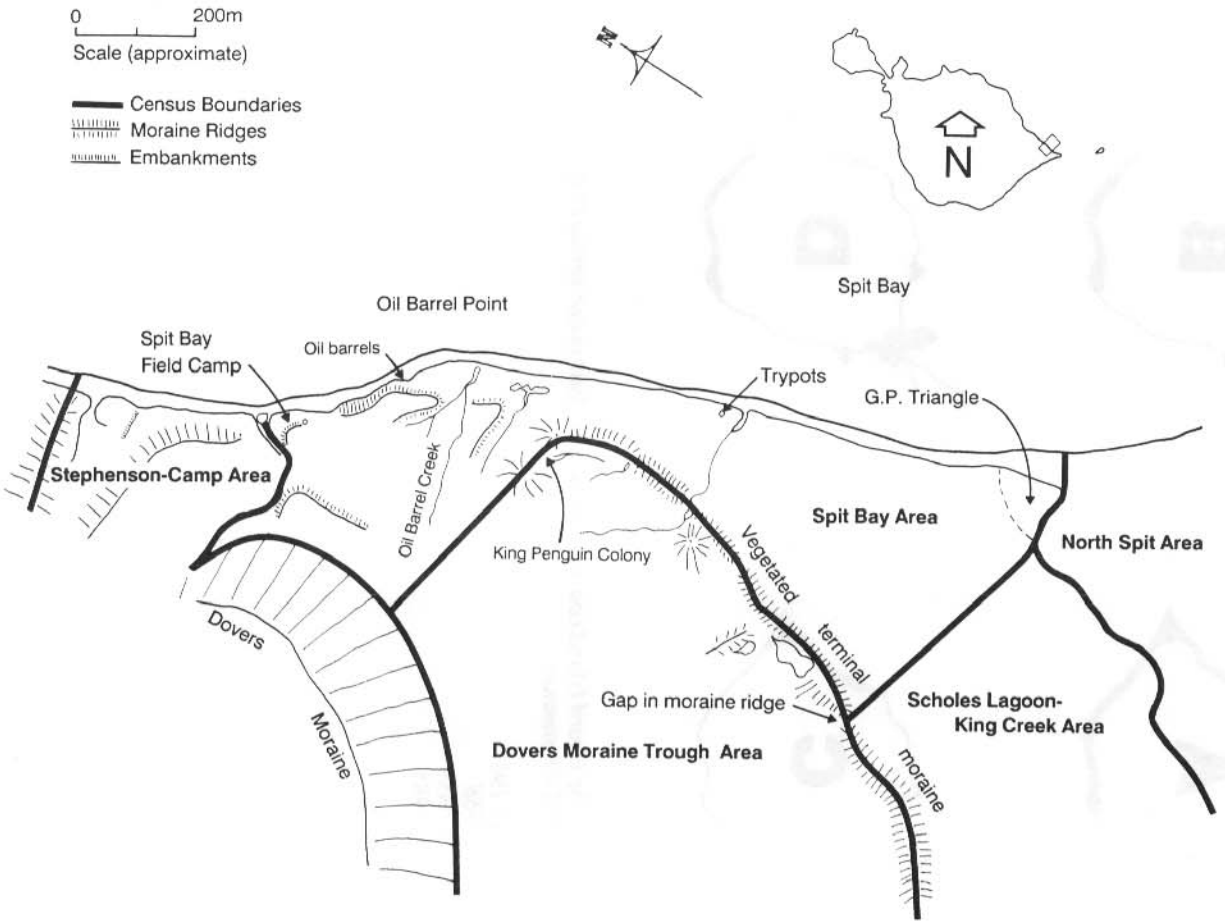
Map 5. Part of Spit Bay showing Antarctic fur seal breeding sites and the number of pups born in the 1987-88 summer (totalling 40 pups).



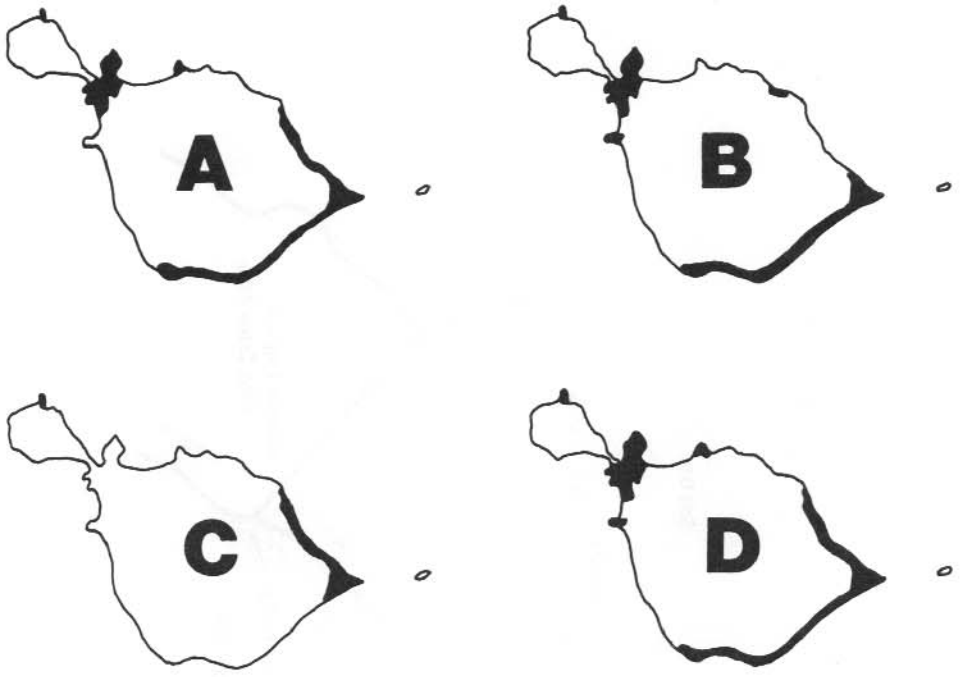
Map 6. North-western Heard Island, showing Antarctic fur seal breeding sites and the number of pups born in the 1987-88 summer (totalling 69 pups).



Map 7. Eastern end of Heard Island, indicating boundaries of census areas for Antarctic fur seals during the 1987-88 summer.



Map 8. Part of Spit Bay, showing boundaries of small census areas where Antarctic fur seals were prevalent in the 1987-88 summer.



Map 9. Sections of the Heard Island coastline included in four major censuses of Antarctic fur seals during the 1987-88 summer.

a. 19-20 December 1987
b. 3-16 January 1988
c. 25-26 January 1988
d. 4-25 February 1988

4. RESULTS AND DISCUSSION

4.1 PUPPING SEASON

The results of censuses to determine the duration of the pupping season are shown in Table 1. Pup births began in late November and showed a sigmoidal increase to 145 on 19 December when counting ceased. This is a commonly observed feature with fur seal populations (e.g. Payne 1977).

A total of 169 pups was counted at these sites on Heard Island when they were tagged on 7 January. The number of cows reached a lower maximum than that for pups. Because cows returned to sea to feed for 8 days, on average, after giving birth in the 1987-88 summer, many of them were at sea when pup numbers peaked.

Analyses of pup counts indicate that 90% of the pups were born within a period of 26 days. The median date of birth was 11 December.

4.2 MOVEMENTS OF PUPS

Throughout January and February, the number of pups playing in freshwater pools or streams increased. At Fairchild Beach, they often swam in the surf; e.g. on 25 January, 20 pups were swimming within 20 m of the shore at Fur Seal Creek. A few days later pups from Fairchild Beach were observed at Spit Bay, 7 km away (1 February 1988, tags 337/338) and Skua Beach, 4 km away (9 February 1988, tags 235/236). Both pups had just begun moulting. Thus, pups are capable of swimming at an early age. Since Antarctic fur seal pups are weaned in late March - early April (Doidge *et al.* 1986, Kerley 1983), it is unlikely that these pups had been weaned by early February. Neither was recorded subsequently. Despite the mobility of pups from Fairchild Beach, pups from Skua Beach and Spit Bay colonies were not seen in the surf, and rarely on the beach until 2 March.

4.3 MAJOR CENSUSES

Details of four major censuses are presented in Tables 2-5 and totals are summarised in Table 6. Place names used in these tables are shown in Maps 1 to 8. Portions of the island covered in each census are illustrated in Map 9 from which it is apparent that some colonies were not reached, especially on the second and third censuses. Estimates of the number of animals ashore at particular sites for the missed censuses have been interpolated linearly in Table 6 using the counts on adjacent days. Only one count was available for Gilchrist Beach, from the second census. Estimates for Gilchrist Beach for the other three censuses assume fur seals at this site increased at the same rate as on the whole island.

The maximum estimate for the whole island from these four censuses was 9748 animals in the last census (4-25 February). The censuses indicate a major increase in the number of non-breeding animals ashore during January and February. Budd and Downes (1969) also noted that numbers of fur seals ashore were greatest in late summer.

The maximum number of pups counted on the censuses was 238, again in the last census (Table 5). A more accurate estimate of the number of pups born on the whole island was 248, obtained by marking them with tags.

4.4 FUTURE COMPARISONS

The tabulated counts and maps of colonies and haul-out areas, together with descriptions of census areas, will provide a basis for comparisons of the numbers and distribution of Antarctic fur seals at Heard Island in future years. Future censuses based on these areas will enable the direction and extent of changes in the population to be determined.

Table 1. Counts at 3-day intervals of Antarctic fur seals at the eastern end of Heard Island, November and December 1987.

DATE	LOCALITY	BULLS[1]	COWS	PUPS
25 November 1987	Fairchild Beach	*	6	2
	Skua Beach[2]	*	3	1
	Spit Bay[3]	*	2	2
	Total	8*	11	5
28 November 1987	Fairchild Beach	41	15	7
	Skua Beach	16	3	2
	Spit Bay	5	2	2
	Total	62	20	11
1 December 1987	Fairchild Beach	39	21	13
	Skua Beach	10	10	7
	Spit Bay	8	5	5
	Total	57	36	25
4 December 1987	Fairchild Beach	44	37	28
	Skua Beach	12	11	9
	Spit Bay	8	7	6
	Total	64	55	43
7 December 1987	Fairchild Beach	37	47	44
	Skua Beach	10	12	13
	Spit Bay	6	10	12
	Total	53	69	69
10 December 1987	Fairchild Beach	40	58	60
	Skua Beach	11	9	17
	Spit Bay	6	18	16
	Total	57	85	93
13 December 1987	Fairchild Beach	40	60	73
	Skua Beach	11	10	18
	Spit Bay	5	18	20
	Total	56	88	111
16 December 1987	Fairchild Beach	42	56	84
	Skua Beach	9	11	21
	Spit Bay	9	18	29
	Total	60	85	134
19 December 1987	Fairchild Beach	37	50	88
	Skua Beach	9	14	23
	Spit Bay	8	26	34
	Total	54	90	145

[1] Includes territorial bulls and bachelor bulls unless otherwise indicated.
[2] Includes census areas *West* and *Lava*.
[3] Includes census areas *Stephenson-Camp* and *Spit Bay*.
* All territorial bulls.

Table 2. Census of Antarctic fur seals at Heard Island, 19-20 December 1987.

LOCALITY	DATE	AGE CLASS[1] TB	BB	LSAM	SAM	COW	JUV	Y	PUP	TOTAL
Red Island peninsula	20 Dec	1	11	10	15	4	6		2	49
Sydney Cove	20 Dec	14	16	2	4	33	10		56	135
Four Bays region										
South West Bay	20 Dec		4		1					5
West Bay	20 Dec		2	2	1					5
Atlas Cove	20 Dec						5			5
Corinthian Bay	20 Dec						3			3
Saddle Point	12 Dec							2		2
Compton Spit	19 Dec			1	1					2
Fairchild Beach	19 Dec	19	22	8	18	50	35	8	88	248
Brown Spit	19 Dec			1	1		4			6
Sooty Valley	19 Dec				3		8	2		13
Skua Beach:West	19 Dec	4	5		9	14	24	4	23	83
Skua Beach:Lava	19 Dec			1			2			3
Stephenson Spit	19 Dec									0
The Spit region										
Stephenson-Camp	19 Dec	1				3	6	3	3	16
Spit Bay	20 Dec	5	7	2	10	24	77	4	32	161
North Spit	20 Dec						7	1		8
Spit Point	20 Dec									0
South Spit	20 Dec				1		3	1		5
Scholes Lake-King Ck	20 Dec				5		17			22
Dovers Moraine Trough	20 Dec									0
Doppler Hill	20 Dec	1	2		5	7	7	1	5	28
Doppler-Glacial Stream	20 Dec									0
Glacial Str-P.Valley[2]	19 Dec						1	3		4
Paddick Valley[2]	19 Dec				6		8	4		18
Winston Spit	19 Dec			1						1
Capsize Beach	19 Dec							2		2
Lockyer-Lambeth	20 Dec							1		1
51 Glacier beach	20 Dec							1		1
Long Beach	20 Dec		1		2		6			9
TOTAL		45	70	28	82	135	229	37	209	835

[1] TB—territorial bull, BB—bachelor bull, LSAM—large sub-adult male, SAM—sub-adult male, COW—adult female, JUV—juvenile, Y—yearling, PUP—black pup.
[2] Paddick Valley, formerly known as Green Valley.

Table 3. Census of Antarctic fur seals at Heard Island, 3-16 January 1988.

LOCALITY	DATE	AGE CLASS[1] TB	BB	LSAM	SAM	COW	JUV	Y	PUP	TOTAL
Red Island peninsula	7 Jan		82	31	16	8	4	8	3	152
Sydney Cove	7 Jan		38	27	16	31	22		55	189
Four Bays region										
South West Bay	7 Jan									14[2]
West Bay	7 Jan									10[2]
Atlas Cove	7 Jan									7[2]
Corinthian Bay	7 Jan			3			1			4
Gilchrist Beach	3 Jan				5		1			6
The Spit region										
Stephenson-Camp	9 Jan	1	34	48	13	2	1		4	103
Spit Bay	9 Jan		483	304	96	11	50	9	41	994
North Spit	9 Jan		11	5	3		1	1		21
Spit Point	9 Jan		1	1			3			5
South Spit	9 Jan		13	14	3		9	5	1	45
Scholes Lake-King Ck	9 Jan		50	39	31	2	12		2	136
Dovers Moraine Trough	9 Jan									0
Doppler Hill	9 Jan	1	8	3	2	4	2		4	24
Doppler-Glacial Stream	9 Jan									0
Glacial Str-P.Valley[3]	9 Jan									0
Paddick Valley	9 Jan		47	41	43		9	8		148
Winston Spit	15 Jan		1	1	3		2	1		8
Capsize Beach	15 Jan									0
Lockyer - Lambeth	15 Jan									0
51 Glacier beach	15 Jan									0
Long Beach	16 Jan		7	21	14		9	5		56
Cape Gazert	9 Jan			4	12			3		19
TOTAL		2	775	542	257	58	126	40	110	1941

[1] TB—territorial bull, BB—bachelor bull, LSAM—large sub-adult male, SAM—sub-adult male, COW—adult female, JUV—juvenile, Y—yearling, PUP—black pup.
[2] Age class of seals not distinguished.
[3] Paddick Valley, formerly known as Green Valley.

Table 4. Census of Antarctic fur seals at Heard Island, 25-26 January 1988.

LOCALITY	DATE	AGE CLASS[1] BULL	LSAM	SAM	COW	JUV	Y	PUP	TOTAL
Red Island peninsula	26 Jan	13	66	27	1	17	1	3	128
Sydney Cove	26 Jan	18	30	57	20	14	2	42	183
Compton Spit	25 Jan	15	5	7	2	11	2		42
Fairchild Beach	25 Jan	127	220	244	23	152	14	99	879
Brown Spit	25 Jan	8	21	18		5	2		54
Sooty Valley	25 Jan	30	44	45	1	32	5	1	158
Skua Beach:West	25 Jan	18	41	83	4	53	18	25	242
Skua Beach:Lava	25 Jan	70	83	43		14			210
Stephenson Spit	25 Jan	6	5	6	1	10	2		30
The Spit region									
Stephenson-Camp	26 Jan	15	76	56	2	10	4	4	167
Spit Bay	26 Jan	273	608	655	7	185	46	41	1815
North Spit	26 Jan	11	6	17		16	8		58
Spit Point	26 Jan	1	2	2		2	1		8
South Spit	26 Jan	4	14	9		3	2	1	33
Scholes Lake-King Ck	26 Jan	8	72	68		37	9	3	197
Dovers Moraine Trough	26 Jan	10	43	47		12	12		124
Doppler Hill	26 Jan	4	24	28	2	4		4	66
TOTAL		631	1360	1412	63	577	128	223	4394

[1] BULL—adult male, LSAM—large sub-adult male, SAM—sub-adult male, COW—adult female, JUV—juvenile, Y—yearling, PUP—black pup.

Table 5. Census of Antarctic fur seals at Heard Island, 4-25 February 1988.

LOCALITY	DATE	AGE CLASS[1] BULL	LSAM	SAM	COW	JUV	Y	PUP	TOTAL
Red Island peninsula } Sydney Cove	19 Feb	27		186	20		16	58[2]	307
Four Bays region									
South West Bay	19 Feb								0
West Bay	19 Feb			11			2		13
Atlas Cove	19 Feb	1		10			2	1	14
Corinthian Bay	22 Feb	2				11	2		15
Saddle Point	4 Feb								168[3]
Compton Spit	15 Feb	10	16	33		28	1		88
Fairchild Beach	15 Feb	215	320	435	29	208	16	99	1322
Brown Spit	15 Feb	36	25	46		16	2		125
Sooty Valley	15 Feb	72	93	207		96	1	1	470
Skua Beach:West	15 Feb	70	135	227	9	112	25	25	603
Skua Beach:Lava	15 Feb	183	186	136		28	3		536
Stephenson Spit	15 Feb	4	6	9		11			30
The Spit region									
Stephenson-Camp	16 Feb	170	130	98		19	4	5	426
Spit Bay	16 Feb	856	978	574	10	215	23	41	2697
North Spit[4]	16 Feb	19	14	20		13	5		71
South Spit[4]	16 Feb	12	17	22		3	1	1	56
Scholes Lake-King Ck	16 Feb	236	484	333	1	142	3	3	1202
Dovers Moraine Trough	16 Feb	72	197	212		81			562
Doppler Hill	16 Feb	58	60	68		15	3	4	208
Doppler-Glacial Stream	15 Feb	1		1					2
Glacial Str-P.Valley[5]	15 Feb	1		2		1			4
Paddick Valley	14 Feb	139	186	168		37	6		536
Winston Spit	13 Feb	1	3	9					13
Capsize Beach	13 Feb	14	27	39		10			90
Lockyer-Lambeth	13 Feb								0
51 Glacier beach	13 Feb	1		2					3
Long Beach	12 Feb	6	49	47		20			122
Cape Gazert	25 Feb	8	7	22		7	2		46
TOTAL		2214	2933	2917	69	1073	117	238	9729

[1] BULL—adult male, LSAM—large sub-adult male, SAM—sub-adult male, COW—adult female, JUV—juvenile, Y—yearling, PUP—black pup.
[2] 68 pups at Red Island peninsula and Sydney Cove on 12 February.
[3] Age classes not distinguished.
[4] Counts for Spit Point included in North Spit and South Spit areas.
[5] Paddick Valley, formerly known as Green Valley.

Table 6. Summary of censuses of Antarctic fur seals at Heard Island in the 1987-88 summer, with estimates for localities where censuses were missed. (in parentheses)

Colony	19-20 Dec	3-16 Jan	25-26 Jan	4-25 Feb
Red Island peninsula	49	152	128	307
Sydney Cove	135	189	183	a
Four Bays region				
South West Bay	5	14	(8)	0
West Bay	5	10	(11)	13
Atlas Cove	5	7	(10)	14
Corinthian Bay	3	4	(8)	15
Saddle Point	2	(88)[b]	(139)	168
Gilchrist Beach[c]	(2)	6	(10)	(19)
Compton Spit	2	(24)	42	88
Fairchild Beach	248	(603)	879	1322
Brown Spit	6	(33)	54	125
Sooty Valley	13	(95)	158	470
Skua Beach:West	83	(172)	242	603
Skua Beach:Lava	3	(119)	210	536
Stephenson Spit	0	(17)	30	30
The Spit area				
Stephenson-Camp	16	103	167	426
Spit Bay	161	994	1815	2697
North Spit	8	21	58	71
Spit Point	0	5	8	d
South Spit	5	45	33	56
Scholes Lake-King Creek	22	136	197	1202
Dovers Moraine Trough	0	0	124	562
Doppler Hill	28	24	66	208
Doppler-Glacial Stream	0	0	(1)	2
Glacial Stream-Paddick Valley	4	0	(2)	4
Paddick Valley	18	148	(327)	536
Winston Spit	1	8	(10)	13
Capsize Beach	2	0	(33)	90
Lockyer-Lambeth	1	0	(0)	0
51 Glacier beach	1	0	(1)	3
Long Beach	9	56	(79)	122
Cape Gazert	(7)	19	(29)	46
Counts	835	1941	4394	9729
Interpolations	(9)	(1151)	(668)	(19)
TOTALS	844	3092	5062	9748

a. Count for Red Island included Sydney Cove.
b. Interpolations enclosed in parentheses use counts from adjacent days.
c. Estimates for Gilchrist Beach utilise the count for 3 January and Totals (without Gilchrist).
d. Counts for Spit Point on 16 February were included with those for the adjacent areas (North Spit and South Spit).

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