

CENSUSES OF PENGUIN POPULATIONS OF THE ANTARCTIC PENINSULA, 1983-87

S. PONCET and J. PONCET

*c/o Post Office, Port Stanley, Falkland Islands, South Atlantic**

ABSTRACT. In four years between 1983 and 1987, breeding sites of penguins were mapped and breeding numbers estimated (by direct counts ashore or from a sailing vessel close inshore) along the west coast of the Antarctic Peninsula. This gave almost complete coverage of all suitable areas between 63° 17' S and 69° S. For Adélie penguins the region has 99 colonies (over 50 previously unreported) with a total of 125 000 pairs. There are about 55 000 pairs of chinstrap penguins in 126 colonies (over 100 previously unreported) and about 19 000 pairs of gentoo penguins, in 40 colonies. Comparisons are made with previous data; most colonies are stable, some increasing slightly; a few appear to have decreased. Chinstraps may be extending southwards, with a pair observed at 65° 52' S.

INTRODUCTION

Records of the size and distribution of penguin colonies on the Antarctic Peninsula date back 85 years to the expeditions of Nordenskjöld (1905) and Charcot (1906). Early reports were essentially descriptive but some quantitative data gradually accumulated, this being extensively supplemented by incidental observations by members of the British Antarctic Survey (originally Falkland Islands Dependencies Survey), and ultimately by organized penguin census surveys (e.g. Muller-Schwarze and Muller-Schwarze, 1975; Parmelee and others, 1977).

A comprehensive review of the distribution of penguins of the Antarctic Peninsula and islands of the Scotia Sea (Croxall and Kirkwood, 1979) summarized data from all available sources up to 1978. Since then, detailed surveys have been completed for the South Orkney Islands (Croxall and others, 1981; Poncet and Poncet, 1985), King George Island (Jablonski, 1984), Brabant Island (J. R. Furse, pers. comm.), the south coast of Anvers Island (Heimark and Heimark, 1984; Parmelee and Parmelee, 1987) and the Argentine Islands area (Airey, 1982).

This paper reports the results of surveys of the western coastline of the Antarctic Peninsula, from 63° 17' S to 69° S, including Palmer Archipelago, Wilhelm Archipelago, Biscoe Islands, and the islands of Marguerite Bay, using the yacht *Damien II* (a 15-m steel schooner with a beam of 4.40 m and a draught varying between 1 and 3 m) during the austral summers of 1982-83, 1983-84, 1985-86 and 1986-87.

The surveys involved a systematic search for breeding sites of all seabird colonies, with particular emphasis on the mapping and counting of penguin colonies. We present here the results of the penguin survey and compare them with previous information. Many hitherto unreported colonies were discovered and for numerous other colonies we obtained the first, or the first recent, quantitative data. This permits the first realistic assessment of the penguin populations of most of the Antarctic Peninsula.

* Address for reprints: British Antarctic Survey, Natural Environment Research Council, High Cross Madingley Road, Cambridge CB3 0ET, UK.

METHODS

The area surveyed covered all the Peninsula coastline from Cape Roquemaurel (63° 33' S) to the entrance to King George VI Sound (69° S); this includes the Palmer Coast, Danco Coast, Graham Coast, Loubet Coast, Fallières Coast, Astrolabe Island, Tower Island, Trinity Island, Liège Island, Hoseason Island, Christiana Islands, Two Hummock Island, Anvers Island, Brabant Island, Biscoe Islands and the islands of Marguerite Bay.

The surveys were done from mid-January to early March in each season, this being the period during which most areas of the Peninsula are usually free of ice and accessible to a small vessel. Mild weather conditions and the absence of pack ice during the four seasons greatly facilitated the survey work which, in less favourable years could be difficult to undertake.

Jablonski's (1984) definitions of a 'colony' (breeding sites within isolated headland and islands, these last being at least 500 m from the nearest land or another island) and 'breeding groups' (breeding sites up to 50 m apart within the colony) are used in this paper. However, his definition of a 'rookery' (breeding sites on isolated headlands and small islands distant at least 500 m from the nearest land or another island) is too arbitrary, particularly for the Adélie penguin (*Pygoscelis adeliae*) populations of this region. In some areas Adélie breeding sites are dispersed over a distance of up to 10 km, on various islands and headlands all lying within a particular geographical locality; this locality is geographically isolated from the next such locality by a considerable distance (at least 10 km), so that in effect breeding localities are defined by their relative geographic disposition rather than by an arbitrary distance. Thus in our tabulations colonies are grouped in localities rather than rookeries.

Ground counts in these surveys were done from mid-January to mid-February, being counts of either nests (N) or chicks (C). An estimate of the original number of breeding pairs (P) was derived by correcting for nest failure, using data presented in Trivelpiece and others (1987), and also by counting both occupied and abandoned nests. The resulting estimates are considered to be accurate to within 15–25% (i.e. category 3/4 of Croxall and Kirkwood, 1979).

Where ground counts were not made, the size of the colony was estimated from *Damien II*. For colonies containing fewer than 10000 breeding pairs and where most of them are visible from the water, we found that the most efficient method of surveying was from the crow's nest (13 m above the water) of the boat. To obtain the population estimate, the first step was to count (preferably on the ground) 50 nests spaced as at egg-laying. The area these occupied then became the basic counting unit into which the whole colony area was divided. The shape and extent of the colony was sketched on to a map and the estimate made using $\times 8$ binoculars. With practice, we found it feasible to estimate the number of breeding pairs (B) directly from the overall occupied surface area (as indicated by the guano-covered ground) when viewed from 200 m offshore. Direct ground counts of nests in some colonies during previous surveys have suggested that such boat counts are accurate to within 15–25% (Poncet and Poncet, 1985). Precision was considered to decrease with distance to a P4 count (accurate to 25–50%) at about 2 km from the colony.

RESULTS AND DISCUSSION

The population estimates made during the surveys are summarized in Appendix 1 and the location of colonies indicated on Figs 1-4.

Current breeding populations

On the northern half of the Antarctic Peninsula (called Trinity Peninsula), Adélie penguins are known to breed on the east coast (south to 64° 20' S) and on the west coast south to 63° 20' S (Croxall and Kirkwood, 1979). However, this area is poorly known, and ground surveys are still necessary to confirm species, determine numbers and map breeding sites.

On the southern half of the Antarctic Peninsula, Adélies breed on the west coast only, from Anvers Island (64° 36' S) to Marguerite Bay (68° 18' S). Inexplicably, there are no Adélie colonies on the many offshore islands and on the 200 km of coast that lie between Trinity Peninsula and Anvers Island.

The present survey counted and mapped 77 Adélie colonies, distributed in 26 different breeding localities south of Trinity Peninsula; a total population of c. 82000 breeding pairs was estimated. Croxall and Kirkwood (1979), including an unpublished supplement to 30 June 1980, give counts for 17 of these colonies. Three others were listed simply as breeding sites; 57 were not listed, most of these being unknown until the present survey. An additional 22 colonies (totalling c. 43000 pairs) were not covered in this survey, having been adequately surveyed by others (Airey, 1982; Parmelee and Parmelee, 1987; J. R. Furse, pers. comm.) in the last five years. There are ten colonies listed in Croxall and Kirkwood (1979) whose localities were not found during this survey (see Appendix 2): three colonies (Rhyolite Islands, Jenny Island and Port Lockroy) are no longer in existence; the remaining localities have never existed as breeding sites, being listed through errors of observation (Anchorage Island, Flyspot Rocks, Hovgaard Island and Cape Monaco) or geographical positioning (Henkes Islands, Hermit Island and Halfway Island).

The total Adélie penguin breeding population for the whole region surveyed is c. 125000 breeding pairs, distributed in 31 geographical localities and in 99 colonies. The largest single colony, Avian Island, contains one-third of the regional population; the four largest colonies (Avian Island, Dream Island, Torgersen Island and 'Lulu Island' at Armstrong Reef) contain over 50% of the total. Colonies containing 1000 pairs or less make up nearly 80% of all colonies surveyed.

Nearly all Adélie colonies are situated close to the shore, near sea level, rarely extending above 50 m altitude. Over half the colonies lie on low ice-free islands, islets and headlands situated either near the south coasts of high ice-covered islands (37% are off Adelaide Island, Lavoisier Island, Renaud Island and Anvers Island) or near the mainland Peninsula coast (17% are on Fish Islands, Cape Evensen, Holdfast Point and Red Rock Ridge). The northerly winds that blow off the ice piedmonts of these large islands, and the easterly winds that descend from the mainland plateau, may favour these sites for breeding because the strength and frequency of the winds ensures minimal snow cover during the breeding season. Most of the remaining colonies occur on isolated low rocky islets (e.g. Jalour Islands, Berthelot Islands, Darbel Island, Pitt Islands and Joubin Islands).

Chinstrap penguins (*Pygoscelis antarctica*) are recorded breeding on the west coast only of the Antarctic Peninsula from islands off the northern tip (63° 00' S) to Port Charcot on Booth Island (65° 04' S) (Croxall and Kirkwood, 1979), with one unsuccessful breeding pair at Armstrong Reef (65° 52' S) (this paper).

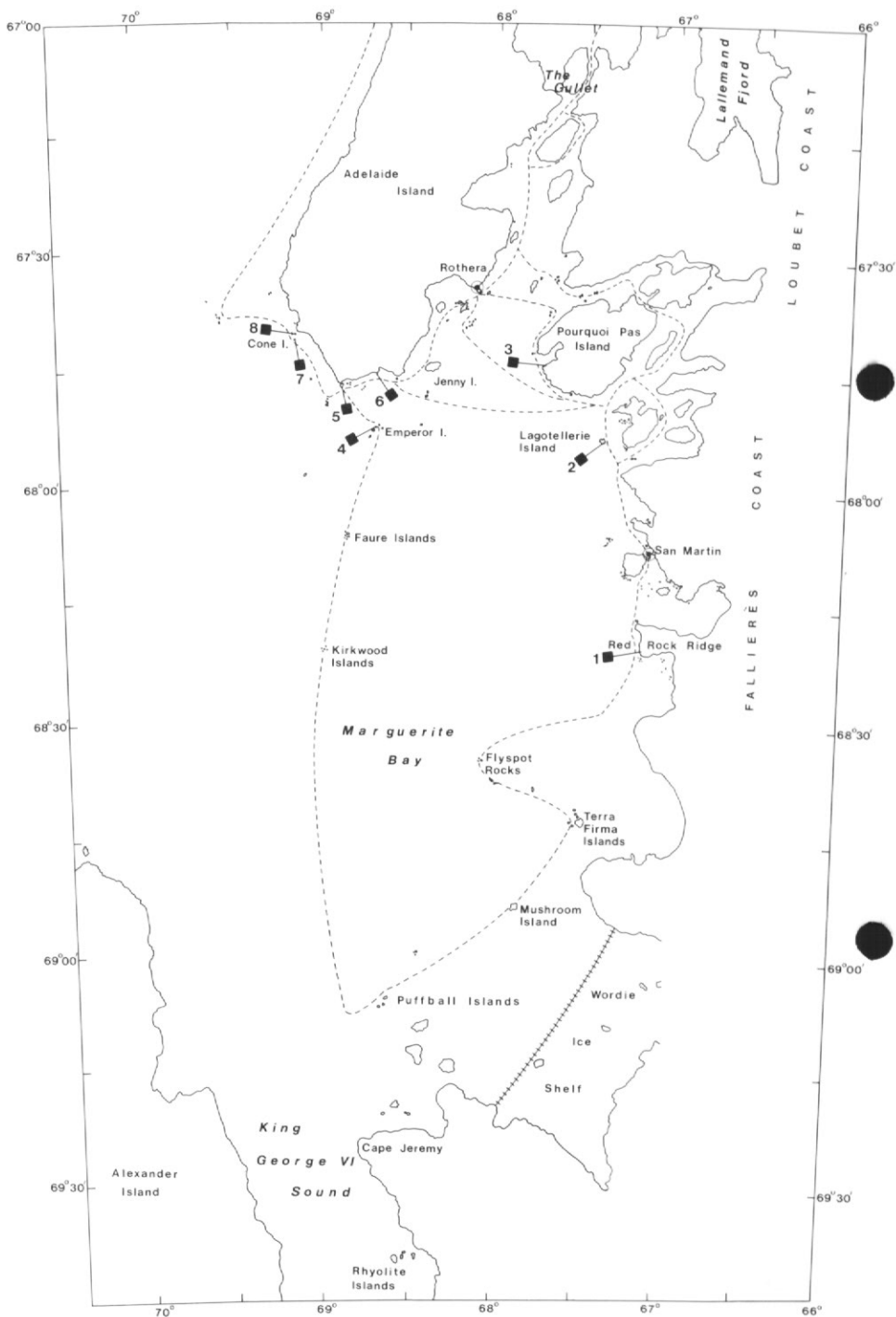


Fig. 1. The location of breeding colonies of Adélie penguins (■) on the southern Antarctic Peninsula. Broken line (---); track of *Damien II* indicates coastline surveyed. Sites of permanent Antarctic stations are encircled. Numbers correspond to those in Appendix I.

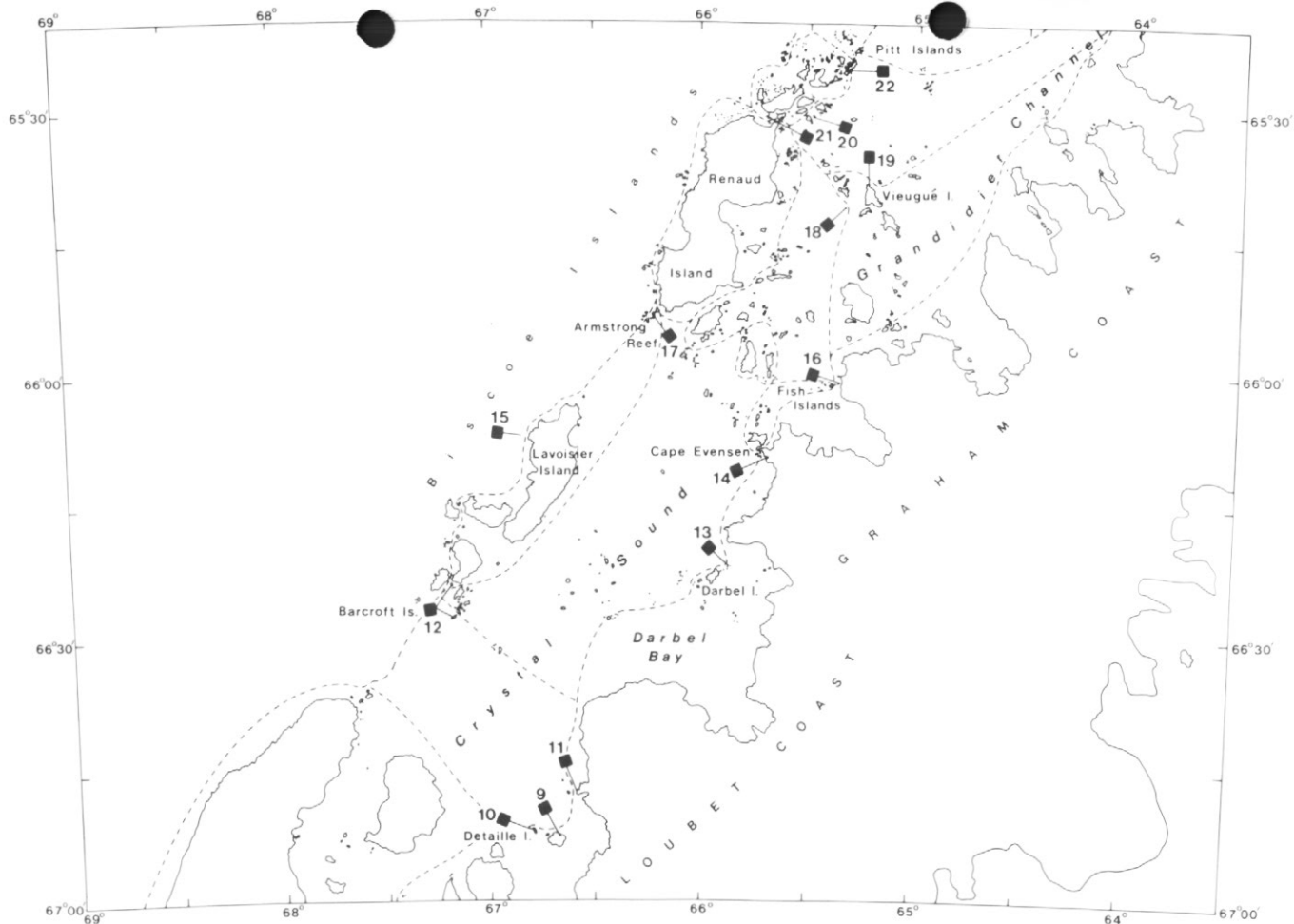


Fig. 2. The location of breeding colonies of Adélie penguins (■) in the Biscoe Islands area. Conventions as in Fig. 1.

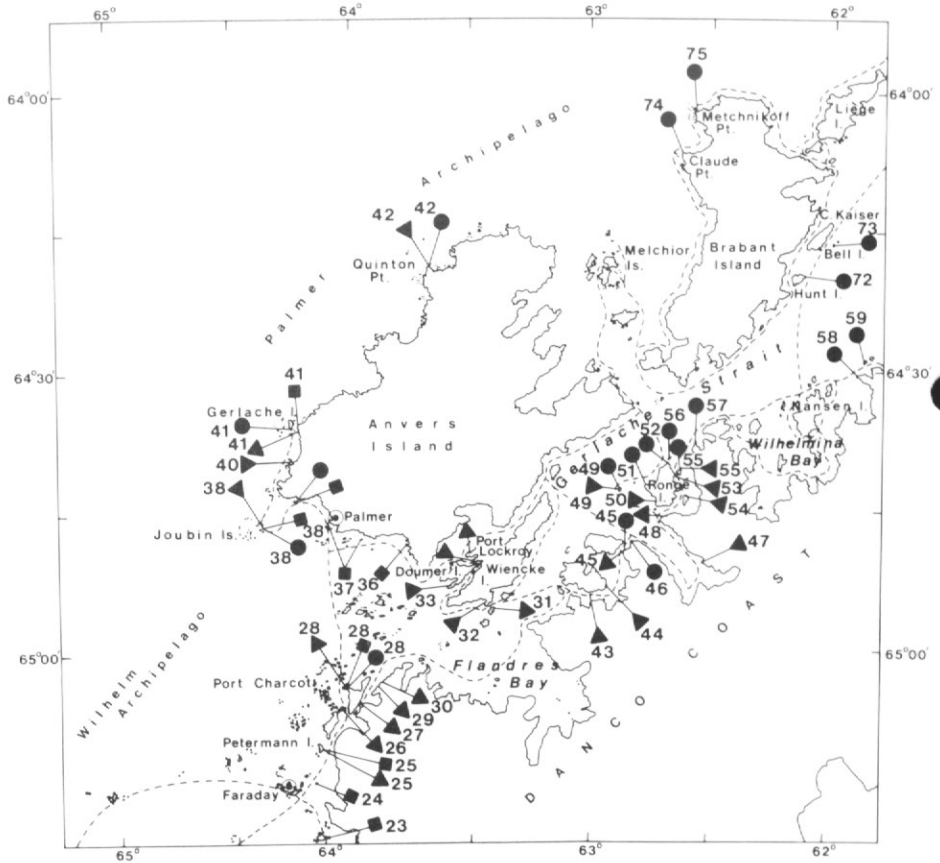


Fig. 3. The location of breeding colonies of Adélie (■), chinstrap (●) and gentoo (▲) penguins in the southern Danco Coast area. Conventions as in Fig. 1.

The present survey mapped 56 chinstrap breeding localities from Astrolabe Island south. Over 116 chinstrap colonies were censused, a total of 36 648 breeding pairs being estimated. Croxall and Kirkwood (1979), including additions to 30 June 1980, give counts for ten of these localities; eight were listed simply as breeding sites; four colonies (totalling *c.* 22 500 pairs) have been surveyed by others (Muller-Schwarze and Muller-Schwarze, 1975; Parmelee and Parmelee, 1987; J. R. Furse, pers. comm.); the remainder have not been recorded previously. The estimated total breeding population for this region is 55 000 pairs distributed in 62 geographical localities and in over 126 colonies.

At their southernmost limit on the Peninsula (around 65° S) chinstraps form mixed colonies with gentoo penguins *Pygoscelis papua* (at 'Coal Point', Quinton Point and Cuverville Island), with Adélies (at Dream Island) and also with both gentoos and Adélies (Joubin Islands, Gerlache Island and Port Charcot).

In this region most chinstrap penguin colonies are small (usually fewer than 500 pairs) and situated on small headlands or islets near sea level. Towards the southern limit of its range (south of Cuverville Island) colony size decreases to fewer than 200 pairs; at the southernmost localities there are only a few isolated pairs breeding amongst gentoos and Adélies. Only size colonies contained over 2000 pairs, these being

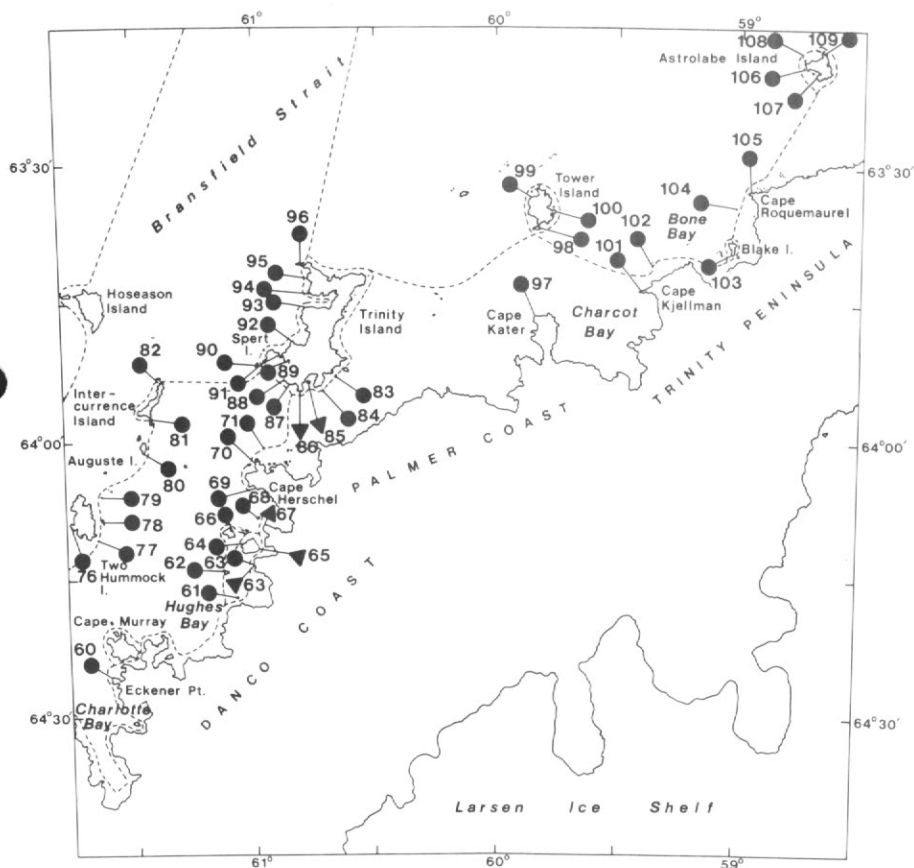


Fig. 4. The location of breeding colonies of chinstrap (●) and gentoo (▲) penguins in the northern Danco Coast area. Conventions as in Fig. 1.

● moderate to large ice-free islands or headlands at altitudes of up to 200 m, often on steep slopes or with steep access paths.

Distribution of chinstrap colonies appears to be determined mainly by availability of ice-free terrain, because colonies are to be found along the Danco Coast on any suitable headland or islet. Obvious absences in Andvord Bay, Wilhelmina Bay, Charlotte Bay, the east coasts of Anvers Island, Brabant Island, Two Hummock Island, Trinity Island, Hoseason Island and Liège Island are explained by a coastline of continuous icecliff. Although suitable localities exist south of 65° S, distribution here may be limited by availability of food or by climatic conditions; chinstrap chicks fledge in mid-March on the Peninsula, a month later than Adélies, at a time when sea ice may have formed, temperatures are decreasing, and food may be less abundant.

Gentoo penguins are known to breed on the east and west coasts of the Peninsula south to Petermann Island (65° 11' S). In our survey, 34 gentoo colonies, distributed over 24 geographical localities with a total of 16820 breeding pairs, were counted and mapped. Of these, six colonies are previously unrecorded.

The total gentoo breeding population for the area south of Trinity Peninsula is 19370 breeding pairs distributed in 30 geographical localities and in 40 colonies.

Average colony size was approximately 480 breeding pairs, with two colonies of 3000 pairs; 70% of all colonies had fewer than 500 pairs. Most colonies were situated on flat or gently sloping terrain near sea level. The southernmost colony (65° 11' S) is only slightly further south than the most southerly chinstrap colony, indicating perhaps a similar restriction in distribution due to food or climate, because gentoo chicks fledge at approximately the same time as chinstraps.

No gentoo colonies occur in the area between Cuverville Island (64° 41' S) and Sterneck Island (64° 11' S) on the Danco Coast, nor on Brabant Island, Two Hummock Island, Liège Island or Hoseason Island and adjacent islets, probably due to the scarcity of gently sloping ice-free areas.

Long-term population changes

Although penguin populations are believed to have increased in both number and distribution over the past 70–80 years (Conroy, 1975; Croxall and Kirkwood, 1979; Croxall and others, 1981; Jablonski, 1984; Poncet and Poncet, 1985), any study of long-term changes in breeding population size is difficult because of the lack of accurate baseline information.

However, Croxall and others (1981) gave unequivocal evidence for population increases on Signy Island in the South Orkney Islands over the previous 20–30 years. In addition, Jablonski (1984) concluded that there has been a general tendency for population increases on King George Island in the South Shetland Islands, despite considerable variation between numbers in consecutive breeding seasons.

Most of the present survey data, like those summarized in Croxall and Kirkwood (1979), were collected from December to February, i.e. in the hatching to fledging period. Egg and chick losses will have influenced all of these estimates to some extent, so that comparisons are not necessarily straightforward.

Comparison of the present data with previous counts for Adélie penguins (Table I) suggests that generally populations appear to be fairly stable, most changes being consistent with the typical fluctuations shown by essentially undisturbed colonies, e.g. at Arthur Harbour (Parmelee and Parmelee, 1987) and as recorded by Jablonski (1984). Some colonies have undoubtedly increased over the past 30 years, after a decline caused by removal of eggs in the 1950s and 1960s. For example, the Red Rock Ridge and Detaille Island colonies have more than doubled in the last 30 years, and on Lagotellerie Island the population has increased by 70%. The disappearance of the colony at Port Lockroy, last recorded in 1909 (Gain, 1914; see Appendix 2) was no doubt due to the removal of eggs and birds by whalers based there in 1911–31.

Substantial decreases seem to have occurred at Port Charcot – now only 100 pairs compared with about 500 in 1909 (Gain, 1914) – and the Jalour Islands, where the population has halved over 25 years. Although eggging did occur intermittently on a very small scale up to 1966, this could not account for such a decline in a colony originally of 10000 pairs. Similarly, at Detaille Islands there appears to be an unaccountable decrease from 10000 in 1909 (Gain, 1914) to fewer than 1000 pairs in 1986 (this paper).

The increase in chinstrap populations recorded for the South Orkney Islands (Croxall and others, 1981; Poncet and Poncet, 1985) and to some extent in the South Shetland Islands (Jablonski, 1984) over the past 30 years, is less evident in the Peninsula populations. Of the colonies listed in Table II, those at Waterboat Point and 'Coal Point' have decreased due to human disturbance (Croxall and Kirkwood, 1979), as has the Joubin Islands colony (Parmelee and Parmelee, 1987). Some, such as Cuverville Island and Sterneck Island, appear to have decreased naturally; two

Table I. Changes in population size of selected Adélie penguin colonies on the Antarctic Peninsula

Locality	Count	Category	Date	Reference
1 Red Rock Ridge	540	N3	24. 11. 36	Croxall and Kirkwood, 1979
	900	N3	25. 11. 60	Croxall and Kirkwood, 1979
	1200	P3/4	13. 02. 84	This paper
2 Lagotellerie I.	400	N3	13. 12. 36	Croxall and Kirkwood, 1979
	2402	N1	28. 11. 55	Croxall and Kirkwood, 1979
	1000	N3	28. 12. 60	Croxall and Kirkwood, 1979
	1700	P3/4	17. 02. 83	This paper
5 Avian I.	25000	P3	15. 11. 68	Croxall and Kirkwood, 1979
	35600	N2	11. 11. 78	This paper
● Detaille I.	10000	P5	01. 02. 09	Croxall and Kirkwood, 1979
	400	P3	16. 11. 58	Croxall and Kirkwood, 1979
	900	P3/4	09. 02. 86	This paper
24 Jalour Is	10400	N1, N3	05. 12. 58	Croxall and Kirkwood, 1979
	5865	N1	10. 12. 82	Airey, 1982
25 Petermann I.	925	P3	06. 11. 09	Croxall and Kirkwood, 1979
	1540	N3	09. 12. 71	Muller-Schwarze and Muller-Schwarze, 1975
	987	N1	22. 12. 82	Airey, 1982
28 Port Charcot	500	P5	01. 01. 09	Croxall and Kirkwood, 1979
	100	P3/4	26. 01. 83	This paper
36 Biscoe Pt	3020	N3	10. 12. 71	Muller-Schwarze and Muller-Schwarze, 1975
	3000	FP3/4	07. 02. 87	This paper

colonies (Nansen Island, Cape Kaiser) seen in 1922 (Bagshawe, 1938) no longer exist (see Appendix 2). Others, however, have increased markedly, e.g. Dream Island, Georges Point and Orne Island. Although the species may be expanding its range southward, with new colonies established within the last 30 years at Dream Island (Parmelee and Parmelee, 1987), Port Charcot and Armstrong Reef (this paper), most population changes may simply reflect the variable breeding success of colonies situated at the limit of the species range, together with a greater tendency than Adélie and gentoos to abandon and colonize nesting sites.

The few data for gentoo penguins, a species which characteristically shows considerable inter-annual variation in breeding numbers, suggest that populations are generally at least stable. However, at Damoy and Port Lockroy there has been a steady increase in the number of chicks fledged from 1982-83 to 1986-87, together with the establishment of a new group on Goudier Island near the Port Lockroy site in 1984-85. Increased breeding success here may possibly be explained by clement weather conditions over the last five years.

Gentoos appear to have been more resistant to interference and disturbance than the other two species. They recolonized Port Lockroy by 1931 (Adélie have never returned) and at Waterboat Point have recovered well from persistent human disturbance between 1951 and 1975 (chinstraps have disappeared).

Within the area surveyed, additional observations are needed for the west coast of Anvers Island, Two Hummock Island and Auguste Island and Cape Kater and Cape Kjellman on the Palmer Coast. To complete a penguin census of the Antarctic

Table II. Changes in population size of selected chinstrap penguin colonies on the Antarctic Peninsula

<i>Locality</i>	<i>Count</i>	<i>Category</i>	<i>Date</i>	<i>Reference</i>
28 Port Charcot	0	N3	01. 01. 09	Gain, 1914
	3	N1	26. 01. 83	This paper
	3	N1	01. 02. 86	This paper
37 Arthur Harbour	1	N3	02. 12. 71	Muller-Schwarze and Muller-Schwarze, 1975
	1	N1	05. 01. 86	R. J. Heimark and A. Morton, pers. comm.
38 Joubin Is	35	N1	16. 01. 75	Parmelee and others, 1977
	17	N1	24. 01. 83	This paper
	24	N1	27. 12. 85	R. J. Heimark and A. Morton, pers. comm.
39 Dream I.	2	N1	05. 01. 57	Croxall and Kirkwood, 1979
	46	N1	13. 01. 78	Parmelee and Parmelee, 1987
	136	N1	29. 12. 85	R. J. Heimark and A. Morton, pers. comm.
45 Waterboat Pt	225	P3	01. 01. 22	Bagshawe, 1938
	46	N1	15. 12. 63	Croxall and Kirkwood, 1979
	0		30. 01. 86	This paper
45 'Coal Pt'	350	P3	01. 01. 22	Bagshawe, 1938
	15	C1	30. 01. 86	This paper
52 Georges Pt	300	B4	17. 01. 84	This paper
	800	B3/4	26. 01. 87	This paper
55 Cuverville I.	37	N3	14. 12. 71	Muller-Schwarze and Muller-Schwarze, 1975
	3	C1	30. 01. 86	This paper
56 Orne I.	340	B3/4	17. 01. 84	This paper
	800	B3/4	26. 01. 87	This paper
59 Gaston Is	417	N3	16. 12. 71	Muller-Schwarze and Muller-Schwarze, 1975
	500	B3/4	26. 01. 87	This paper
60 Eckener Pt	50	B4/5	11. 03. 83	This paper
	40	B4/5	25. 01. 87	This paper
64 Sterneck I.	3000	B4	06. 03. 87	This paper
	1100	B3/4	24. 01. 87	This paper
66 Midas I.	2060	N3	16. 12. 71	Muller-Schwarze and Muller-Schwarze, 1975
	2000	B3/4	24. 01. 87	This paper

Peninsula, further surveys are needed north of the area surveyed, on the Trinity Peninsula, where large populations of Adélies and chinstraps are known to exist on both the west and east coasts and offshore islands, and for which no recent counts are available. Similarly, counts of most of the South Shetland Islands penguin colonies are required before an estimate of the total penguin populations in this region is possible.

ACKNOWLEDGEMENTS

We are most grateful to various persons and yachts for their assistance in the field, in particular to Patrick Cudennec and Tina Troup for their help with counts and logistic support, and the crew of the yacht *Kim* for their observations. Gary and

Table III. Changes in population size of selected gentoo penguin colonies on the Antarctic Peninsula

Locality	Count	Category	Date	Reference
25 Petermann I.	75	P3	04. 01. 09	Gain, 1914
	480	N3	09. 12. 71	Muller-Schwarze and Muller-Schwarze, 1975
	375	N1	22. 12. 82	Airey, 1982
28 Port Charcot	2000	P4	01. 01. 09	Gain, 1914
	400	P3/4	26. 01. 83	This paper
34 Port Lockroy	1000	P4	28. 12. 08	Gain, 1914
	627	N1	19. 01. 83	This paper
	786	N1	25. 01. 84	This paper
35 Damoy Pt	619	N1	22. 01. 83	This paper
	828	N1	27. 01. 84	This paper
45 Waterboat Pt	6000	P3	1921	Bagshawe, 1938
	450	P3	1965	Croxall and Kirkwood, 1979
	1010	C1	30. 01. 86	This paper

Becky Heimark and Ash Morton kindly provided data for the Palmer Station area, as did Chris Furse of the Joint Services Expedition to Brabant Island 1983-85, and David Parmelee for the Anvers Island and Brabant Island area. We also thank Tony Sylvester for preparing the maps, Christine Thulbourn for typing the manuscript and especially John Croxall for his comments and advice during the preparation of it.

Received and accepted 7 August 1987

REFERENCES

- AIREY, L. R. 1982. General Report. 11 March 1982-28 February 1983. AD6/2F/1982/A. British Antarctic Survey unpublished report.
- BAGSHAWE, T. W. 1938. Notes on the habits on the gentoo and ringed or Antarctic penguins. *Transactions of the Zoological Society of London*, **24**, 185-306.
- CHARCOT, J. 1906. *Le Français au Pole Sud*. Paris, Flammarion.
- CONROY, J. W. H. 1975. Recent increases in penguin populations in Antarctica and the Sub-Antarctic. (In STONEHOUSE, B., ed. *The biology of penguins*. London, Macmillan, 321-36.)
- CROXALL, J. P. and KIRKWOOD E. D. 1979. *The distribution of penguins on the Antarctic Peninsula and islands of the Scotia Sea*. Cambridge, British Antarctic Survey.
- CROXALL, J. P., ROOTES, D. M. and PRICE, R. A. 1981. Increases in penguin populations at Signy Island, South Orkney Islands. *British Antarctic Survey Bulletin*, No. 54, 47-56.
- GAIN, L. 1914. Oiseaux antarctiques. (In CHARCOT, J., *Deuxième Expedition Antarctique Française*, Paris, Masson.)
- HEIMARK, G. M. and HEIMARK, R. J. 1984. Birds and marine mammals in the Palmer Station area. *Antarctic Journal of the United States*, **19** (4), 3-8.
- JABLONSKI, B. 1984. Distribution and numbers of penguins in the region of King George Island, South Shetland Islands in the breeding season 1980/81. *Polish Polar Research*, **5**, 17-30.
- MULLER-SCHWARZE, C. and MULLER-SCHWARZE, D. 1975. A survey of twenty-four rookeries of pygoscelid penguins in the Antarctic Peninsula region. (In STONEHOUSE, B. ed. *The biology of penguins*. London, Macmillan, 309-320.)
- NORDENSKJÖLD, N. O. G. 1905. *Antarctica*. London, Hurst and Blackett.
- PARMELEE, D. F. and PARMELEE, J. M. 1987. Updated penguin distribution for Anvers Island, Antarctica. *British Antarctic Survey Bulletin*, No. 76, 65-74.
- PARMELEE, D. F. and RIMMER, C. C. 1985. Ornithological observations at Brabant Island, Antarctica. *British Antarctic Survey Bulletin*, No. 67, 7-12.

- PARMELEE, D. F., FRASER, W. R. and NEILSON, D. R. 1977. Birds of the Palmer Station area. *Antarctic Journal of the United States*, **12** (1-2), 14-21.
- PONCET, S. and PONCET, J. 1985. A survey of penguin breeding populations at the South Orkney Islands. *British Antarctic Survey Bulletin*, No. 68, 71-81.
- TRIVELPIECE, W. Z., TRIVELPIECE, S. G. and VOLKMAN, N. J. 1987. Ecological segregation of Adélie, gentoo and chinstrap penguins at King George Island, Antarctica. *Ecology*, **68**, 351-61.

Appendix I. Most recent counts for penguin colonies within the Antarctic Peninsula survey area

Locality	Species	Date	Category	Count	Pairs ¹	Locality description	Reference
1 Red Rock Ridge 68° 18' S, 67° 11' W	<i>P. adeliae</i>	13. 2. 84	C1	1820	1200 (1)	Low point 1 km S off Bar I. at N entrance of Red Bay	This paper
2 Lagotellerie I. 67° 53' S, 67° 23' W	<i>P. adeliae</i>	17. 2. 83	C1	1720	1700 (1)	Easternmost point of island near sea level	This paper
3 Pourquoi Pas I. 67° 44' S, 67° 45' W	<i>P. adeliae</i>	9. 2. 84	B3/4	700	700 (1)	Beach at foot of cliffs	This paper
4 Emperor I. 67° 52' S, 68° 43' W	<i>P. adeliae</i>	28. 2. 86	B4/5	700	700 (1)	South-west point up to 50 m a.s.l.	This paper
5 Avian I. 67° 46' S, 68° 54' W	<i>P. adeliae</i>	11. 11. 78	N2	35600	35600 (1)	Northern half of island near sea level	This paper
6 Ginger I. 67° 45' S, 68° 42' W	<i>P. adeliae</i>	10. 2. 83	C1, C3	2790	3000 (1)	Entire island and small nearby islet	This paper
7 Cone I. 67° 41' S, 69° 10' W	<i>P. adeliae</i>	9. 2. 83	B4/5	3000	3000 (1)	Southern area of island up to summit and northern point near sea level	This paper
8 Chatos I. 67° 40' S, 69° 10' W	<i>P. adeliae</i>	9. 2. 83	B4/5	100	100 (1)	Low islet 500 m E of Chatos I.	This paper
9 Andressen I. 66° 53' S, 66° 40' W	<i>P. adeliae</i>	2. 2. 84	B3/4	2200	2200 (2)	North-east coast up to 50 m a.s.l.; 2 low islets off N point	This paper
10 Detaille I. 66° 52' S, 68° 47' W	<i>P. adeliae</i>	9. 2. 86	C1	858	900 (2)	S end of island from 20 m to 40 m a.s.l.; islet close by N end of island	This paper
11 Holdfast Pt 66° 48' S, 66° 35' W	<i>P. adeliae</i>	2. 2. 84	B3/4	625	625 (3)	Low islet 1.5 km S of Holdfast Pt; low southernmost islet of Mist Rocks; low point 2.5 km N of Holdfast Pt	This paper
12 Barcroft Is 66° 25' S, 67° 10' W	<i>P. adeliae</i>	6. 2. 83	B4/5	1600	1600 (17)	16 islets, islands and rocks scattered up to 8 km S of Belding I.	This paper
13 Darbel I. 66° 23' S, 65° 35' W	<i>P. adeliae</i>	1. 2. 84	B3/4	650	650 (3)	2 islets at 'Depot I.' and low islet 'Outer I.' 2 km NE of Darbel I.	This paper
14 Cape Evensen 66° 09' S, 65° 42' W	<i>P. adeliae</i>	1. 2. 84	B3/4	1200	1200 (1)	Graham Coast, 2 km SE of Cape Evensen up to c. 50 m a.s.l.	This paper
15 Lavoisier I. 66° 10' S, 66° 55' W	<i>P. adeliae</i>	21. 2. 87	B4/5	150	150 (1)	Highest island of an archipelago lying 1 km W of Lavoisier I. and 17 km N of Krogh I.	This paper
16 Fish Is 66° 01' S, 65° 21' W	<i>P. adeliae</i>	30. 1. 84	B3/4	4000	4000 (12)	10 low islands, islets and rocks in the Minnows group and 1 low islet close by SE coast of Flounder I.	This paper

Appendix 1 (cont.)

Locality	Species	Date	Category	Count	Pairs ¹	Locality description	Reference
17 Armstrong Reef 65° 52' S, 66° 15' W	<i>P. adeliae</i>	27. 1. 84	C1 + N3/4	9626 + 700	12800 (6)	Point of S coast of Renaud I., 3.5 km NW of Lively Pt; 3 islands, 2 islets lying 2 km. W of Lively Pt	This paper
	<i>P. antarctica</i>	27. 1. 84			1 (1)	'Lulu I.', 2 km W of Lively Pt with Adélie	This paper
18 'Kim Is' 65° 41' S, 65° 20' W	<i>P. adeliae</i>	2. 2. 83	C1	1277	1300 (2)	2 islands lying 4 km W of the SW point of Vieugué I. near sea level	This paper
19 Vieugué I. 65° 39' S, 65° 14' W	<i>P. adeliae</i>	5. 2. 86	N4	600	1000 (1)	N coast of northernmost point of island from 40 m to 60 m a.s.l.	This paper
20 Fizkin I. 65° 31' S, 65° 30' W	<i>P. adeliae</i>	25. 1. 84	B3/4	250	250 (1)	N coast of small island 1 km E of Fizkin I.	This paper
21 Pitt Is, south 65° 30' S, 65° 42' W	<i>P. adeliae</i>	1. 2. 83	C1	52	50 (2)	2 low islets 1 km S of southernmost point of Pickwick I.	This paper
22 Pitt Is, north 65° 25' S, 65° 20' W	<i>P. adeliae</i>	25. 1. 84	C1 + N3/4	3424 + 350	3900 (9)	SE point of Jingle I. and low islet close by; 2 low islets 2 km SW of Jingle I.; NE tip of Weller I.; Smiggers I. 2 low islets lying close N and S Smiggers I.	This paper
23 Berthelot Is 65° 20' S, 64° 08' W	<i>P. adeliae</i>	16. 12. 82	N1	904	1300 (1)	Easternmost island near sea level	Airey, 1982
24 Jalour Is 65° 15' S, 64° 11' W	<i>P. adeliae</i>	10. 12. 82	N1	5865	8000 (13)	13 low islands and islets	Airey, 1982
25 Petermann I. 65° 11' S, 64° 10' W	<i>P. adeliae</i>	22. 12. 82	N1	987	1400 (1)	Mixed colony, E coast of southern half of island and rock close offshore	Airey, 1982
26 Pléneau I. 65° 06' S, 64° 05' W	<i>P. papua</i>	22. 12. 82	N1	375	400 (1)	NE coast near sea level	Airey, 1982
27 Glandaz Pt 65° 05' S, 63° 58' W	<i>P. papua</i>	23. 12. 82	N1	75	100 (1)	Up to 150 m a.s.l.	Airey, 1982
28 Port Charcot 65° 04' S, 64° 03' W	<i>P. adeliae</i>	26. 1. 83	C1	83	100 (1)	N coast of western headland up to 50 m a.s.l., on Booth I.	This paper
	<i>P. antarctica</i>	26. 1. 83	C1	3	3 (1)		This paper
	<i>P. papua</i>	26. 1. 83	N1	318	400 (1)		This paper
29 Loubat Pt 65° 03' S, 63° 55' W	<i>P. papua</i>	28. 1. 83	N1	208	250 (1)	Moraine 2 km NW of Loubat Pt up to 200 m. a. s. l.	This paper
30 Humphries Heights 65° 03' S, 63° 54' W	<i>P. papua</i>	28. 1. 83	N1	30	50 (1)	Nests aligned on small moraine 3 km NW of Loubat Pt from 10-30 m. a.s.l.	This paper

Appendix 1 (cont.)

Locality	Species	Date	Category	Count	Pairs ¹	Locality description	Reference
31 Truant I. 64° 55' S, 63° 27' W	<i>P. papua</i>	6. 2. 87	C1+	717	1000 (2)	W coast of island, just opposite Pursuit Pt; NE tip of island	This paper
32 Pursuit Pt 64° 54' S, 63° 27' W	<i>P. papua</i>	6. 2. 87	B3/4	200	200 (1)	1 km NNW of Pursuit Pt on Wiencke I. up to 30 m a.s.l.	This paper
33 Doumer I. 64° 53' S, 63° 36' W	<i>P. papua</i>	22. 1. 83	N1	1030	1500 (3)	Low peninsula on S side of South Bay: 500 m and 1.5 km NE of Py Pt, and 1.5 km E of Py Pt up to 50 m a.s.l.	This paper
34 Port Lockroy 64° 50' S, 63° 31' W	<i>P. papua</i>	25. 1. 84	C1	786	1000 (2)	On peninsula on S side of the bay up to 30 m altitude on Wiencke I.; Goudier I. (new colony in 1985)	This paper
35 Damoy Pt 64° 49' S, 63° 31' W	<i>P. papua</i>	6. 2. 87	C1	715	900 (1)	Between Damoy Pt and Dorian Bay on Wiencke I. up to 30 m a.s.l.	This paper
36 Biscoe Pt 64° 49' S, 63° 47' W	<i>P. adeliae</i>	7. 2. 87	C1	2164	3500 (1)	Low island formerly attached to the ice-cliffs close off SE coast of Anvers I.	This paper
37 Arthur Harbour 64° 47' S, 64° 05' W	<i>P. adeliae</i>		N1	13893 ³	20000 (5)	Humble, Torgensen, Litchfield, 'Christine', Cormorant Islands near Palmer Station	Parmelee and Parmelee 1987
	<i>P. antarctica</i>	5. 1. 86	N1	1 ²	1 (1)	Humble Island	R. J. Heimark & A. Morton (pers. comm.)
38 Joubin I. 64° 46' S, 64° 23' W	<i>P. adeliae</i>	9. 2. 87	C1	1072	1000 (3)	3 islands 5 km SW of Stayaway Skerries	This paper
	<i>P. adeliae</i>	9. 2. 87	C1	298	250 (1)	'Langdon I.', 4.8 km SW of Stayaway Skerries	This paper
	<i>P. antarctica</i>	9. 2. 87	C1	15	30 (1)		This paper
	<i>P. papua</i>	9. 2. 87	C1	97	100 (1)		This paper
39 Dream I. 64° 43' S, 64° 15' W	<i>P. adeliae</i>	12. 12. 85	N4	10700	12000 (1)	Occupies most of Dream Island	Parmelee and Parmelee, (in press)
	<i>P. antarctica</i>	29. 12. 85	N1	136	150 (1)	Southernmost peninsula on W. coast of Dream Island, adjacent to Adélie	R. J. Heimark & A. Morton (pers. comm.)
	<i>P. adeliae</i>	8. 2. 87	C1	525	600 (1)		This paper
	<i>P. antarctica</i>	8. 2. 87	C1	68	100 (1)	E coast of small island, 1 km SW of Dream I.	This paper
40 Anvers I. SW 64° 39.5' S, 64° 16' W	<i>P. papua</i>	8. 2. 87	C3	2500	3000 (1)	Point on SW coast of Anvers I., 7 km S of Gerlache I.	This paper
	<i>P. antarctica</i>	8. 2. 87	N1	2	2 (1)		This paper

Appendix 1 (cont.)

Locality	Species	Date	Category	Count	Pairs ¹	Locality description	Reference
41 Gerlache I. 64° 36' S, 64° 15' W	<i>P. adeliae</i>	2. 1. 85	N1	171	250 (1)	2 small tied islands close SE of Gerlache I.	Parmelee and Parmelee, 1987
	<i>P. antarctica</i>	2. 1. 85	N5	1000	1000 (1)		
	<i>P. papua</i>	2. 1. 85	N1	1023	1500 (1)		
	<i>P. antarctica</i>	2. 1. 85	N5	2000	2000 (2)	Small island close SE of Gerlache I., point close by on Anvers I.	Parmelee and Parmelee, 1987
42 Quinton Pt 64° 19' S, 64° 41' W	<i>P. antarctica</i>	8. 2. 87	C1	1700	4000 (3)	3 small islands close W of Gerlache I.	This paper
	<i>P. antarctica</i>	27. 12. 83	A5	8000	4000 (c.5)	Several small islands off N end Quinton Pt	Parmelee and Parmelee, 1987
	<i>P. papua</i>	27. 12. 83	N1	42	50 (1)	Small island off Quinton Pt with chinstraps	Parmelee and Parmelee, 1987
43 Bryde I., south 64° 54' S, 62° 57' W	<i>P. papua</i>	6. 2. 87	C3	550	500 (1)	Small low island 1 km off SE coast of Bryde I. in Ferguson Channel	This paper
44 Bryde I., east 64° 53' S, 62° 56' W	<i>P. papua</i>	31. 1. 86	N1	173	240 (1)	Islet close off E coast of Bryde I.	This paper
45 Waterboat Pt 64° 49' S, 62° 52' W	<i>P. papua</i>	30. 1. 86	C1	825	600 (1)	'South I.' and 'The Island' 100 m W of Waterboat Pt	This paper
	<i>P. antarctica</i>	30. 1. 86	C1	15	20 (1)	100 m N of Waterboat Pt on 'Coal Pt'	This paper
	<i>P. papua</i>	30. 1. 86	C1	185	150 (1)		This paper
46 Duthiers Pt 64° 48' S, 62° 49' W	<i>P. antarctica</i>	30. 1. 86	C1	137	140 (1)	Around old beacon and up to 30 m a.s.l.	This paper
47 Neko Harbour 64° 51' S, 62° 32' W	<i>P. papua</i>	4. 2. 87	C1	397	250 (1)	E point of bay behind hut	This paper
48 Beneden Head 64° 46' S, 62° 42' W	<i>P. papua</i>	30. 1. 86	C1	250	500 (3)	1 km NE of Beneden Head; 1.2 km NE of Beneden Head; 2 km NE of Beneden Head	This paper
			C3	200			
			C1	250			
49 Useful I. 64° 43' S, 62° 52' W	<i>P. antarctica</i>	17. 1. 84	B3/4	100	100 (4)	Summit of island N of beacon; sea level SW and SW coasts; inlet 100 m E of island	This paper
	<i>P. papua</i>	17. 1. 84	B3/4	250	150 (2)	N end of island; islet 100 m E of island	This paper
50 Ketley Pt 64° 43' S, 62° 46' W	<i>P. papua</i>	14. 3. 86	B5	200	200 (1)	S side of bay 2 km SE of Ketley Pt near sea level on Rongé I.	This paper
51 Ketley Pt 64° 42' S, 62° 46' W	<i>P. antarctica</i>	17. 1. 84	B3/4	250	250 (1)	1 km S of Ketley Pt near old beacon at sea level on Rongé I.	This paper
52 Georges Pt 64° 40' S, 62° 39' W	<i>P. antarctica</i>	26. 1. 87	B3/4	800	800 (1)	On Rongé I. at Georges Pt near sea level	This paper

Appendix 1 (cont.)

Locality	Species	Date	Category	Count	Pairs ¹	Locality description	Reference
53 Rongé I. 64° 41' S, 62° 39' W	<i>P. papua</i>	28. 1. 87	C1	202	150 (1)	3 km SE of Georges Pt up to 30 m a.s.l. on NE coast of Rongé I.	This paper
54 Danco I. 64° 44' S, 62° 36' W	<i>P. papua</i>	31. 1. 86	C1	1172	800 (1)	N end near hut and up to 100 m a.s.l.	This paper
55 Cuverville I. 64° 41' S, 62° 38' W	<i>P. antarctica</i>	30. 1. 86	C1	1	3 (1)	N end of island amongst gentoos	This paper
56 Orne I. 64° 39' S, 62° 40' W	<i>P. papua</i>	30. 1. 86	C3	3700	3700 (2)	N end and westernmost point of island W coast of island; islet 100 m NW of island	This paper
	<i>P. antarctica</i>	26. 1. 87	B3	800	860 (2)		This paper
57 Spigot Pt 64° 38' S, 62° 34' W	<i>P. antarctica</i>	10. 3. 83	B3	60	3000 (5)	Low islet 3.5 km S of Spigot Pt; near old beacon; up to and N along ridge at 150 m a.s.l. for 2 km and down E side of ridge to Orne Hbr; on point below Spigot Pt	This paper
			B5	3000			
58 Reclus Peninsula 64° 31' S, 61° 51' W	<i>P. antarctica</i>	11. 3. 83	B4	300	300 (1)	Up to 200 m a.s.l.	This paper
59 Gaston Is 64° 29' S, 61° 50' W	<i>P. antarctica</i>	26. 1. 87	B3/4	500	500 (1)	SE point of southernmost island near sea level	This paper
60 Eckener Pt 64° 26' S, 61° 36' W	<i>P. antarctica</i>	25. 1. 87	B3/4	40	40 (1)	Near sea level at point	This paper
61 Sprightly I. 64° 17' S, 61° 09' W	<i>P. antarctica</i>	16. 1. 84	B3/4	85	85 (2)	2 islets close N of Sprightly I. near sea level	This paper
62 Alcock I. 64° 14' S, 61° 08' W	<i>P. antarctica</i>	16. 12. 71	N3	7710	10000 (1)	Scattered over all the Island	Muller-Schwarze, 1975
63 Charles Pt 64° 13.5' S, 61° 00' W	<i>P. antarctica</i>	23. 1. 87	B1	10	10 (1)	Point 1.5 km N of Charles Pt; on the beach	This paper
	<i>P. papua</i>	23. 1. 87	B3	130	130 (1)		This paper
64 Sterneck I. 64° 11' S, 61° 04' W	<i>P. antarctica</i>	24. 1. 87	B4	1100	1100 (3)	On NW coast up to c. 100 m a.s.l.	This paper
65 Sterneck I. 64° 11' S, 61° 03' W	<i>P. papua</i>	24. 1. 87	B1	450	450 (1)	Low-tide islet close off SE corner of island	This paper
66 Midas I. 64° 10' S, 61° 07' W	<i>P. antarctica</i>	24. 1. 87	B3/4	1200	2000 (2)	SE point of island and islet nearby; 200 m behind beach in bay on E coast	This paper
			B3/4	800			
67 Cape Spring 64° 09' S, 60° 58' W	<i>P. papua</i>	16. 1. 84	N1	409	600 (1)	100 m inland from buildings up to 50 m a.s.l.	This paper

Appendix 1 (cont.)

Locality	Species	Date	Category	Count	Pairs ¹	Locality description	Reference
68 Primavera I. 64° 08' S, 60° 59' W	<i>P. antarctica</i>	16. 1. 84	B4	500	500 (1)	N half of island up to 20 m a.s.l.	This paper
69 Cape Herschel SE 64° 04' S, 61° 02' W	<i>P. antarctica</i>	16. 1. 84	B4	330	330 (5)	Low island 1 km S of Cape; point on Danco Coast 3 km SE of Cape; islet 8 km SE of Cape	This paper
70 Cape Herschel NE 64° 03' S, 61° 00' W	<i>P. antarctica</i>	23. 1. 87	B3/4	450	450 (3)	Point and 2 islets nearby lying 2.5 km NE of Cape	This paper
71 Monument Rocks 64° 01' S, 60° 58' W	<i>P. antarctica</i>	16. 1. 84	B3/4	270	270 (4)	4 main islets	This paper
72 Hunt I. 64° 20' S, 62° 07' W	<i>P. antarctica</i>	2. 2. 87	B4	400	400 (1)	NE point from 50–100 m a.s.l.	This paper
73 Bell I. 64° 16' S, 61° 59' W	<i>P. antarctica</i>	29. 1. 86	B4	25	25 (1)	N coast of island W of beacon up to 30 m a.s.l.	This paper
74 Claude Pt 64° 06' S, 62° 37' W	<i>P. antarctica</i>	7. 1. 85	N1	190	250 (1)	On low rock platform	J. R. Furse (pers. comm.)
75 Metchnikoff Pt 64° 03' S, 62° 34' W	<i>P. antarctica</i>	29. 12. 83	N1, N5	5000	5000 (1)	From sea level to 100 m a.s.l.	Parmelee and Rimmer, 1985
76 Two Hummock I. 64° 09' S, 61° 46' W	<i>P. antarctica</i>	16. 3. 86	B4/5	3000	3000 (1)	Palaver Pt, up to c. 100 m a.s.l.	This paper
77 Cobalescou I. 64° 11' S, 61° 40' W	<i>P. antarctica</i>	29. 1. 86	B4/5	500	500 (1)	Scattered over the island up to 25 m a.s.l.	This paper
78 Hydrurga Rocks 64° 09' S, 61° 38' W	<i>P. antarctica</i>	29. 1. 86	B4/5	1000	1000 (1)	Scattered along W coast of main island near sea level	This paper
79 Lobodon I. 64° 05' S, 61° 38' W	<i>P. antarctica</i>	29. 1. 86	B1	10	10 (1)	Low islet 1 km SW of Lobodon I.	This paper
80 Small I. 64° 01' S, 61° 28' W	<i>P. antarctica</i>	29. 1. 86	B4/5	1000	1000 (2)	Small island just S of Small I.; islet close off SE end of this small island	This paper
81 Grinder Rock 63° 58' S, 61° 26' W	<i>P. antarctica</i>	29. 1. 86	B4/5	120	120 (3)	N tip of island lying just N of Grinder Rock; islet lying just N of this island	This paper
82 Intercurrence I. 63° 53' S, 61° 24' W	<i>P. antarctica</i>	29. 1. 86	B4/5	500	500 (2)	2 islands 1 km NW of N tip of Intercurrence I. near sea level	This paper
83 Trinity I. 63° 53.5' S, 60° 41' W	<i>P. antarctica</i>	16. 1. 84	B1	2	2 (1)	Islet 2 km SW of Chionis I. off SE coast of Trinity I. near sea level	This paper
84 Tetrad I. 63° 55' S, 60° 45' W	<i>P. antarctica</i>	16. 1. 84	B3/4	180	180 (3)	3 largest islands of the group up to 20 m a.s.l.	This paper

Appendix 1 (cont.)

Locality	Species	Date	Category	Count	Pairs ¹	Locality description	Reference
85 Mikkelsen Harbour 63° 54' S, 60° 48' W	<i>P. papua</i>	16. 1. 84	B3/4	300	300 (1)	Near hut on small island 2 km NE of Skottsberg Pt near sea level	This paper
86 Skottsberg Pt 63° 55' S, 60° 49' W	<i>P. papua</i>	22. 1. 87	B3	300	300 (1)	On point near sea level	This paper
87 Trinity I. 63° 54.5' S, 60° 53' W	<i>P. antarctica</i>	22. 1. 87	B3/4	500	500 (1)	E side of conspicuous rock 4.5 km NW of Skottsberg Pt up to 50 m a.s.l.	This paper
88. Trinity I. 63° 53' S, 60° 54' W	<i>P. antarctica</i>	22. 1. 87	B4/5	500	500 (c. 8)	Point 1 km N of conspicuous rock and on several low islets nearby lying 4.5 km SE of Spert I.	This paper
89 Trinity I. 63° 52' S, 60° 52' W	<i>P. antarctica</i>	29. 1. 86	B4/5	600	600 (3)	Point lying 6.5 km E of Farewell Rock and on 2 islets 500 m and 1.5 km SW off this point	This paper
90 Farewell Rock 63° 52' S, 61° 01' W	<i>P. antarctica</i>	27. 1. 86	B4/5	100	100 (1)	On higher part of islands S coast	This paper
91 Spert I. 63° 52' S, 60° 59' W	<i>P. antarctica</i>	27. 1. 86	B4/5	200	200 (2)	S side of SW point of island	This paper
92 Trinity I. 63° 49.5' S, 60° 50' W	<i>P. antarctica</i>	22. 1. 87	B3/4	700	700 (1)	Point near sea level	This paper
93 Trinity I. 63° 45' S, 60° 47' W	<i>P. antarctica</i>	22. 1. 87	B3/4	120	120 (3)	S coast of Milburn Bay on westernmost point and on 2 islets 1 km NE of point near sea level	This paper
94 Trinity I. 53° 43.5' S, 60° 47' W	<i>P. antarctica</i>	22. 1. 87	B3/4	350	350 (2)	N coast of Milburn bay on westernmost point and on 1 islet 1 km NW of point	This paper
95 Trinity I. 63° 42' S, 60° 48' W	<i>P. antarctica</i>	22. 1. 87	B3/4	200	200 (1)	Point 3 km SE of Megaptera I. near sea level	This paper
96 Megaptera I. 63° 40.5' S, 60° 50' W	<i>P. antarctica</i>	22. 1. 87	B3/4	900	900 (2)	E coast of Megaptera I. and on islet lying immediately to the east	This paper
97 Cape Kater 62° 47' S, 59° 50'/55' W	<i>P. antarctica</i>	Jan 1984			few		J. L. Smellie (pers. comm.)
98 Zig Zag I. 63° 38' S, 59° 50' W	<i>P. antarctica</i>	21. 1. 87	B5	1000	1000 (1)	On N coast of island	This paper
99 Tower I west 63° 33' S, 59° 53' W	<i>P. antarctica</i>	21. 1. 87	B3/4	+1 500	1500 (5)	Low islet; N coast of 50 m high island; 3 low headlands south of above; all lying 2.5-4 km SW of C. Leguillou	This paper

Appendix 1 (cont.)

Locality	Species	Date	Category	Count	Pairs ¹	Locality description	Reference
100 Tower I east 63° 35' S, 59° 44' W	<i>P. antarctica</i>	21. 1. 87	C1	2	5 (1)	Point 500 m W of Cape Dumoutier	This paper
101 Cape Kjellman 63° 44' S, 59° 25' W	<i>P. antarctica</i>	18. 1. 87	B5		few		This paper
102 Beaver Rocks 63° 41' S, 59° 23' W	<i>P. antarctica</i>	18. 1. 87	B3/4	100	100 (1)	E coast of island lying 5 km NE of C. Kjellman	This paper
103 Blake I. 63° 35' S, 59° 03' W	<i>P. antarctica</i>	18. 1. 87	B3	10	5 (1)	SW point of island	This paper
104 Bone Bay 53° 35' S, 59° 02' W	<i>P. antarctica</i>	18. 1. 87	B3/4	200	200 (3)	2 islets lying 4 km SW of Cape Roquemaurel	This paper
105 Cape Roquemaurel 63° 33' S, 58° 58' W	<i>P. antarctica</i>	18. 1. 87	B3	800	800 (3)	N coast of cape; headland 500 m E of Cape; 1 km E of Cape, at 50 m a.s.l. near glacier	This paper
106 Astrolabe I. 63° 20' S, 58° 42' W	<i>P. antarctica</i>	18. 1. 87	B3/4	400	400 (2)	Astrolabe I.; S side of large bay on S coast of southernmost point 1 km NE of S point	This paper
107 Astrolabe I. 63° 19' S, 58° 45' W	<i>P. antarctica</i>	18. 1. 87	B3/4	200	200 (2)	N point of large bay on S coast of Astrolabe I.; N coast of high island 1 km NW of N point	This paper
108 Astrolabe I. 63° 17' S, 59° 45' W	<i>P. antarctica</i>	18. 1. 87	B3	300	300 (1)	E coast of 20 m high island 1 km N of NW point of Astrolabe I.	This paper
109 Astrolabe I. 63° 18' S, 58° 40' W	<i>P. antarctica</i>	18. 1. 87	B3/4	2500	2500 (c. 7)	Many groups scattered along N headland and islands off Dragons' Teeth; island close off NE point; point 1 km S of NE point	This paper

¹ Estimated number of breeding pairs (see text p. 110); number of colonies in parentheses.

² Nest-building observed but no eggs seen.

³ Average of December nest counts for 4-8 seasons between 1977 and 1985.

Appendix 2. Present status of additional penguin colonies, recorded by Croxall and Kirkwood (1979)

Locality	Species	Date last recorded	Present status	Date	Reference
Rhyolite I.	<i>P. adeliae</i>	20. 12. 48	No colony?	15. 2. 86	S. Cervantes (pers. comm.)
Flyspot Is	<i>P. adeliae</i>	—	No evidence of any former colony	18. 2. 86	This paper
Henkes Is	<i>P. adeliae</i>	9. 10. 48	Refers to Avian I.	11. 11. 78	This paper
Jenny I.	<i>P. adeliae</i>	1936	No colony	10. 2. 83	This paper
Anchorage I.	<i>P. adeliae</i>	Mar. 1977	No colony	12. 2. 83	This paper
Hovgaard I.	<i>P. adeliae</i>	1903-05	No colony	26. 1. 83	This paper
Hovgaard I.	<i>P. papua</i>	1904	Refer to Pleneau I.	26. 2. 83	This paper
Islets S of Hovgaard I.	<i>P. adeliae</i>	1903-05	Refers to Jalour Is	26. 1. 83	This paper
Hermit I.	<i>P. adeliae</i>	1966	May refer to 'Christine I.'	11. 12. 85	Parmelee and Parmelee, 1987
Halfway I.	<i>P. adeliae</i>	1966	May refer to Dream I.	19. 1. 84	This paper
Cape Monaco	<i>P. adeliae</i>	1962-63	No evidence of any former colony	21. 1. 84	This paper
Perrier Bay	<i>P. antarctica</i>	4. 11. 57	May refer to Quinton Pt	27. 12. 84	Parmelee and Parmelee, 1987
Port Lockroy	<i>P. adeliae</i>	26. 11. 09	No colony	25. 1. 84	This paper
'South I.'	<i>P. antarctica</i>	1964	No colony	30. 1. 86	This paper
Nansen I.	<i>P. antarctica</i>	21. 1. 22	No colony	5. 3. 84	This paper
'Slippery Rock I.'	<i>P. antarctica</i>	16. 12. 71	Refers to Gaston Is	11. 3. 83	This paper
'Cape Reclus'	<i>P. antarctica</i>	30. 1. 22	May refer to Cape Eckener	11. 3. 83	This paper
Cape Murray	<i>P. antarctica</i>	6. 3. 22	No evidence of any former colony	16. 1. 84	This paper
Melchior Is	<i>P. antarctica</i>	Feb. 1941	No colony	20. 1. 84	This paper
Duthiers Pt	<i>P. papua</i>	1965	No colony	30. 1. 86	This paper
Cape Kaiser	<i>P. antarctica</i>	27. 11. 09	Refers to Hunt I.	29. 1. 86	This paper
Cape Kaiser	<i>P. antarctica</i>	9. 3. 22	No colony	29. 1. 86	This paper
Cape Kaiser	<i>P. papua</i>	No date	No evidence of any former colony	29. 1. 86	This paper
Auguste I.	<i>P. antarctica</i>	27. 11. 09	No colony?	29. 1. 86	This paper
Cape Herschel (NE of)	<i>P. antarctica</i>	1905	May refer to Monument Rocks	16. 1. 84	This paper
Skottsberg Pt	<i>P. antarctica</i>	1905	No colony	16. 1. 84	This paper