

REVISED PENGUIN NUMBERS AND DISTRIBUTION FOR ANVERS ISLAND, ANTARCTICA

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ABSTRACT. Estimates of population sizes of penguins breeding at Anvers Island, Antarctic Peninsula, based on records from 1974 to 1986 are summarized. Adélie penguins (c. 28458 pairs) are concentrated along the south coast of the island, and chinstrap penguins (c. 7179 pairs) and gentoo penguins (c. 2226 pairs) mostly in the western section. All three species breed side by side at two observed localities. The first records for the breeding area of macaroni penguins and of a vagrant king penguin are reported. Adélie and chinstrap populations have remained fairly stable over the last decade despite extensive human activity in the vicinity of some colonies.

INTRODUCTION

Since 1974 the authors and others have kept records of the occurrences and numbers of breeding pairs of penguins in the vicinity of US Palmer station (64° 46' S, 64° 03' W) on Anvers Island off the Antarctic Peninsula. As part of a contribution to the International Survey of Antarctic Seabirds, the authors with the help of students, station personnel and independent investigators, attempted to survey the entire coastline of Anvers Island, including numerous offshore islets. The results of these observations during December 1986 are reported here.

Penguin colonies within 5 km of Palmer station were accessible by means of small inflatable boats when ice and wind conditions were favourable. Colonies farther out were reached by R/V *Hero*, and also by a US Coast Guard Arctic survey boat. Both vessels were equipped with inflatable boats for shore landings. US Coast Guard helicopters were used to survey coastal areas whenever available.

An attempt was made to survey colonies during the incubation period in late November and December, although this was not always possible due to a variety of circumstances beyond our control. We followed the method of Croxall and Kirkwood (1979) in recording the degree of accuracy in our counts: N_1 = individual nest counts accurate to $\pm 5\%$; N_2 = nest counts accurate to $\pm 10-15\%$; N_3 = accurate to 20-30%; N_4 = guesstimate to nearest order of magnitude (few, hundreds, thousands). The letter A = adult, C = chick. In order to avoid errors in identifying colony locations, we employed the numbering system used by Croxall and Kirkwood whenever appropriate (see Fig. 1).

ANNOTATED LIST OF SPECIES

King penguin (*Aptenodytes patagonicus*)

One individual, thought to be an immature bird, was observed by C. Rimmer (pers. comm.) on Humble Island on 21 February 1984, but not seen thereafter.

Adélie penguin (*Pygoscelis adeliae*)

By far the most common penguin along the southern coast of Anvers Island from Biscoe Bay in the east to Dream Island and the Joubin Islands in the west. In recent

Cormorant Island colony (No. 23)

Count	Nature	Date	Reference
1000	N ₄	28 Dec. 74	Parmelee and others, 1977
737	C ₁	23 Jan. 77	D. Neilson, pers. comm.
699	N ₁	14 Dec. 77	D. Neilson, pers. comm.
605	N ₁	31 Dec. 78	S. Maxson, pers. comm.
715	C ₁	30 Jan. 79	S. Maxson, pers. comm.
695	N ₁	11 Dec. 79	P. Pietz, pers. comm.
1093	C ₁	30 Jan. 79	P. Pietz, pers. comm.
890	N ₁	4 Jan. 81	P. Pietz, pers. comm.
1052	C ₁	4 Feb. 81	P. Pietz, pers. comm.
795	N ₁	8 Dec. 82	Heimark and Heimark, 1984
623	N ₁	24 Dec. 83	D. Parmelee and C. Rimmer, pers. obs.
905	N ₁	13 Dec. 84	D. Parmelee and J. Parmelee, this study
872	N ₁	2 Dec. 85	G. Heimark and R. Heimark, pers. comm.

Remarks. With respect to N₁ counts, colony size varied from a low of 605 in 1978–79 to a high of 905 in 1984–85 ($n = 8$, $\bar{x} = 761$, $SD = 121.0$, $SE = 42.8$).

Christine Island colony (No. 24)

2170	N ₃	3 Dec. 71	Muller-Schwarze and others, 1975
2000+	N ₄	19 Jan. 75	Parmelee and others, 1977
1292	N ₁	8 Dec. 79	S. Maxson, pers. comm.
1460	N ₁	11 Dec. 79	P. Pietz, pers. comm.
1425	N ₁	2 Jan. 83	D. Parmelee and C. Rimmer, pers. obs.
1261	N ₁	1 Jan. 84	D. Parmelee and J. Parmelee, this study
1459	N ₁	2 Dec. 85	G. Heimark and R. Heimark, pers. comm.

Remarks. With respect to N₁ counts, colony size varied from a low of 1261 in 1983–84 to a high of 1460 in 1979–80 ($n = 5$, $\bar{x} = 1379$, $SD = 95.6$, $SE = 42.8$). Since we found no past or present evidence of penguins breeding on Hermit Island, we assume that Watson and Angle (1966) confused that island with Christine Island nearby (see Croxall and Kirkwood, 1979).

Arthur Harbour

Torgersen Island colony (No. 25)

8000–			
10000	N ₄	23 Dec. 55	Wylie, 1958
8000	N ₃	2 Dec. 71	Muller-Schwarze and others, 1975
8000+	N ₄	15 Jan. 75	Parmelee and others, 1977
8876	N ₁	4 Jan. 79	S. Maxson, pers. comm.
8750	N ₁	11 Dec. 79	P. Pietz, pers. comm.
8723	N ₁	31 Dec. 80	P. Pietz, pers. comm.
6500	C ₁	27 Jan. 82	Muller-Schwarze, 1984
5523	N ₁	2 Jan. 83	Muller-Schwarze, 1984
8732	N ₁	20 Nov. 83	Heimark and Heimark, 1984
5575	N ₁	30 Dec. 83	Muller-Schwarze, 1984
8483	N ₁	1 Dec. 85	G. Heimark and R. Heimark, pers. comm.

Remarks. Unless his methods differed greatly from ours, it is difficult to account for the drastic drop in nest counts by Muller-Schwarze (1984) who claimed a 9–36% drop from his 1971 nest census of 8650. Based on all other N₁ counts by various individuals, the colony has fluctuated only from a low of 8483 in 1985–86 to a high of 8876 in 1978–79 ($n = 5$, $\bar{x} = 8713$, $SD = 142.6$, $SE = 63.8$).

Litchfield Island colony (No. 26)

Count	Nature	Date	Reference
890	N ₃	2 Dec. 71	Muller-Schwarze and others, 1975
1000	N ₄	5 Jan. 75	Parmelee and others, 1977
650	N ₁	8 Dec. 77	D. Neilson, pers. comm.
527	C ₁	29 Jan. 78	D. Neilson, pers. comm.
519	N ₁	8 Jan. 79	S. Maxson, pers. comm.
683	C ₁	31 Jan. 79	S. Maxson, pers. comm.
564	N ₁	11 Dec. 79	P. Pietz, pers. comm.
673	C ₁	30 Jan. 80	P. Pietz, pers. comm.
650	N ₁	6 Dec. 80	P. Pietz, pers. comm.
881	C ₁	4 Feb. 81	P. Pietz, pers. comm.
635	N ₁	20 Nov. 83	G. Heimark and R. Heimark, 1984
482	N ₁	26 Dec. 83	D. Parmelee and C. Rimmer, pers. obs.
549	N ₁	11 Dec. 84	D. Parmelee and J. Parmelee, this study
586	N ₁	12 Dec. 85	G. Heimark and R. Heimark, pers. comm.

Remarks. With respect to N₁ counts, colony size varied from a low of 480 in 1983–84 to highs of 650 in 1977–78 and 1980–81 ($n = 8$, $\bar{x} = 579$, $SD = 62.6$, $SE = 22.1$). Chick counts varied from a low of 527 in 1977–78 to a high of 881 in 1980–81 ($n = 4$, $\bar{x} = 691$, $SD = 145.4$, $SE = 72.7$).

Humble Island colony (No. 27)

3000+	N ₄	23 Dec. 55	Wylie, 1958
3215	N ₃	2 Dec. 71	Muller-Schwarze and others, 1975
3000+	N ₄	4 Jan. 75	Parmelee and others, 1977
2393	N ₁	28 Dec. 83	S. Maxson, pers. comm.
2343	N ₁	12 Dec. 79	P. Pietz, pers. comm.
2420	C ₁	9 Feb. 80	P. Pietz, pers. comm.
2140	N ₁	31 Dec. 80	P. Pietz, pers. comm.
4076	C ₁	4 Feb. 81	P. Pietz, pers. comm.
2287	N ₁	20 Nov. 83	Heimark and Heimark, 1984
2525	N ₁	15 Dec. 84	D. Parmelee and J. Parmelee, this study
2407	N ₁	5 Dec. 85	G. Heimark and R. Heimark, pers. comm.

Remarks. With respect to N₁ counts, colony size varied from a low of 2140 in 1980–81 to a high of 2525 in 1984–85 ($n = 6$, $\bar{x} = 2349$, $SD = 129.5$, $SE = 52.9$). A noticeable difference in reproductive success was noted between 1979–80 and 1980–81.

Wylie Bay

Dream Island colony (No. 29)

'Huge'	N ₅	5 Jan. 57	Wylie, 1958
12000	C ₃	9 Jan. 84	S. Poncet, pers. comm.
10000+	N ₅	10 Dec. 84	D. Parmelee and J. Parmelee, this study
10700	N ₃	12 Dec. 85	G. Heimark and R. Heimark pers. comm.

Nameless Island colony (No. W-1)

118	C ₁	5 Feb. 79	D. Parmelee, N. Bernstein and S. Maxson, pers. obs.
400	N _{3/4}	19 Jan. 84	S. Poncet, pers. comm.
563	N ₁	12 Dec. 84	D. Parmelee and B. Obst, pers. obs.

Remarks. Nameless Island is located 1 km south-west of Dream Island. Both islands also have small, established breeding colonies of chinstrap penguins (*P. antarcticus*).

Joubin Islands

Nameless Island colony (No. 31)

Count	Nature	Date	Reference
90+	N ₃	16 Jan. 75	Parmelee and others, 1977
408	C ₁	14 Feb. 81	P. Pietz, pers. comm.
363	N ₁	13 Jan. 84	K. Nagy, pers. comm.
330	C ₁	24 Jan. 84	S. Poncet, pers. comm.

Remarks. Island 31 also has small, stable breeding colonies of chinstrap penguins and gentoo penguins (*P. papua*).

Nameless Island colony (No. J-2)

100+	N ₃	12 Jan. 84	D. Parmelee and C. Rimmer, pers. obs.
100	N ₅	24 Jan. 84	S. Poncet, pers. comm.

Nameless Island colony (No. J-3)

157	N ₁	12 Jan. 84	D. Parmelee and C. Rimmer, pers. obs.
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Nameless Island colony (No. J-4)

248	N ₁	12 Jan. 84	D. Parmelee and C. Rimmer, pers. obs.
365	C ₁	24 Jan. 84	S. Poncet, pers. comm.

Nameless Island colony (No. J-5)

Few hundred	N ₅	24 Jan. 84	S. Poncet, pers. comm.
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Gerlache Point

Nameless Island colony (No. G-1)

171	N ₁	2 Jan. 85	D. Parmelee and J. Parmelee, this study
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Remarks. Colony was located on small twin islands, joined visibly by gravel bar at low tide, south of large, ice-capped Gerlache Island (64° 35' S, 64° 16' W) (see Fig. 2). Larger numbers of chinstrap and gentoo penguins bred close by.

Chinstrap penguin (*Pygoscelis antarctica*)

By far the most common penguin along the north-west coast of Anvers Island where until fairly recently its nesting had not been recorded. Elsewhere it breeds sparingly in Wylie Bay and on the Joubin Islands. Muller-Schwarze and others (1975) reported a single, isolated nesting for Arthur Harbour in 1971, and G. Heimark and R. Heimark (pers. comm.) reported another for Humble Island in November 1985.

Wylie Bay

Dream Island (No. 29)

2	N ₁	5 Jan. 57	Wylie, 1958
Few	N ₅	1 Feb. 75	Parmelee and others, 1975
46	N ₁	13 Jan. 78	D. Parmelee, N. Bernstein and S. Maxson, pers. obs.
210	A ₁	5 Feb. 79	D. Parmelee, N. Bernstein and S. Maxson, pers. obs.
99	N ₁	7 Jan. 84	D. Parmelee and C. Rimmer, pers. obs.
95	N ₁	19 Jan. 84	S. Poncet, pers. comm.
109	N ₁	12 Dec. 84	D. Parmelee and J. Parmelee, this study

Remarks. Presumably Wylie (1958) observed the birth of the Dream Island colony which has increased in number since 1957.

Nameless Island colony (No. W-1)

Count	Nature	Date	Reference
40	N _{3/4}	19 Jan. 84	S. Poncet, pers. comm.
47	N ₁	12 Dec. 84	D. Parmelee and B. Obst, pers. obs.

Remarks. Species not noted when Parmelee, Bernstein, and Maxson counted Adélie penguin chicks on this island on 5 February 1979.

Joubin Islands

Nameless Island colony (No. 31)

35	N ₁	16 Jan. 75	Parmelee and others, 1977
23	C ₁	14 Feb. 81	P. Pietz, pers. comm.
17	N ₁	24 Jan. 83	S. Poncet, pers. comm.
24	N ₁	13 Jan. 84	K. Nagy, pers. comm.
23	N ₁	26 Dec. 84	D. Parmelee and J. Parmelee, this study

Remarks. The decrease in numbers of chinstrap penguins from 35 in 1974-75 to 17 in 1982-83 may have in part resulted from the collecting of breeding adults earlier in 1982-83 (W. Hamner, pers. comm.).

Gerlache Point colony (No. G-1)

4000	A ₅	3 Feb. 79	D. Parmelee, N. Bernstein and S. Maxson, pers. obs.
3000	N ₅	2 Jan. 85	D. Parmelee and J. Parmelee, this study

Remarks. Several colonies with nests, estimated at 1500, 1000, and 500 each on separate islands, were located near Gerlache Island. The colony with about 1000 nests, referred to above as twin islands, also had smaller numbers of Adélie and gentoo penguins.

Quinton Point (No. Q-1)

8000	A ₅	3 Feb. 79	D. Parmelee, N. Bernstein and S. Maxson, pers. obs.
8000	A ₅	27 Dec. 84	D. Parmelee and C. Rimmer, pers. obs.

Remarks. Disjunct colonies spread over several small islands off the northern end of Quinton Point (64° 19' S, 63° 41' W). Small numbers of gentoo penguins bred on one of the islands.

Gentoo penguin (*Pygoscelis papua*)

Gentoo penguins have long been known to breed near the south-eastern coast of Anvers Island on Wiencke and Doumer Islands where Croxall and Kirkwood (1979) compiled the records of various observers dating back to 1914. We now know that small numbers also breed in the Joubin Islands and along the west coast of Anvers Island north of Cape Monaco.



Fig. 2. Gerlache Point 'twin-island' colony. Island shown (in part) in foreground accommodated 873 gentoo penguin nests and one Adélie penguin nest. Island in centre accommodated 170 Adélie, an estimated 1000 chinstrap, and 150 gentoo penguin nests. An estimated 500 chinstrap penguin nests were on the peninsula in the background. An additional 1500 chinstrap penguin nests were estimated for islands (not shown) near-by. Photographed from a helicopter on 8 December 1984 before the ground count was made on 2 January 1985.

Joubin Islands

Nameless Island colony (No. 31)

Count	Nature	Date	Reference
54	N ₁	16 Jan. 75	Parmelee and others, 1977
59	C ₁	14 Feb. 81	P. Pietz, pers. comm.
41	N ₁	24 Jan. 83	S. Poncet, pers. comm.
50	N ₁	13 Jan. 84	K. Nagy, pers. comm.
61	N ₁	31 Dec. 84	D. Parmelee and J. Parmelee, this study

Remarks. Larger numbers of Adélie penguins and smaller numbers of chinstrap penguins also bred on this island.

Cape Monaco (NW) colony (No. M-1)

950	C ₁	5 Feb. 79	D. Parmelee, N. Bernstein, and S. Maxson, pers. obs.
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Remarks. This colony is located on Anvers Island north-east of the Gossler Islands at approximately 64° 42' S, 64° 18' W. Although chicks prevailed at this date, adults were still incubating eggs at two nests. No other species of penguins were observed near this colony. Whether this is the same colony visited by S. Poncet (pers. comm.) on 8 February 1987 when 2400 chicks C₃ were counted is uncertain at this time.

Gerlache Point colony (No. G-1)

Count	Nature	Date	Reference
2000	A ₅	3 Feb. 79	D. Parmelee, N. Bernstein, and S. Maxson, pers. obs.
1023	N ₁	2 Jan. 85	D. Parmelee and J. Parmelee, this study

Remarks. Described above as 'twin island' colony near Gerlache Island where Adélie and chinstrap penguins also bred.

Quinton Point colony (No. Q-1)

Few	A ₅	2 Feb. 79	D. Parmelee, N. Bernstein, and S. Maxson, pers. obs.
42	N ₁	27 Dec. 83	D. Parmelee, K. Nagy, C. Rimmer, pers. obs.

Remarks. Colony located on small island off Quinton Point. Large numbers of chinstrap penguins bred in vicinity.

Macaroni penguin (*Eudyptes chrysolophus*)

Macaroni penguins are rare visitors to Anvers Island where there is but a single nesting record. Holdgate (1963) reported a crested penguin for Humble Island on 6 January 1956; at first it was identified as a rockhopper penguin (*Eudyptes crestatus*), but Holdgate believed that it was in fact *E. chrysolophus*. Bernstein and Tirrel (1981) observed a macaroni penguin on Cormorant Island on 21 February 1979 and 10 days later collected possibly the same individual on Humble Island. On 26 January 1984, Rimmer observed one at the edge of the Adélie penguin colony on Torgersen Island.

The authors observed a lone macaroni penguin on Humble Island where it resided among nesting Adélie penguins from 12 January to at least 28 January 1985. According to G. and R. Heimark (pers. comm.), a pair had a nest on Humble Island during 1985-86.

1	N ₁	Nov. 85	G. Heimark and R. Heimark, pers. comm.
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Remarks. Evidently this is the first nesting attempt by the species for this region. One egg was laid but the birds failed to produce young.

DISCUSSION

Taking into account the average number of nests at colonies surveyed frequently and recent counts of nests, adults or chicks surveyed only infrequently, the number of breeding pairs of Adélie penguins is estimated at 28458 for Anvers and associated small islands. Although the birds are known to breed from the south-east section to the north-west section, their numbers are largely concentrated in Arthur Harbour and Wylie Bay. Chinstrap penguins predominate in the north-west section where their numbers are estimated at about 7000 breeding pairs; elsewhere their numbers remain at low levels (179 pairs). The less common gentoo penguins are estimated at about 2226 pairs and mostly confined to the north-west section as well. Our combined estimate for the three species is approximately 37863 breeding pairs.

Although evidence for changes in status of the penguins is slight, several points need to be addressed. The only penguin colony in the Anvers Island region visited regularly by tourists, outside the Wiencki Island and Doumer Island colonies, is Torgersen Island in Arthur Harbour. Despite the assertions by Muller-Schwarze (1984), we see little evidence that penguin numbers have been substantially reduced there through human activity. On a year-to-year basis, numbers fluctuate to some extent at all of the colonies, but to date the birds appear to be holding their own.

Numbers of chinstrap penguins in Wylie Bay have been increasing at a very slow rate since the 1950s, but it remains to be seen whether at some point their numbers will increase dramatically at the expense of the predominate Adélie penguins. Observations in the north-west section are so recent that one cannot detect changes in penguin status, but the Gerlache Point colonies, where all three species breed in proximity, merit special attention in the future.

With respect to other future survey requirements, additional observations are needed, particularly on the outer islands of the Joubin Archipelago, and all along the north-west and north coast of Anvers Island where there are innumerable bays and offshore islands. The location of the important gentoo penguin colony near Cape Monaco needs to be defined more clearly, since S. Poncet (pers. comm.) may well have found another a short distance from the one visited by us earlier. Far better estimates are needed for the chinstrap penguins breeding abundantly off Quinton Point. From a helicopter, B. Obst (pers. comm.) believed that he saw a chinstrap colony on a small island off Anvers northernmost coast, one that we evidently failed to see from a low-lying vessel. Unquestionably there are others.

ACKNOWLEDGEMENTS

The Palmer station studies were supported by Natural Science Foundation grants-in-aid to D. Parmelee, the latest one being DPP82-13688. Many people helped directly or indirectly with the penguin counts, notably N. Bernstein, S. Maxson, D. Neilson, P. Pietz, and C. Rimmer, all at or formerly from the University of Minnesota; also B. Obst and K. Nagy from the University of California, Los Angeles. S. Poncet, Falkland Islands, kindly provided notes on her many observations along the Antarctic Peninsula as did G. Heimark and R. Heimark who overwintered twice at Palmer station. We are indebted to P. Pietz and referees of the British Antarctic Survey for critically reviewing the manuscript. For logistic support we are indebted to the officers and crew of R/V *Hero*, especially the ship's Master, Captain P. Lenie; also B. Manning, T. Michalski, and B. Mulford of the US Coast Guard. For secretarial assistance, we thank S. Elvig. Special thanks to G. A. Llano and F. Williamson, formerly of the National Science Foundation, who in many ways supported the bird studies at Palmer station.

Received 30 January 1987; accepted 23 April 1987

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