

ADÉLIE PENGUIN ROOKERIES AT COULMAN ISLAND, WESTERN ROSS SEA, ANTARCTICA

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ABSTRACT

Three rookeries of Adélie Penguins (*Pygoscelis adeliae*) at Coulman Island were last reported in 1964. Their size was then only roughly estimated and their positions were incorrectly mapped. They were relocated and photographed during aerial photographic surveys of Ross Sea penguin breeding areas on 6 December 1981, 29 November 1982 and 2 December 1983. This paper reports the correct position of each colony, together with detailed description and photograph and an accurate count of occupied nests. Numbers of breeding pairs in 1983 were assessed as Northern Rookery 2157, Middle Rookery 3989, Southern Rookery 22 743.

INTRODUCTION

Coulman Island (73°30'S, 169°45'E) is an elongated basaltic dome, 34 km long, lying 16 km off the coast of northern Victoria Land (Harrington *et al.* 1967). The island rises to 1998 m a.s.l. and is covered with a thick ice cap flowing to steep 600-1800 m high cliffs on all sides. Along the eastern coast numerous glaciers combine to form an almost continuous ice shelf.

Three rookeries of Adélie Penguin (*Pygoscelis adeliae*) are known from Coulman Island. One, near the northern end, was discovered by Scott's National Antarctic Expedition of 1901-04 (Scott 1905, Wilson 1907). The other two were first seen in 1964 from helicopters transporting geological and biological field parties (Cranfield 1966). Cranfield named them Northern Rookery, Middle Rookery, and Southern Rookery and estimated the size of each from information received from Bishop Museum entomologists Gressitt, Wise and Shoup, who had overflown or visited them in November 1964. He gave little indication of their position other than that they were below exposed parts of the island's high eastern cliffs and appeared to be sited on moraine-covered shelf ice. Later, all three were positioned on the published 1:250 000 topographical map of the Coulman Island area (US Geological Survey 1969). The southern rookery was shown about 5 km south of Cape Main and the others about 21 km and 13 km south from Cape Wadworth at the north end of the island.

AERIAL SURVEY

Coulman Island was searched for breeding Adélie Penguins from a C-130 Hercules aircraft flying at an altitude of about 1000 ft during aerial photographic surveys of Ross Sea penguin breeding areas on 6 December 1981 (Taylor & Wilson 1982) and again on 29 November 1982 and 2 December 1983. We could not locate penguins at the positions previously mapped but found three rookeries — the most southern about 2 km north of Cape Main and other two about 11 km and 7 km south of Cape Wadworth (Fig. 1).

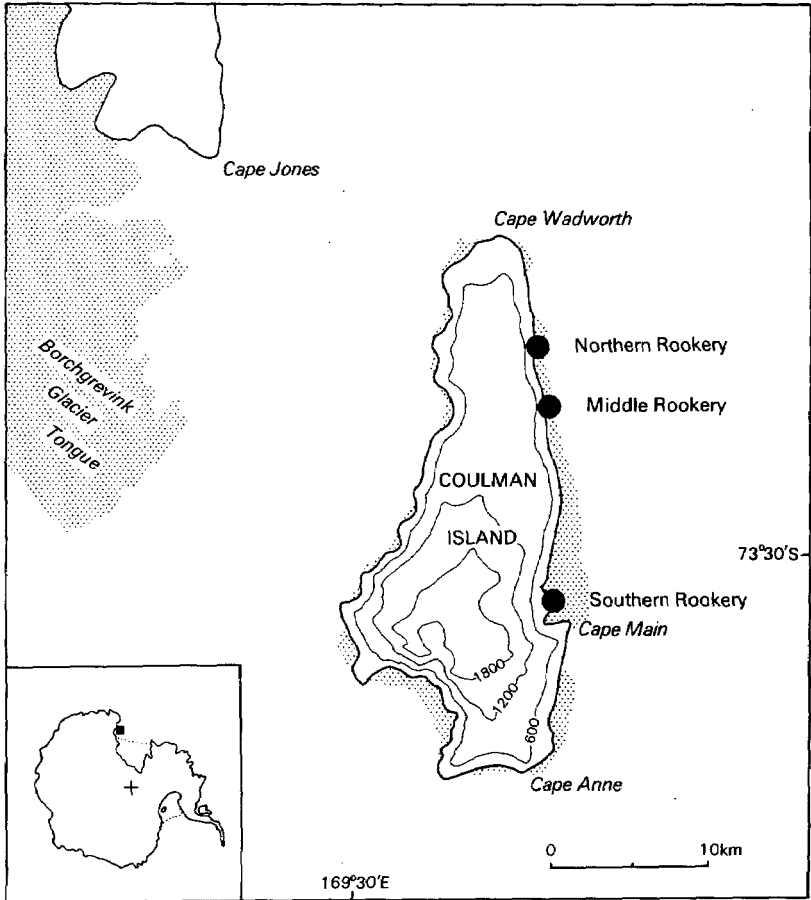


FIGURE 1 — Coulman Island and its Adélie Penguin rookeries. Areas of glacial ice shelf are shown in stipple



FIGURE 2 — Site of Northern Rookery, Coulman Island, 2 December 1983. Adélie Penguins nested in the two areas marked (see text)

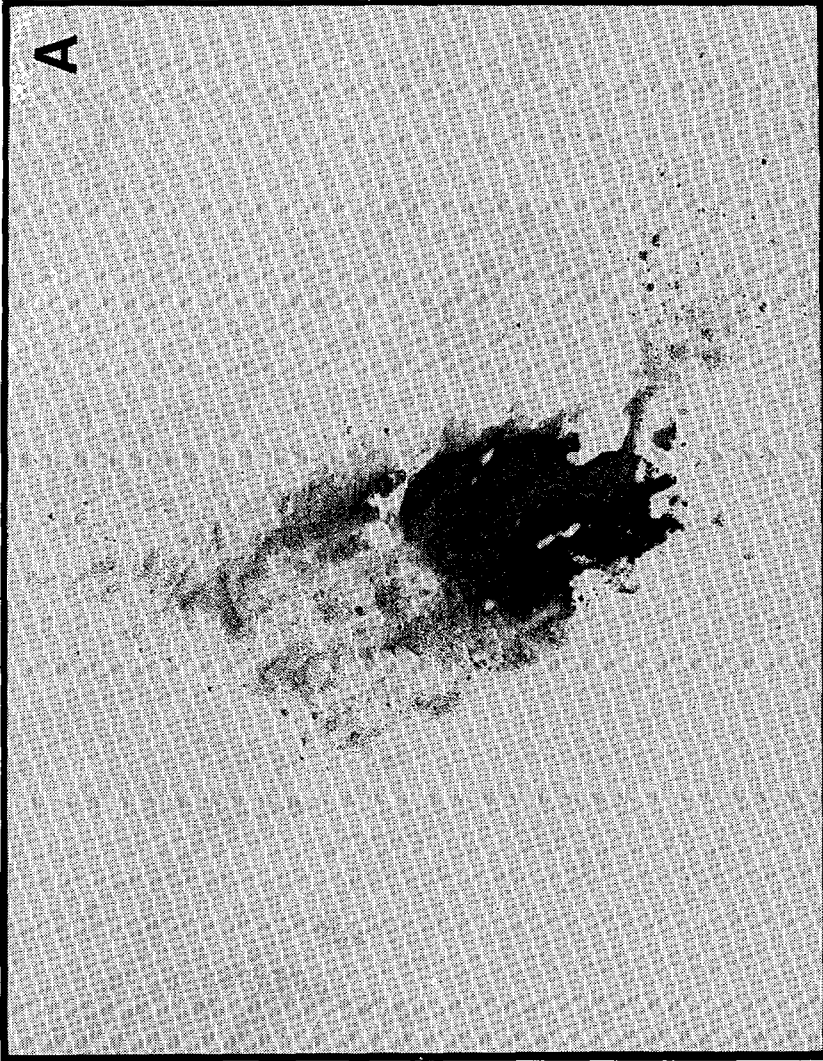


FIGURE 3 — (A) Site of Middle Rookery, Coulman Island, 2 December 1983. The sea cliff was less than 100 m down slope from the bottom edge of the colony

In 1983, we took several large-format (6 x 7 cm) black-and-white oblique photographs of each rookery. We then enlarged sections of these photographs and made accurate counts of the total number of occupied nests in all three rookeries. We estimated the dimensions of the breeding areas by using for scale the size of incubating birds and the distances between evenly spaced nests, as measured at Cape Royds rookery. The timing of the photographic flights was planned to coincide with the phase of breeding when nearly all birds ashore were incubating while their mates and non-breeding birds were feeding at sea (Taylor 1962, Taylor & Wilson 1982). By comparing counts of occupied nests from aerial photographs with careful ground counts of breeding Adélie Penguins at Cape Royds, we found that aerial photography gives an accurate count of the number of breeding pairs at this stage of the season, with less than 5% error (unpubl. data).

Northern Rookery

This rookery is at the southern end of a small steeply sloping glacial shelf extending below high volcanic cliffs (Fig. 2). Fallen rock debris thinly covers the margin of the shelf ice, which is partly ablated where it abuts exposed coastal rock. These features form a base for the penguin rookery and sloping access from the sea. This rookery is the smallest of the three with 2157 occupied nests on 2 December 1983. Most nests (2090) were among the veneer of stones covering an area of about 30 x 90 m on the rim of the glacial shelf, but a small group of 67 was seen on a ledge on the debris-covered ice slope.

Middle Rookery

This rookery (Fig. 3A) is on a patch of sloping rock debris towards the northern end of the 17-km-long glacial ice shelf which extends south to Cape Main. The debris patch is roughly 60 x 140 m in extent and less than 100 m from the shelf's seaward ice cliff, where there is access for penguins. On 2 December 1983, about half the area of exposed moraine was covered with 3989 occupied nests.

Southern Rookery

This rookery (Fig. 3B) is on the wide glacial ice shelf about 2 km north of Cape Main. The birds' only access is up a small gut in the side of an ice tongue about 2 km south of the rookery (M. Gregory and P. Harper, pers. comm.). They nest on low ridges on a large triangular tail of glacial moraine in the lee of an exposed rock cliff between two ice falls. The area of sloping moraine is about 350 m wide at its upper end and steadily tapers away over its length of about 600 m. This is by far the largest group of breeding Adélie Penguins at Coulman Island. On 2 December 1983, 22 623 occupied nests were on the moraine and 120 in small groups were on the steeper talus slopes immediately below the cliffs. The total of occupied nests was 22 743.

POPULATION TRENDS

The Coulman Island Adélie Penguin rookeries are all on moraine-covered shelf ice, which is subject to glacial movement. They may therefore be less



FIGURE 3 — (B) Site of Southern Rookery, Coulman Island, 2 December 1983. Adélie Penguins were nesting on every ridge on the triangular moraine and in small groups (arrowed) on talus below the volcanic cliffs.

permanent and display greater fluctuations in numbers than those established on rocky terrain elsewhere. Access for penguins on to the ice shelf at the middle and southern rookeries could be difficult or even impossible in some years. Other factors, such as the variation in the amount of rock debris being deposited or of snow accumulating, may in time change the size, shape and viability of these breeding areas.

Although their mapped positions differ by as much as 10 km, we assume that the three rookeries found in 1980-83 are the same as those found in 1964. Table 1 compares the results of the 1983 aerial census with the 1964 estimates given by Cranfield (1966). The 1964 figures were based only on an overall impression from the air or the ground, whereas the 1983 figures are from careful counts of occupied nests on aerial photographs. Therefore, we cannot make any conclusions on trends in the size of the Coulman Island rookeries during the last 20 years. Now that the three breeding sites have been relocated and described, the recent aerial census gives an accurate basis for comparing future numbers of Adélie Penguins breeding at Coulman Island.

TABLE 1 — Population estimates of Adélie Penguin rookeries, Coulman Island, 1964 and 1983

Rookery	Nov 1964 (Cranfield 1966)	Number of breeding pairs	
		2 Dec 1983	1983
Northern	1000 - 2000 (air estimate)	2157	
Middle	4000 - 5000 (air estimate)	3989	
Southern	8000 - 10000 (ground estimate)	22743	
Totals	13000 - 17000	28889	

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LITERATURE CITED

- CRANFIELD, H. J. 1966. Adélie Penguin rookeries in the Cape Hallett region. *Antarctic* 4: 315-317.
 HARRINGTON, H. J.; WOOD, B. L.; MCKELLAR, I. C.; LENSEN, G. J. 1967. Topography and geology of the Cape Hallett district, Victoria Land, Antarctica. *NZ Geol. Surv. Bull.* n.s. 80.
 SCOTT, R. F. 1905. *The voyage of the Discovery*. London: John Murray.
 TAYLOR, R. H. 1962. The Adélie Penguin *Pygoscelis adeliae* at Cape Royds. *Ibis* 104: 176-204.
 TAYLOR, R. H.; WILSON, P. R. 1982. Counting penguins from the air. *Antarctic* 9: 366-368.
 U.S. GEOLOGICAL SURVEY 1969. Topographic map, 1: 250 000 Reconnaissance Series. Coulman Island, Antarctica. SS58-60/6.
 WILSON, E. 1907. Aves. *British National Antarctic Expedition 1901-04. Zoology* 2: 1-121.

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