

Short Note

A systematic survey of breeding Adélie penguins (*Pygoscelis adeliae*) along the Mawson and Kemp Land coasts, East Antarctica: new colonies and population counts

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Introduction

The Adélie penguin is broadly distributed throughout the Antarctic, with a minimum breeding population of *c.* 2.5 million pairs (Woehler 1993). This value is based on many separate, independent studies at smaller scales, and is probably an underestimate as many areas with potential breeding habitat have not been searched (Southwell *et al.* in press, Woehler 1993).

This paper addresses one region along the Mawson coast between 57–62°E that was identified by Southwell *et al.* (in press) as having little evidence of previous search effort. Adélie penguin colonies are known to occur at four sites (Table I) in this region, but it is not clear whether the apparent absence at most sites in the area is real or due to incomplete search effort. Consequently, we attempted to completely search this area for Adélie penguin colonies, and count breeding adults to improve population estimates.

Methods

On 6 March 2008 we searched an area of the Mawson coast (Fig. 1) from Forbes Glacier (67°35'38"S, 62°18'00"E) in the east to an unnamed island (67°14'27"S, 59°18'29"E) 3 km to the north-west of Fold Island in the west, and from the edge of the continent 27 km north to Kidson Island (67°12'51"S, 61°11'16"E) by helicopter at 500 m altitude for evidence of Adélie penguin colonies. In order to allocate our search effort efficiently, we used the coarse-scale, qualitative model of Southwell *et al.* (in press). This model defines two strata: definitely unsuitable and potentially suitable Adélie penguin breeding habitat. The potentially suitable Adélie penguin breeding habitat stratum (defined as all ice free islands and exposed continental rock within 1 km of the coast) included many areas where Adélie penguins were known to be absent; this was due to the coarseness of the model. This potentially suitable stratum contained 434 islands and 43 outcrops of continental rock and had a total area of 111 km² along 130 km of coastline. During the helicopter flight, two observers independently searched all the listed sites for evidence of

Adélie penguin presence. No attempt was made to search unsuitable habitat as defined by the model (Southwell *et al.* in press) as no actual breeding habitat was expected to occur there. In March most penguins have left their breeding colonies so ground discolouration was used to infer the presence of Adélie penguins.

Between 30 November and 9 December 2008 we attempted to revisit all sites identified from the helicopter using 4WD quad bikes equipped for sea ice travel. At this time of the year most breeding birds are ashore at their breeding colonies and the presence of breeding sites can be determined with certainty. If breeding penguins were found at a site, two people independently counted all adults present; if the two counts were not within 10% both individuals recounted the whole site until counts were within 10%.

Results

Of the 477 sites of potential breeding habitat in the survey region, nine islands and four areas of continental rock were recorded as having evidence of possible Adélie penguin breeding presence during the helicopter flight. Nine of these 13 sites were later visited on the ground, and six were found to be Adélie penguin breeding colonies (Table I). Counts of adults at these sites ranged from 801 at an unnamed island in the Stanton group to 4455 at Low Tongue (Table I). Four areas could not be visited due to unsuitable sea ice and weather conditions (three islands and one area of continental rock; Table I).

Discussion

As in Low *et al.* (2007), this survey attempted to comprehensively search a pre-defined area rather than just target known colonies, allowing us to confirm the absence of Adélie penguins, an aspect which is often overlooked, and also led to the discovery of at least three previously unreported sites. The general lack of Adélie penguin colonies in the survey area is notable given the large number of colonies immediately east (Low *et al.* 2007, Woehler *et al.*

Table I. Locations of the nine sites in the survey area with evidence of penguin breeding colonies from a helicopter survey, and counts of adults present at those sites visited on the ground.

Island group (if named)	Site	Latitude	Longitude	Previously known colony? (count*)	Count (adults)	Count date
-	Kidson Island	67°12'51"	61°11'16"	Yes (1000 pairs)		not visited
Colbeck Archipelago	unnamed island	67°20'37"	61°03'53"	No		not visited
Colbeck Archipelago	Ufs Island	67°28'10"	61°08'26"	Yes (850 adults)	2300	30-Nov-08
Forbes Glacier	continental rock	67°35'47"	62°17'9"	Yes (1421 nests)	2032	09-Dec-08
-	Low Tongue	67°32'55"	61°59'26"	Yes ('large colony')	4455	29-Nov-08
Stanton Islands	continental rock	67°32'03"	61°43'03"	No	3227	29-Nov-08
Stanton Islands	unnamed island	67°30'28"	61°35'52"	No	801	29-Nov-08
Stanton Islands	Oldham Island	67°31'15"	61°43'31"	No	3570	29-Nov-08
-	unnamed island	67°20'39"	59°39'51"	No		not visited
-	continental rock	67°23'59"	59°47'47"	No		not visited

* From Horne (1983), Robertson (1991) and Woehler (1993).

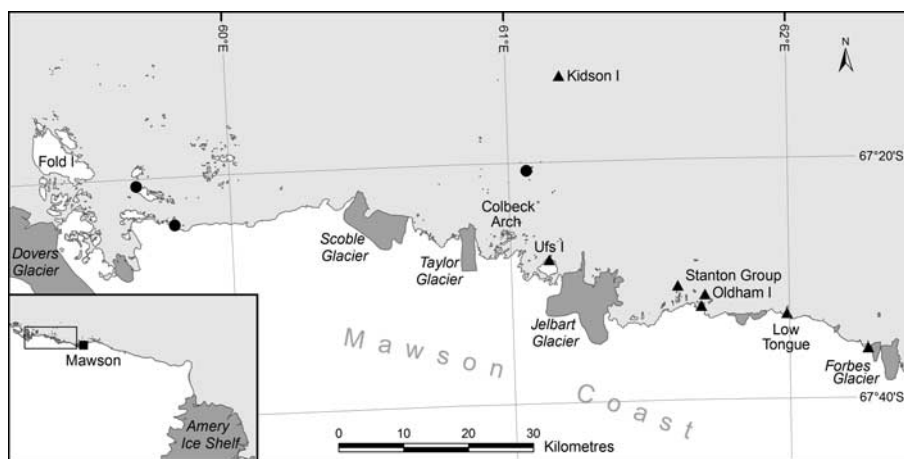


Fig. 1. Map of the survey extent, including place names mentioned in the text. All sites were identified by helicopter as having evidence of Adélie penguin breeding colonies. Those known or found to be breeding sites are marked ▲, those not subsequently visited are marked ●.

1989). We can see no topographical differences between the two areas that would account for these differences. Prior records of Adélie penguins from within the search area are limited to four records (Table I). While there are large differences between these historical records and current counts, they are not directly comparable as counts were made at different dates and comprised different units. We were unable to visit four islands identified as possible Adélie penguin breeding sites (Table I). Of these, Kidson Island is a known Adélie penguin breeding colony, with *c.* 1000 pairs of Adélie penguins in 1989 (Robertson 1991). As not all sites identified by helicopter were subsequently found to be Adélie penguin breeding sites, the remaining three sites need to be visited to determine their status.

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