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## LONGEVITY OF CAPE PETRELS *Daption capense* AT BLUFF ISLAND, VESTFOLD HILLS, EAST ANTARCTICA

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The Cape Petrel *Daption capense* nests on the Antarctic Peninsula, on Antarctic and Subantarctic islands as well as on the continent itself (Watson 1975; Marchant and Higgins 1990). Breeding occurs in East Antarctica, including sites in Prydz Bay (Woehler and Johnstone 1991). Bluff Island (68°33'S, 77°54'E), off Davis Station in the Vestfold Hills, is one such nesting area where Cape Petrels have been banded intermittently since 1959. To the end of the 1989/90 summer 299 pulli and 130 adult birds at nests have been marked there.

Bluff Island was visited briefly in early February 1989 and again, for a longer period, on 7 January 1991 during studies on the South Polar Skua *Catharacta maccormicki*. Previously-banded Cape Petrels were noted in 1989. In 1991 petrels at nests over much of the Island were examined, particularly where nest density was high and where birds banded prior to 1989 were breeding. Of 334 adults caught at nest sites, 15 had been banded previously. Four adults were banded in 1989, one breeding adult was banded as a chick in February 1974 and another as a pullus in 1984;

a further adult had been banded as a nestling at the Forbes Glacier (67°38'S, 62°21'E), some 800 km away near Mawson in February 1973. Eight adults were banded on nests in February 1984, when 68 pulli and 32 breeding birds were marked by K. Green.

Since Cape Petrels are essentially monogamous, with a long-lasting pair bond, and show a strong fidelity to nesting areas (Marchant and Higgins 1990), such recapture data may provide a measure of minimum survival and hence annual mortality. Minimum mean annual survival ( $S$ ) may be calculated as  $S = (r/n)^{1/y}$  or, as a percentage, as  $S = 100 \cdot \sqrt[y]{r/n}$ , where  $y$  = number of years,  $n$  = number originally banded, and  $r$  = number of recaptures (e.g. Mougín 1975). Thus for the cohort of adults marked in 1984, minimum mean survival was 0.82 (82%) and hence annual mortality ( $m$ ) 0.18 (18%). Life expectancy ( $E$ ) =  $2 - m/2m$  (200 -  $m/2m$  in percentage form) and, in consequence, is some five years for such adult birds assuming that mortality is independent of age. Confidence limits about such estimates are, however, large; mortality estimates from these data, for example, vary between 12 and 28 per cent.

Conclusions from these data are limited both by the small numbers of banded birds in the original cohort and their subsequent recaptures. In addition, mortality estimates may be magnified by band loss (presumably minimized by the use of stainless steel bands from 1984 onwards), the non-recapture of previously-marked birds (reduced here by the coverage of the Island in areas of previous bandings) and emigration. However, Mougín (1975) reported some 21 per cent of marked birds at the same nest sites six years later and in this study at least 25 per cent of adult birds banded on Bluff Island in 1984 were present there in 1991, seven years later. Estimated mortality rates are, however, somewhat higher than 4–7 per cent previously reported (Hudson 1966; Mougín 1975), and life expectancy correspondingly less. That only one of 68 chicks banded in 1984 was recaptured as a breeding adult could suggest heavy mortality of such chicks that season (or subsequent prebreeding mortality). However, since the majority of birds breed for the first time at about five years of age (Pinder 1966; Beck 1969) and hence would have been available for capture in 1991, it may also indicate some dispersal to breed at other sites (e.g. Beck 1969), rather

than strict philopatry (e.g. Pinder 1966; Marchant and Higgins 1990). The recapture of an adult Cape Petrel at Bluff Island originally banded (with a monel band) as a chick near Mawson indicates that some birds do disperse from natal sites to breed elsewhere, sometimes over considerable distance. Pinder (1966) noted that 5–16 per cent of the breeding population was replaced in any one year and hence estimated adult mortality for Cape Petrels at Bluff Island may reflect both death and emigration. Such estimates may be biased further by failure of nesting attempts early in the breeding season, and the subsequent dispersal of adults. At breeding colonies such as Bluff Island, blizzards and resulting snow drifts could reduce nest site availability, nesting attempts and success, and lead to abandonment of nesting colonies. Further studies may clarify such issues.

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