Mortality of the Black Swan in New Zealand—a progress report

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Black Swans *Cygnus atratus* were first introduced into New Zealand in 1864 and coincidental with this, self-introduction may also have occurred. They found a completely unoccupied niche (the native New Zealand swan *C. sumnerensis* became extinct several centuries earlier) and population growth was spectacular. Today, the species occurs on large water-bodies throughout New Zealand although breeding colonies are restricted to relatively few sites. The largest breeding colony is at Lake Ellesmere, South Island (Cutten, 1966; Miers & Williams, 1969).

Black Swans may be shot during the shooting season (the month of May) in most parts of the country and until recently there was no daily bag limit. At Lake Ellesmere, shooting was allowed for 3 months (May–July) and in response to complaints of pasture damage, special 'swan drives' were conducted there each year. On these occasions, shooters were stationed at intervals across the lake and swans driven toward them. Several hundred to several thousand swans were killed in a single drive.

As a first step towards rationalizing this shooting pressure and the other procedures (such as egg collecting) used to control swan numbers, the New Zealand Wildlife Service commenced banding cygnets at Lake Ellesmere in 1956. Almost 20,000 were banded between 1956 and 1968 and 4,479 of these had been recovered dead by October 1970. Of these recoveries, 91% were made by shooters.

Ellesmere swans appear to be long-lived. In 1968, twenty-three of 1,281 banded in 1956 were recovered, and by 1970 this cohort was still extant. Recoveries of birds up to 20 years old will probably be made. The method of analysing these band returns is therefore a time specific one and I used the method of Seber (1971). Seber's model makes a number of assumptions, the most important of which are: (1) the annual reporting probability is the same for all birds and remains constant from year to year; (2) the probability of a bird's survival depends on age rather than on calendar year. These assumptions may not be completely satisfied by the data.

Mortality rates of males and females were similar (females on average 2% higher than males) and data for both sexes are combined in Table I.

Post-fledging mortality was highest during the first 2 years of life and the relatively constant adult mortality rate was not achieved until the fifth year of life. Mortality after the tenth year increased to 58% in the fifteenth year but these figures may have been influenced by band loss and small samples.

Estimates of the contribution which shooting makes to total mortality depend on knowing how many swans were shot and died but were not recovered and how many bands from shot birds were not reported to the Banding Office. For example, from 19,822 cygnets banded, 31·8% (6,300) died in their first year of life but only 1,519 were reported shot. These correction factors are not known at present.

To achieve a stable population, productivity to breeding age must equate adult mortality. Thus, 0·306 cygnets from each pair's annual production must survive to the fourth–fifth year. To achieve this, each pair of breeding adults must rear 1·02 cygnets to fledging each year. The average number of cygnets hatched per nest in 1960 and 1961 was 3·62 (Miers & Williams, 1969), allowing a maximum hatching to fledging mortality of 72%. Cygnet mortality is currently being studied. However, the decline in Black Swan numbers over the past decade clearly indicates that this modest level of productivity was not achieved.

Table 1. Mortality and life expectancy of Black Swans banded as cygnets at Lake Ellesmere, New Zealand

Years after banding	0–1	1–2	2–3	3–4	Adult*
Mortality rate (%)	31·8	30·9	18·9	20·8	15·3
Life expectancy (years)	2·7	2·7	4·8	4·3	6·0

*The adult figure is the mean of mortality rates for years 4–5 to 9–10 inclusive.

In 1968, the Ellesmere swan population suffered a major setback. A severe storm almost completely destroyed the beds of *Ruppia spiralis* in the lake and swans were short of food (Bucknell, 1969). Few pairs attempted breeding in 1968, 1969 or 1970 and no cygnets fledged in any of those years (Adams, 1971). Despite the total lack of production, shooting continued and the decline of the Ellesmere swan population was accentuated.

Studies on the dispersal, nesting and mortality of Black Swans at Lake Ellesmere continue.

References

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