

HOW THE MACQUARIE ISLAND PARAKEET BECAME EXTINCT

R.H.TAYLOR

Ecology Division, DSIR. Private Bag, Nelson

SUMMARY: For 70 years following the discovery of Macquarie Island in 1810 the endemic parakeet *Cyanoramphus novaeseelandiae erythrotis* remained plentiful, despite the introduction of cats (*Felis catus*) and other predators. The crucial factor in the bird's rapid disappearance between 1881 and 1890 appears to have been the successful liberation of rabbits (*Oryctolagus cuniculus*) in 1879. This led to great increases of feral cats and introduced wekas (*Gallirallus australis*) and presumably to greatly intensified predation on parakeets.

INTRODUCTION

When subantarctic Macquarie Island (54° 30'S, 159° 00'E) was discovered in 1810 it had an endemic parakeet, *Cyanoramphus novaeseelandiae erythrotis*. Little has been recorded of the bird's habits but it was widespread and abundant, nesting in and under tussocks on the tree-less island (Cumpston, 1968). These parakeets were particularly common around the shore, where they fed on invertebrates from heaps of seaweed. For 70 years after discovery, parakeets remained plentiful on the island, but after 1880 they disappeared very rapidly and were extinct by 1891 (Hamilton, 1894).

Mawson (1943) and Oliver (1955) suggest that the parakeets were probably exterminated by feral cats (*Felis catus*). Taylor (1955) implicates both cats and feral dogs (*Canis familiaris*), whereas Law and Burstall (1956) blame the extinction on introduced wekas (*Gallirallus australis*). Feral rabbits (*Oryctolagus cuniculus*), rats (*Rattus rattus*), and mice (*Mus musculus*) are now also well established on the island, but their part in the parakeet's extinction has not been discussed.

This paper briefly reviews man's impact on Macquarie Island during the 100 years following its discovery, and discusses the ecological processes probably involved in the parakeet's extinction. The study was prompted by reading J. S. Cumpston's (1968) classic history of the island, without which it would not have been possible.

MODIFICATION OF THE ISLAND

Macquarie Island was regularly inhabited and worked by sealers immediately following its discovery in 1810. Fur seals (*Arctocephalus forsteni*) rapidly decreased, and during the years 1835-75 the island was seldom visited. The annual harvesting of elephant seals (*Mirounga leonina*) and penguins for

their oil began in the 1870s and continued until 1918 (Cumpston, 1968).

As early as 1815 it was reported that there were "innumerable wild dogs" on the island, which were causing great destruction to the bird life. Bellinghausen in 1820 found both feral dogs and cats established. There is no record of feral dogs after 1820, and presumably they died out from starvation when sealing became sporadic and when easily obtainable winter food in the form of surface-nesting albatrosses had been destroyed. However, most sealing parties continued to bring trained dogs to the island to hunt birds for food (Cumpston, 1968).

The early sealers killed and ate parakeets and also captured some alive-keeping them for pets and taking them to Sydney as cage birds. When the scientific expedition under Bellinghausen called at the island in 1820, the Russian naturalists collected 20 parakeets for museum specimens and a live one was bought from the sealers (McNab, 1907; Cumpston, 1968). Parakeets were still plentiful at Macquarie Island in 1877 when Thomson and his companions were shipwrecked for about 4 months: he "shot some parakeets, and occasionally we were successful in knocking them over with stones. . . there appeared to be great numbers of them" (Thomson, 1912).

For over 60 years the combination of man, dogs and cats seems to have had no obvious effect on the parakeet population, for in 1880 the birds were still very numerous (Scott, 1882).

The first recorded introduction of wekas to Macquarie Island was in 1872, and more were liberated in 1879 (Falla, 1937); but they appear at first to have remained scarce. Scott (1882) saw only one during a short visit in late 1880, and a sealer who in 1882 "lived for two months entirely on the resources of the island" apparently makes no mention of them (Cumpston, 1968).

Domestic "French" rabbits were taken from

Dunedin and liberated at North-East Bay, Macquarie Island, in 1879 (Cumpston, 1968). They multiplied and spread rapidly, for when Scott (1882) visited less than two years later he found them swarming at the northern end of the island. Captain Graham, who had regularly visited Macquarie Island since 1882, reported in 1884 that the rabbits had "wonderfully increased and can now be counted by thousands". Large numbers of rabbits continued to be recorded through to 1906, but they were rare in 1909-10 and appear to have still been scarce in 1918 and 1923 (Cumpston, 1968).

The cats, which Bellinghausen in 1820 recorded living wild "in the thick grass on the higher parts" of the island, appear to have remained scarce for many years. Possibly, like the present day feral cats on Campbell Island (Dilks, 1979), they avoided man and were seldom seen. Nearly all early accounts of the island fail to mention cats, probably because the sealers seldom travelled inland. For example, in 1888 the Collector of Customs, Dunedin, wrote: "From enquiries I have made about Macquarie Islands, I have ascertained that the only mammalia inhabiting the land, are rabbits which are found on the north end of the island in great abundance, feeding on tussock, or rather I think a kind of snow-grass and Maori cabbage. They are rapidly spreading and one of my informants thinks in a few years they will have eaten every green thing on the island and starved themselves out. . . I forgot to say that one man said he had seen wild cats, but the others I spoke to said nothing about such animals" (Chamberlain, 1888).

Shortly after the rabbits were introduced, cats and wekas increased markedly. By 1891 wekas were very numerous (Cumpston, 1968). In 1894 Hamilton (1894) noted how wekas had "increased and multiplied in a most extraordinary way" and that they could be seen on most sections of the coast. He also found that cats were "very numerous and of great size" and had spread over the island in the last few years.

The decade 1881-90 saw the extinction of the parakeet. The last definite sighting of these birds on the island seems to be that of Smith early in 1890; reports by Fairchild and Hamilton in 1891 were based on hearsay (Cumpston, 1968). Hamilton (1894) was at Macquarie in March 1894 and found that the sealers then on the island had not seen any parakeets during the two years they had been there. He concluded: "it seems pretty certain that these birds have either migrated or have been exterminated by the wild cats which have spread over the island within the last few years".

The numbers of cats appear to have remained

fairly high until at least 1900, but they were rare again by 1909. Wekas were in poor condition in 1895 but were still abundant in 1901. In 1913 their numbers were reported to be diminishing (Cumpston, 1968).

Mice were first recorded at the island in 1890 when H. Mellish found them damaging clothes stored there (Cumpston, 1968). However, it seems almost certain that rats did not reach the island until early in the present century—probably in stores and empty casks for the oil trade. The taxidermist J. R. Burton stayed on Macquarie for 3½ years from November 1896 to April 1900 and wrote at some length on the island's wildlife. He mentions neither mice nor rats, and does not seem to have had any trouble with rodents damaging his collections. When Burton left the island he had to leave behind a number of bird skins in a hut at Lusitania Bay. These skins were found by the Discovery Expedition in November 1901, and had been damaged by mice. The first record of rats on the island is for 1908, when the two huts at Nuggets Point were found to be "over-run with large rats", and thereafter their presence at Macquarie was reported often (Cumpston, 1968).

Early reports and most recent papers do not identify the species of rat at the island, but 11 specimens collected in 1958 and 1959 and now in

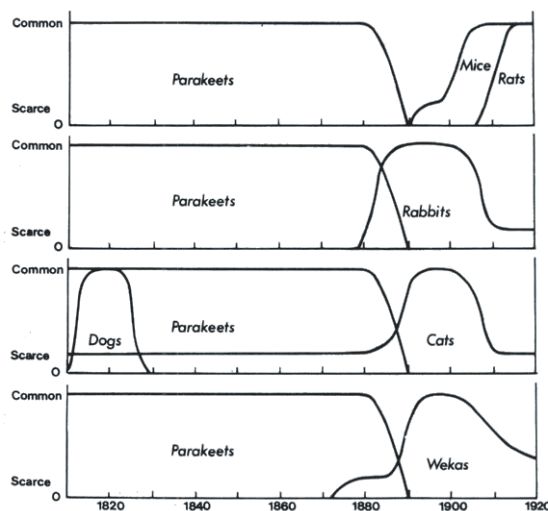


FIGURE 1. Changes in numbers of parakeets, rats, mice, feral rabbits, feral dogs, feral cats and wekas on Macquarie Island 1810-1920. Diagrammatic reconstruction from early accounts (Cumpston, 1968). Not to scale.

the collection of Ecology Division, DSIR, are all *Rattus rattus*. *R. rattus* is also the only rat listed from Macquarie Island by Simpson (1965) and Jones (1977).

DISCUSSION

The extinction of the Macquarie Island parakeet coincided (Fig. 1) with a sudden large increase in the numbers of cats and wekas apparently caused by the introduction of rabbits.

Before the advent of rabbits, the scarcity of winter food on Macquarie Island would have severely limited cat numbers. There were no other small mammals; the parakeet, the banded rail (*Rallus philippensis*), and possibly an endemic teal were the only indigenous land birds (Falla, 1937) and comparatively few sea-birds would have remained at the island during winter. Wekas would have provided additional winter prey after 1872, but they remained in low numbers until some time in the 1880s.

It is suggested that the introduction of rabbits upset the previously stable mixture. They rapidly multiplied and spread, providing an abundant and year-round food supply for cats. This may have eased cat predation on wekas and young rabbits may have provided more food for the wekas. The cats and wekas increased, immediately putting more pressure on parakeets throughout the year. This increased predation may have been sufficient to reduce parakeets from abundance to extinction in just over ten years and may also have destroyed the indigenous banded rail, which was extinct by 1894 (Hamilton, 1894).

This interpretation is supported by the work of both Davis (1957) and Pearson (1966) who found that the impact of feral cats on a vulnerable species was exaggerated if they had an alternative food when numbers of the preferred prey were low.

Macquarie Island parakeets should have been most vulnerable to predation during summer, when they were nesting, but at that time of year millions of breeding sea-birds would have provided more easily obtainable alternative food for cats. That feral cats change their feeding habits to match the seasonal availability of food was shown on Little Barrier Island (Marshall, 1961). During winter there they feed mainly on resident vertebrates (bush birds and *Rattus exulans*), but these are only a small part of their diet in summer when burrowing petrels and other sea-birds become readily available. Jones (1977) has shown that a similar seasonal pattern occurs now at Macquarie Island, with rabbits and wekas sustaining the cats in winter when burrowing petrels and penguins are absent. Derenne and Mougins (1976) have recently reported similar

seasonal food habits of feral cats on Hog Island, Crozet Archipelago.

The rapidly expanding population of wekas in the 1880s probably complemented the cats in the extinction of the ground-nesting Macquarie Island parakeet. Falla (1937) said that wekas have undoubtedly contributed to the reduction of burrowing birds on Macquarie Island, and Carrick (1957) commented on the havoc wreaked by wekas on the eggs and chicks of penguins and petrels.

One lesson to be learned from the Macquarie Island experience—apart from the obvious one of continually guarding against the introduction of exotic animals to island ecosystems—is that we should watch for new factors that can alter an island environment in a predator's favour. We must consider not only predators already present but those that might arrive in the future.

On Antipodes Island, 650 km south-east of Dunedin and 970 km north-east of Macquarie Island, there are two endemic parakeets; the Antipodes Island parakeet (*Cyanoramphus unicolor*) and Reischek's parakeet (*C. novaezelandiae hochstetteri*)—the latter closely related to the now-extinct Macquarie Island bird (Forshaw, 1973; Taylor, 1975). The vegetation of Antipodes Island in many ways resembles that of Macquarie, being predominantly tussock and herbage, with only scattered patches of low scrub and fern. Mice occur all over the main Antipodes Island and were probably introduced with stores for the castaway depot, where they were reported as common in 1907 (Waite, 1909). Their presence makes the island more favourable for cats, should they ever arrive. Thus the accidental introduction of mice, which superficially appears to have been relatively benign, may in fact have seriously compromised the long-term survival of the Antipodes Island parakeets.

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