

# PRESENT STATUS OF THE KOKAKO AND IMPLICATIONS FOR FOREST MANAGEMENT

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## ABSTRACT

*The kokako, a member of New Zealand's ancient endemic wattlebird family, began to decline in numbers and become restricted in distribution towards the end of the 19th century. This was probably because of its vulnerability to predation, and later to the removal or modification of its habitat, and competition for food with introduced mammals. Kokako utilise a wide diversity of food species and types. They are "sequential specialists" relying on particular foods at certain times of the year.*

*The survival of kokako in West Taupo forest areas scheduled for logging became the focal point of debate and research in 1978. A substantial number of kokako were detected in Puketi forest in 1979 and kauri timber production was suspended to facilitate an investigation of habitat use and needs with a view to predicting the effect of selective logging on the species.*

*The impact of past logging cannot be used to reliably predict the effect of recently developed low impact timber removal techniques on kokako populations. Some evidence might be considered to suggest that factors other than timber removal may put the long-term survival of kokako at considerable risk. However, the bird's perpetuation can only be assured if sufficient suitable habitat is available. Currently it would seem prudent to resolve forest management decisions in a manner which favours the kokako.*

## EVOLUTIONARY TRENDS

With the exception of moat bones found in post-ice age deposits, few clues revealing the historical development of New Zealand's endemic birdlife have been unearthed. However, in default of more positive evidence, differences between New Zealand's birds and their overseas relatives, and comparisons with the fossilised

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†The scientific names of birds and other animals mentioned in the text are listed in the appendix.

remains of their distant common ancestors, give some leads to evolutionary trends (Fleming 1977, 1979).

Fleming claimed that the evolution of birdlife in New Zealand is intimately linked with the country's geological development. Research conducted in New Zealand and in other Southern Hemisphere areas has indicated that, in the very distant past (around 300 million years ago), New Zealand, Australia, Antarctica, India and South America were linked together in a supercontinent called Gondwanaland.

The primitive ancestors of the moas and kiwis were present before the land connections between Gondwanaland fragments were severed and New Zealand drifted into isolation in the South Pacific Ocean. In the almost total absence of mammals (the only mammal in this archaic fauna was the short-tailed bat) these ratite birds diversified and expanded to occupy many of the ecological niches filled by mammals elsewhere in the world.

Before the Gondwanaland landmass began to disintegrate, New Zealand was colonised by the first of the early flowering plants. It managed, however, to divorce itself sufficiently from the ancestral Australian portion of the supercontinent before the primitive snakes and ancient marsupial forebears of the koala and kangaroo were able to invade the New Zealand archipelago.

The arrival dates of the ancestors of New Zealand's endemic bird families are not known precisely (Fleming *op. cit.*). Arrivals probably spanned a period of about 50 million years until the Holocene about 10 000 years ago.

There has been an evolutionary tendency in New Zealand for bird size to increase gradually (Falla *et al.*, 1979). This trend is generally associated with a reduction in flight capability, and has been held in check in other regions of the world, partly because of the importance of flight as a means of eluding mammalian predators. The mammal-free environment resulted in "genetic relaxation" (Enting and Molloy, 1982) taking place amongst the bird population. As body size increased, wings became less prominent, feathers grew heavier, and legs became more strongly developed. The flightless takahe and kakapo, both of ancient lineage, are relics from this period (McDowall, 1969). It would seem that these birds have experienced difficulty in adjusting adequately to the changing environmental conditions of the post-Holocene period and this has contributed to the situation where now only precariously small populations of the two species exist. The kokako is also a relic

from the past, but its ability to fly, though reduced, has not been lost.

### ENTER MAN

The arrival of Polynesian man, together with his dogs, rats and fire, disrupted the tranquillity of the New Zealand avian community. Over the ensuing centuries, New Zealand's primeval landscape and unique wildlife were to suffer modifications more severe in relation to time than those caused by the large fluctuations of climate which had occurred since the onset of the Pleistocene Ice Age (*circa* 2 million years ago). There is little doubt that the Polynesians were responsible for the demise of 21 of the 24 known species of moa (Duff, 1977).

Early European colonists also had a dramatic effect on the abundance of New Zealand's fauna. The forested area was quickly reduced by destructive exploitation and land-clearing activities. The impact of deforestation fell most heavily on the country's lowland forests. These were rapidly cleared for settlement and farms (Nature Conservation Council, 1981).

The substantial reduction in forest habitat, together with the activities of introduced predators, resulted in a significant depletion of the ranks of forest-dwelling birds. Some flightless species and others nesting on or near the ground were seriously affected. Browsing animals modified forests over large areas (Perham, 1922; Nelson, 1979) and predators spread throughout the mainland forests. Atkinson (1973) suggests that the spread of ship rats through New Zealand has had catastrophic effects on several species of forest birds. The suggested time of ship rat spread in the North Island has been, according to Atkinson, more or less coincidental with declines in the population of the bellbird, robin, stitchbird, saddleback, and thrush. In the South Island, in addition to these species (excepting stitchbirds which were never recorded in the South Island) declines in the population of yellowhead, South Island kokako and red- and yellow-crowned parakeets occurred during the period of ship rat spread. Atkinson does note, however, that the possible impact of ship rats in the South Island is difficult to separate from that due to stoats and weasels which were spreading about the same time. Notable amongst the forest bird species eliminated during the period of European colonisation were the huia, piopio and North Island kakapo. The survival of the small population of Chatham Island robins is still of concern despite the successful efforts of the Wildlife Service to increase the

number of fledglings by cross-fostering the first eggs laid, thus inducing the birds to relay (Anon., 1980; M. C. Crawley, pers. comm). The long-term survival of several other species, such as the laughing owl and bush wren, is also tenuous.

Land management practices which have resulted in a changed, more open environment have not always adversely affected native birdlife. The fantail, grey warbler, kingfisher, robin and tui are amongst those birds which have thrived in urban surroundings, pastoral countryside or exotic forest (Bull, 1981).

### THE WATTLEBIRDS

The huia, saddleback and kokako make up the endemic family of New Zealand wattlebirds. This family is one of the most ancient elements of the country's avifauna. The huia is extinct and the saddleback now occurs only on a few small off-shore islands. The kokako is the only member of the family still surviving on the mainland. However, while the North Island subspecies is present in moderate numbers in some areas, the continued survival of its South Island relative, despite some very recent sightings must be in doubt (Clout and Hay, 1981; Hay, 1984).

Research suggests that the original distribution of the huia was restricted to the southern uplands of the North Island and to the adjoining forests to the east (Turbott, 1967). The bird appears to have survived longest in the least accessible portion of its range. It has probably been extinct since about 1907. The huia was subjected to sustained collecting pressure both for the "curio" value of the tail features and to meet the demand for preserved mantlepiece specimens. Collectors gathered the birds in such numbers that its fate would probably have been sealed regardless of other factors. Buller (Turbott, *op cit.*) documents one case where a party of eleven Maoris bagged a total of 646 birds during a month's huia shooting expedition west of the Manawatu Gorge.

Saddleback populations had begun to decline by the 1880s. This appears to have been due primarily to the liberation of predators (Williams, 1976; Wodzicki and Wright, 1984). The bird is now found only on certain forested, cat- and rat-free islands; the North Island subspecies on Hen Island and a few other small islands off the coast of Northland and the upper Coromandel Peninsula and on Kapiti Island, and the South Island bird on a few outliers of Stewart Island. The saddleback spends periods of time feeding on the forest floor and would therefore appear to be very vulnerable to predation. The disappearance of the bird from Little Barrier and

Cuvier Islands coincided with the liberation of cat (Williams, 1973; King, 1984).

## THE KOKAKO

The kokako has been ranked amongst New Zealand's most beautiful birds. It may be seen just after dawn, staging a conspicuous singing display from prominent trees in the forest canopy. It is a dark slate-grey, and significantly larger than the tui. It has a broad mask of black around the base of the bill and over the eyes. The bird's most distinctive feature is its fleshy, brilliant ultramarine blue wattles, which arise from the apices of the gape.

The wings, which are small and rounded, are capable of supporting flights of only limited duration. The more usual mode of travel is a progression of vigorous hops and leaps propelled by the bird's powerful legs (Westerskov, 1979). Williams (1976) describes the most common method of movement as a bounding "monkey-like" hopping.

The kokako has been described as a songster of unsurpassed quality. Its wide repertoire of flute-like melodious calls includes both fluid notes and low chuckles. Its most noticeable call is a long drawn out organ note ending in an abrupt bell-like toll.

Kokako use a wide diversity of food species and types (Hay, 1981, 1984). Fruit of shrubs, small trees, podocarps and lianes, and foliage are major components of the bird's food intake. Invertebrates are an important but minor dietary component. Kokako are described as "sequential specialists" rather than food "generalists", relying upon particular foods at certain times of the year.

The kokako once inhabited lowland forests in the North and South Islands (Buller, 1882; Reischek, 1886). A rapid reduction in distribution (and probably abundance) started towards the end of the 19th century. This may be attributed to vulnerability of the bird to predation from introduced mustelids and rodents and later to competition for food from introduced browsing mammals (Atkinson, 1973; Wodzicki and Wright, 1984; King, 1984). The removal or severe modification of large tracts of forest during the early decades of the 20th century no doubt accelerated this decline.

Although the South Island kokako now appears to be on the verge of extinction, the outlook for the North Island subspecies is not as bleak. It has a discontinuous distribution with present populations often being confined to discrete areas of forests (Lavers, 1978). Present known localities include the central North Island, the larger forested areas of the Bay of Plenty and East Coast. It

occurs in several localities throughout Northland, on Great Barrier Island, western King Country and northern Taranaki. It is also reported in low numbers from the South Auckland and Coromandel regions (Lavers, 1978; O'Donnell, 1984).

Although still relatively widespread, comparative evidence suggests that the species is generally in retreat. Some groups of birds are now very small remnants of previously large populations. Reduction of the area of suitable forest and the now discrete fragmented nature of much of the remaining forest habitat mean that residual birds are unlikely to form the basis for viable populations, although individuals may continue to be present for many years because of the bird's apparent longevity (Lavers, 1978).

### A PUBLIC ISSUE

In 1978 widespread public interest in the status of the North Island kokako was generated by a nationwide debate surrounding the future management of indigenous forests in the West Taupo region, and in particular the selective logging of podocarp stands in Pureora State Forest. High populations of kokako were known to be present in areas scheduled for timber harvesting (Crook *et al.*, 1972) and fears for the safety and long-term survival of birds in those areas became the focal point of discussion.

As a result of views expressed at a seminar to discuss management options for the forests of the Rangitoto and Hauhungaroa ranges, and subsequent public submissions, a three-year moratorium on selective logging in areas known to contain kokako was imposed in December 1978. The Forest Bird Research Group (joint Wildlife Service, Forest Service and Royal Forest and Bird Protection Society team) was established to investigate the kokako's habitat and food requirements and to assess the effects of selective logging on kokako populations during the moratorium period. Other related issues, such as the competition for food and other resources between kokako and introduced mammals, and aspects of population dynamics which appeared to be relevant to the conservation of kokako were also examined. The recommendations from this research have influenced the subsequent direction of forest management at Pureora. In particular, selective logging did not recommence in known kokako habitat, the Waipapa Ecological Area was extended to embrace much of the remaining unmodified podocarp forest, and the need to control browsing mammals in kokako-occupied forest was recognised as important as was the need to initiate predator control trials.

In 1979 a substantial population of kokako was detected in Puketi Forest, Northland (Anderson, 1979). The forest had for some time been the only State forest area from which mature kauri logs had been removed. This material was used to support saw-milling, boat building, furniture making and handcraft enterprises. The identification of the kokako population, coupled with the realisation that they utilised the kauri component of the forest to some degree, resulted in an immediate suspension of timber production activities.

During the period of suspension, research is being conducted jointly by the Wildlife Service and the Forest Service to examine kokako behaviour patterns with reference to the structure and composition of the forest. This will permit the habitat needs of the species to be determined and so facilitate an evaluation of the effect of selective logging practices on the kokako and its habitat (Bellingham, 1983). The threat posed to Northland kokako by predation, competition and habitat impoverishment by introduced mammals and displacement by aggressive exotic birds (such as eastern rosella and myna) is identified by Ogle (1982). These factors, along with research recommendations and other relevant factors, will need to be carefully reviewed when formulating future management options for the forest.

## DISCUSSION

Hay (*op. cit.*) found that at Pureora Forest kokako did not occur in recently selectively logged forest. This appeared to be attributable to the abrupt reduction in the availability of food resulting from the removal of food trees and epiphytic food plants plus the disturbance of shrub tiers during logging. Immediately after logging, conditions were unsuitable for the regrowth of favoured plant species. Disturbed ground and canopy gaps are initially colonised by hardwood species and tree ferns not used by kokako to any great extent.

Kokako were present in moderately dense populations in some older cutover forests (logged *circa* 1930-50) (Hay, *op. cit.*). However historical evidence indicates that kokako numbers were greater at the time logging took place; there were also substantial areas of adjoining unmodified forest to facilitate escape and recolonisation following the return of more acceptable habitat conditions.

Tracts of logged lowland forest from which kokako now appear to be absent were generally exploited during the days when it was customary to remove all merchantable timber with little regard for

the condition and welfare of the residual forest. Studies of the impact of past logging in these areas cannot be used to reliably predict the effects of recently developed low impact timber removal techniques (such as methods based on *in situ* milling or helicopter log extraction) on populations (Bathgate, 1983; N.Z. Forest Service, 1983). However, some areas recently investigated at Pureora Forest and areas examined at Puketi Forest were selectively logged, and, as indicated (Hay, *op. cit.*), bird numbers at least in some of these areas appear to have declined.

It is perhaps conceivable that other factors such as predation, habitat invasion by alien birds and a reduction in abundance of preferred food caused by browsing mammals may, individually or collectively, put the continuing survival of the kokako in greater jeopardy than low impact timber removal. Indirect support for this prognosis may be drawn from the dramatic decline of saddleback populations in unmodified forests, and the information from faecal pellet analysis (Leathwick *et al.*, 1983) which indicated that possums, deer, and goats compete with kokako for food, causing a reduction in initially preferred food species and a downgrading of habitat.

Although kokako apparently have an ability to withstand some habitat depletion and predation and still maintain moderate numbers in some localities, it is obvious that their long-term survival is possible only if sufficient suitable habitat is available. Present evidence suggests that the kokako, adapted through a long evolutionary process to life in New Zealand's primeval forest, is unlikely to settle successfully or thrive in a much altered environment. It would therefore seem prudent to resolve future forest management decisions in a manner which favours the kokako.

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## APPENDIX

Scientific names of birds and other animals mentioned in the text  
(in alphabetical order of common names)

*Birds*

bellbird	<i>Anthornis melanura</i>
bush wren	<i>Xenicus longipes</i>
eastern rosella	<i>Platycercus eximius</i>
fantail	<i>Rhipidura fuliginosa</i>
grey warbler	<i>Gerygone igata</i>
huia	<i>Heteralocha acutirostris</i>
kakapo	<i>Strigops habroptilus</i>
kingfisher	<i>Halycon sancta</i>
kokako (North Island subspecies)	<i>Calleas cinerea wilsoni</i>
kokako (South Island subspecies)	<i>C.c. cinerea</i>
laughing owl	<i>Sceloglaux albifacies</i>
moa	<i>Petroica</i> spp.
myna	<i>Acridotheres tristis</i>
parakeet, red-crowned	<i>Cyanoramphus novaezelandia</i>
parakeet, yellow-crowned	<i>Cyanoramphus auriceps</i>
robin	<i>Petroica</i> spp.
robin, Chatham Island	<i>Petroica traversi</i>
saddleback (North Island subspecies)	<i>Philesturnus carunculatus rufuster</i>
saddleback (South Island subspecies)	<i>P.c. carunculatus</i>
stitchbird	<i>Notiomystis cincta</i>
takahe	<i>Notornis mantelli</i>
thrush (native)	<i>Turnagra capensis</i>
tui	<i>Prothemadera novaeseelandiae</i>
yellowhead	<i>Mohoua ochrocephala</i>

*Animals*

deer	<i>Cervus</i> spp.
goat	<i>Capra hircus</i>
kangaroo	Macropodidae
koala	<i>Phascolarctos</i> spp.
possum	<i>Trichosurus vulpecula</i>
ship rat	<i>Rattus rattus</i>
short-tailed bat	<i>Mystacina tuberculata</i>
stoat	<i>Mustela erminea</i>
weasel	<i>Mustela nivalis</i>