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CONSERVATION OF
KAKA IN NEW ZEALAND

A review of status, threats,
priorities for research
and implications for management

compiled by

Colin F J O'Donnell and Gretchen Rasch

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CONSERVATION OF KAKA IN NEW ZEALAND

A review of status, threats, priorities for research and
implications for management

Proceedings of a workshop held in Wellington
28 February 1991

compiled by

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ABSTRACT

Kaka (*Nestor meridionalis*) populations have been declining in New Zealand since European occupation, largely because of predation and competition from introduced animals, forest destruction and fragmentation, and hunting pressure. They are now considered a threatened species. Kaka may be one of our most difficult species to manage because they continue to decline through the combined effects of competition and predation. The effects of these factors, and the rates of decline probably vary regionally.

A workshop was convened to pool the knowledge of kaka workers, to review the conservation status of kaka, causes of decline, information needs and implications for management, to plan and prioritise research projects and to increase the awareness of Department of Conservation staff and the public by producing a document summarising the status of kaka.

1 PURPOSE OF MEETING

1.1 Background

Kaka (*Nestor meridionalis*) populations have been declining in New Zealand since European occupation, largely because of predation and competition from introduced animals, forest destruction and fragmentation, and hunting pressure (Oliver 1955, O'Donnell and Dilks 1986, Beggs and Wilson 1991).

Kaka are now rare in almost all districts of the North and South Islands, apart from localised concentrations in some large remaining areas of native forest (Moynihan *et al.* 1979, Ogle 1982, O'Donnell 1983, Saunders 1983, O'Donnell and Dilks 1986).

The kaka is now classed as a "threatened" species; that is, it will probably be moved into the "endangered" category if factors causing its decline are not removed (Bell 1986).

Kaka may be one of our most difficult species to manage. They occur in extensive forested areas of difficult terrain. Kaka appear to be declining because of the combined effect of competition and predation. The effects of these factors, and the rates of decline probably vary regionally.

Because of these concerns, and because there are a number of research programmes currently under way proposed, the Department of Conservation held a meeting on kaka on 28 February 1991.

1.2 Objectives

- (a) To pool the knowledge of kaka workers.
- (b) To review the conservation status of kaka, causes of decline, information needs and implications for management.
- (c) To plan research by organising and ranking information needs and commencing the preparation of a conservation strategy.
- (d) To increase the awareness of Department of Conservation staff and the public by producing a document summarising the status of kaka.

1.3 Workshop participants

Participants were those who have been working or intend to work on kaka conservation:

Jacqueline Beggs, DSIR Land Resources, Nelson
Alison Davis, Protected Species Policy Division, DOC, Wellington
Stephen King, NZ Native Forests Restoration Trust, Auckland
Brian Lloyd, Science & Research Division, DOC, Wellington
Ron Moorhouse, Victoria University, Wellington
Colin O'Donnell, Science & Research Division, DOC, Christchurch
Gretchen Rasch, Threatened Species Unit, DOC, Wellington
Alan Tennyson, Forest & Bird Protection Society, Wellington
Richard Toft, DSIR Land Resources, Nelson
Peter Wilson, DSIR Land Resources, Nelson

2 REVIEW OF KAKA DISTRIBUTION

The current distribution and the status of kaka populations in each conservancy of the Department of Conservation were briefly summarised (Table 1).

Kaka have declined throughout their range. They were abundant throughout indigenous forests when Europeans arrived in New Zealand but now are very rare in almost all areas.

Table 1. Overview of the current status of kaka populations (W/P=workshop participants).

Conservancy	Areas	Status	References
Northland	All mainland forests	very rare/absent	Ogle (1982), S. King pers. comm.
	Hen and Chickens Islands	common	G. Taylor pers. comm.
Auckland	Mainland forests	very rare/vagrants, probably juveniles from islands	W/P
	Great Barrier Island	moderate density	Ogle (1980)
	Little Barrier Island	common	W/P
Waikato	Coromandel	rare vagrants	W/P
	Mercury Islands	regular in very low numbers	A. Tennyson pers. comm.
	Western forests	almost gone	O'Donnell (1983), Moynihan (1986)
	Pureora/Waihaha	still moderate numbers/ highest numbers on NI mainland	Imboden (1978), S.King pers. comm.
Bay of Plenty	Mamaku Plateau	very rare/declining	Saunders (1983)
	Mayor Island	present/may be breeding	W/P
	Whirinaki	moderate numbers/ second NI stronghold	Moynihan <i>et al.</i> (1979)
East Coast	Urewera	scattered/some local concentrations/ declining recently	W/P, Saunders (1983), G. Taylor pers. comm.
	Raukumara	low numbers but could be isolated populations	S. Moore pers. comm.
Tongariro/ Taupo	All forests	Very few/ no viable populations	W/P
Wanganui	All forests	Very rare/ virtually gone	O'Donnell (1983), W/P
Hawkes Bay	All forests	Very rare/ virtually gone	W/P
Wellington	Mainland forests	very low numbers only in Tararuas	W/P
	Kapiti Island	common	R. Moorhouse pers. comm.
Nelson	NW Nelson	widespread but small numbers	Spurr (1985)
	Nelson Lakes/ Lewis Pass	low numbers	P. Wilson pers comm.
	Marlborough/ eastern forests	very few/ almost gone	W/P
West Coast	Nth of Paringa River	low numbers/ isolated pockets	O'Donnell & Dilks (1986)
	Sth of Paringa	numerous in mid and high altitude forest	O'Donnell & Dilks (1-986)
Canterbury	All forests	very rare or absent except Lewis Pass	W/P
Otago	All forests	absent except low numbers in Aspiring NP	W/P
Southland	Fiordland	low numbers throughout	W/P
	Waitutu	common	Elliott & Ogle (1985)
	Catlins	extremely rare	Buckingham (1987)
	Stewart Island	low numbers	W/P
	Codfish Island	common	W/P

In the 1800s, kaka were abundant throughout New Zealand. Between 1885 and 1900 they began to decline and were "fast disappearing" in some areas. By 1930, their distribution had become localised. Kaka numbers remained high in local populations, though some "crashed" as late as the 1960s (e.g. Northland). Kaka are now absent from most of the North Island and there is evidence that the decline is continuing in the two remaining North Island areas with apparently viable populations: Pureora and Whirinaki. Many recent sightings of kaka in isolated fragments of forest and in urban areas are of vagrant birds, probably juveniles, which wander in winter from large forest tracts and offshore islands. In the South Island kaka are still widespread through most forests, particularly in the west. Numbers have declined greatly, but not as markedly as in the North Island.

Two main strongholds remain in the North Island (Pureora and Whirinaki) and two in the South Island (southern South Westland and Waitutu). Four large populations survive on offshore islands: Little Barrier, Great Barrier, Kapiti and Codfish Islands. However, little is known of the stability of these populations.

3 SUMMARY OF RESEARCH ON KAKA

3.1 Ecology of North Island kaka on Kapiti Island

Investigator: Ron Moorhouse (Victoria University)

Objectives:

To investigate habitat use, diet, breeding biology and social organisation of North Island kaka.

To identify aspects of the birds' ecology which relate to its decline on the mainland.

Summary:

Kapiti Island supports a high density kaka population. Possums were eradicated in 1987, so Kapiti provides an example of how kaka populations respond following the removal of possums. Kaka were colour-banded and radio-tagged to allow study of their habitat use and foraging behaviour. Kaka nests were located by searching suitable habitat. A marked difference in productivity occurred between the 1988 and 1989 breeding seasons (eight nests in 1989 compared with 26 the preceding year). Chicks in three out of eight nests starved to death in 1989, though no starvation was observed in 1988. In 1988 23% of nests failed because of predation by Norway rats. The results suggest that productivity is limited by food availability even in the absence of possums. On the mainland, possums may reduce food availability and hence depress productivity further.

Study Duration: 1988-1992

3.2 Ecology and energetics of South Island Kaka in Nelson Lakes National Park

Investigators: P.R. Wilson, J.R. Beggs, R.J. Toft (DSIR Land Resources).

Objectives:

To determine habitat use by kaka and their feeding energetics in beech forest.

To record their diurnal and seasonal movements.

To monitor breeding.

Summary:

Kaka are rare and widely dispersed, and exhibit extreme changes in seasonal conspicuousness. They are therefore very difficult to find, follow and especially census. Kaka were fitted with radio-transmitters and tracked from ground and air in the Nelson Lakes area. Activity budgets, feeding rates and digestive efficiency were measured. The energy values of food items and kakas' energy expenditure were determined. The numbers of wasps, rodents, stoats and seeding of beech were indexed. These results have been compared with a long-term on-going baseline study at nearby Mt Misery. Only one successful kaka nest has been found, and the female of that nest was killed on another nest, presumably by a stoat, in the following year. Kaka in Nelson Lakes beech forests are under threat from mammalian predators, browsing mammals and wasps. The latter have reduced the availability of the birds' high energy food items.

Study Duration: 1984-

References: Beggs 1988, Beggs & Wilson 1987, Beggs & Wilson 1991.

3.3 Will supplementary feeding of South Island kaka improve their breeding success?

Investigators: P.R. Wilson, J.R. Beggs, R.J. Toft (DSIR Land Resources).

Objectives:

To train kaka to feed on high energy supplementary food items provided at feeding stations and to measure the intake of supplementary food by kaka.

To develop efficient automatic nectar feeders and solid food dispensers.

To determine whether kaka using supplementary foods breed more successfully than those not taking the food.

Summary:

The study tests the hypothesis that shortages of high energy food cause the poor breeding performance of kaka in Nelson Lakes. During summer and autumn introduced wasps cause a severe shortage of honeydew. Browsing, primarily by possums, has removed other nectar sources in these beech forests.

Silk fuchsia flowers with honey pasted on them are used to attract young kaka initially. Once the birds are conditions to artificial foods, measured quantities of honey water and solids (cheese, pine nuts) are provided each day. Marked and unmarked kaka are observed and recorded while feeding. Marked birds are followed and their activity budgets determined. About a dozen kaka regularly take supplementary food. Because all of these birds appear to be juveniles, the effect of the feeding will not be noticed until they reach breeding age.

Study duration: 1989-

3.4 Distribution and habitat use of kaka in South Westland

Investigators: C.F.J. O'Donnell, P.J. Dilks (DOC, Science & Research Division).

Objectives:

To quantify seasonal and annual variation in habitat use by forest birds, including kaka, in representative forest types in South Westland.

To map the distribution of forest birds, including kaka, in relation to altitudinal and forest type preferences in South Westland.

To develop a model for predicting the impacts of logging on forest birds.

Summary:

South Westland supports one of the largest kaka populations remaining in the South Island. Over 147 000 ha of forest were surveyed and 5334 observations of kaka were collected. Although kaka used a wide variety of foods they were not generalist feeders but sequential specialist feeders, moving from one specific food source to another seasonally. Although kaka mostly occurred in mid-altitude forests, in some seasons they moved to low-altitude forests in search of specific foods (e.g. fuchsia and rimu). The results of the study indicated that extensive overlap occurs between the preferred foods of kaka and possums. Kaka numbers decreased significantly with an increase in possum density, their history of occupation, and the extent of canopy and gully modification by possums. Information on preferred food plants also provided a framework for predicting the impacts of selection logging on kaka.

Study Duration: 1983-1986

References: O'Donnell 1991, O'Donnell & Dilks 1986, 1987, 1989.

4 CAUSES OF DECLINE

Causes of decline have been identified by independent studies:

4.1 Habitat loss

FOREST CLEARANCE: Loss of habitat was probably the initial cause of population declines. With the clearing of land for agriculture, kaka disappeared from many lowland areas, e.g., Southland and Canterbury (Oliver 1955). Kaka require very large tracts of forest to survive. For example, in Nelson Lakes National Park the majority of male kaka have ranges of up to 1600 ha, some females cover distances up to 20 km, and 30 kaka occupy a minimum of 10 000 ha (P.R. Wilson pers. comm.).

LOGGING: Logging has been a major, on-going cause of kaka decline. Review work has identified that logging (selection, partial, and clearfelling) has been highly detrimental to kaka populations. In 13 comparisons between logged areas and adjacent unlogged forests, kaka had disappeared completely from 10 sites after logging and had declined markedly at the remaining 3 sites (O'Donnell 1991).

4.2 Competition from introduced animals

Kaka are vulnerable to competition from introduced mammalian browsers because:

- they selectively feed on food types similar to those utilised by the browsers.
- their preferred habitat is prone to dieback induced by mammalian browsers.

Possums: Research has shown that there is considerable overlap between the preferred foods of kaka and possums (e.g. O'Donnell & Dilks 1986, R. Moorhouse pers. comm.) and that possums remove some of the high energy food sources that kaka probably require for breeding (e.g. mistletoe, Wilson 1984).

The possible impact of possums on kaka is being evaluated in South Westland (Rose et al. 1990). Comparison of kaka counts with possum densities and the degree of possum-induced forest modification indicates that kaka numbers declined significantly with increasing possum density and history of occupation. Forest with light canopy defoliation and unmodified gullies had significantly more kaka than conspicuously defoliated forests.

WASPS: In areas of Nelson beech forests where other high energy foods (e.g. mistletoe) have been removed by browsers, honeydew may provide essential energy during part of the breeding season. Wasps reduce the amount of honeydew available in the beech forests in late summer and autumn to a level that makes it uneconomic for kaka to feed on it (Beggs & Wilson 1987, and pers. comm.).

DEER, GOATS, PIGS, RODENTS: These browsers have probably affected kaka populations by removing palatable and high energy foods in much the same way as possums. Their impact may be less than that of possums because generally they do not feed in the canopy where kaka foods are concentrated.

4.3 Predation by introduced mammals

Kaka are vulnerable to predation because they:

- nest in deep holes and have little chance of escape from nest predators.
- have a very long nesting period (24 days incubation, 10 weeks as nestlings) and therefore are vulnerable for a lengthy period.
- have conspicuous and strong-smelling nests.
- fledge before they can fly, and therefore fledglings spend time on the ground.

STOATS: Very few kaka nests have been monitored on the mainland. Only one, which has been successful, has been monitored at Nelson Lakes. The female of that nest was killed on another nest, presumably by a stoat, the following year (Beggs and Wilson 1991). Stoats are absent from all the islands where kaka still occur in good numbers; they are present on one island (D'Urville) where possums are absent, but where kaka have almost disappeared.

RATS: Rats have been confirmed recently as predators of kaka nests. On Kapiti Island in 1988 nearly 23% of nests were preyed upon by Norway rats. Mainly chicks were eaten. There is some evidence that kiore prey upon kaka chicks on Little Barrier Island (B. Lloyd pers. comm.). Ship rats, which are much more arboreal than the other rats and are widespread and common on the mainland, could be significant nest predators.

4.4 Collection

While the effects of collection have not been scientifically assessed, it is well known that in historical times Maori collected kaka for both food and to use in feather cloaks, while Pakeha used kaka for food, for bird collections, and for pets. Parrot smuggling goes on today, and it is likely that kaka are victims of this illegal trade. The effects of this collecting on a low density species in decline would probably be significant.

5 INFORMATION NEEDS

Eight questions summarise the main areas where information is needed for effective management of kaka populations.

5.1 What are the respective roles of competitors and predators in the decline of kaka and what can we do?

Existing information indicates that currently the two principal factors causing decline of kaka populations are predation and competition. There is little information yet on the precise effect of predation and how it interacts with competition. Is predation more or less important than competition? How do the factors vary regionally and over time? Could control of either (rather than both) reverse the decline of kaka on the mainland? A research project designed to compare the productivity of kaka in various study areas with one factor, or both factors together would provide the best test of their relative

impacts. Ideally, an experimental management design with scientific controls would be required.

5.2 How do the kaka's diets vary seasonally and what are the phenology patterns of kaka's principal food species?

5.3 What is the natural periodicity of breeding?

It appears that kaka breeding is linked to the occurrence of high quality foods available only periodically. Thus kaka may not breed every year. It may be possible to predict in advance when local kaka populations will breed using knowledge of the phenology of crucial food plants. For maximum benefit local control of predators and competitors could then be targeted to the predicted breeding years. Knowledge of which specialised food plants are preferred in different regions is required to make adequate predictions.

5.4 What is the historic pattern of kaka population decline in different regions?

Documentation of the historic patterns of changes in kaka population is required in order to identify key sites for management. Patterns of change may also provide insight into the precise roles of different causes of decline by looking at causal factors operating in regions when populations crashed.

5.5 What is the taxonomy of North and South Island kaka?

Are North and South Island kakas one species or two ? Blood samples should be routinely collected in the course of field work and DNA studies be carried out to determine the taxonomy. Note: Victoria University has an ongoing project looking at genetics of parrots.

5.6 Are kaka populations genetically and physically distinct and what are the population parameters?

Information is needed on population structure, longevity and the movements of kaka. This information could be used for reserve design, determination of viable population sizes and assessing how distinct populations are geographically.

5.7 What are the effects of 1080 poison on kaka populations?

1080 poison is being used extensively for possum control in areas inhabited by kaka. Poisoning could be a greater threat to kaka than competition with browsers. Trials done by Eric Spurr (Forest Research Institute, Christchurch) on bait acceptance by captive kaka showed that they ate many, probably enough to obtain a lethal dose of 1080.

5.8 Are kaka being caught for the illicit bird trade?

Recently a group of illicit bird traders were caught smuggling kea (*Nestor notabilis*) out of New Zealand. This underlines the possibility that kaka may also be caught for the illegal bird trade.

6 HIGH PRIORITY RESEARCH PROJECTS

Three research projects were identified as being important to successful future management of kaka populations.

6.1 Review of the historic changes and current status and trends in kaka populations

Objectives:

- (a) To document the historical changes in kaka populations.
- (b) To document the current location and status of kaka populations.
- (c) To collate information on the factors affecting a variety of kaka populations and thereby assess the relative importance of each.

Methods: Literature review.

Time/Resources: Two persons/3 months.

6.2 The role of competitors and predators in the decline of kaka: Experimental management of kaka populations

Objectives:

- (a) To determine the relative importance of predators and competitors in causing the decline of kaka.
- (b) To monitor the productivity and survival of kaka populations subject to experimental management in three study areas.
- (c) To develop a management strategy for kaka conservation.

Study Areas:

- (a) North Island Mainland-Pureora: Predation and competition are both likely to be important.
- (b) South Island Mainland-Windbag: Would isolate the effects of predation. Habitat quality is still high, relatively unaffected by possums.

(c) Nelson Lakes National Park: Predation and competition both likely to be important, but the control of competitors (wasps) and the provision of supplementary food should allow assessment of the relative impacts of predators and competitors.

Methods:

Study nesting success in relation to manipulation of predator and/or competitor numbers. Will involve controlling combinations of predators, wasps, and possums (depending on the study area) using trapping and control blocks. The effects of treatments would be compared with close monitoring of breeding success of kaka, involving intensive nest searches and radio tracking of kaka. If control is successful, practical management programmes will need to be developed.

Time/Resources: 3-5 year programmes per site; 1-2 person years per site per year.

6.3 Prediction of years in which kaka breed

Objectives:

- (a) To determine regional variation in the diets of kaka.
- (b) To determine the predictability of the food sources used by kaka.
- (c) To relate food availability to breeding intensity of kaka each year.

Study Areas:

Use existing study areas (Windbag, Nelson Lakes, Kapiti) and study 6.2 (above). Expand diet and phenology studies to key North Island sites (Pureora, Great Barrier or Little Barrier Islands).

Methods:

Sample kaka diets over different seasons and years (this may require radio tracking of birds). Establish phenology lines in representative forest types.

Time/Resources: Tie in with 6.2 (above).

7 MANAGEMENT IMPLICATIONS AND CONCLUSIONS

This report has identified a large number of problems associated with the decline of kaka.

Kaka appear to be declining because of a complex interplay between competition, predation and the natural limited reproductive potential of the species. There are only 4 strongholds for kaka on the New Zealand mainland. Generalisations about the role of individual predator and competitor species in the decline are difficult to make because of differences in the suite of animals present, the time and order in which they arrived, and the forest structure. All of these vary considerably from site to site.

Management of kaka populations may be very difficult if both competitor and predator numbers must be controlled. Thus answers to questions about the relative role of these factors is crucial if management is to be achievable in the longer term. The conservation problems facing kaka parallel those facing other endemic forest birds on the New Zealand mainland; particularly kokako, kereru, yellowhead and kakariki. The projects outlined in this report are achievable with the expertise which exists. Funding would be contingent on the priority which kaka is given relative to other threatened species. It should be borne in mind that research on kaka may assist the management of other mainland threatened species.

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