

# KIWIS AND DOG PREDATION: OBSERVATIONS IN WAITANGI STATE FOREST

By MICHAEL TABORSKY

## ABSTRACT

A wild dog was found to kill 13 out of 23 kiwis marked with transmitters. The whole population may have lost 500 out of 900 birds, although this estimate may be conservative. The population will probably need 10-20 years and a rigorous protection scheme to recover to previous densities.

## KIWI STUDY

The reproductive behaviour of the North Island Brown Kiwi (*Apteryx australis mantelli*) was studied during the breeding periods between 1985 and 1987 by M. Taborsky and B. Hudde in Waitangi State Forest, a commercial pine forest near Kerikeri, Northland.

The kiwis in Waitangi Forest are important for three reasons:

1. They form the largest known and counted population of *Apteryx australis*, estimated at 800-1000 birds (Colbourne & Kleinpaste 1984; Kayes & Rasch, unpublished NZ Forest Service report 1985).
2. They have been studied since 1978. The 147 birds banded so far have provided long-term and large-scale information on the social structure of the species for the first time.
3. They constitute an apparently stable population in a commercial pine forest. Their habitat requirements are of great interest and have important implications for the management of kiwis elsewhere.

In June and July 1987, 24 birds were tagged with radio transmitters so that their spacing and reproductive activities could be studied. These birds covered an area of about 500 ha. In the main study area (approx. 80 ha) nearly all the resident kiwis had transmitters on in August 1987.

A dead kiwi, the biggest female ever caught and banded in this population, was found on 24 August 1987. Obviously it had been killed by a dog on 21-22 August.

### **Telemetry checks and carcass inspection**

Birds with transmitters were recaptured every 2-5 weeks to check their breeding status, weight and general condition and to check the straps holding the transmitters. When dog predation became evident, the frequency of checks was increased and birds were located by their transmitter signals as often as possible (i.e. largely each day and night). Whenever a carcass was found its position in the forest was noted, together with such factors as whether the body was buried, its posture, the nearby vegetation, and closeness to roads or nests. The surroundings were searched for traces and footprints. Each body was thoroughly searched for marks (e.g. bruises, dents, defeathered areas, scars, fractures) and four carcasses were sent to C. R. Veitch (Department of Conservation, Auckland) for autopsy.

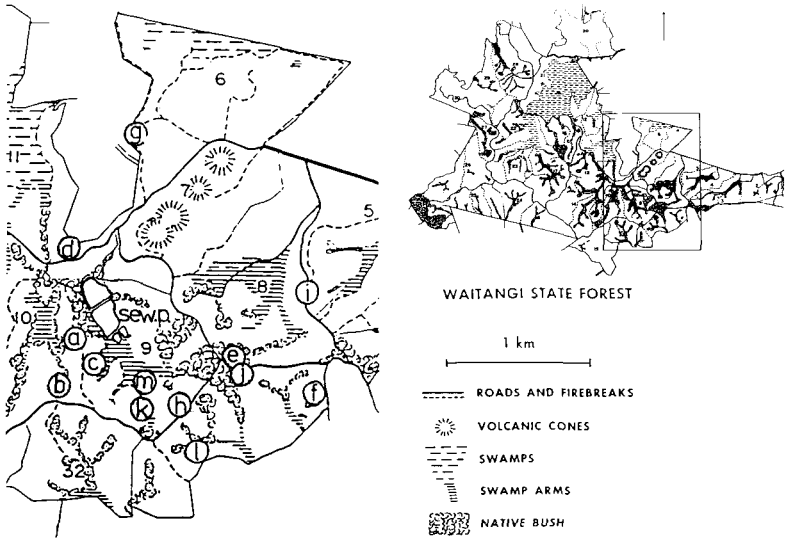


FIGURE 1 — Map showing where dead kiwis with transmitters were found (encircled letters a to m). See text for dates of kills. Exact dates and so sequence of birds, c to h, were uncertain. Numbers refer to forest compartments. The top right-hand corner shows the position of the study area rectangle that is enlarged on the left. sew.p. = sewerage oxidation ponds.

**Dead birds found**

From 21 August to 27 September 13 birds were killed of the 23 which had transmitters when the predation started. Carcass inspection, dog footprints and autopsies revealed that a dog was responsible for all deaths. Most bodies had defeathered areas, bruises (sometimes all over the body), dents in the skin and blood in the beak. The autopsy of a carcass with hardly any signs on the surface revealed that liver and lungs had haemorrhaged and been ruptured when a dog had squeezed the bird. Toothmarks in the shape of a dog mouth were found under the skin. Only one kiwi had minor open injuries (two little wounds on its foot). Ten of the 13 birds were found partly covered or completely buried under leaf litter and soil.

The letters against dates show when the birds were killed. In some, the date of death could only be roughly estimated because the interval between when the kiwi was found dead and when it had last been checked was too long.

AUGUST/SEPTEMBER																										
21	22	23	24	25	26	27	28	29	30	/	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	a		b											c	d	e	f	g	h							i
17	18	19	20	21	22	23	24	25	26	27	28	29	30													
	j					k	l		m																	

Kiwis were killed in all forest compartments (6, 8, 9, 10, 11) in which birds had transmitters, ranging from the southern to the northern edge of the forest (Figure 1).

Rogan Colbourne from the Dept. of Conservation, Wellington, searched through the forest for kiwis with Tess, a dog trained to find live kiwis. He found two carcasses in compartments 14 and 16, and forestry workers found four carcasses in compartment 7 and one on the road in compartment 8. I found one carcass of an unbanded bird in compartment 8, and I was told that possum trappers found two more carcasses, although I could not find out in which compartments.

This adds up to 10 dead kiwis without transmitters. I investigated 4 of them, and their condition suggested that they had been killed within the same period of time as the birds with transmitters.

The buried carcasses had all been covered in a similar way, and none of them was opened up or torn apart. The footprints found near some of the carcasses were all of the same size (9.5 cm for the hind foot). Dog droppings of one type and size were found in different parts of the forest, and these faeces often contained possum remains and sometimes kiwi feathers. These facts indicated that a single dog was responsible for the killings.

### **The killing dog**

On 30 September a female German Shepherd was shot in compartment 9. She had a collar but was not registered, and the long claws suggested that she had not been on hard surfaces for some time, i.e. was probably living in the forest. Her stomach was empty. The owner of the dog was not found.

Due to new captures the number of birds with transmitters was subsequently increased from 10 to 18. All survived at least until 31 October, when the study finished and the last transmitters were removed. Dog baits laid by the Department of Conservation were not taken after the dog was shot. From these facts I conclude that the destroyed dog was responsible for all reported killings.

### **The damage to the population**

The dog killed 56.5% of kiwis with transmitters (13 out of 23), and there is no reason to believe that birds with transmitters were at greater risk than those without. The course of events would even suggest that these birds were partly protected by our presence and activities, which may have deterred the dog from staying in this area. Most of the transmitter birds living outside our main study area were killed (7 of 9), whereas only 6 of the 14 birds inside were killed. Of these six of the main study area, five were killed after all the peripheral ones had been. The dog was most likely hunting at night, and at the same time we were working in our main study area on most nights.

If we assume the proportion of killed transmitter birds to be representative for the total losses, which is the only estimate available to date and might even be conservative (see above), the dog may have killed about 500 out of the estimated 900 birds. Rogan Colbourne, in a report to the Department of Conservation in 1987, gave a similar figure.

Several lines of evidence support the conclusion that the proportion of killed kiwis was very large. In all parts of the forest that were searched, dead kiwis, dog faeces with possum remains and kiwi feathers, dog footprints, or possum carcasses were found. The carcasses of the 10 kiwis without transmitters turned up despite the remote chance of finding such birds. We estimated the calling activity of kiwis on an arbitrary scale each night during our whole study and noted a major drop in the average calling rates after the reported incident. The trained kiwi dog, Tess, did not find a single live kiwi in any parts of the forest which were searched through, although she found two dead ones. Her lack of success in Waitangi may be another hint that kiwi numbers had been greatly reduced. Finally, we also know that some individual birds without transmitters disappeared during the time the tagged kiwis were killed.

Could a single dog really do so much damage? People working trained kiwi dogs at night know it is very easy indeed for a dog to spot and catch a kiwi. The birds are noisy when going through the bush and their smell is very strong and distinctive. When a kiwi calls, a dog can easily pick up the direction from more than 100 m away. With a kiwi density as high as it was in Waitangi Forest a dog could perhaps catch 10-15 kiwis a night, and the killing persisted for at least 6 weeks.

There is evidence that predation on kiwis has happened before. In an area of 18 ha on the south-east end of compartment 9, six banded birds disappeared between the study seasons of 1986 and 1987 (i.e. between October 1986 and May 1987). From our knowledge of the stability of kiwi home ranges it is most unlikely that all these birds left the area on their own account. Yet by 1987, the whole area was inhabited by only one previously uncaught bird.

The studies of McLennan (in press) and Potter (pers. comm.), as well as our study, revealed that kiwis have a very low reproductive rate. According to our preliminary calculations the population in Waitangi will take at least 8-10 years, probably 10-20 years, to recover to its previous size. This estimate is based on the reproductive rate found in Waitangi Forest and on the likely number of reproductive birds left. It assumes that no further predation on adult kiwis will occur.

## CONCLUSIONS AND DISCUSSION

This is the first account of very severe predation on kiwis. Within weeks or a few months a single dog reduced one of the largest kiwi populations, probably by half. Why could this happen?

The responsibility for the forest was recently transferred from the New Zealand Forest Service to Timberlands, a division of the recently established Forest Corporation. While the former management tried to keep the forest free of dogs and cats, under new administration the forest is no longer closed for dogs.

This change in management policy is probably not the sole cause for the events. Even with a restrictive programme the presence of a dog in the forest may have escaped notice for quite a while: we did not encounter the

dog at all, even though three of us were working in the forest for at least 6 hours every day and night, especially at dark when the dog was probably hunting. It was merely by chance that our telemetry study was in progress when this predation occurred. Otherwise, few or no dead kiwis would have been found, and the authorities would not have been alarmed.

This is a most important problem for the future. Another predatory incident like the one reported here could easily wipe out the Waitangi kiwis or reduce them to a number that could not recover. If this kiwi population is regarded as being important enough to be saved, certain steps can be taken immediately:

1. The forest has to be strictly closed for dogs. Any dog may accidentally encounter a kiwi and is very likely to kill it. Kiwis are vulnerable even to a "gentle" capture by a dog. Once a dog's interest has been aroused it may continue to take kiwis whenever it can.
2. The forest should be searched regularly for signs of feral dogs (e.g. footprints in muddy places, dog droppings) and bait laid. The intervals should be at least monthly because a dog might, within a month, reduce the population to a stage from which it cannot recover.
3. Pigs have recently been released in the forest, presumably for hunting. They are believed to be a danger to kiwi eggs, chicks, and adults hiding in their daytime shelters or breeding. These pigs should be controlled immediately, before their population can expand throughout the forest. Obviously poison must be used and not pig dogs, which would be an enormous threat to kiwis.

As the kiwi population is probably vulnerable at its present low state, other measures are worth consideration:

4. Burning and bulldozing after clearfelling are a great threat to kiwis and so should be avoided. In contrast to what Colbourne & Kleinpaste (1983) suggested our study has revealed that kiwis not only move into but even nest in clearfelled areas.
5. Cats are probably killing chicks (e.g. one of 4 chicks in 1987 may have been lost to a cat; it disappeared after a feral cat was seen close to its nest). The frequent sightings of cats in 1987 as opposed to previous years suggest that cats are increasing and should be controlled.
6. Activities of the public in the forest should be supervised more rigorously. People have stayed overnight in the forest with an unleashed dog, even though they have been well informed about kiwis being killed there by a dog.

Future research in Waitangi Forest is needed to improve our knowledge on the real extent of the damage and whether and how the population will recover.

Scientifically, this predatory incident may be viewed as a giant experiment providing unique opportunities for research on basic biology and population dynamics of kiwis (research recommendations were given elsewhere). The disappearance of kiwis from other populated parts of New

Zealand during the last decades underlines the general importance of the issue to the protection and management of kiwis.

#### LITERATURE CITED

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MICHAEL TABORSKY, *Institut für Vergleichende Verhaltensforschung der Österreichischen Akademie der Wissenschaften, Savoyenstr. 1a, A-1160 Wien, Austria, and Max-Planck-Institut für Verhaltensphysiologie, D-8131 Seewiesen, West Germany*



#### SHORT NOTE

##### Birds taking insects from car radiators

Our note describing how House Sparrows (*Passer domesticus*) search for insects on car radiators in Lower Hutt, New Zealand, Illinois, USA, and England (Flux & Thompson 1986 *Notornis* 33: 190-191) stimulated four most informative responses.

Mrs Jean Potter reported sparrows visiting car radiators at Moorhouse Avenue, Christchurch, between August and December 1985. Mr R. C. Baker had watched a male sparrow making four or five visits to his Mazda 323 before transferring its attention to several adjacent cars parked at Lake Rotoiti, Nelson Lakes National Park, in the summer of 1982-83. Mr Dick Veitch saw sparrows searching cars at the terminal building, Auckland Domestic Airport; and at a Give Way sign at the main highway junction east of Te Puke, where most cars have to pause, "The sparrow was disappearing into the fronts of these briefly stopped cars". Finally, Dr Peter Harper had seen sparrows at bus radiators at least three times in Canterbury, and on 15 January 1987 watched a pair of Greenfinches (*Carduelis chloris*) gathering insects, including two white butterflies, from the radiator of his MG Montego parked on the Arthur's Pass road.

These reports establish that the habit is widespread in cities in both the North and South Islands; that some birds learned the trick in places as isolated as St Arnaud, Lake Rotoiti; and that another species, the Greenfinch, also shows similar initiative. We are very grateful to these respondents for their observations.

JOHN E. C. FLUX and CHARLES F. THOMPSON, *Ecology Division, DSIR, Private Bag, Lower Hutt, and Department of Biological Sciences, Illinois State University, Normal, Illinois 61761, USA*