

# DISTRIBUTION AND DECLINE OF THE NORTH ISLAND BROWN KIWI (*Apteryx australis mantelli*) IN NORTHLAND

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## ABSTRACT

Kiwi distribution in Northland was surveyed during 1992, largely by listening for calls. Kiwi were recorded at 242 sites in six Ecological Districts. High call rates were recorded in the central and northern parts of Northland in forest remnants of varying sizes, but remnants over 100 ha had significantly higher call counts. Kiwi have declined in abundance and range in southern Northland since the late 1970s. Threats and potential threats to Northland kiwi include habitat destruction and deterioration, but particularly predation by dogs and other introduced mammals.

KEYWORDS: North Island Brown Kiwi, *Apteryx australis*, Northland, distribution, decline

## INTRODUCTION

Northland has long been regarded as the stronghold for North Island Brown Kiwi (*Apteryx australis mantelli*) (Ogle 1982, Marchant & Higgins 1990). During 1976-1980 surveys by the former New Zealand Wildlife Service and the Ornithological Society of New Zealand revealed that kiwi were widespread and often common in a wide area of native and exotic forest from the Brynderwyn Range in the south to Awanui and Hihi Peninsula in the north Bull *et al.* 1985). This wide distribution was also outlined by Marchant & Higgins (1990) who added that the North Island range in general had been substantially reduced by "land clearance" since European settlement.

During the 1980s the impacts of different human activities on North Island Brown Kiwi became apparent with knowledge of birds being killed by vehicles, gin traps, poisons and by dogs (Reid *et al.* 1982, Taborsky 1988, Marchant & Higgins 1990). One study in Waitangi Forest in Northland revealed that a single dog killed an estimated 500 kiwi over two months (Taborsky 1988), and many other dog-mauled kiwi were reported to authorities in the 1980s. These and other impacts, together with apparent declining ranges of all kiwi species, led to the preparation of a kiwi recovery plan (Butler & McLennan 1990). One of the first objectives of this plan was to identify current distribution and abundance of kiwi, including North Island Brown Kiwi in Northland.

## METHODS

Most of the survey was carried out by Pat Miller from January 1992 to January 1993. Many other Department of Conservation staff and volunteers assisted in the survey. At least one survey was made at each of over 300 sites within the 1970s range of kiwi. These included Sites of Special Biological Interest (SSBI) listed in the Northland Conservancy Office and where kiwi had previously been recorded, mainly during the late 1970s and early 1980s. We also visited many previously unsurveyed sites.

During daytime surveys of kiwi habitats, we recorded habitat parameters including vegetation, presence of wild animals and history of pest control programmes by farmers. These daytime surveys often revealed kiwi presence via probe holes, feathers, burrows, footprints, droppings, or reliable reports from landowners, but they gave little indication of relative abundance.

At each site night surveys for kiwi were carried out by listening from a high point for one hour after dark. Occasionally, if many calls were heard, we ceased listening after 30 minutes and moved to a new site. If no calls were heard in the first 30 minutes, listening was always continued for the full hour. Repeat visits were made to many sites, particularly those which produced "nil" returns on the initial visit, and particularly in the early stages of the survey in southern Northland. All results were recorded on standard Department of Conservation Kiwi Call Scheme cards. Because of nightly variation in call rates at any site (McLennan 1992), the average call rate provides only an approximate estimate of kiwi abundance, but sufficient for the purposes of this survey.

In the early months of the survey (January to March 1992), taped calls of kiwi were often played at the end of the listening period, including after all "nil" returns. On only one occasion however, did a bird call, possibly in response to the tapes. Kiwi did respond to tapes, but seldom by calling, e.g. a kiwi within 20 m of the tape immediately came closer, apparently to investigate the intruder. On other occasions, birds ceased calling and remained still. Because of the poor vocal response to tapes, we discontinued playing tapes after April 1992.

The area of indigenous habitat available to kiwi were calculated from data on SSBI files, and in some cases these were updated from field observations during the surveys. These calculations probably underestimate the current indigenous habitat available for kiwi, although figures for Tutamoe Ecological District between SSBI (424 km<sup>2</sup>) and current Protected Natural Area mapping (460 km<sup>2</sup>) indicate reasonable agreement (G. Carlin, N. Miller pers. comm.). Kiwi also occur in some forests of exotic pines (*Pinus* spp.), particularly Glenbervie and Waitangi forests of eastern Northland. Limits of high possum density in 1992 (Fig. 2) were ascertained by a combination of levels of die-back in key indicator species including northern rata (*Metrosideros robusta*) and kohekohe (*Dysoxylum spectabile*), and indices of possums abundance through trap-catch data with capture rates of below 25% representing "low densities" (D. McKenzie pers. comm.).

TABLE 1 – The extent of suitable habitat and call statistics indicating the occurrence and density of the Brown Kiwi in Northland Ecological Districts.

	Tangihua/ Kaipara	Eastern Northland*			Tutamoe	Hokianga	Maunga- taniwha	Aupouri
		South	Central	North				
Potential Kiwi habitat (km <sup>2</sup> )**	136	87	301	210	424	65	454	31
No. of listening sites	44	21	89	57	35	8	58	6
No. of sites where Kiwi called	10	0	60	46	23	6	44	0
Mean no. of calls/h x site	1.2	0	4	6.5	4.2	5	4	0
Max. no. calls/h	5	0	41	40	52	10	24	0

\* Eastern Northland was divided arbitrarily into three subdistricts: southern (south of Whangarei), central (between Opuia and Whangarei), and northern (north of Opuia).

\*\* Shrubland and native forest habitat on the SSBI database. Excludes exotic forest.

## RESULTS

Kiwi were recorded at 242 sites spanning six Ecological Districts. The highest call rates were recorded in parts of four central Ecological Districts: Eastern Northland (north of Whangarei Harbour), Tutamoe, Hokianga and Maungataniwha, all of which averaged four or more calls per hour (Table 1). No kiwi were recorded in Aupouri Ecological District and none have been recorded from Te Pahi this century. None were recorded in eastern Northland south of Whangarei Harbour, but a few were heard in Tangihua and Kaipara Ecological Districts. One "new" population was confirmed west of Pouto on North Kaipara Head, over 50 km south of the nearest known population (Fig. 1).

Areas with high call rates (> 16 calls/h) were in five clusters:

1. Mangakahia-Marlow-Purua: Three forest remnants of 3,000 ha, 300 ha and less than 100 ha, respectively, north-west of Whangarei. One other site in this area, Motatau (450 ha forest), had a call count of 15 calls/h, while Rarewarewa (less than 100 ha forest), linked by bush remnants to Purua Reserve, had a count of six calls in 30 minutes, and in December 1993 produced call counts of up to 30 calls/h.
2. Mimiwhangata-Hikurangi: Three sites, comprising one small (137 ha) forest remnant not connected to other sites, and one large (1,540 ha) forest area. These were covered by three listening stations, one at Mourees Bay, one at Mimiwhangata and one along the Kaiikanui Road.
3. Northern Bay of Islands-eastern Puketū: Seven sites, ranging from a 15 ha forest remnant to a 3,000 ha exotic pine forest (Waitangi). Many sites of contiguous or semi-contiguous kiwi habitat were scattered throughout this region.
4. Waipoua-Trounson: Three native forest sites comprising Trounson (525 ha), Katui (308 ha) and Waipoua (10,000 ha). However, the "high altitude" (500-700 m a.s.l.) Waima and Mataraua Forests which are contiguous with Waipoua Forest, presented nil returns for five hours of listening.

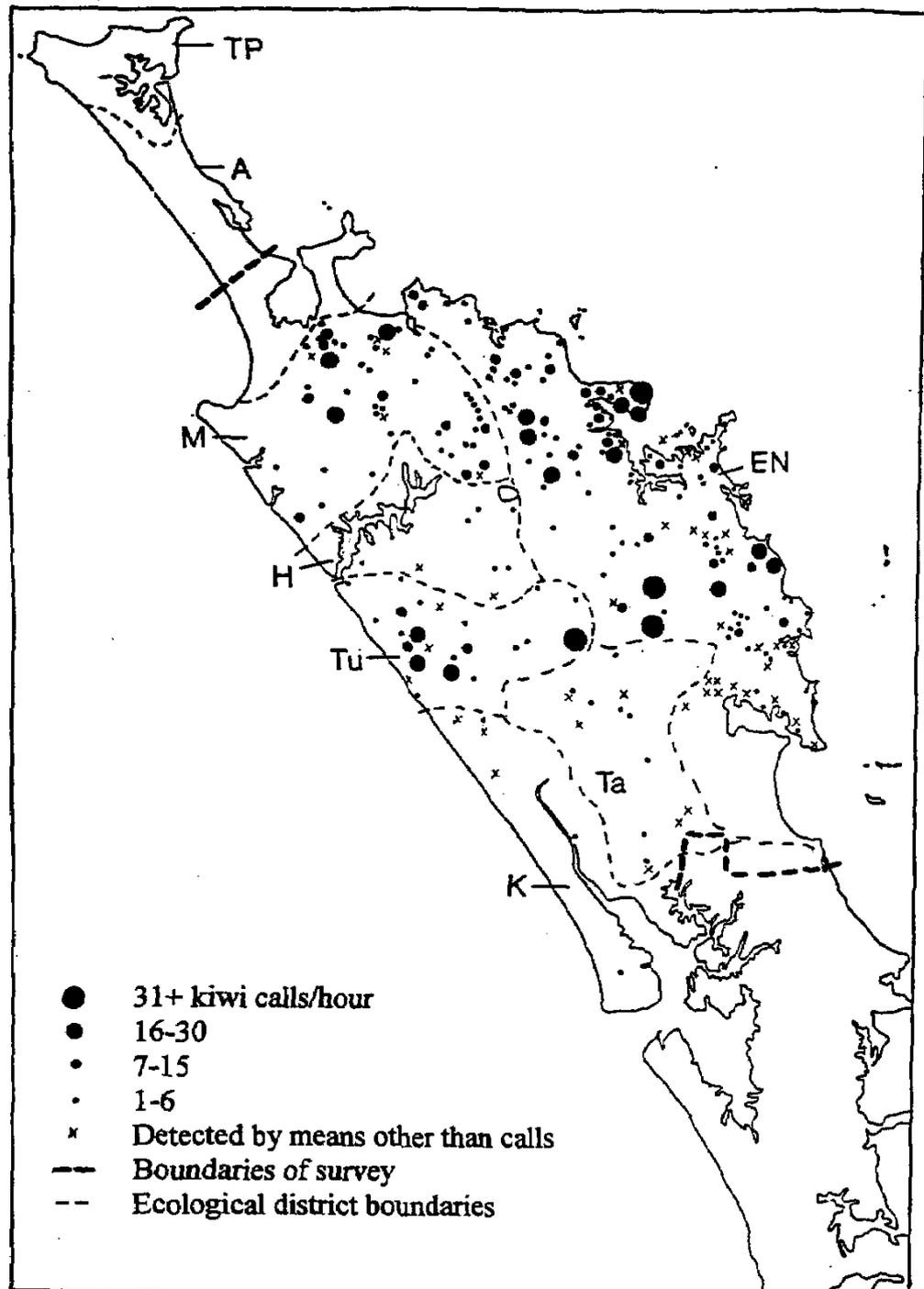


FIGURE 1 - The distribution of the Brown Kiwi and the frequency of Brown Kiwi calls in Northland during 1992. Ecological districts - TP = Te Pahi; A = Aupouri; M = Maungataniwha; H = Hokianga; Tu = Tutamoe; K = Kaipara; Ta = Tangihua; En = Eastern Northland

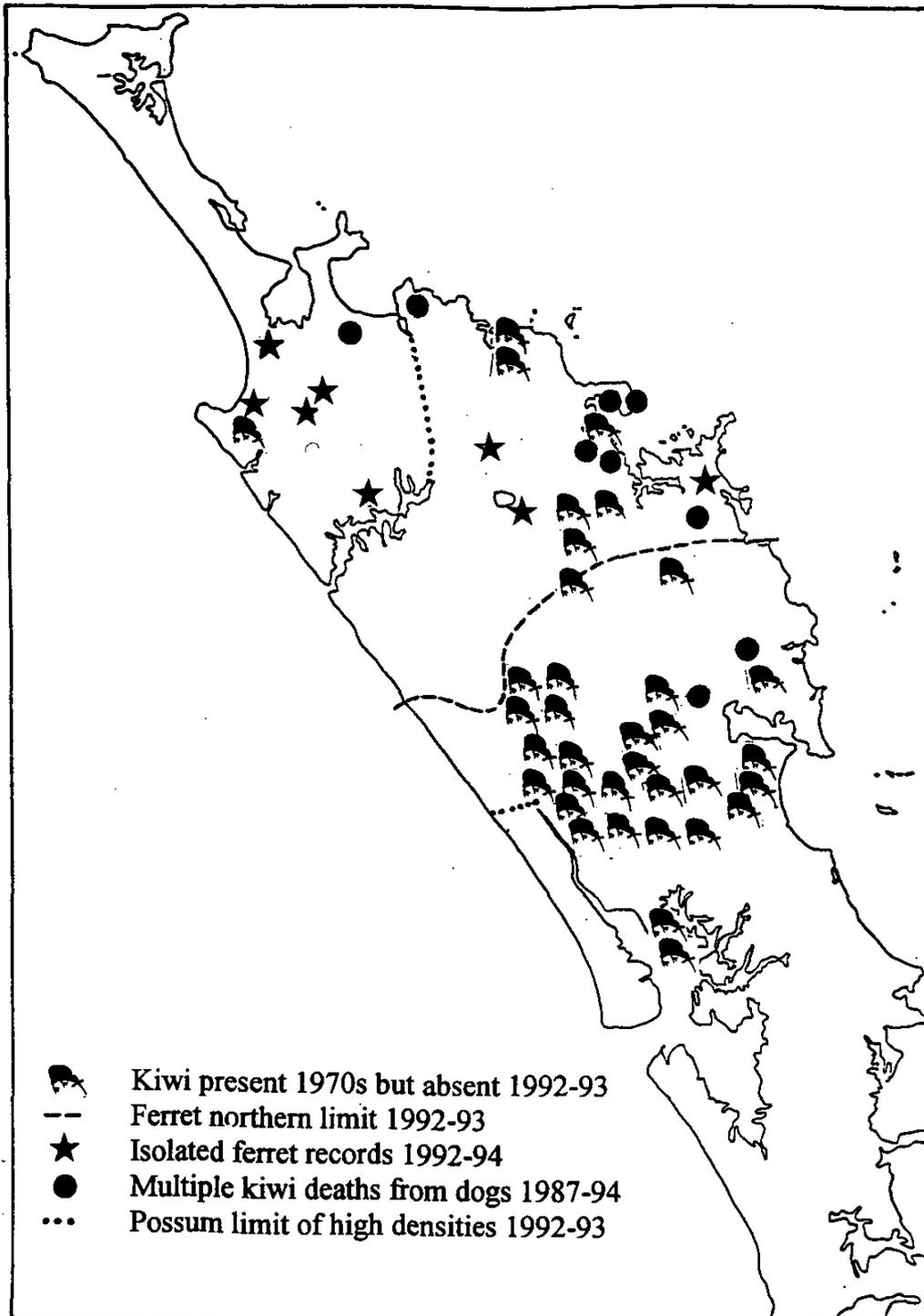


FIGURE 2 – The decline of the Brown Kiwi in Northland and the incidence of predatory mammals.

TABLE 2 – Size, number and call statistics in Northland sites where Brown Kiwi call rates exceeded 16 calls per hour.

	Size of habitat (ha)				Total
	<100	100-500	500-1000	>1000	
No. of stations	133	70	14	101 (34)*	318
No. of stations with high call counts**	4	8	2	6	20
Proportion of high call count stations, %	3	11	14	6	8

\* The figure in parentheses indicates the total number of forests; some of these had two or more census stations.

\*\* Defined as the 20 locations with the highest call numbers recorded.

#### 5. Northern Maungataniwha: Three native forest sites including western Raetea (13,000 ha) and two 50-55 ha remnants.

The 20 sites with highest call counts had widely differing sizes with a trend towards higher call rates in larger areas. This was significant when sites of less than 100 hectares (3% of which had high call counts) were compared with sites over 100 hectares (8.6% of which had high call counts,  $X^2 = 3.90$ , 1 d.f.,  $P < 0.05$ ).

Most of these sites had habitats dominated by old growth, secondary or cutover forest ( $n = 15$ ), with the remaining five sites being dominated by shrubland (3) and exotic forestry (2). There was an approximately even distribution of tenure with nine of the top 20 sites being administered by the Department of Conservation and 11 being in private ownership. There was, of course, considerable overlap of kiwi populations across legal boundaries where habitat was suitable.

One striking pattern is the loss of kiwi from southern Northland. Surveys in the late 1970s by the NZ Wildlife Service and the Ornithological Society of NZ revealed that kiwi occurred in 18 of the 20 1000 yard grid squares south of Whangarei, including in the Brynderwyn Range, Mareretu Forest, Ruakaka Forest and Tangihua Forest (Bull *et al.* 1985). Using similar methodology, the 1992 survey located kiwi in only nine grid squares south of Whangarei, and kiwi were either locally extinct or extremely rare in the four areas mentioned above. Of 35 individual Northland sites that have apparently lost kiwi since the 1970s, 26 are south of Whangarei (Fig. 2).

The contraction of numbers and range in the south does not correlate directly with presence of pigs and/or dogs. Pigs are absent from, or only recently arrived at, most of these southern sites, including Tangihua Forest where past dog activity has probably been only peripheral (A. Gardiner pers. comm.). However, two potentially threatening pests which have increased to high densities in southern Northland are possums (*Trichosurus vulpecula*)

and ferrets (*Mustela furo*). Possums have been recorded disturbing kiwi in large burrows in other parts of New Zealand (J. McLennan, H.A. Robertson pers. comm.), and ferrets have been recorded killing captive and wild kiwi (P. Anderson, J. McLennan pers. comm.). By the early 1990s, possums were abundant to the Hokianga-Mangonui area in the north (Fig. 2), while ferrets, which formerly reached the eastern Kaipara at their northernmost point in the 1960s (Marshall 1963, King 1990), had advanced at least 80 km northward to southern Waipoua, east through Mangakahia and Whangaruru, with many scattered records further north. During the late 1980s and 1990s many landowners reported their first sightings of ferrets in these areas. During this period ferrets also reached the centres of extensive forests in Northland including Tangihua and Puketi Forests.

### DISCUSSION

Forest clearance in Northland during Maori and particularly European occupation has greatly reduced the habitat available to kiwi today. During the five years 1978-1983, over 13,000 ha of forest was lost, largely for conversion to exotic forestry (Anderson et al. 1984). Whilst this rate of native forest loss has declined in recent years (partly due to the recent advent of the Resource Management Act and Native Forests Amendment Act, and especially the withdrawal of monetary incentives for land development), there is still significant pressure on shrubland and other small patches of forest, particularly to make way for exotic forestry (P. Anderson pers. comm.). Shrubland is a particularly important habitat type for kiwi (McLennan *et al.* 1987, pers. obs.) and these and other small bush patches often provide important corridors for kiwi moving between larger remnants (Potter 1990). The loss of these linkages effectively isolates small populations, preventing the dispersal of birds and reducing the ability of populations to recover from local impacts like predation.

Whereas kiwi have clearly suffered due to habitat loss in most regions of Northland, there are many areas of protected native forest from which kiwi have disappeared or declined significantly since the 1970s. Many of these are clearly attributable to dogs as large numbers of dog-mauled kiwi have been found since 1987. In eastern Northland, recent (1987-1994) reports of multiple (4+) kiwi maulings have come from Pukenui Forest, Glenbervie Forest, Waitangi Forest (2), Russell Forest, Opuia Forest, Purerua Peninsula (2), Hihi Peninsula and Taipa. Most of these incidents have involved single stray dogs, including a Taipa house-based dog which repeatedly returned home with dead kiwi in the late 1980s-1990 and where the 1992 survey revealed that no kiwi were left. Two landowners on contiguous farms fringing kiwi habitat on Hihi Peninsula claim to have shot about 70 feral/stray dogs including pups over a period of 15 months in 1991-92. Autopsies of one family of feral dogs from Whangaruru revealed a varied diet of sheep (*Ovis aries*), rodents, kiwi, other birds and their eggs, and berries (R. Pierce unpublished).

A recent survey in the northern parts of the kiwi range in Northland has revealed that dog predation of kiwi is still frequent. Over 50% of

landowners whose land fringes or includes good kiwi habitat are able to describe incidents of dogs killing kiwi (W. Sporle pers. comm.). The growing evidence of dog predation indicates that the 'Waitangi incident' of 1987 in which a dog killed possibly half of the kiwi in that forest (Taborsky 1988) was not a one-off incident, but an ongoing problem. Continuous dog control by farmers on Purerua Peninsula has proved very effective in maintaining high numbers of kiwi (e.g. 40 calls/h in July 1993) in that area. Long-term control of dogs could be more readily achieved in and around some of the smaller reserves rather than in extensive forest, and is currently being implemented in many areas.

Dogs may be the single most important factor in adult kiwi mortality in the northern and eastern parts of Northland, but they are not so readily implicated in the large contraction of kiwi range in southern Northland. Southern Northland has had the added pressures of high possum and ferret numbers. Possum control operations had some negative impact on kiwi there in the 1970s (Gardiner 1993). The range of ferrets in Northland appears to be extending northward quickly, particularly so since the late 1980s, with recent reports from near Cape Brett, Puketi Forest, northern Hokianga and Kaitaia. Demographic data on ferrets and other predators in Northland are currently being analysed following a Northland Polytechnic survey (P. Manson pers. comm.). The ability of ferrets to find rodent prey year round in at least some Northland broadleaf forests (R. Pierce unpublished), including areas of over 2000 mm annual rainfall (compared with a rainfall limit of < 1500 mm reported elsewhere in New Zealand; Marshall 1963, King 1990) presents a challenge to retain kiwi on the Northland mainland.

Possums have reached high densities in most kiwi habitats in Northland (D. McKenzie pers. comm.). Clearly there is a need to understand the relative threats of these two recent invaders and how those threats compare with those of stoats and cats which have been present for over 100 years. If, for example, ferrets have a negative impact on kiwi, targeted control programmes will need to be implemented in key areas. Research currently underway near Whangarei aims to answer questions of relative impact.

Kiwi management in Northland has been stepped up to phase II of the Kiwi Recovery Programme, focusing primarily on dog control (both directly and through advocacy), but also on habitat protection and management. This includes providing advice to land owners, forest owners and community groups. Meanwhile, kiwi numbers are monitored by call count annually at 24 sites throughout the region.

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