# DISTRIBUTION OF KOKAKO (*Callaeas cinerea wilsoni*) IN THE HUNUA RANGE

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ABSTRACT

Four surveys for Kokako were conducted in the Hunua Range between November 1986 and May 1988, by playing tapes of the local song dialect. Three of the four surveys were done in conjunction with the Auckland and South Auckland branches of the Ornithological Society of New Zealand. Forty Kokako were recorded, of which 12 were definitely in pairs, one was a definite juvenile and another a possible juvenile. Some of the remaining 26 were likely to have been paired.

Thirty-eight birds were recorded in tawa-podocarp forest and two in adjacent second-growth scrub. The 40 birds ranged in altitude between 300 and 660 m a.s.l. with an average of 490 m. They were distributed in the following catchments: Mangatangi (20 birds), Mangatawhiri (12), Orere (5), Tapapakanga (2) and Hauarahi (1). Most records were of birds heard rather than seen, and tape responses were low compared with those in surveys elsewhere.

Comparisons are made with past surveys and survey techniques, and the discussion includes options for forest management in the Hunua Range.

## INTRODUCTION

The North Island Kokako (*Callaeas cinerea wilsoni*) is the only member of the wattle-bird family, Callaeidae, to remain on the New Zealand mainland. Bell (1986) listed the North Island Kokako as "endangered" and "under grave threat from destruction of habitat and by predation". The Kokako's range and numbers are continuing to decline; from the most recent estimates (J.R. Hay, in prep.) fewer than 2000 birds are thought to remain. Recent surveys (Hay 1981) * have shown that up to two-thirds of occupied Kokako territories may contain only single birds. The densest populations tend to be in forests with the lowest densities of browsing mammals (Leathwick *et al.* 1983). Black rats (*Rattus rattus*), Norway rats (*R. norvegicus*), mustelids, feral cats (*Felis catus*) and possums (*Trichosurus vulpecula*) are all potential nest predators. Mice (*Mus musculus*) may also prey on nests, but Baden (1979) found no evidence for this in a study of mice in the Mangatangi Valley, Hunua Range.

In the Auckland Ecological Region, Kokako are now confined to the Hunua Range (Figure 1). St Paul & McKenzie (1974) estimated that 250 to 300 Kokako were in the Hunua Range in 1957, but the estimated population had dropped to 50 by 1967. A greater number of searchers in 1971-1972 counted a total of 60-70 birds (St Paul & McKenzie 1974). The same authors, on the basis of this more intensive search, suggested that the 1957 and 1967 estimates had been too low and that there might have been up to 500 birds in 1957, although some of the searchers had doubts that the population was as high as this. The most recent survey before the work outlined in this paper was that of the Wildlife Service Fauna Survey Unit (FSU) in 1981 (FSU report 1981); it found only 15 birds, centred around the Kohukohunui trig track (Figure 2).

* Unpubl. report. Forest & Bird Research Group Report

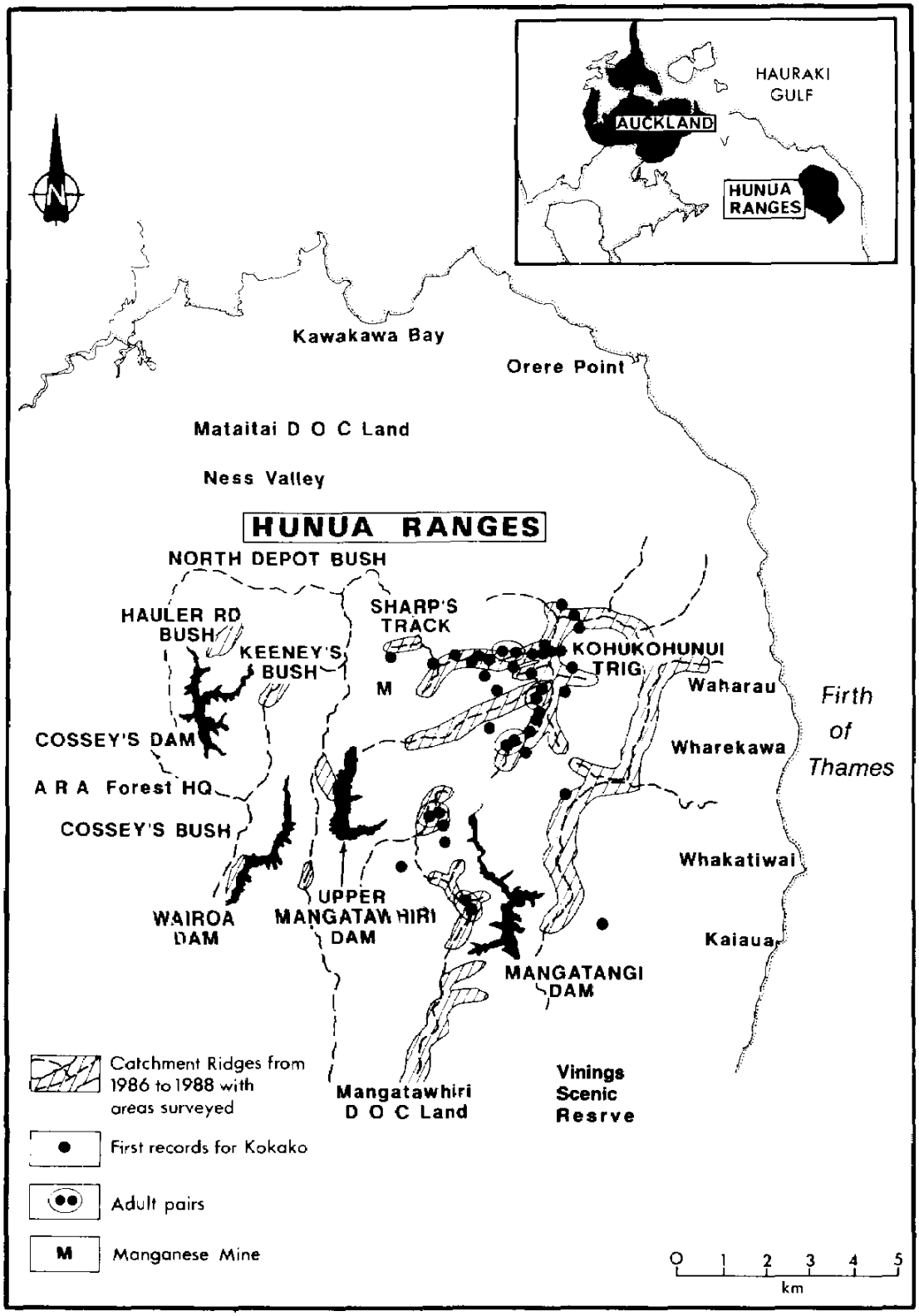


FIGURE 1 — Distribution of the 40 Kokako in the Hunua Ranges, surveyed from November 1986 to May 1988

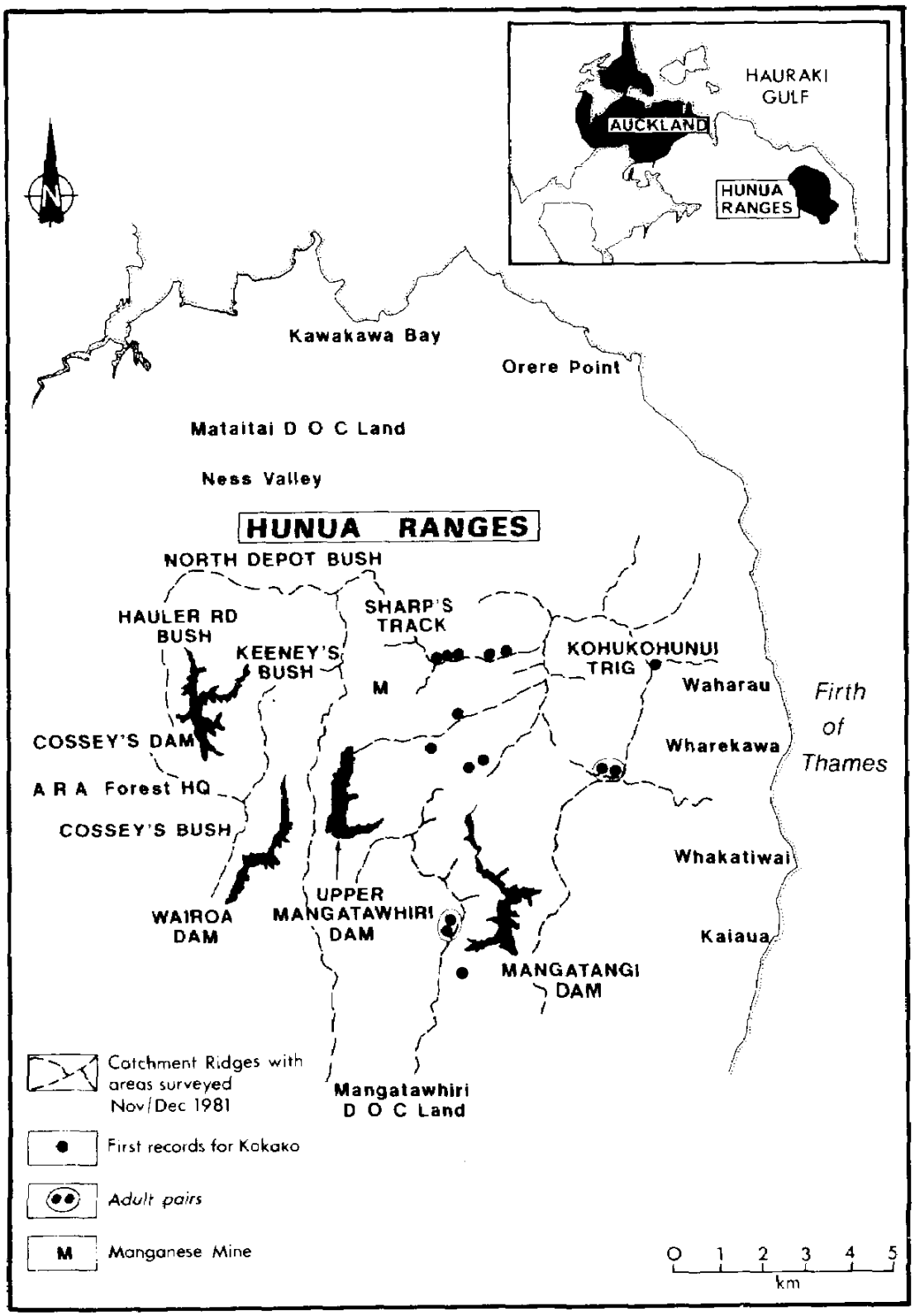


FIGURE 2 — Distribution of the 15 Kokako in the Hunua Ranges, surveyed November1981 by the FSU team

Since the mid-1950s there have been very few reports of Kokako breeding in the Hunua Range. However, a report of two juveniles seen adjacent to the Kohukohunui track in April 1986 by B.R.M. was of considerable interest, as it suggested that some birds might still be breeding successfully in the area.

In 1986-87, the Auckland Regional Authority (ARA) and Ecology Division, DSIR, conducted another survey of the Kokako in the Hunua Range to determine their present distribution and breeding status. This was a timely survey because large areas of regenerating bush were thought to provide potential habitat for young Kokako to move into. The study was carried out in four main parts – an initial late spring/early summer (1986) survey by the authors, and more detailed surveys by the authors with assistance from members of the Ornithological Society of New Zealand (OSNZ), and the ARA, in autumn and spring 1987 and autumn 1988.

All map references are to be found on NZMS 260.

## STUDY AREA

The Hunua Ranges (30° 10′ S, 175° 05′ E) are about 40 km southeast of metropolitan Auckland and adjacent to the Firth of Thames. The area is characterised by blocks of faulted Mesozoic greywackes and argillites which have been tilted from west to east in a series of backsloping steps rising to a maximum height of 685 m at the Kohukohunui trig.

The climate is moist; rainfall increases from east to west (Hunua Forest Working Plan 1984), with the eastern slopes receiving about 1500 mm and the western slopes higher than 600 m receiving over 2400 mm (Barton 1972). Snow has been recorded occasionally. Most wind is from either the southwest or the north.

Some 16 400 ha of the range is Water Reserve land, and this area and the adjacent recreational fringelands with public walking tracks are administered by the ARA.

Much of the original forest was cleared for farming between about 1890 and 1920. The forest types of the Hunua Range have been described by McKelvey & Nicholls (1957, 1959), Silvester (1963) and Barton (1972). Indigenous forest covers approximately 60% (150 km$^2$) of the range, and the remainder consists of exotic forest, farmland and shrublands in varying stages of regeneration. Goats (*Capra hircus*), pigs (*Sus scrofa*) and possums have been present for the last 100 years. Browsing mammals have drastically affected the regeneration of some important canopy species such as northern rata (*Metrosideros robusta*) and have eliminated many food-bearing understorey species.

Past measures to control noxious animals may have been ineffective, as populations appear to be increasing and there are abundant signs of damage (ARA staff and OSNZ survey members, pers. comm.). Black and Norway rats, feral cats, and mustelids are also present.

The areas chosen for the surveys were tracts of native forest that fitted the criteria of being unmodified, having a large number of plant species and

high structural diversity, having many fruiting species, and having forest on low ridges and spurs rather than just in deep gullies.

These areas were divided into four categories: those with recent (1986) Kokako records, those with 1980-86 records, those with pre-1980 records, and those with no Kokako records but which appeared to be suitable for Kokako. The last were included because some younger regenerating forest might have been colonised by young birds or because previous surveys may have missed birds. Excluded from the survey were exotic plantations, areas of fern, manuka and kanuka scrub, and other very young native scrub associations. There have never been any reports of Kokako from these habitats in the Hunua Range (St Paul & McKenzie 1974). However, in many places the tape would have been audible to birds in such areas where they were adjacent to mature forest.

## METHODS

The survey method used was similar to that described by Hay (1981) and Hay *et al.* (1985), with minor modifications. A brief initial reconnaissance was made over several days, covering major roads and access points to main tracks.

The survey used a series of listening posts along ridges at c. 500 m intervals. Wherever practicable, high vantage points overlooking valley systems were used. The observer stopped at each listening post and, before playing the Kokako song tape, spent a few minutes listening so as to help distinguish tape versus non-tape responses. The Kokako song tape was then played for a few minutes on a cassette recorder. This tape was of the Hunua 'dialect' recorded in the 1970s by C.R. Veitch of the Wildlife Service. The observer then listened for a few minutes. If a distant or incomplete response was heard, the whole process was repeated several times for verification. In clear, fine weather the taped song could occasionally be heard several kilometres away, as could the Kokako response. As a result of this, a variable area was often covered – probably larger than intended and larger than shown in Figure 1.

Surveys were conducted in fine calm conditions wherever possible, as Kokako are apparently not as vocal in windy or wet conditions (Hay 1981) and calls are difficult to hear.

The period from half an hour before sunrise to about two hours after sunrise was used as the main survey period, as Kokako call most at this time of day (Hay 1981). Tape-playing and listening were also done throughout the day, especially in late afternoon when Kokako are again more active (Hay 1981). Some of the spring 1986 survey was conducted at suboptimal times and in poor weather. However, it was considered important that as much habitat be covered as possible to get an accurate population estimate. ARA forestry and water supply catchment roads and tracks, and ARA survey and public walking tracks, were used wherever possible.

### November/December (1986) survey

This part of the survey was carried out by the authors on the Kohukohunui track, on two days of survey on other ridge systems after overnight stays at the Kohukohunui trig, and on several old, often poorly defined tracks. All other sites were surveyed by B.W.H.M. alone on single morning visits.

Several ridges in the upper Mangatangi catchment were not covered because there were no tracks and a guide was not available. These were noted to be surveyed in the autumn (April) survey.

**Autumn (1987) survey**

This was carried out in two periods.

(a) In Easter 1987, in conjunction with OSNZ members, we concentrated on areas where Kokako were found in the November/December survey, areas not covered by the earlier survey, and areas with post-1980 records (FSU 1981 and R. Isemonger, pers. comm. 1986).

(b) On 4 and 5 May, we covered a ridge system encompassing ARA catchment, ARA fringeland, private land, Mangatawhiri Forest, and Vinings Scenic Reserve; the last two areas are now managed by the Department of Conservation (DOC) (see Figure 1).

In the Easter survey, each site surveyed was checked on the two consecutive mornings of 17 and 18 April by the same group of observers. This allowed for the variability of Kokako calls from morning to morning in apparently perfect conditions, and for observers to become familiar with the terrain and so better to locate calling birds later in the day or the following morning. One observer from the group approached the calling bird if it was within 100 m and the terrain allowed. The observer then tried to see whether there was a pair of birds and whether any juveniles were present. Juveniles were distinguished by plumage characteristics, voice and wattle colour. Compared with adult song, young Kokako song is very rambly, harsh, and quiet. For a month or two after leaving the nest, the young have wattles which are pink/lilac in colour and are smaller and duller than in adults. None of these criteria are very obvious (J.R. Hay, pers. comm. 1986).

The other observer or observers remained on the track and recorded details including time and duration of call, distance and compass direction. They took care not to over-count, and they checked later with other groups to avoid double counting of distant calls and birds which moved between survey areas. In May the methodology was identical to that at Easter.

**October 1987 survey**

The methodology of the October 1987 survey was identical to that of the autumn 1987 survey. Surveying was done on the two consecutive mornings of 17 and 18 October, again in conjunction with OSNZ and ARA members. All the same areas were covered, plus an extra ridge system from Mt Kohukohunui between the Mangatawhiri and Konini (Mangatangi) catchments, and the Pukapuka ridge system (see Figure 1).

**Autumn 1988 survey**

The autumn 1988 survey was done over two days (30 April and 1 May) by B.W.H.M. and OSNZ members on the Kohukohunui track, to try and obtain a more accurate picture of Kokako distribution in this area, which has the highest population and most records of Kokako. Observers were allocated sections of the track; the general methodology was otherwise the same as in earlier surveys. On the second day a few other sites of known pairs (Goss track and Pukapuka ridge) were also visited (see Figure 1).

In addition to these four main surveys, other Kokako observations made over this period, mainly by ARA staff, were also noted.

## RESULTS

During this study, 40 Kokako were detected: 14 were found on the November/December 1986 survey, 11 were added in autumn 1987, 14 in spring 1987 and only one further bird was discovered on the autumn 1988 survey.

The distribution of the 40 Kokako (using first records) is shown in Figure 1. The 15 records of the FSU (1981) are shown for comparison in Figure 2. Figure 3 graphs the decline of Kokako in the Hunua Range based on population estimates from 1957 to the present study.

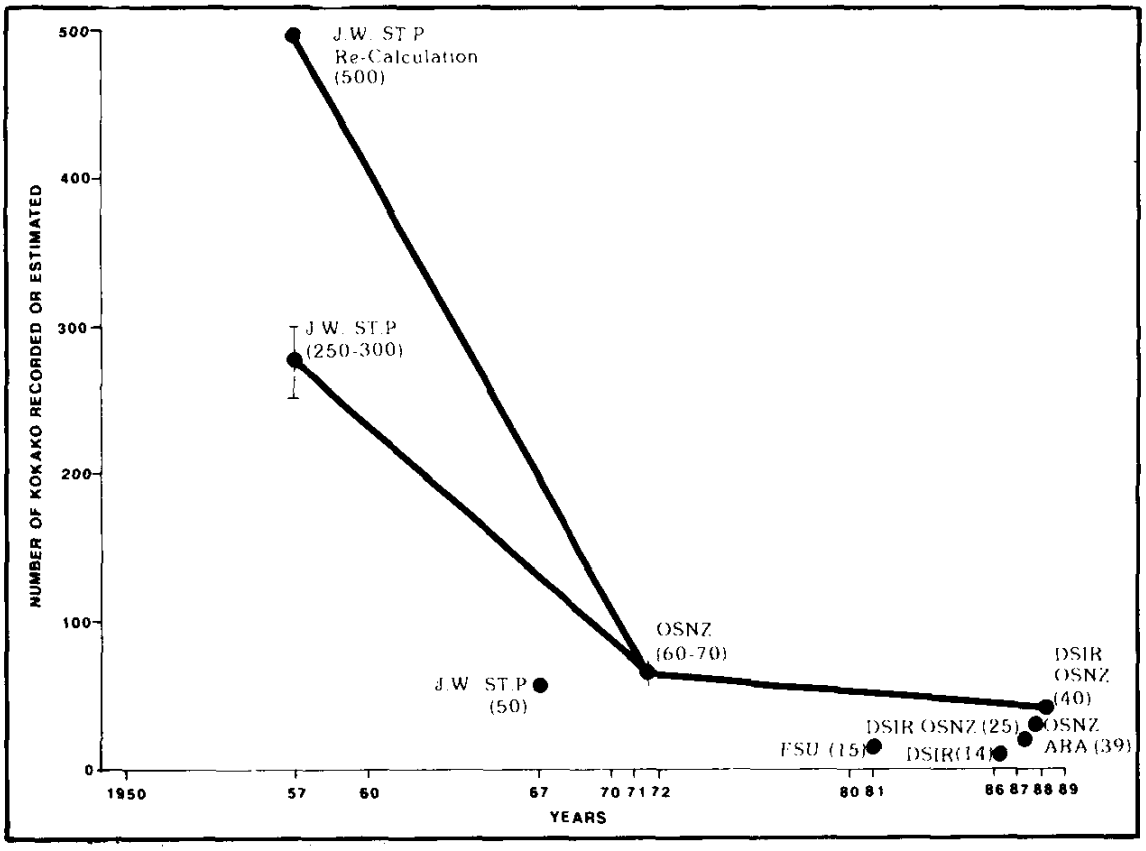


FIGURE 3 — Kokako population surveys 1957-1988

Table 1 contains the records of B.R.M. from the Kohukohunui Track between December 1985 and December 1986, some heard while accompanied by OSNZ and Royal Forest and Bird Protection Society members. Detailed results of the four main surveys are given in Tables 2-4.

In April 1986, two juvenile Kokako were sighted from the Kohukohunui Track as they flew towards a parent bird when it called nearby. Thirty-one (78%) of Kokako in this study were recorded from the Kohukohunui/Waharau track and the adjacent ridge system. This is where the majority of sightings have been made in the last 20 years.

Locations with previous Kokako records, but where none were found in this study, included (see Figure 1): the Mangatangi Hill (S12 060510) in 1979 (S. Browne, pers. comm.) and the adjacent Home Guard track

TABLE 1 — Kokako records of B. R. McClure, December 1985 to December 1986, for Kohukohunui track

| *Date* | *Time (h)* | *Kokako seen/heard* | *Catchment* | *Comment* |
|---|---|---|---|---|
| 2.12.85 | 0800 | 1 heard | Mangatawhiri | 20 min up Kohukohunui track. Wind 4 NE, cloudy, showers. |
| 28.2.86 | 0800 | 1 heard | Mangatawhiri | 20 min up track. Wind 0, overcast. |
| 3.4.86 | 0900 | 2 juveniles seen; flew to adult calling | Orere | 25 min up track. Wind 3 SW, partly cloudy, showers. |
| 1.5.86 | 0900 | 2 heard | Mangatawhiri | 20 min up track. Wind 0, cloudy. |
| 3.6.86 | 0830–1000 | 3 heard | Mangatawhiri | 20–25 min up track. Tape played (not local). Wind 0, cloudy. |
| 2.7.86 | 0800 & 1200 | 3 heard<br>1 juvenile heard | Mangatawhiri | 20–25 min up track. Wind 3–4, southerly, fine, cold, 2°C at trig at 1000 h. |
| 2.9.86 | 0900 | 1heard | Mangatawhiri | 20 min up track. Wind 3, southerly, cloudy, showers. Others heard 1 below Kohukohunui trig. |
| 28.9.86 | 0900–1000 | 2 seen | Mangatawhiri | On track. F & B members (12) photographed and played tape (local), watched 10 min. Wind 2, westerly, overcast. |
| 1.12.86 | 0750–0800 | 2 heard | Mangatawhiri | 20 min up track. 1 close & 1 further away. Wind 2–3 SW, overcast, intermittent rain. |
| 14.12.86 | 0600–0735 | 4 heard | New 1 Orere, 3 Mangatawhiri | New one, 200 m from manganese mine, 25 min up track. One 20 min up track, 1 on Thermos Cup Track and 1 down Mangtawhiri. 'Foreign' tape stopped them calling. Wind 1, partly overcast. |

in 1981 (FSU); Cossey's Bush near the Dam caretaker's house (S12 970570) up to 1979 (T. Marrett, pers. comm.); behind the North Depot (Araoro catchment, S11 010620) about 15 years ago (B.R.M.); and Keeney's Bush (Wairoa catchment, S12 990590), which held Kokako up to 1957 (St Paul & McKenzie 1974) and where feathers were found in 1980 (B.R.M.).

Six pairs of Kokako were seen, 30% of the total number of birds. This agrees with the finding of Hay (1981), in some other North Island forests, that up to two-thirds of Kokako territories are occupied by single birds. Excluding the juvenile seen and the possible juvenile heard, some of the remaining 26 birds may have been paired, especially since only 11 (28%) of the birds were actually seen. The figure would be higher if repeat sightings were included, but most repeat sightings were of pairs, which responded best to the tape.

TABLE 2 — Kokako distribution in the Hunua Range, November/December 1986 (Grid references based on first record of a bird)

| *Bird No.* | *Date* | *Time* | *Grid reference* | *Altitude (m a.s.l.)* | *Vegetation type* | *Catchment* | *Tape response* | *Type of song* | *Seen/ heard* | *Adult/ paired* |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 14.12.86 | 0630 | S12 052603 | 440 | tawa/podocarp | Orere | no | complete | heard | adult |
| 2 | 11.11.86 | 0446 | S12 057602 | 500 | tawa/podocarp | Mangatawhiri | no | incomplete | heard | adult, paired (3) |
| 3 | 11.11.86 | 0454 | S12 058603 | 500 | tawa/podocarp | Mangatawhiri | no | complete | heard | adult, paired (2) |
| 4 | 11.11.86 | 0456 | S12 060603 | 540 | tawa/podocarp | Mangatawhiri | no | complete | heard | adult |
| 5 | 11.11.86 | 0520 | S11 060598 | 540 | tawa/podocarp | Mangatawhiri | yes | complete | heard | adult |
| 6 | 11.11.86 | 0547 | S11 066605 | 500 | tawa/podocarp | Orere | no | complete | heard | adult |
| 7 | 11.11.86 | 0547 | S12 069600 | 600 | tawa/podocarp/*Quintinia* | Mangatawhiri | no | complete | heard | adult |
| 8 | 11.11.86 | 0608 | S11 069605 | 600 | tawa/podocarp/*Quintinia* | Orere | no | complete | heard | adult |
| 9 | 11.11.86 | 0636 | S11 074606 | 600 | tawa/podocarp/*Quintinia* | Orere | yes | complete | heard | adult |
| 10 | 11.11.86 | 0636 | S12 074598 | 600 | tawa/podocarp/*Quintinia* | Mangatawhiri | yes | incomplete | heard | adult |
| 11 | 11.11.86 | 0645 | S12 085600 | 520 | second-growth scrub | Mangatangi | no | incomplete | heard | adult |
| 12 | 18.11.86 | 0628 | S12 046556 | 400 | tawa/podocarp | Mangatangi | yes | complete | seen | adult, paired (13) |
| 13 | 18.11.86 | 0724 | S12 046556 | 400 | tawa/podocarp | Mangatangi | yes | incomplete | seen | adult, paired (12) |
| 14 | 20.11.86 | 0441 | S11 078607 | 620 | tawa/podocarp/*Quintinia* | Mangatangi | no | complete | heard | adult |

TABLE 3 — Kokako distribution in the Hunua Range, Easter 1987 (16,17 and 18 April)

| *Bird No.* | *Date* | *Time* | *Grid reference* | *Altitude (m a.s.l.)* | *Vegetation type* | *Catchment* | *Tape response* | *Type of song* | *Seen/ heard* | *Adult/paired/ juvenile* |
|---|---|---|---|---|---|---|---|---|---|---|
| 15 | 16.4.87 | 1700 | S12 078593 | 650 | tawa/podocarp/*Quintinia* | Mangatangi | yes | complete | seen | adult, paired (16) |
| 16 | 16.4.87 | 1700 | S12 078593 | 650 | tawa/podocarp/*Quintinia* | Mangatangi | yes | complete | seen | adult, paired (15) |
| 17 | 17.4.87 | 1640 | S12 083593 | 650 | tawa/podocarp/*Quintinia* | Mangatangi | yes | incomplete | seen | juvenile |
| 18 | 17.4.87 | 0701 | S12 069578 | 535 | tawa/podocarp | Mangatangi | yes | complete | seen | adult, paired (19) |
| 19 | 17.4.87 | 0701 | S12 069578 | 535 | tawa/podocarp | Mangatangi | yes | complete | seen | adult, paired (18) |
| 20 | 18.4.87 | 0641 | S12 077587 | 600 | tawa/podocarp | Mangatangi | yes | incomplete | seen | adult |
| 21 | 18.4.87 | 0628 | S12 076585 | 520 | tawa/podocarp | Mangatangi | yes | incomplete | heard | adult |
| 22 | 17.4.87 | 0640 | S11 085615 | 500 | tawa/podocarp | Tapapakanga | no | complete | heard | adult |
| 23 | 18.4.87 | 0625 | S11 087612 | 500 | tawa/podocarp | Mangatangi | yes | complete | heard | adult |
| 24 | 18.4.87 | 0725 | S12 084562 | 400 | tawa/podocarp | Mangatangi | yes | complete | seen | adult |
| 25 | 18.4.87 | 0627 | S12 094525 | 300 | tawa/podocarp | Hauarahi | yes | complete | heard | adult |

TABLE 4 — Kokako distribution in the Hunua Range, 14 August, September, 17-18 October 1987, and 1 May 1988

| *Bird No.* | *Date* | *Time* | *Grid reference* | *Altitude (m a.s.l.)* | *Vegetation type* | *Catchment* | *Tape response* | *Type of song* | *Seen/ heard* | *Adult/paired/ juvenile* |
|---|---|---|---|---|---|---|---|---|---|---|
| 26 | 18.10.87 | 0625 | S12 061583 | 400 | tawa/podocarp | Mangatangi | no | complete | heard | adult |
| 27 | 18.10.87 | 0548 | S12 064593 | 450 | tawa/podocarp | Mangatawhiri | yes | complete | heard | adult |
| 28 | 18.10.87 | 0526 | S12 074581 | 540 | tawa/podocarp | Mangatangi | yes | no data | heard | adult |
| 29 | 18.10.87 | 0549 | S12 072576 | 440 | tawa/podocarp | Mangatangi | no data | no data | heard | adult |
| 30 | 18.10.87 | 0752 | S12 036543 | 364 | second-growth scrub | Mangatawhiri | no | incomplete | heard | adult |
| 31 | 17.10.87 | 0659 | S12 055531 | 470 | tawa/podocarp | Mangatawhiri | yes | incomplete | seen | adult, paired (32) |
| 32 | 17.10.87 | 0659 | S12 055531 | 470 | tawa/podocarp | Mangatawhiri | yes | incomplete | seen | adult, paired (31) |
| 33 | 18.10.87 | 0826 | S12 048549 | 330 | tawa/podocarp | Mangatangi | no | incomplete | heard | adult |
| 34 | 18.10.87 | 0603 | S12 047555 | 400 | tawa/podocarp | Mangatangi | no | incomplete | heard | adult |
| 35 | 14.8.87 | a.m. | S11 033604 | 420 | tawa/podocarp | Mangatawhiri | no | incomplete | heard | adult |
| 36 | Sept.87 | a.m. | S12 046601 | 480 | tawa/podocarp | Mangatawhiri | no | complete | seen | adult |
| 37 | 17.10.87 | 0814 | S11 079606 | 600 | tawa/podocarp/*Quintinia* | Mangatangi | – | – | seen | adult, paired (39) |
| 38 | 17.10.87 | 0750 | S11 077605 | 660 | tawa/podocarp/*Quintinia* | Orere | no | incomplete | heard | possible juvenile |
| 39 | 17.10.87 | 0815 | S11 080606 | 600 | tawa/podocarp/*Quintinia* | Mangatangi | yes | complete | seen | adult, paired (37) |
| 40 | 1.5.88 | 0755 | S11 082618 | 500 | tawa/podocarp | Tapapakanga | yes | incomplete | heard | adult |

Thirty-eight (95%) of the 40 birds, and 114 of all 1216 records (98%), were made in tawa-podocarp forest. Only two Kokako were recorded in second-growth scrub. Thirteen records (33%) were from the higher-altitude tawa-podocarp-*Quintinia* association (over 600 m a.s.l.),whereas 25 (62%) were from lower-altitude tawa-podocarp forest (300-600 m). The two remaining records were those from second-growth scrub.

There were no records of Kokako in taraire-dominant forest at a lower altitude, where they were once present in good numbers (St Paul & McKenzie 1974).

The Kokako ranged in altitude from 300 to 660 m, with an average of 490 m for first records. They were distributed in the following catchments: Mangatangi (20 birds), Mangatawhiri (12), Orere (5), Tapapakanga (2) and Hauarahi (1).

Birds responding to the tape made up 56% of first records, but caution must be applied to the result because of the large number of observers (38) and the differing interpretations of what a 'tape response' was. Similarly, with the 61% complete calls noted for first records allowance must be made for observer interpretation and for the autumn and spring surveys being carried out in the peak calling seasons.

## DISCUSSION

### Survey techniques and results

This study demonstrated the advantage of using skilled ornithologists and willing learners in intensive 'one-hit' exercises over the whole catchment (in two surveys) or a selected part (autumn 1988 on the Kohukohunui track). This was done on two consecutive fine mornings in spring 1987 and the autumns of 1987 and 1988, and compares with one person in spring 1986 or a team (FSU) in spring 1981 surveying over a period, with a single visit to each site. The main problems were trying to record on sufficient fine days at changeable times of the year (autumn and spring) and not knowing when it would be a morning with no calling, which can happen at any time of the year for some unknown reason.

The FSU survey (1981) recorded 15 Kokako (Figure 2) and the initial spring (1986) survey by the authors recorded 14, although the range of the birds was less extensive. This total increased to 25 in the Easter 1987 OSNZ survey and up to 39 by the end of the spring 1987 OSNZ survey, with one bird added in the autumn 1988 survey to bring the total to 40. It is probable that some birds had died since the start of this survey. Balanced against that, however, is that there are probably still a few undetected Kokako and a few juveniles that may have survived to maturity.

The estimate of 2000 birds in total for the whole North Island, as calculated by DOC, could be higher if their FSU count in the Hunua Range picked up a typical percentage of the birds actually present in an area, i.e. less than 50%.

### Population and management

The decline in North Island Kokako numbers, as recorded by various surveys from 1957 to 1988 for the Hunua Range, is one of a decline in population, range and habitat. This parallels the probable general trend throughout the North Island (Lavers 1978), though the rate of decline is not clear for many areas.

Although the results of this study indicate that the Hunua population is not as low or declining as quickly as was thought, it is still in real danger of extinction – perhaps by the end of the century – unless the forest habitat is actively managed. Populations of predators and browsing animals need to be controlled, and poaching of New Zealand Pigeons (*Hemiphaga novaeseelandiae*), which probably results in some Kokako being shot incidentally, should be halted.

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