

Successful translocations of Little Spotted Kiwi (*Apteryx owenii*) between offshore islands of New Zealand

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ABSTRACT

In the 1980s, Little Spotted Kiwi (*Apteryx owenii*) were transferred to Long, Red Mercury and Hen Islands to establish new populations beyond their stronghold on Kapiti Island. Recent surveys indicate that all three populations are increasing at between 4% and 8% per annum. Recently, a fifth population has been established successfully on Tiritiri Matangi Island in the Hauraki Gulf, and has grown at a rate of about 11% per annum. Little Spotted Kiwi now appear to be secure with five viable populations on predator-free islands. Aerial poisoning of rats using brodifacoum baits does not appear to have had any long-term adverse effect on the populations of Little Spotted Kiwi on Red Mercury and Tiritiri Matangi Islands.

KEYWORDS: Little Spotted Kiwi, *Apteryx owenii*, translocation, islands, brodifacoum

INTRODUCTION

The Little Spotted Kiwi (*Apteryx owenii*) is the rarest of the four species (Baker *et al.* 1995) of kiwi. Subfossil, midden and historical evidence indicate that it was formerly widespread on both the North and South Islands (Heather & Robertson 1996), but by 1980 its population had diminished to about 1000 birds. Almost all were confined to Kapiti Island, where the species has been since before 1929, possibly originating from the release of five 'kiwis from the South Island' in 1912 (Wilkinson & Wilkinson 1952) or, more likely, from seven South Island kiwi (species not stated) released in October 1923 (Anon 1924). A few persisted into the 1980s on D'Urville Island in the Marlborough Sounds and a few scattered birds may still persist in the South Island (Heather & Robertson 1996).

Because the only viable population was confined to a single island, three new populations were established in the 1980s to reduce the risk of extinction (Jolly & Colbourne 1991).

In this paper we evaluate the success of the transfers to Long, Red Mercury and Hen Islands reported on by Jolly & Colbourne (1991) and Robertson *et al.* (1993), and provide details about two recent transfers of Little Spotted Kiwi from Kapiti Island to Tiritiri Matangi Island, and a survey there. In Appendix 1 we give details of the birds transferred from Kapiti Island to Tiritiri Matangi Island, and give details of all birds handled during our island surveys.

METHODS

As part of the Kiwi Recovery Programme, we have visited each of the newly-established island populations between 1992 and 1997, and determined whether they are self-sustaining. This was done by plotting the location of calls at night, using trained muzzled labrador dogs to find survivors of the original release and island-reared birds (=unbanded birds), banding new birds, and radio-tracking a sample of birds to determine their home ranges to integrate with call location information. Population growth data were crudely estimated by assuming a geometric rate of increase from the number released to the number of birds assumed to be alive some years later. These estimates are likely to be conservative because our population estimates do not generally include non-calling juveniles, some pairs and unpaired adults may not have called during our rapid surveys, and the geography of the islands meant that we could not always achieve full listening coverage of each island.

RESULTS

Long Island

A female from D'Urville Island and two males from Kapiti Island were released on Long Island, Marlborough Sounds ($41^{\circ}07'S$, $174^{\circ}17'E$), in August 1982. Jolly & Colbourne (1991) reported that these birds had bred successfully and at least one offspring was found in 1986. A further male was found on D'Urville Island and transferred to Long Island in July 1987, and a further female was transferred from Kapiti Island in July 1989.

In July 1989, one of the two male birds (O-13968) brought from Kapiti Island in 1982 was removed to Otorohanga Kiwi House in order to improve the chances of breeding for the male recently transferred to Long Island from D'Urville Island.

Between 27 and 31 March 1995, we caught three Little Spotted Kiwi on Long Island: two new birds and the former D'Urville Island male (O-22129). From radio-telemetry of these birds, and from plotting the calls of other birds, we consider that in 1995 there was a minimum of 10 birds on the island, and all birds, except for one juvenile, were on the southern half of the island (Fig. 1a). The estimated growth rate of this population since 1982 has been 6% per annum.

Red Mercury Island

Six males and six females were transferred from Kapiti Island to Red Mercury Island ($36^{\circ}38'S$, $175^{\circ}56'E$), in July 1983. Most were adults, but at least one female (O-20734) was a subadult judging from the growth in its bill length from 76.1 mm in 1983 to 89.9 mm in 1993. Jolly & Colbourne (1991) reported that the population had increased to about 17 birds by March 1989, despite one of the original females (O-20733) being accidentally killed by a dog in 1986. Robertson *et al.* (1993) estimated that in the summer of 1992/93, there was a minimum of 11 pairs on the island; three of the original birds (male O-13986, female O-20734 and male O-20735) were recaptured, and eight new birds were banded.

Between 23 February and 1 March 1996, we caught 10 Little Spotted Kiwi on Red Mercury Island. Two (O-13982 and O-13983) were males released in 1983, but the other eight birds were unbanded. From radio-tracking records of six of these birds, sightings of birds, and locations of calling birds, we conclude that there were probably 13 pairs, and a minimum of 30 birds on the island (Fig. 1b). The estimated population growth rate has been at about 8% per annum since 1983.

Hen Island

A total of 38 birds (16 males, 14 females and 6 juveniles) were transferred from Kapiti Island to Hen Island (35°58'S, 174°43'E) in May 1988 and June 1989.

A rapid survey of Hen Island from 12 to 16 March 1992 showed that the Little Spotted Kiwi had spread to occupy the whole island, and we estimated that there were about 20 pairs. Between 28 February and 6 March 1995, we counted a minimum of 44 individuals and estimated that there were about 50 birds (Fig. 1c); this equates to a population growth rate of about 4% per annum. We caught three birds, a pair (female O-20583 and male O-21003) of the original 1988 birds, and a new female (O-19923). Male O-21003 has a particularly interesting history as he was first caught as an adult in the Waiorua Valley on Kapiti Island on 12 April 1980, banded and transferred to Otorohanga Kiwi House on 13 March 1981, returned to Kapiti Island later in 1981, then transferred to Hen Island in May 1988. To be adult size, and to have completed growth by April 1980, he must have hatched before March 1978, and so at the time of recapture was the oldest Little Spotted Kiwi recorded in the wild, at over 17 years old.

Tiritiri Matangi Island

Five adjacent pairs of Little Spotted Kiwi were transferred from the Okupe Valley, Kapiti Island to Tiritiri Matangi Island (36°36'S, 174°53'E) on 4 July 1993, although one of the males died shortly after release when its transmitter became entangled in vegetation, and another drowned in August 1994 (Sibilla Girardet pers. comm.). A further two pairs (former neighbours of the original five pairs) and two males were shifted to the island on 15 July 1995. The pattern of establishment on Tiritiri Matangi Island has been monitored closely and will be reported on elsewhere (S. Girardet, pers. comm.).

Between 6 and 11 May 1997, we caught 11 birds, including five island-bred birds, and determined that there was a minimum of 15 individuals, nine adult males, five adult females and one juvenile (Fig. 1d). We suspected that, as we found four island-bred territorial adults, there would have been more non-territorial, non-calling, juveniles present than the one we happened to encounter. One adult female (found by our dogs) remained silent over five nights of listening in its territory, despite her partner calling several times each night, and so we believe that some of the apparently unpaired males may well have had mates. We therefore estimated that there were probably 20-25 birds on the island in winter 1997, and so the population growth rate has been about 11% per annum.

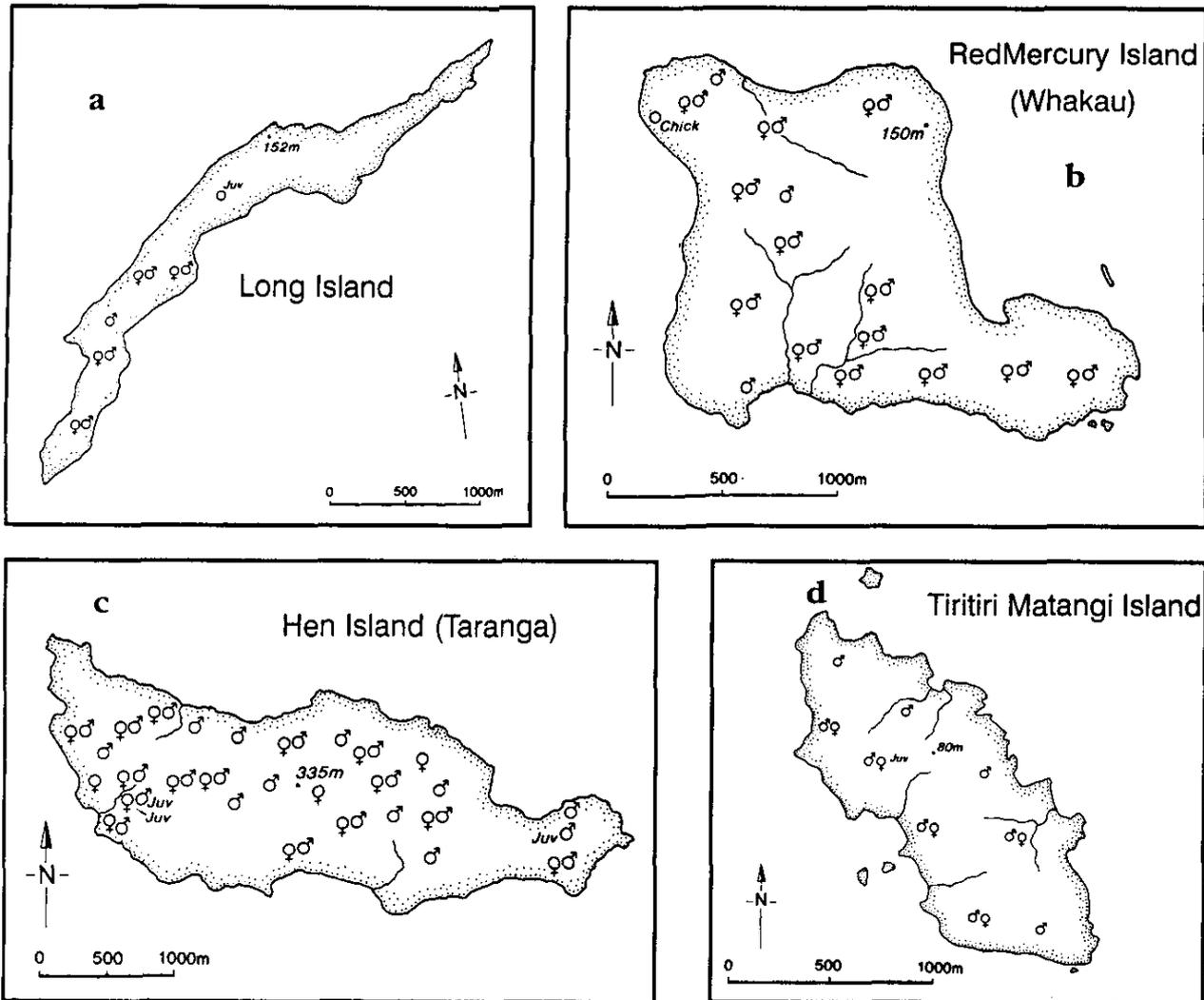


FIGURE 1 - Distribution of Little Spotted Kiwi on four offshore islands around New Zealand. Long Island, Marlborough Sounds, surveyed 27-31 March 1995. Red Mercury Island, surveyed 23 February - 1 March 1996. Hen Island, surveyed 28 February - 6 March 1995. Tiritiri Matangi Island, surveyed 6-11 May 1997. ♂ = male, ♀ = female, ♂♀ = pair, Juv = juvenile/subadult.

DISCUSSION

Although the Little Spotted Kiwi is the rarest of the four species of kiwi, it is probably the only species increasing in numbers. All four transfers have been successful and these populations are expanding at between 4% and 11% per year. Assuming that the carrying capacity of each island is at a density similar to that found on Kapiti Island of 0.5 birds ha⁻¹, at the current population growth rate, it will take until the year 2030 to reach 80 birds on 160 ha Long Island, until 2013 to reach 110 birds on 220 ha Red Mercury Island, until 2036 to reach 250 birds on 500 ha Hen Island, and until 2012 to reach 109 birds on 218 ha Tiritiri Matangi Island. Although these calculations are crude, they indicate that none of the populations is close to its carrying capacity, and decisions on further transfers are not needed urgently.

The aerial applications of brodifacoum rat poison on Red Mercury Island in September 1992, and on Tiritiri Matangi Island in September 1993 appeared to

have had no long-term adverse effect on these populations of Little Spotted Kiwi. Robertson *et al.* (1993) reported that there had been no short-term effect on nine radio-tagged birds on Red Mercury Island, and during our 1996 survey we caught two of the original birds put there in 1983. Although a bird that drowned on Tiritiri Matangi Island in August 1994 had traces (0.01mg/kg) of brodifacoum in its liver (Sibilla Girardet, pers. comm.), we caught or saw two of the birds originally released in 1993, and four of the island-bred adults we caught must have hatched no later than the 1993/94 summer.

Overall, Little Spotted Kiwi appear secure, with viable populations on five islands and a total population of about 1100 birds in 1997.

ACKNOWLEDGEMENTS

The surveys of Little Spotted Kiwi were supported by the Bank of New Zealand as part of the Kiwi Recovery Programme. We thank Bill Cash for organising the Long Island survey, Keith Hawkins for organising the Hen Island surveys, Jason Roxburgh for organising the Red Mercury Island survey in 1996, and Ray and Barbara Walters and Shaarina Boyd for organising the Tiritiri Matangi survey. We especially thank the many people who helped us with the listening surveys and with catching and banding birds. We thank Peter Gaze, Pat Miller and two referees for their comments on the manuscript.

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Manuscript received 19 March 1997, revised & accepted 4 July 1997

APPENDIX 1 – Details of birds handled during island surveys from 1992 to 1997, and during transfers from Kapiti Island to Tiritiri Matangi Island in July 1993 and July 1995. Birds shown in bold are island-bred. Ad = adult, Subad = subadult, Ch = chick. M = male, F = female, ? = unknown sex.

Island	Date	Band	Age	Sex	Bill (mm)	Body mass (g)
Long	28/3/95	22129	Ad	M	67.6	1180
	28/3/95	27471	Ad	F	81.7	1520
	30/3/95	27472	Ad	M	69.8	1120
Red Mercury	3/9/92	32692	Ad	M	69.2	1140
	3/9/92	32693	Ad	F	84.3	1640
	6/9/92	32694	Ad	F	85.8	1360
	6/9/92	32695	Ad	M	66.9	1060

Island	Date	Band	Age	Sex	Bill (mm)	Body mass (g)
	10/9/92	32696	Ad	F	79.5	1400
	13/9/92	32697	Ad	F	81.4	1290
	16/9/92	20851	Ad	F	79.1	1330
	18/9/92	13986	Ad	M	64.0	1240
	18/9/92	32698	Ad	F	82.2	1410
	1/3/93	20734	Ad	F	89.9	1380
	1/3/93	20735	Ad	M	69.7	1040
	23/2/96	13982	Ad	M	66.7	1020
	23/2/96	13983	Ad	M	66.7	1190
	23/2/96	w1984 ¹	Ch	?	42.4	355
	24/2/96	19931	Ad	F	86.8	1450
	25/2/96	19932	Ad	F	81.7	1310
	25/2/96	19933	Ad	M	66.4	1240
	25/2/96	19934	Ad	M	69.7	1120
	28/2/96	27486	Ad	M	64.0	1090
	28/2/96	27487	Ad	M	65.0	1230
	28/2/96	27488	Ad	F	78.9	1280
Hen	3/3/95	19923	Subad	F	74.7	1480
	4/3/95	20583	Ad	F	87.3	1500
	5/3/95	21003	Ad	M	69.8	1130
Tiritiri	4/7/93	20867	Ad	F	82.5	1525
Matangi	4/7/93	20868	Ad	M	68.8	1090
	4/7/93	32861	Ad	M	69.7	1105
	4/7/93	32863	Ad	F	84.2	1570
	4/7/93	32864	Ad	M	67.9	1205
	4/7/93	32686	Ad	F	83.8	1465
	4/7/93	33104	Ad	M	68.1	1145
	4/7/93	33105	Ad	M	66.9	1170
	4/7/93	33106	Ad	F	88.6	1445
	4/7/93	33129	Ad	F	80.8	1120
	8/7/95	19907	Subad	M	68.8	1120
	8/7/95	20859	Ad	M	69.0	1220
	8/7/95	20864	Ad	F	87.9	1680
	8/7/95	32687	Ad	F	86.5	1630
	8/7/95	32688	Ad	M	69.2	1360
	8/7/95	33108	Ad	M	73.0	1310
	6/5/97	20859	Ad	M	69.0	1220
	6/5/97	20864	Ad	F	87.9	1580
	7/5/97	32684	Ad	M	68.6	1170
	7/5/97	33108	Ad	M	72.8	1300
	8/5/97	20482	Ad	M	67.7	1080
	8/5/97	19907	Ad	M	69.1	1050
	9/5/97	32687	Ad	F	86.7	1600
	9/5/97	20483	Subad	?	64.9	1010
	10/5/97	20484	Ad	M	63.7	1350
	10/5/97	20485	Ad	M	66.2	1200
	10/5/97	20486	Ad	F	80.2	1920

wing-tag number - the bird was too small to band