

# Status of weka (*Gallirallus australis greyi*) on Mokoia Island

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# Abstract

The status of weka on Mokoia Island was assessed in two ways: (1) by surveying the number of weka on the island using two methods: call broadcast and unsolicited call survey, and (2) by capturing weka.

Using our call broadcast technique we have estimated the population of weka on the island between 90 and 120 birds. However, several areas of the island were not surveyed. We caught 12 birds in 19 days (1420.5 cage/hrs). This catching success was low when compared to Owen 1998 (34 birds caught in 10 days). A possible explanation could be the availability of a great variety of foods at this time of the year compared with August, when Owen and collaborators were catching.

We recommend that a monitoring programme for weka is established on Mokoia well in advance of mice eradication (currently scheduled for 2001) to allow the Department of Conservation to effectively measure the effect of the poisoning on the birds. Removing some weka, as was done prior to the first attempt to eradicate mice, is also recommended.

Future studies of weka on Mokoia considered necessary include: feeding studies (food availability and use/preference), importance of habitat structure for weka, and breeding dynamics.

## 1. Introduction

Weka (*Gallirallus australis*) are large, flightless rails endemic to New Zealand, where there are four subspecies: one on each of the three main islands, and one on the Chatham Islands (Buff weka). At present, all subspecies are considered threatened, with the exception of the Buff weka (*G. a. hectori*). The Weka Recovery Group (WRG), which has been set up to ensure the continued survival of weka, has written a Weka Recovery Plan (1999) that addresses the problems faced by weka and the priorities to follow for the recovery of threatened weka populations. Currently, there are only four self-sustaining, healthy populations of North Island weka (*G.a. greyi*), all of them on islands: Pakatoa, Kawau, Mokoia and Whanganui Island. In April 1999, the WRG made it a national priority to establish the status of the weka on Mokoia Island by April 2000.

Mokoia (135 ha) is owned by local Maori, and has a 'wildlife refuge' status. The Department of Conservation (DOC) manages the wildlife on the island with the support of the Mokoia Island Trust Board. With the exception of the house mouse (*Mus* sp.) there are no mammalian predators on the island. In addition to North Island weka, several other endangered or threatened species have been liberated on Mokoia in the last ten years.

Weka were introduced to Mokoia from Gisborne in 1952, 1956, and 1958 (Owen 1997) soon after the island's designation as wildlife refuge in 1953. In 1989, Norway rats were eradicated from Mokoia using poison placed in bait stations. Although weka are known to suffer mortality following operations of this kind, weka persisted after the rat eradication on the island. It was subsequently found that mice were still present on Mokoia. In September 1996 an aerial poison drop (Brodifacoum® on a cereal-based bait) to eradicate mice was carried out. As a precaution, 34 weka were caught and taken off the island prior to the mice eradication (Owen 1998). The poison operation was unsuccessful and mice were found again on the island a few months after the drop. Thirty-two of the 34 weka removed from Mokoia were released back on to the island five months after the poison operation (two birds died in captivity). No monitoring of weka was done prior to or after the drop. However, comparisons of sightings as well as the number of weka calls during the years before and after the poison drop, suggest that any negative effects of the operation on weka have been overcome (Owen 1998).

The aim of this research was to investigate the status of weka on Mokoia and to determine future research and management needs. The three main objectives of our study were to:

1. Establish the status of the Mokoia Island weka population by capturing most of the birds on the island and individually banding them.
2. Map the distribution of the banded birds to establish the pattern of habitat utilisation of the species on Mokoia.
3. Make recommendations on future research and management of weka on Mokoia. This is particularly important, because a poison drop to eradicate mice from the island is being planned for the winter of 2001.

## 2. Methods

### 2.1 FIELD TRIPS

We made five trips to Mokoia Island between October 1999 and February 2000, for a total of 173 person-days in the field (Table 1).

### 2.2 LOCATION AND NUMBER OF WEKA ON MOKOIA

#### **Census**

*Call broadcast.* Initially (16-17 October) we censused weka by broadcasting pre-recorded calls at listening points located 100 m apart following the major tracks. On the 17th we modified this technique, to obtain a more accurate location of the calling birds. This new method used three observers, spaced 50 m apart (Appendix 1). The observer in the centre played the tape for a

few seconds, and all three observers recorded the time, direction (compass bearings), the approximate distance and, where possible, the sex, of the responsive birds for at least two minutes or until the birds stopped calling. Although weka produce sexually dimorphic calls, sometimes the differences can only be picked up if both sexes duet. Having several observers recording the direction of the calling weka allowed us to estimate the position of some individuals by triangulation. After recording the information at one location, all the observers moved, with the observer at the back of the line positioning him/herself 50 m from where the front observer had been. Each location used for the census was marked on the map as the census proceeded, and afterwards all calls were plotted, using the time at which they were heard, and the compass bearings. Weka presumed present were mapped using triangulation of all compass bearings noted by the observers. The surveys were carried out in both the morning and the afternoon.

*Unsolicited calls.* While waiting for captures, we recorded all weka calls heard (without broadcasting taped calls), for 30 minutes at five other locations. Position (compass bearings and estimated distance), time and sex of weka heard were noted. The locations were: Hihi Camp, Tracking Tunnel 9 (line 3), opposite bush 2, bottom of Queen Street Gully (QSG), and top of QSG (see Appendix 1). The first three locations allowed us to hear calls from weka occupying an area that had been covered with blackberry until January 2000 (Appendix 1). The observations done at these three locations were carried out simultaneously, which allowed triangulation on the map of some weka.

### **Weka sightings**

Throughout this study, we recorded on the map the locations of any incidental observations of weka seen or heard no more than c. 10 m from observers. This information was used to determine the best locations for our traps.

### **Capture**

We used two different types of traps to catch weka on Mokoia Island, hook traps and plate traps. Both types of cages had been used previously for live capture of Australian brush-tailed possums (*Trichosurus vulpecula*). During field trips 1, 3 and 4, we used eight wire cage traps with hook release. On the 5th trip, an additional five wire cage traps with plate release were used.

Traps were positioned where we either saw or heard weka. The cages were baited with mutton flaps and/or cheese and checked each hour during the capture periods (for capture periods, see Appendix 2). Pieces of cheese were spread outside the cages in an attempt to encourage weka to enter them. Cages were moved to a different location after weka were caught in them or if they had failed to catch a weka after a period of catching.

*Hook-release traps* (Appendix 3a). These traps (30 cm x 30 cm x 700 cm) have a hook suspended near the back of the cage attached to a hard wire which is in turn connected to the door of the cage. The trap springs when the animal tries to detach a bait placed on the hook. Hook traps have in the past been used to capture weka (Bramley 1994; Owen 1998).

*Plate-release traps* (Appendix 3b). Plate traps (20 cm x 20 cm x 70 cm) are sprung when the animals place their body weight on a plate that is connected to the door of the cage by a hard wire. We are not aware that these traps have been used before to catch weka.

### 2.3 MEASURING AND BANDING

After capture, all weka were weighed using a 5 kg spring balance, and the lengths of the tarsus, mid-toe, mid-toe plus claw, wing and culmen were taken. We also recorded the depth of the beak, width of the tarsus, the shape of the wing spur and the colour of the eye. These measurements were recorded following Beauchamp (1987) and Carrol (1963). Each measurement was taken at least twice and the data presented in this report are based on the average of the measurements.

To sex weka by using genetic markers, we took 2-3 feathers of each bird captured. These were either removed by a quick pull, or, if shed naturally, collected from the bags used to transfer weka from the traps to the banding site. The feathers collected were stored at the Rotorua Lakes Area Office, Bay of Plenty Conservancy, ready for genetic analysis.

Where possible, excreta were collected for analysis to detect parasite loads. Samples were sent to the Auckland Zoo Veterinary Department for analysis.

We examined the bird for external parasites and looked at body condition by feeling the area along the keel. We gave the bird a score from 1 (keel noticeable, no muscle on the sides) to 4 (keel barely felt below muscle level). We recorded whether the bird was moulting.

When unhandled at capture, weka were given one size L or size M metal band, and size M colour band(s) supplied by the New Zealand Banding Office.

## 3. Results

### 3.1 CENSUS

#### **Call broadcast**

Surveys took various amounts of time to complete, depending on how long the transect line was (Appendix 1; Table 2). Weka responded to the broadcasted calls regardless of the time of day at which the survey was done.

Appendix 4 (map) presents the combined results from censuses carried out on 16 and 17 of October and on 24 of November 1999. We have placed circles around those locations where we believe calls heard by the different observers were from the same weka (i.e. where we considered there could be overlap in observations). We recorded 61 individual locations in total, of which

31 were areas where we heard pairs of weka (sexes specified on the map). For 30 of the locations we were either unable to determine if there was more than one individual calling (w), or we only heard individual birds (sex specified on the map). Based on this information we found a minimum of 90 birds within the area surveyed. Should the single weka have mates that did not respond to our tapes, the number of birds could be closer to 120 within this area.

### **Unsolicited calls**

Very few weka were heard from the listening posts at the top and bottom of Queen Street Gully. The area covered by blackberry supported at least 6, and possibly 10 pairs of weka (Appendix 5). This could represent as much as 16% of the total weka population on the island. The blackberry has subsequently been removed.

## **3.2 WEKA SIGHTINGS**

Weka were difficult to observe. Most sightings were incidental, as we came across birds by surprise while walking during the early hours of the morning (between 06:00 and 07:00) or late at night. Weka were observed responding to our cage traps on several occasions. On one occasion, a weka approached the cage but was uninterested and left. On a second occasion a (different) weka went into the cage but did not touch the bait (mutton flap). A few times we saw weka in the immediate vicinity of the traps, but we were unable to catch them. Appendix 6 shows the locations of weka seen and/or caught during this study.

## **3.3 CAPTURE**

We set our traps along tracks in the area between Queen Street Gully and Kumara God Track; the Loop track from Hinemoa's hot pool to the Kumara God; and the summit of the island (Appendix 7). Weka were always caught at locations where we saw them or where we heard individual weka repeatedly. However, we were not successful at catching at all sites where we saw or heard them. On two separate occasions weka were seen investigating our traps without entering (see above).

Although a great amount of effort was put into catching weka (1420.5 trap hours), only 11 individual weka were caught (Table 3). The number of trap hours spent to catch one weka ranged from 91 in our second trip, in November 1999, to 176 in our first trip, in October 1999 (Appendix 8).

## **3.4 MEASURING AND BANDING**

All 11 weka caught during the period of this study were in moult. With the exception of two birds (M36032 and M36002) weka caught were in very good

condition (Table 3). Two of the birds (M36003 and 27-09662) had large numbers of lice on their bodies. The chick captured had a hypoboscidae fly within its feathers. Weka bred this year as indicated by the capture of three young birds, one as young as 40 days, and two between 70 and 240 days (Table 4; weka were aged following the Weka Recovery Plan guidelines, Beauchamp et al. 1999).

Three of the weka caught were recaptures (Table 3). One was a bird captured in November 1999; it had lost 150 g from its first capture to the second in February 2000 (3 months). The other two recaptures (male and female) were birds first banded in 1996, prior to release back to Mokoia Island after the mice eradication attempt. The male M44585 was first caught on 16 July 96 by the Hut clearing and was recaptured on 1 March 00 at the summit. The female 27-09662 was first caught on 2 August 96 above Hinemoa's pool on the summit track, and was recaptured on 3 March 00 in approximately the same location.

### 3.5 COMPARISON WITH CAPTURE RATES AND WEKA STATUS IN 1996

Data from the birds captured by K Owen in 1996 (Owen, unpubl. results) were tabulated and mapped (Appendices 9 and 10) to allow comparisons with the data collected during this study.

In 1996 weka were aged by A. Beauchamp following methods he developed. In 1999 we aged the weka following the same methodology, as described in the Weka Recovery Plan (Beauchamp et al. 1999). There were differences between the proportions of weka in different age classes in 1996 and 1999 (Appendix 11a). The average male and female weka were heavier in 1996 than in 1999 (Appendix 11b).

### 3.6 PARASITOLOGY RESULTS

Five samples were sent to the Auckland Veterinary Laboratory for examination by the pathologist Caroline Twentyman. Two of the samples had parasites in them, although in very low numbers. *Coccidea ursa* were found in the excreta of M36003, an adult female, and a *Capillaria* was found in the excreta of the only chick caught (Appendix 13).



# 4. Discussion

## 4.1 CENSUS

### **Call broadcast**

The call broadcast technique, using triangulation, was very useful in giving us an estimation of the number of weka and their location. Weka that were close to the observers did not always respond, yet they would reply to the broadcasted calls once observers had moved on to the next listening post. Therefore, this technique is a very powerful monitoring tool. A single morning or afternoon survey could be used to determine changes in weka numbers and territories. To obtain the best results from this technique, the locations from which call broadcasts are made, and from which listening is carried out should be marked in the field, so that the survey is always done from the same posts. The survey could be extended to cover a larger area, but this will require additional survey time. However, if this survey method is to be used as a monitoring index, the most important factor is to be able to repeat it as closely as possible each time, rather than how much area is covered.

### **Unsolicited calls**

This survey technique was useful to determine the number and distribution of weka in the "blackberry area", but not so around the Queen Street Gully area. It has to be noted that these surveys were carried out at different times of the day, and it is possible that night surveys (Bramley, in press) are not as effective as morning ones when using this technique. Additionally, weka on Kawau Island called less frequently during the breeding season (Beauchamp and Chambers, submitted) and that could be the case for Mokoia weka as well. Although this technique provides the same type of information as the call broadcast, it takes longer and/or requires a larger number of participants. Additionally, the time of the survey may need to be early morning, the time when weka appear to call naturally. This indicates the need for a relatively large number of people (we estimate 19 people) to be located at several strategic areas to listen at the same time.

Weka calls are distinctive, and loud, allowing the participation of non-expert observers, requiring a minimum amount of training. To maintain uniformity among censuses carried out at different times, it is important to always include one participant who has done the census before.

## 4.2 WEKA SIGHTINGS

Observing weka on Mokoia is not easy. Although they are generally known to be inquisitive and even a nuisance, weka on Mokoia are notoriously shy. However, fleeting glimpses of the birds are common in the early morning. These were successfully used to locate traps and capture birds.

Due to their shyness, any study of weka on Mokoia will require the use of transmitters to locate the birds (caution will be needed, however, since weka fitted with transmitters may become caught in the blackberry). In our experience, if you stay quiet in an area for a period of time weka will come out of hiding. However, because they are cautious towards the observer, care should be taken when interpreting the weka's behaviour.

### 4.3 CAPTURE

Our capture rates were low when compared to Owen (1996 unpublished). There are several possible explanations for this. It is possible that during our capture periods in October and November 1999, weka were nesting and/or had small chicks and were more cautious than at other times, therefore avoiding our traps. Food availability was high during the period of this study, with a large number of insects available and also a good blackberry crop (we know weka ate the blackberry, as evidenced from their droppings). It is possible that weka were not interested in the bait we provided. Owen (1998) caught weka in August, after the winter, when food resources may have been low and also at a time when weka were not breeding.

We chose the times for catching weka based on previous knowledge on weka activity periods (Marchant & Higgins 1993) in other locations, and our own observations on Mokoia Island. Despite this we noticed that weka, although actively calling, were less likely to be caught before sunrise and in the afternoon. We suggest that when catching weka on Mokoia, the traps should be open after sunrise and around late afternoon, and closed at noon and at midnight. Additionally, July/August should be targeted, as these months may be more productive capture periods if relatively quick capture of large numbers of weka is required (suggested by K Owen experience in 1996).

The recapture of two weka banded in 1996 indicates that weka can survive following capture, captivity, and re-release on Mokoia.

### 4.4 COMPARISON BETWEEN 1996 AND 1999

The difference in age composition and weight found between the birds caught in 1996 and 1999 can be explained by the fact that weka were caught during the breeding season in 1999. Although more results are needed, it appears that the Mokoia population fits into the first category listed in the Weka Recovery Plan, under the sub-title *Population assessment using individual analysts sample and information gathered on breeding*. This category describes a population with restricted breeding periods (lack of young weka caught in 1996 suggests that they did not breed that year, but we know that they did breed in 1999 and 2000), relatively high numbers of weka in older age groups (55-59% of birds between 3 and 15 years of age), and moderate to low weights (females @800 g; males @1000 g).

## 5. Conclusions

The most important factors determining weka population structure and dynamics are: food supply and availability (Beauchamp et al. 1999), habitat composition and structure, and social structure (G. H. Bramley, pers. comm.). Addressing these factors is necessary to elucidate the stability and sustainability of weka on Mokoia Island. Data from mainland and island studies suggest that weka populations are extremely sensitive to food availability and associated habitat disturbances. Mokoia is undergoing some structural changes that may affect weka. For instance, the area previously covered in blackberry, which appears to sustain 16% of the weka population found during this study, has recently been cleared. The changes in both habitat structure and food supply (in the form of the blackberries and the invertebrates that use the blackberry) caused by this clearing pose the question of what is going to happen with the weka living there. Provided that they are at carrying capacity in this area, and based on data available, there can be two scenarios. If weka on Mokoia are strongly territorial, as are those on Kapiti Island (Beauchamp 1987; Marchant & Higgins 1993), the birds may not leave their territories even though they do not find enough food to survive (Marchant & Higgins 1993). Should this be the case, then it is possible that all weka currently living in this area could die. Young birds may eventually disperse into and occupy the area and form new territories that will be determined by the available resources. In a second scenario, where weka are not so territorial (such as Gisborne weka; G. H. Bramley pers. comm.) the birds currently using the blackberry area could move to areas where food is more plentiful. This scenario puts pressure on weka with established territories in the areas where the displaced birds will go. In both cases there will be a disruption of the population the effects of which are unknown.

Another possible impact of the blackberry clearing is a reduction in the access to the shore by all weka to both feed and drink. The dense blackberry cover would have made it easier for weka outside the territories that were close to the water's edge to access it without being spotted by the territory holders. Additionally, weka in Gisborne behave apprehensively when having to cross open areas (G. H. Bramley, pers. comm.). Although it is a good idea to rid the island of blackberry, potentially some large weka habitat may be lost.

Mice eradication is another disturbance that will affect weka on Mokoia. We consider it important to establish some solid monitoring well in advance of the poison operation, to be continued for two or three years after the event. As a preventive measure, a number of weka should again be removed from Mokoia prior to the drop. In particular next year, because weka will be dealing with 1) structural habitat changes (removal of blackberry, which may be replaced by grassed areas), and 2) a mice eradication operation (both primary and secondary poisoning could be an issue).

The following recommendations are made:

1. Establishment of a monitoring system using call surveys for weka on Mokoia following the method described in this report.

2. A study investigating the merits of re-vegetating the old blackberry areas with native shrubs in order to provide habitat for weka.
3. A study looking at the effects of the island management for tourism on weka and other species.
4. A follow-up study/monitoring of weka after the mice eradication.
5. Removal of some (20-30) weka prior to the mice eradication.
6. Capture of more weka in July 2000 to band and to confirm the results of this study.
7. A study looking at the feeding habits, and the fluctuations and availability of the food supply of weka on Mokoia.
8. A study about the breeding of weka including territoriality of adult birds, juvenile dispersal, causes of mortality, and annual fluctuations in productivity.
9. A study comparing the breeding and feeding behaviour of weka in the open grass/blackberry areas and the weka living in the forested areas.

## 6. Acknowledgements

We would like to thank Jonathan Miles who devised the three-people survey for weka and helped us during the early stages of the project. We also want to thank Rose Collen, Abigail Allan, Yoko Nakada, and Joanne Wards for their indefatigable assistance in the field. Two groups of EcoQuest students spent many hours trapping weka with unfailing enthusiasm, despite the low numbers we were getting.

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**Table 1:** Dates, duration, activities, and number of people on field trips for the assessment of the status of weka on Mokoia Island

<b>Trip</b>	<b>Dates</b>	<b>No. days</b>	<b>Activities</b>	<b>Personnel</b>
1	14-17 October, 1999	4	Census	3
2	16-19 November, 1999	4		4
3	21-25 November, 1999	5	Census + Capture	13
4	14-19 February 2000	5	Capture	13
5	28 February-3 March 2000	5	Capture	3
5	Total	23		36

**Table 2:** Length of time spent in each census using broadcasted calls

<b>Date</b>	<b>Start</b>	<b>Finish</b>	<b>Total time</b>
16-10-99	14:09	17:06	2hr 57 minutes
17-10-99	08:19	11:27	3hr 8 minutes
24-11-99	07:05	11:43	4hr 36 minutes

Table 3: Banding and measuring information from weka caught on Mokoia Island from 17-11-99 to 3-3-2000

Metal band No.	Band combo *	Date captured	Weight (g)	Culmen (mm)	Beak depth (mm)	Tarsus length (mm)	Tarsus width (mm)	Midtoe length (mm)	Toeclaw length (mm)	Wing length (mm)	Iris colour ‡	Spur shape €	Body Condition ¢
L35960	- / M	17-11-99	900	43.7	16.3	58.4	10.2	53.6	65.2	165	Red	S3	4
**	R / -	23-11-99	550	40.5	18.7	68.3 <sup>#</sup>	10.0	50.7	62.7	170	DB	S4	3
M36032	M / -	23-11-99	900	45.2	19	77.5 <sup>#</sup>	10.5	53.0	68.0	179.5	RB	S1	2
M36031	M / -	23-11-99	1000	47.5	19.7	80.7 <sup>#</sup>	10.7	60.0	73.3	190	R	S2	4
L36951	M / -	24-11-99	700	43.2	17.7	58.9	9.5	52.8	64.2	175	R	LS2, RS3	4
M36001	M / -	16-2-00	950	42.8	19	68.8	11.0	51.6	66.0	-	R	***	4
M36031•	M / -	16-2-00	850	-	-	-	-	-	-	-	-	-	-
M36002	M / -	17-2-00	1050	47.8	19.4	61.6	11.0	57.0	66.0	170	R	S4	2
M36003	MG / -	29-2-00	800	45.3	18.7	68.4	10.7	59.6	68.4	120	LB	S1	4
M44585**	M / B	1-3-00	850	45.3	20.4	67.2	11.1	55.6	68.1	-	R	S2 (9.4mm)	4
**	W / B	2-3-00	600	34.4	11.6	60.9	11.0	52.4	60.0	80	DB	S1	4
M36004	M / Y	2-3-00	1000	47.2	18.8	79.8	10.7	55.3	61.9	170	RB	S2	4
27-09662**	M / G	3-3-00	600	44.7	14.0	63.2	9	51.5	62.0	170	R	S3/S4	4

\* Left leg / Right leg

\*\* No metal band given because the bird was too young. Our colour bands were somehow in between size L and M, so we gave young birds a colour band.

\*\*\* Bird struggled strongly and it was released without looking at the spur.

# Tarsus was measured for the full length of the bone, not following Beauchamp (1987) and (Carroll) (1963).

‡ : R = red; RB = red-brown; LB = light brown; and DB = dark brown.

€ : S1= sharp recurved; S2= sharp straight; S3= blunt long spur; S4= blunt short spur; S5= long blunt spur; L= left; R= right.

• : Recapture from 1999

\*\* : Recapture from 1996

¢ : 1= keel very noticeable, little to no-muscle on sides; 2= keel noticeable but muscle present; 3= keel not noticeable, muscle levelled with keel; 4= keel not noticeable, muscle protruding on the sides of the keel.

Table 4: Age and sex of weka caught on Mokoia Is. from 17-11-99 to 3-3-2000. Age and sex were determined using the guidelines in the Weka Recovery Plan.

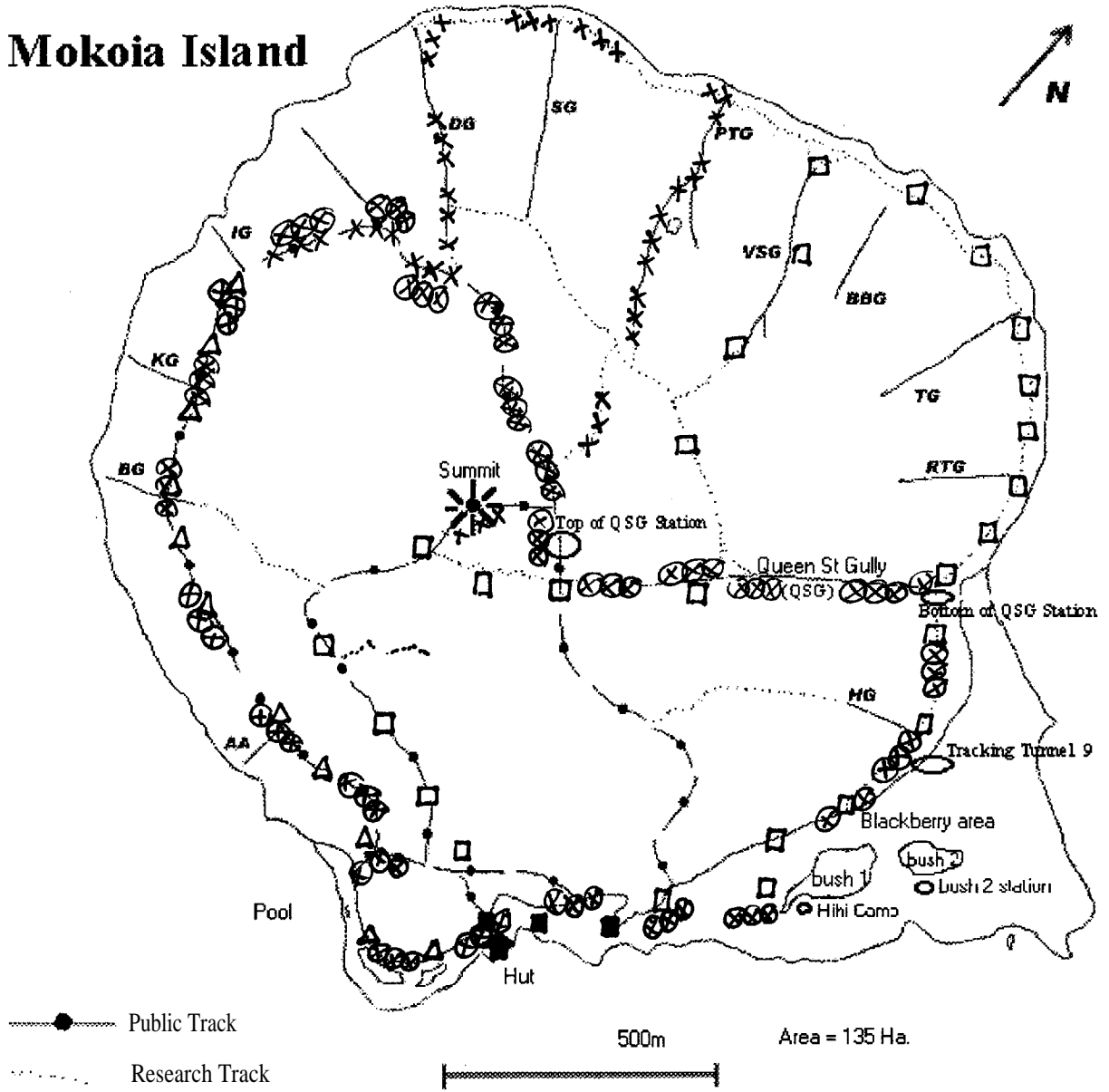
Metal band	Age	Sex
L35960	3	F
**	1	F?
M36032	2	F
M36031	2	M
L36951	3	F
M36001	-	F
M36031•	3	M
M36002	1	M
M36003	3	M
M44585**	3	M
**	1	Chick
M36004	2	F
27-09662**	3	F

\*\* No metal band given because the bird was too young and the tarsi too small. Our colour bands were somehow in between size L and M, so we gave young birds a colour band.

• : Recapture from 1999

\*\* : Recapture from 1996

# Mokoia Island



- Posts used during non-solicited call surveys
- △ Listening post on 16/10/99
- Listening posts on 17/10/99
- × × × Three people posts on 16/10/99
- ⊗ ⊗ ⊗ Three people posts on 24/11/99
- ▲ Early posts used on 16/10/99

Map of Mokoia Island showing the various listening posts used when censusing weka

## Appendix 2

Dates, number of traps, capture periods and total number of trap hours

<b>Date</b>	<b>No. traps</b>	<b>Open</b>	<b>Closed</b>	<b>Total trap hrs.</b>
16/10/99	8	11.30	18.30	56
17/10/99	8	05.20	20.30	120
21/11/99	8	17.00	23.00	48
22/11/99	8	04.00	09.00	40
22/11/99	8	10.00	12.00	16
22/11/99	8	17.00	23.00	48
23/11/99	8	04.00	09.00	40
23/11/99	8	17.00	23.00	48
24/11/99	8	04.00	09.00	40
24/11/99	8	17.00	23.00	48
25/11/99	8	04.00	08.30	36
15/02/00	8	17.00	24.00	56
16/02/00	8	04.00	09.00	40
16/02/00	8	10.00	12.00	16
16/02/00	8	17.00	23.00	48
17/02/00	2	04.00	09.00	10
17/02/00	4	04.00	13.00	36
17/02/00	2	04.00	23.00	40
17/02/00	2	09.00	21.00	24
17/02/00	1	13.00	21.00	8
17/02/00	2	13.00	23.00	20
17/02/00	1	13.00	16.00	3
17/02/00	1	17.00	23.00	6
17/02/00	3	21.00	23.00	6
18/02/00	7	04.00	08.00	28
18/02/00	1	04.00	09.00	5
28/02/00	11	17.30	23.00	60.5
29/02/00	11	06.00	12.00	66
29/02/00	1	09.00	11.00	2
29/02/00	12	18.00	21.30	42
01/03/00	13	06.30	12.00	71.5
01/03/00	13	16.30	21.30	65
02/03/00	13	10.00	21.30	149.5
03/03/00	13	06.00	12.00	78
<b>Total</b>				<b>1,420.5</b>



Traps used to catch weka on Mokoia Island



3a hook trap



3b plate trap