Rotoiti Nature Recovery Project Annual Report July 2006 - June 2007

Nelson Lakes Mainland Island
Nelson Lakes National Park

August 2007

Department of Conservation
Te Papa Atawhai

Rotoiti Nature Recovery Project Annual Report 2006-07

Nelson Lakes Mainland Island, Nelson Lakes National Park

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Cover photo: Bush robin - Tammy Bruce.

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1 Introduction

The Rotoiti Nature Recovery Project (RNRP) is one of six Mainland Island projects managed by the Department of Conservation (DOC). Eight principles were defined in 2005 as being common to all of DOC's mainland island projects.

1. Site-based natural heritage management with a primary focus on learning how to carry out ecological restoration. This is achieved by addressing management questions through rigorous trials and experiments, combined with intensive monitoring and evaluation that follows standardised systems and processes.
2. Results and outcomes are communicated.
3. Sites where research and learning outcomes take precedence over biodiversity outcomes.
4. Sites that contain a number of specific projects, as a secondary objective, aimed at restoring biodiversity through intensive management.
5. Sites that provide boundaries that can be protected.
6. Systems required to manage sites are sustainable.
7. Sites that provide opportunities for community involvement and inspire people to support biodiversity recovery and ecological restoration.
8. Sites that inspire people to initiate and develop additional restoration projects elsewhere.

The RNRP treatment and non-treatment areas include large areas of honeydew beech forest, which is a point of difference from the other mainland islands. The overall site was chosen as representative of a habitat type that covers about 1 million hectares or 15% of New Zealand's indigenous forests (Beggs 2001) largely in the northern South Island. The location is highly accessible to visitors: it surrounds the township of St Arnaud the main gateway to Nelson Lakes National Park, and is crossed by three popular walking tracks.

The RNRP treatment area was extended in 2002 from the original 825 hectares on the slopes of the St Arnaud Range, Nelson Lakes National Park, to take in further forest in the Park to the north and south, and part of Big Bush Conservation Area, bringing the total area managed to 5,000 hectares. Figures 1 and 3 show the extent of different treatments within the management area, which includes a large predator control area maintained by the Friends of Rotoiti community group.

Two sites are used as non-treatment sites, although the original non-treatment site at Rotoiti Lakehead was brought under mustelid and sustained possum control in 2002. Thus Lakehead is only a non-treatment site with respect to rodents and wasps, within a greater context of sustained mustelid and possum control. A full non-treatment site is situated at the head of Lake Rotoroa (refer to Figures 2 and 4).

This annual report presents its results within the project's three objectives (Section 3). Readers are referred to the Strategic Plan (Butler 1998) for the rationale behind these objectives and their translation into a long-term programme of scientifically based activities.

Figure 1 RNRP treatment site
Mustelid control and monitoring 06/07

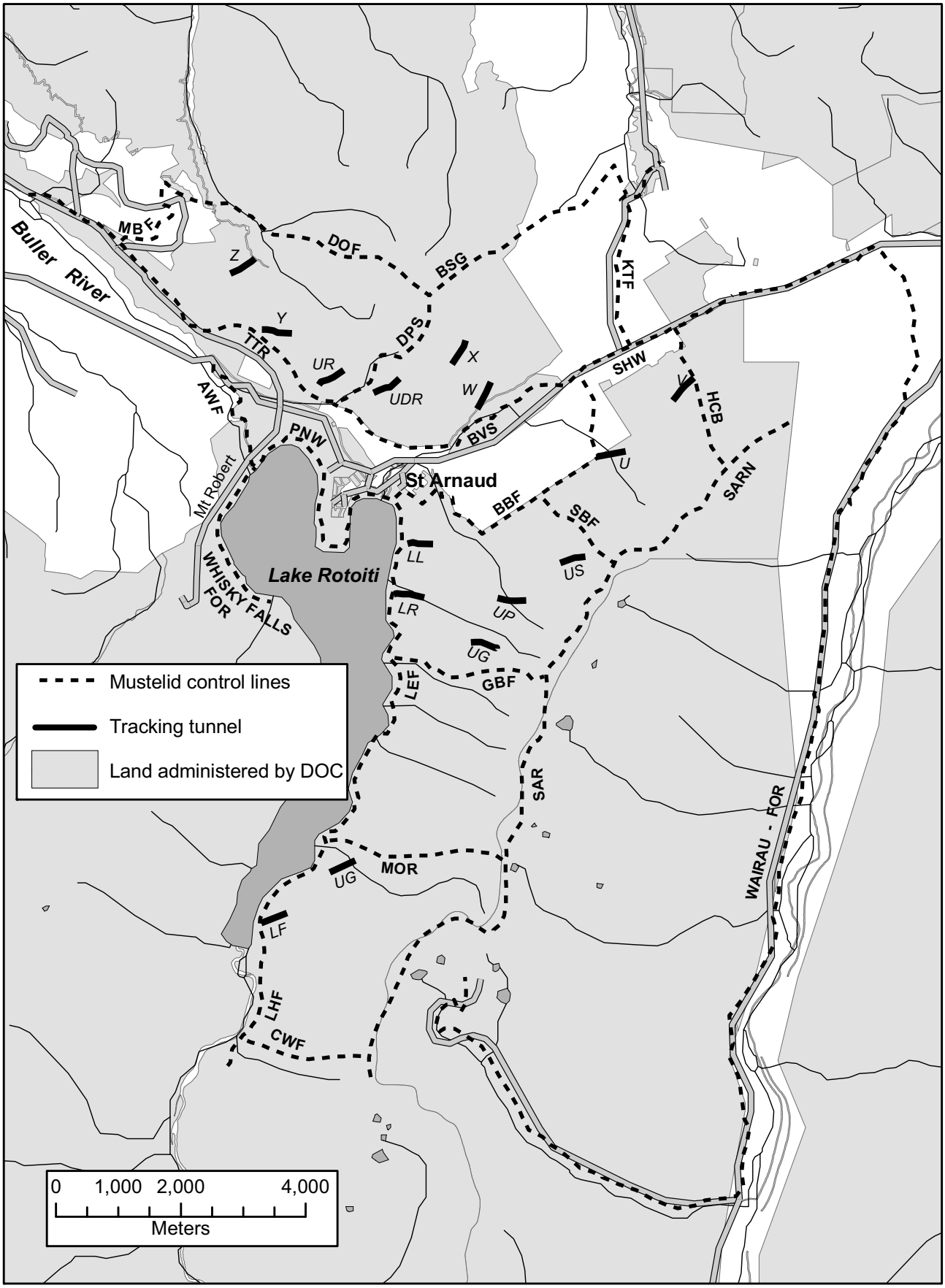

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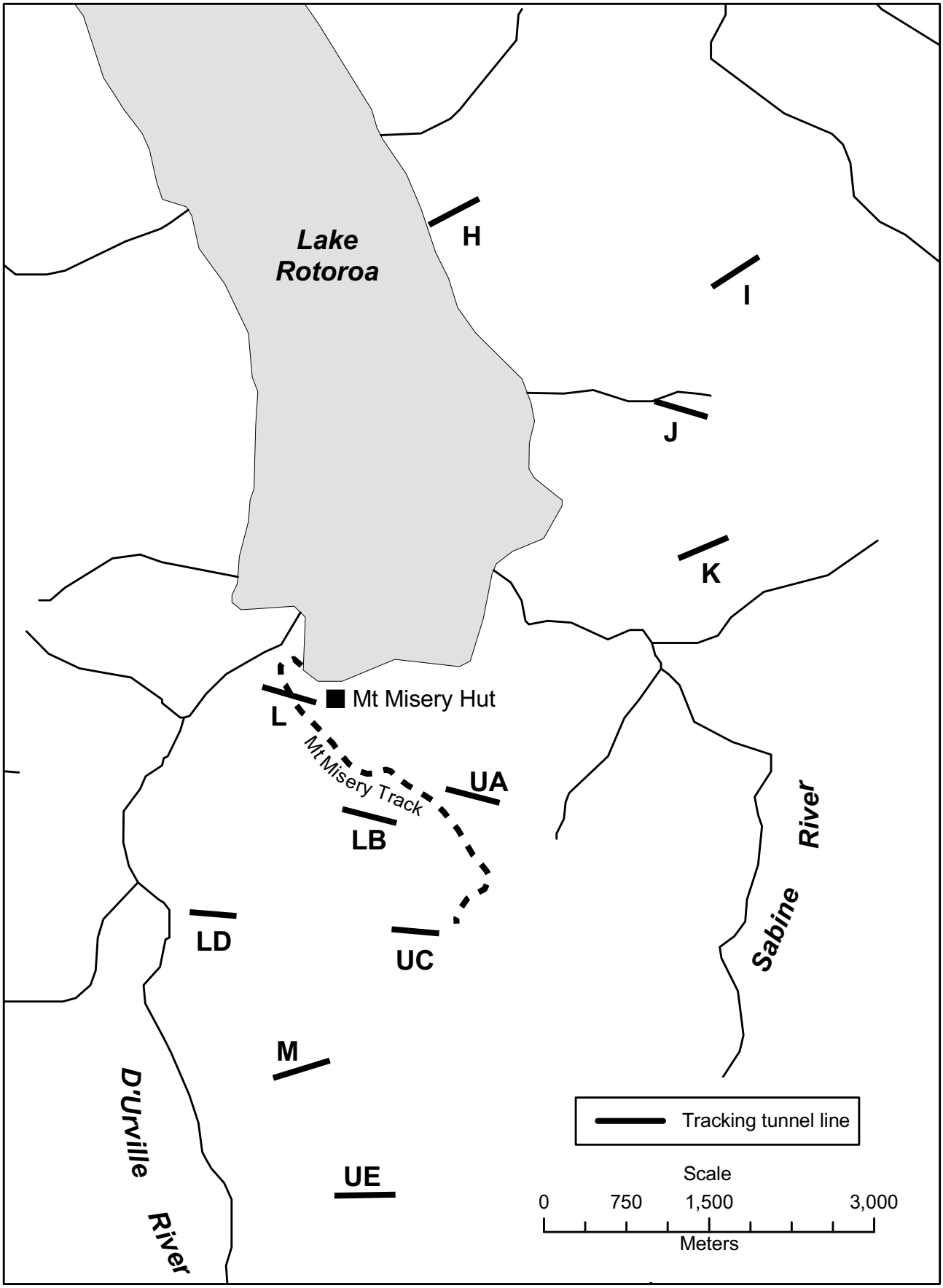
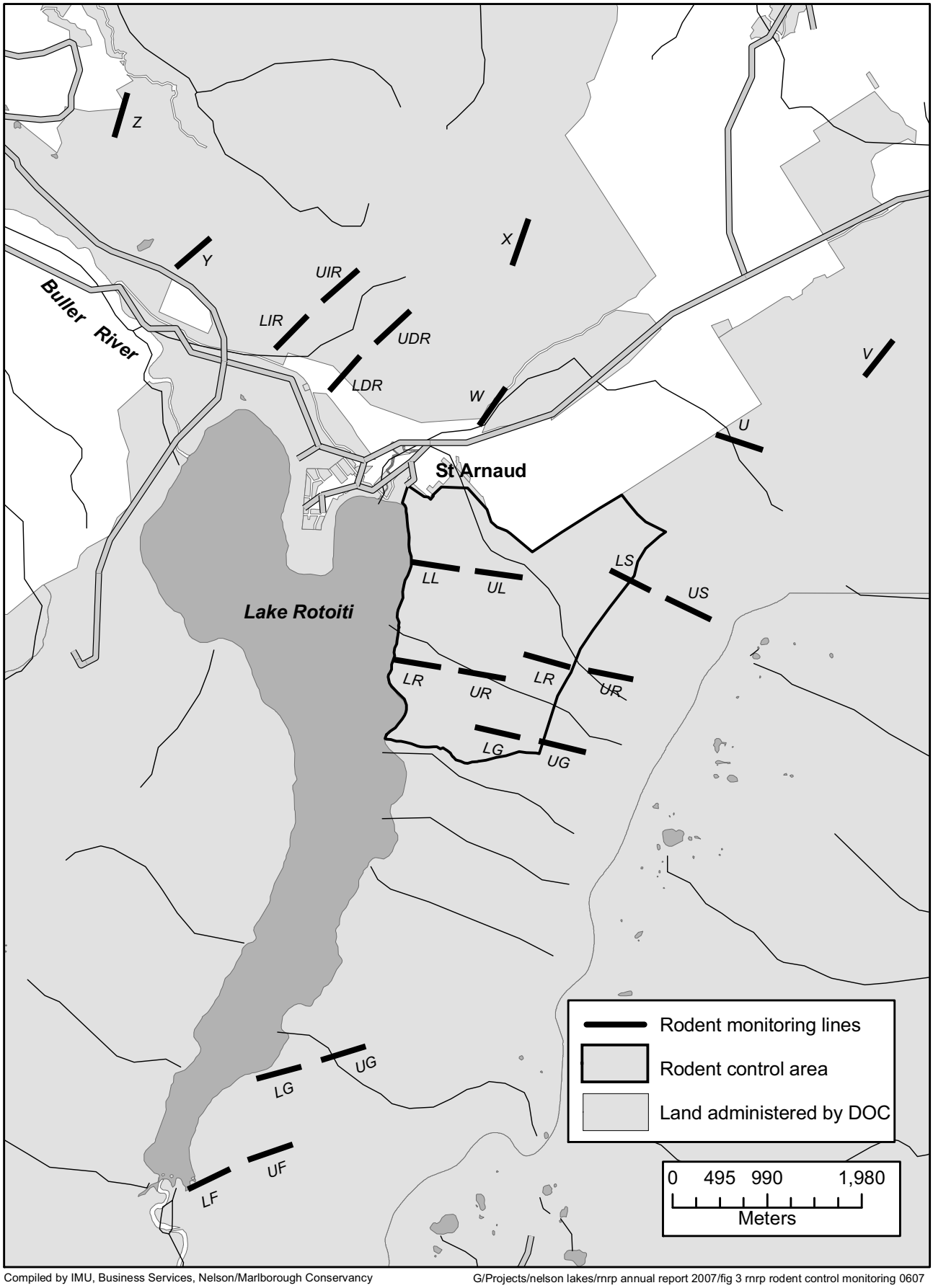
Figure 2 RNRP non treatment site Mustelid monitoring lines



Compiled by IMU, Business Services, Nelson/Marlborough Conservancy G/Projects/nelson lakes/rnrp annual report 2007/fig 2 rnrp non treament site mustelid monitoring lines

Figure 3 RNRP treatment site
Rodent control and monitoring 06/07



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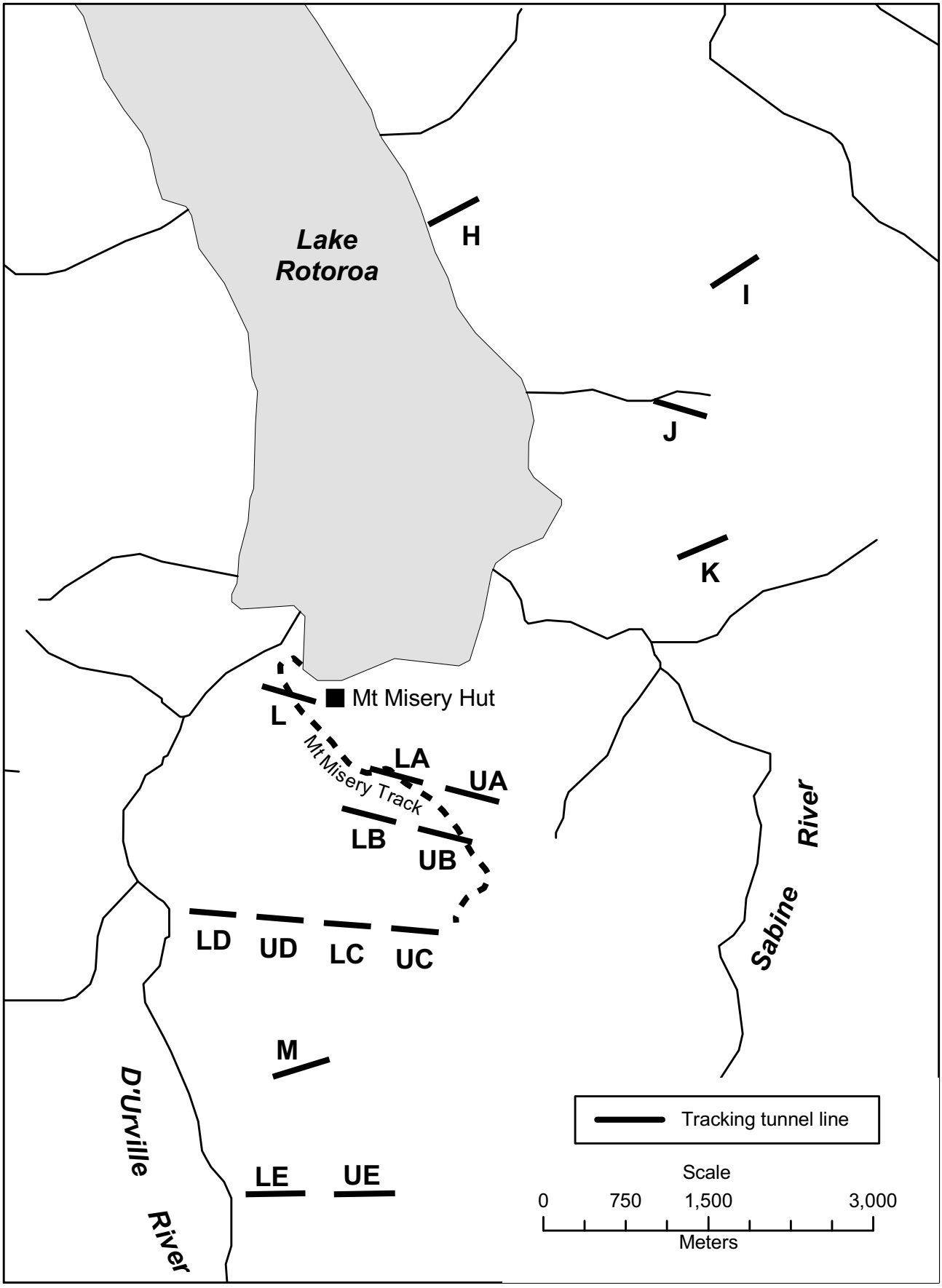
G/Projects/nelson lakes/rnrp annual report 2007/fig 3 rnrp rodent control monitoring 0607

Figure 4 RNRP non treatment site Rodent monitoring lines



Compiled by IMU, Business Services, Nelson/Marlborough Conservancy G/Projects/nelson lakes/rnrp annual report 2007/fig 4 rnrp non treament site rodent monitoring lines

2. Executive Summary

KEY RESULTS

Possum control – vegetation response

The results of the Wax-tag monitoring in 2005-06 showed reduced possum numbers in the RNRP core. Chew stick monitoring in 2006-07 has indicated similar or lower possum activity in the RNRP core as in the 2005-06 year. Outcome monitoring of Raukawa simplex by FBI recorded no possum browse. The current level of control is therefore sufficient to protect the core area.

Rodent control

During 2006-07 RNRP tested a 'detection and staged response model' of ship rat control. A failure of the ground-based toxin (1080) operation to meet the initial rat control target resulted in an inability to test the 'detection and staged response model'. The rat tracking rate of 53% is the highest recorded in the Core since the project began. Tracking rates in the lower core showed limited response to the 1080 operation and the switching off of rat trapping on March 9th 2007. A decision was made to cease rat control for the year and devise a new rodent control plan for the 2007-08 year.

Mustelid control

Tracking results continue to suggest that trapping in the RNRP is having a significant impact on mustelid numbers. There were no mustelid tracks detected within the RNRP Core. Non-treatment mustelid tracks (Lake Rotoroa) peaked at 57% in February 2007, which is the highest recorded tracking rate for mustelids since the start of the project.

Wasp control

An effective wasp control toxin - Fipronil - was expected to become available by 2007; however some of the legal issues were unresolved in early 2007 and Fipronil continued to be unavailable. The unavailability of a suitable toxin has been a disappointment to the project.

Response of native fauna

The RNRP kaka monitoring project is nearly completed, with only two females now carrying transmitters. A report on kaka breeding, survival and recruitment is in progress (Genevieve Taylor in prep.). Robin monitoring showed that the number of robin pairs holding territories within the survey area was higher when the toxin Brodifacoum was used to control rats and declined when trapping was the sole method of rat control. Five-minute bird counts were continued during 2006-07, but results and trends are not analysed annually.

Great spotted kiwi

At the end of the 2006-07 year there were a total of 13 adult kiwi radio-tagged in the recovery area, and another was recaptured and tagged shortly after. Kiwi transferred in 2006 dispersed further in their first year than did kiwi transferred in 2004, but all monitored birds remained within the RNRP project area. Only one pair was known to produce an egg in 2006-07 and this resulted in a new chick that survived. A previously unknown subadult weighing almost 2.5kg – most likely the result of breeding in 2004-05 – was discovered sheltering with a known adult during kiwi transmitter changes in June 2007. The other known chick (discovered in May 2006) survived and weighed more than 1.4kg at the end of the year.

Advocacy and education

Two editions of "Revive Rotoiti" were published during the year. Project information and presentations have been delivered at community meetings and forums; and talks were delivered to 21 different school and community groups. Eight groups were involved in guided walks in the mainland island. Media interest in the great spotted kiwi project has remained strong.

Volunteers and Friends of Rotoiti

Nine individuals contributed 106 volunteer hours. A Royal Society fellow commenced work in the mainland island in January 2007. The friends of Rotoiti contributed 333 volunteer days of work during the 2006-07 period, and participated in two training days.

Research

Student research was conducted on: the role of introduced birds as possible competitors with native birds; the effect of Friends of Rotoiti rodent control on lizard populations; factors influencing the recruitment and establishment of fuchsia; competition between native ants and introduced wasps. Landcare Research also continued their fieldwork investigating the impacts of mice and wasps on soil chemistry and soil microbes and invertebrates in a honeydew beech forest.

3. Goals and objectives

GOAL

Restoration of a beech forest community with emphasis on the honeydew cycle.

OBJECTIVES

- To reduce wasp, rodent, stoat, feral cat, possum and deer populations to sufficiently low levels to allow the recovery of the indigenous ecosystem components (especially kaka, yellow-crowned parakeet, tui, bellbird, robin, long-tailed bat and mistletoe) and ecosystem processes (especially the honeydew cycle).
- To re-introduce recently depleted species such as yellowhead (mohua) kiwi and saddleback (tieke), once the beech forest ecosystem is sufficiently restored.
- To advocate for indigenous species conservation and long-term pest control, by providing an accessible example of a functioning honeydew beech forest ecosystem, so a large number of people can experience a beech forest in as near-to-pristine condition as possible.

4. Results – pest control and monitoring

4.1 POSSUM (*TRICHOSURUS VULPECULA*) CONTROL AND MONITORING

Objectives

- To maintain possum numbers within the RNRP at a level that:
  - Preferred browse species show increased growth/productivity and further plants re-establish.
  - Impacts on land snails are reduced to a level that is insignificant compared to other mortality factors.
  - Nesting success of kaka is maintained at a level allowing population growth.

Performance measures

Operational

- Maintain existing kill traps and check in conjunction with mustelid Fenn™ trap lines as described in the RNRP Draft Operational Plan 2006-07.
- Plan future approach to possum control in the RNRP for inclusion in the Operational Plan 2007-08.
- Maintain dialogue with biodiversity personnel undertaking liaison with Animal Health Board contractors as described in the Operational Plan 2006-07.

Result

- Possum densities maintained at low levels within the RNRP core as assessed by the standard National Possum Control Agencies (NPCA) Wax-tag monitoring protocol (conducted every 2-3 years).

Outcome

- Foliar Browse Index (FBI) monitoring shows an improvement.

Methods

Kill trapping continued along the 'Borlase Boundary', 'German Village', 'Snail Boundary', 'Grunt Boundary' and 'MOR' trap lines with the intention of buffering the core area. Trap results are presented in Table 1.

As in previous years, possum interference with wax chew sticks (designed by Pest Control Research as precursor to Wax-Tag®) was measured on four occasions (Table 2).

The chew sticks are placed next to each tracking tunnel in the core area in association with the rodent and mustelid monitoring. Chew sticks are placed on a raised rodent proof platform and are left out for one night and then for a further three nights.

No wax-tag monitoring was undertaken in the 2006-07 year. It is scheduled for April/May of the 2007-08 year.

Results

TABLE 1: POSSUM TRAPPING OPERATION: NUMBER OF POSSUM KILLS

MONTH	BORLASE BOUNDARY	GERMAN VILLAGE	SNAIL BOUNDARY	GRUNT BOUNDARY	MOR
July	1	0	0	3	5
August	0	0	0	0	1
September	0	0	0	0	1
October	0	0	1	1	3
November	0	0	0	0	2
December	0	0	0	0	6
January	0	0	1	0	2
February	0	0	0	1	0
March	0	0	0	1	3
April	0	0	1	2	2
May	0	0	0	2	5
June	0	0	0	0	0
Rat captures	0	0	3	0	2
Total possums	1	0	3	10	30
# Traps	60	23	10	10	12
Capture/trap*	0.01	0.21	0.3	1.0	2.5

*Not corrected for sprung traps

TABLE 2: POSSUM MONITORING: CHEW STICK RESULTS

	% STICKS CHEWED (+/- ONE STANDARD DEVIATION)			
	AUGUST	NOVEMBER	FEBRUARY	MAY
One night	0 (0)	1 (1)	0 (0)	2 (2)
Three night	1 (1)	0 (0)	1 (1)	0 (0)

Neighbouring operations

Neighbouring possum control operations for TB vector control were contracted out by the Animal Health Board and undertaken by Southern Pest Management. In previous years, a 3km buffer, excluding toxins such as 1080 with secondary poisoning potential, had been maintained around the RNRP. This exclusion was lifted and 1080 was hand laid within this area of the AHB's Tophouse Operational area. These operations may reduce the number of possums dispersing into the RNRP.

Tophouse operation, 1 January 2007 – 31 July 2007

Subcontractor: Target Pest Contracting.

Raised leg-hold trapping, kill trapping and hand-laid toxins: ACP Sodium fluoroacetate Professional Paste (1080) in bait stations & bio bait bags, ACP Decal (Cholecalciferol) cereal pellets in bait stations and hand broadcast Sodium fluoroacetate (1080) pellets.

Overall Actual RTC achieved: 0.30%.

(File ref: NHT-02-16-143).

Upper Motueka operation, 9 August 2006 – 15 September 2006

Subcontractor: Stratford Pest Control

Raised set leg-hold.

Overall Actual RTC achieved: 0.7%.

(File ref: NHT-02-16-142).

Discussion

In the past, possum densities have been monitored using the Residual Trap Catch (RTC) method with an RTC target of less than 2%. The preferred method has now changed to Wax-tag monitoring which is measured using the Possum Activity Index (PAI). A target PAI still needs to be decided on (further research is needed to find out the relativity between RTC & PAI). The results of the Wax-tag monitoring in 2005-06 showed reduced possum numbers in the RNRP core. Chew sticks have indicated similar or lower possum activity in the RNRP core as in the 2005-06 year. The current level of control is therefore adequate to protect the core area. Quarterly checks using Chew sticks have been a useful tool for quickly evaluating possum densities in the RNRP. Outcome monitoring of *Raukawa simplex* by FBI recorded no possum browse showing possum control to be effective in protecting these values (Section 5.4.4).

Highest numbers of possums were caught on the southern boundary (MOR). The next highest catching line was the southern boundary of the core (Grunt Boundary). This pattern is not surprising as no possum control exists south of MOR, while German Village, Borlase Boundary and Snail Boundary lines all border AHB control areas. It is likely that RNRP possum control has been assisted by AHB activities. Bait take, presumably from rat activity, along the German Village line has remained within acceptable levels since February 2005. Rat traps will be maintained as long as rats are caught along this line.

Most possum control is dove-tailed in with other activities, requiring only a slight increase in operational cost.

Recommendations

- Continue trapping of possums along existing possum trap lines.
- Discuss with the Technical Advisory Group the need to add a line of 10 Warrior traps on the most southern Fenn™ line (Clearwater).
- Continue using the WaxTag® protocol for future possum population monitoring (every 2-3 years).
- Continue with vegetation outcome monitoring.

4.2 RODENT CONTROL AND MONITORING

4.2.1 Rat control

Objectives

- Test and improve a 'detection and staged response model' of ship rat control in a South Island beech forest subsequent to a wider scale management response.
- Test the relative efficacy of RS5 vs. Wanganui No. 7 pre-feed and toxic 1080 pellets.
- Reduce rat numbers to levels at which: predation of nesting birds (particularly robins), predation of ground dwelling invertebrates and inhibition of plant regeneration (through eating of fruit, seed) are insignificant alongside other mortality factors affecting these groups.

Performance measures

- To shut down the RNRP core rat trapping grid (825 ha) prior to the rat targeted 1080 toxin operation.
- To have low rat numbers following the 1080 operation which will allow a trial of the 'detection and staged response model' (using tracking tunnels, toxins and rat traps to identify localised clusters or "hotspots"; and make rapid management decisions as the rodent activity dictates).
- To measure the response to rodent control by means of tracking tunnels (result) and robin territory mapping (outcome measure).

Poison ground baiting trial

Methods

The rat trapping grid within the RNRP core (825 ha) was temporarily shut down from July 2006 onwards, to allow rodent numbers to build up and test the effectiveness of the 1080 toxin operation.

The grid was split into two sections 'lower rats' (~500 ha) and 'upper rats' (~325 ha). The experimental management focused on the 'lower rat' section up to the W line. The lower rat section was then split into north and south blocks (Block A and Block B), to compare the effect of RS5 with Wanganui No. 7 pre-feed and toxin/1080 pellets.

The treatment areas had pre-feed laid twice (in mid October and early November) using large Philproof bait stations 100 x 100m apart. The 1080 toxin was laid mid November and brought in early December, when the first stage of the 'detection and staged response model' began.

This year the 'upper rat' section was trapped intermittently from June 2006—March 2007 (excluding the top two lines G + H which were not trapped at all this year). The Big Bush rat grid has not been trapped all year.

Justification

An operational model for control of ship rats in South Island beech forests had been proposed, that is summarised as:

1. Use traps (or other device) to detect the presence/relative abundance of ship rats in the operational area.
2. Undertake local control at the site of detection (i.e. trap or localised bait station control).
3. Increase scale of control (i.e. bait station control).
4. Increase scale of control (i.e. aerial 1080).

In rat events, managers have often jumped from step1 to 3 or 4 due to the high risk of step 2 being ineffective. This site offers a low risk (i.e. does not have critical rat affected avian values) environment to test the model. The potential outcome is increased confidence in this technique as an effective tool, with the potential to reduce toxic, financial and labour inputs to managed areas.

Proposed operational model

The rat management needed to be flexible for rapid detection and response to rodent issues. The intended initial responses were trapping and use of Brodifacoum as follows:

- RNRP lower standard rat trap grid (100 x100m) to be run for purpose of detecting presence of rats in grid.
- Service fortnightly to start and then stretch or tighten as needed (determined by rat activity and need for information turnaround).
- If localised clusters of rats detected consider local spot treatment by either intensive trapping (frequent checks and/or opening intermediary traps (100x 50m grid)), or local toxic pulse.
- Continue detection trapping. Repeat above if local clusters detected. If clusters appear to be growing expand size of 'local cluster response' or move to global toxin response (i.e. one toxic pulse across all bait stations).

- Always use detection trapping and/or tracking tunnel surveys to gauge the success of local or global response.
- Any global response should always have a pre and post tracking tunnel survey.
- The perimeter of the experimental area (all stations within 200m of north and south boundaries) may require regular additional treatment to reduce the rate of immigration.

Results

Bait trial

The bait take was measured using the following system. Recorded as 0, ¼, ½, ¾ bait remaining or 1 (no bait taken). Results were then mapped. Overall the RS5 pre-feed bait take was marginally higher than the Wanganui No. 7 bait take (Figure 5); however the majority of stations had no bait taken during both the 1st and 2nd pre-feed sessions.

A similarly poor take was recorded for the toxic bait in which the majority of stations had no bait taken. Wanganui No. 7 had slightly more stations where zero bait remained (Figure 6).

Overall the pre-feed and 1080 bait take was poor. The most likely explanation for the poor results is due to the timing of the operation, which clashed with 2nd largest beech mast recorded, energy wise since monitoring began in 1997, offering the rodents an abundant alternative food resource.

Detection and staged response model

1080 was removed during the first week of December and the lower rat trapping grid (100x100m) was re-opened the following week (11 December). Traps were checked and re-set after a fortnight and the results mapped. Disappointingly, but not unexpectedly, the results were not as distinct as we had hoped, with no defined clusters or hot spots.

On 5th January the rat traps were re-checked and, although the catch had doubled, there were still no definable clusters. Traps continued to be checked fortnightly throughout January and weekly throughout February, however we were still unable to identify any clusters or hotspots and were therefore unable to follow through with the initial plan of using Brodifacoum in localised areas.

Discussion

It seems unlikely that the rats caught following the 1080 operation had newly occupied this area. The tracking tunnel results throughout the operation support this interpretation. This apparent failure of the 1080 operation meant an inability to trial the 'detection and staged response model'.

Advice was sought from the Technical Advisory Group in early March, and the decision was made to cease rat control for the year and devise a new rodent control plan for the up-coming year 2007-08. The final trapping session was on the 9th of March.

Fig 5 1st Prefeed bait take

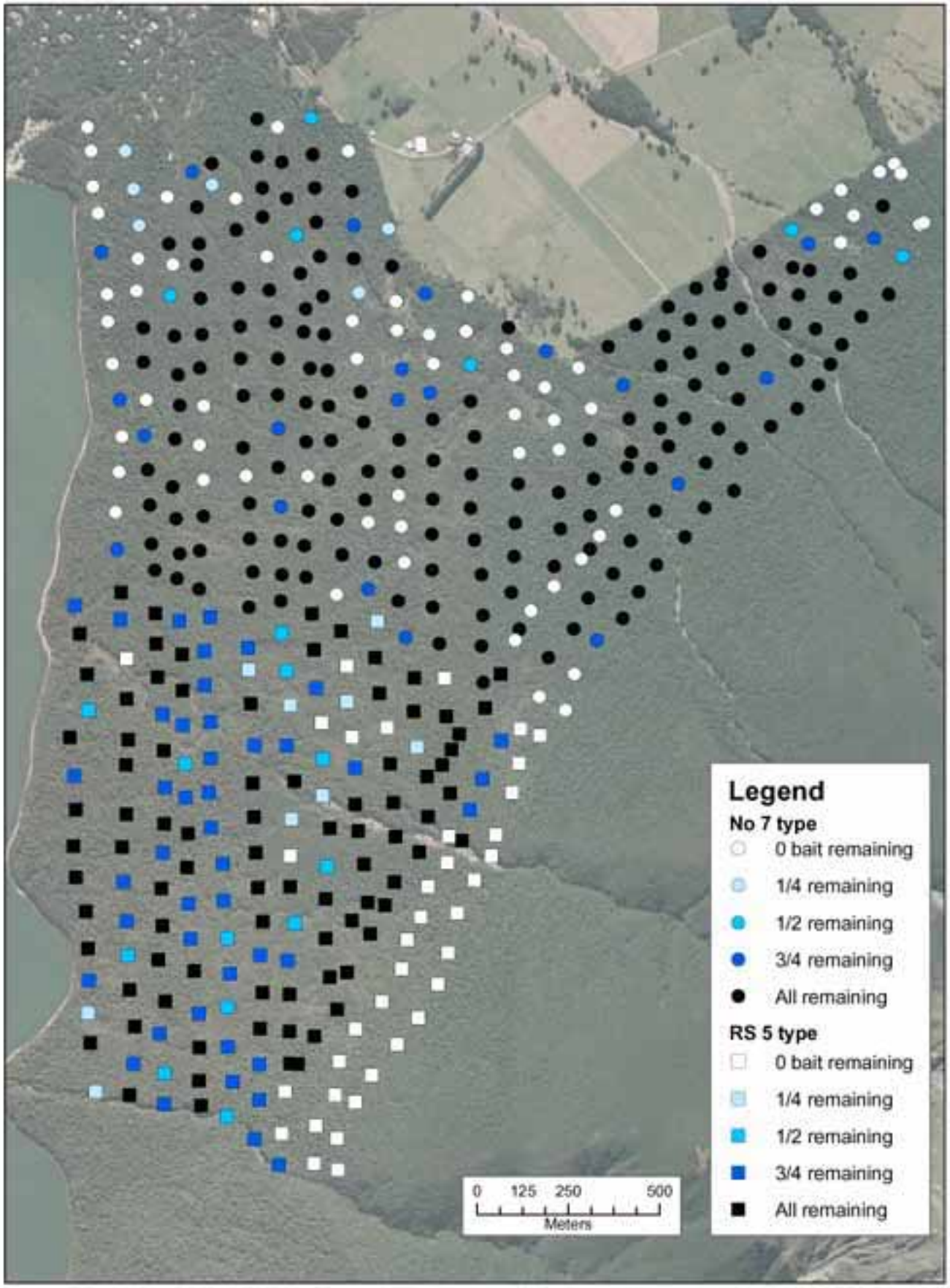


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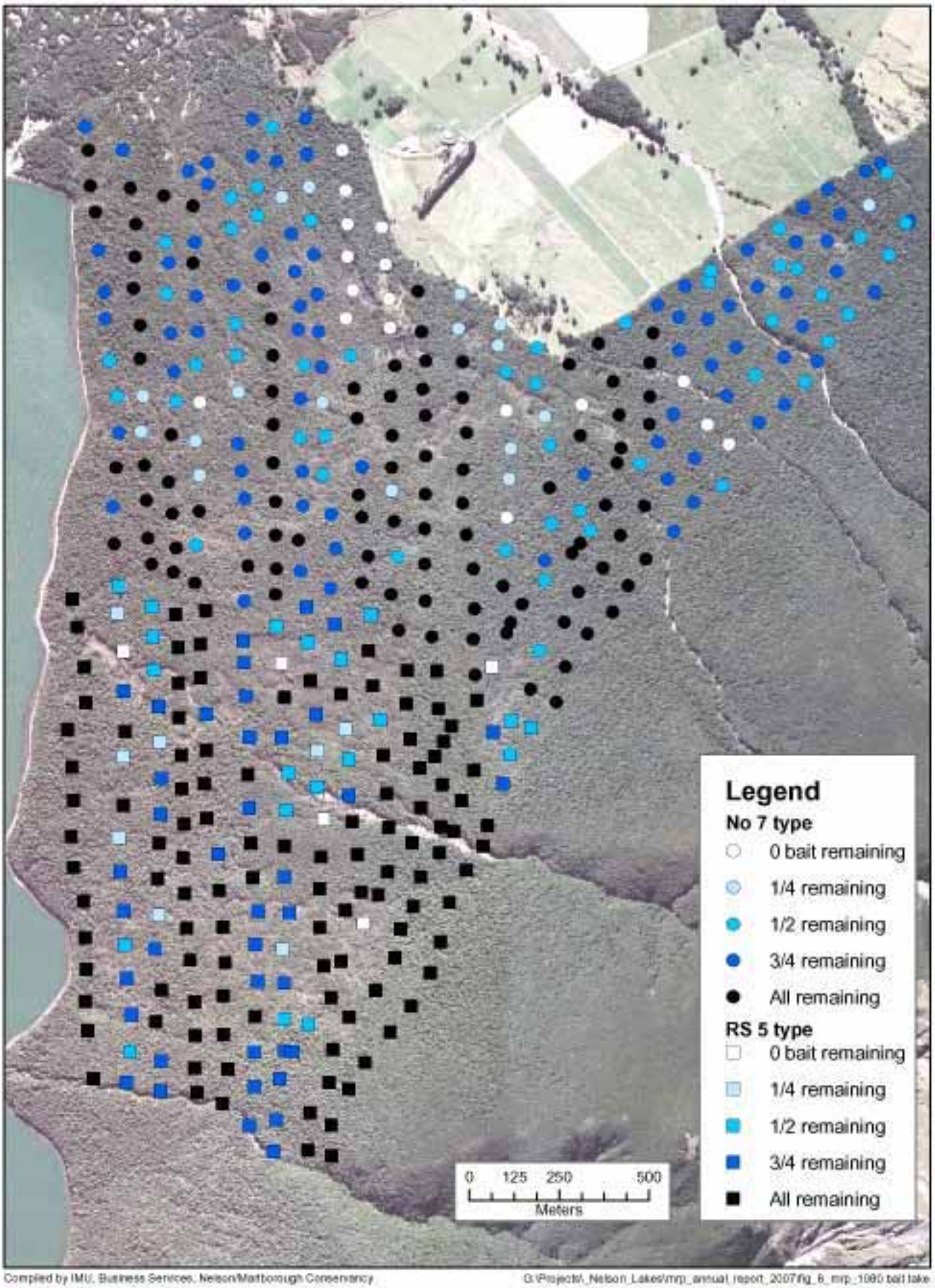
Fig 6 1080 bait take



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G:\Projects_Nelson_Lakes\mrp_annual_report_2007\fig_6_mrp_1080 bait take

Members of the advisory group and other scientists agreed that the lower rat trial area was also too small, and that the approach was not going to be applicable to other sites as we had first hoped i.e. Operation Ark. Instead it was suggested that we consider using the entire rat grid (825 ha) to trial a new rodenticide.

Recommendations

- Carry out the maintenance required to bring the rodent grid up to standard for future rat toxin trials.
- Remove the rat traps and tunnels from the RNRP core and Big Bush, keeping the good ones for the Friends of Rotoiti (FOR) group and offering the rest to the local community and other conservation projects.
- Review the Technical Advisory Group suggestion of altering the top three rat lines to make the grid consistent (F1 + H are currently 150 x 150m).

Rat monitoring

Tracking tunnels are used to compare rat abundance under three treatment regimes – poisoning/trapping of rodents combined with trapping of mustelids (RNRP Core), trapping of mustelids only (Big Bush and Lakehead) and no poisoning or trapping (Rotoroa). Refer to figures 1 to 4 for the details.

For each rodent tracking session, 360 tunnels are set on 36 permanent lines. Ten tunnels are set per line at a distance of 50m. The minimum distance between lines is 200m. The tracking tunnels in the project are a mixture of coreflute and galvanised tunnels. During a monitoring session, numbered papers are placed on each end of a tray within the tunnel and an ink sprayed sponge is set between the 2 papers. The tunnels are baited centrally with a peanut and oat mix which is rolled into a ball the size of a thumbnail. Rodent tracking tunnels are set for one night.

Tracking tunnels for rats are run in August, November, February and May within the Core, Lakehead, Big Bush and Rotoroa sites.

In 2006-07 tracking tunnels throughout the project were realigned so that they met DOC best practise. Lines with 20 tunnels (Snail, Loop, Percolator, Rata, Grunt, Lakehead F, Lakehead "G", Ice Rink, Dome Ridge, A,B,C,D and E) were extended to create 2 lines of 10 tunnels with a 200m gap between the lines. Lines which originally had 10 tunnels (U, V, W, X, Y, Z, H, I, J, K, L and M) remained unchanged. Refer to the tracking tunnel folder in the Rotoiti Nature Recovery Project office for details of these line changes. All tunnels were realigned at least 1 month prior to the next session to reduce the likelihood of rodent aversion; however tracking rates may have still been slightly lower on these lines as a result.

Lines L and H at Rotoroa have previously been affected by possum interference so in February the coreflute tunnels were changed to galvanised ones that prevent this disturbance.

Results

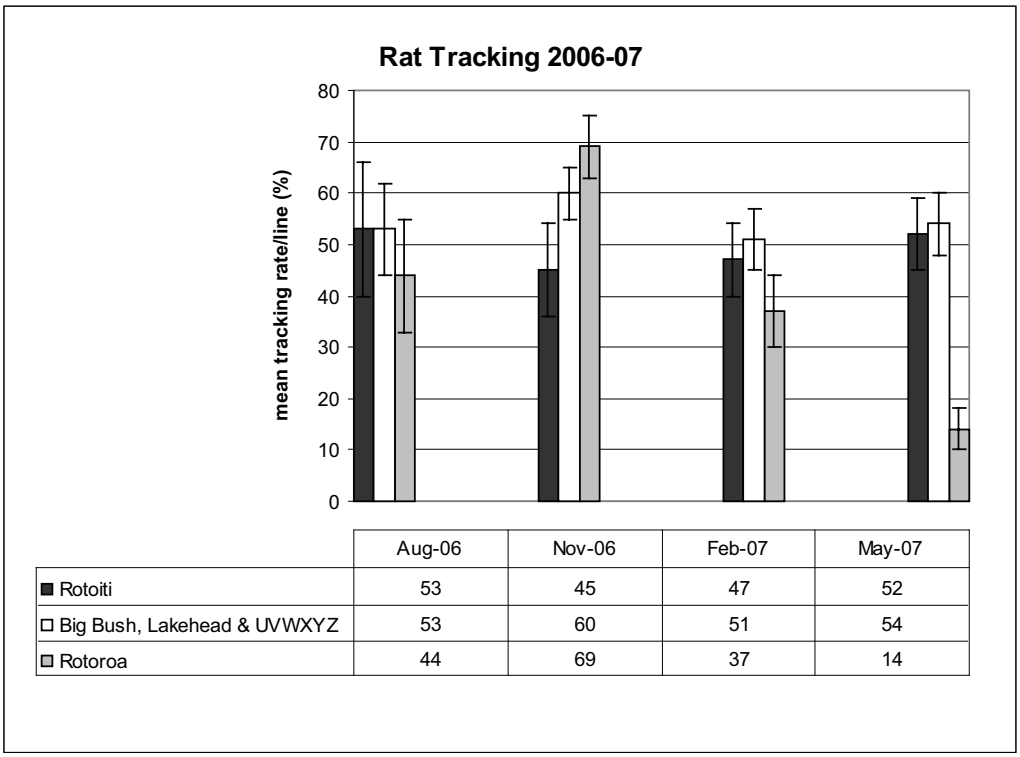
In November 2006 tracking rates at Rotoroa were the highest for any site in the study this year at 69% (+/-6% SE). This is the second highest rat tracking rate recorded at Rotoroa since the beginning of the project (highest recorded 73% in November 2000 after the 2000 beech mast). Rotoroa also recorded the lowest tracking rate with 14% (+/- 4% SE) in May 2007. The Rotoroa figures can be heavily influenced by possum disturbance so conclusions should be made with caution but may demonstrate the response of a rat population to an uncontrolled mustelid population.

Tracking rates for rats were high in the RNRP Core throughout 2006-07 which is consistent with 2006 being the second highest beech mast year since the beginning of the project. The rat tracking rate of 53% (+/- 13% SE) is the highest recorded in the Core since the project began. Previous to this, May 2001 had the highest mean tracking rate of 41% in the Core (see Graph 1).

Tracking rates in the lower core showed limited response to the 1080 operation and the switching off of rat trapping on March 9th 2007.

The tracking rates within the RNRP core and Big Bush, Lakehead & UVWXYZ stayed consistently high throughout the year, compared to the rates at Rotoroa which showed much greater seasonal variation.

GRAPH 1: RAT TRACKING RATES 2006-07 (+/- SE)



	Aug-06	Nov-06	Feb-07	May-07
Rotoiti	53	45	47	52
Big Bush, Lakehead & UVWXYZ	53	60	51	54
Rotoroa	44	69	37	14

Note that the Big Bush, Lakehead and UVWXYZ have been combined for Graph 1. These lines are in areas where mustelids are controlled through Fenn™ trapping but rats are not targeted.

Discussion

The realignment of tracking tunnels prompted a description of the tunnel type and line characteristics.

An attempt to compare tracking tunnel data between years across and between projects has been difficult due to the differences in tunnel design and baiting. While the tracking tunnel data generated to date has some value in comparing rodent abundance at a site over time, the other variables make it difficult to compare between sites and lines within the project. It also raises concerns about the value of the tracking tunnel information to DOC projects outside of the RNRP and impairs the ability to transfer lessons learned to the wider department – one of the central tenets of mainland islands.

Recommendations

The monitoring of rodent abundance through tracking tunnels should be adapted to comply with the national best practice. This will involve:

- Measuring the interference from possums at Rotoroa in November 2007 before adopting the best practise technique.
- Bringing tracking tunnels and baiting in line with national best practise in the RNRP core after the May 2008 set.

The project had hoped to begin using tracker cards in 2007-08 but given the issues over best practise and costs involved in upgrading the lines, this may need to be delayed to 2008-09.

4.2.2 Mouse control

Introduction

There was no targeted control of mice in 2006-2007.

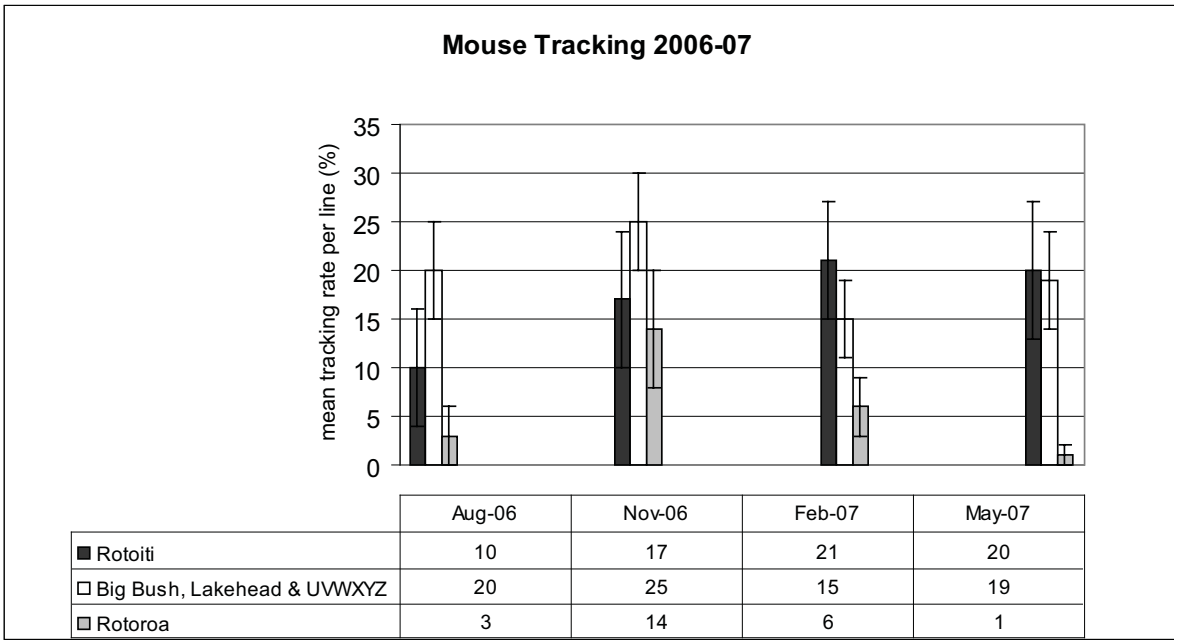
Mouse monitoring

Same as per the monitoring description under Rat Control.

Results

The abundance of mice as revealed by tracking rates is shown in Graph 2.

GRAPH 2: MOUSE TRACKING RATES 2006-07 (+/- SE)



	Aug-06	Nov-06	Feb-07	May-07
■ Rotoiti	10	17	21	20
□ Big Bush, Lakehead & UVWXYZ	20	25	15	19
▫ Rotoroa	3	14	6	1

Note that the Big Bush, Lakehead and UVWXYZ have been combined for Graph 2. These lines are in areas where mustelids are controlled through Fenn trapping but rats are not targeted.

Discussion

Tracking rates for mice were low throughout 2006-07. The highest mouse tracking was within the RNRP Core in February at 21% (+/- 6% SE) and the lowest was at Rotoroa in May with 1% (+/- 1% SE). The low index at Rotoroa coincides with low rat tracking rates at that site. We might tentatively conclude that an uncontrolled stoat population impacts significantly on both species. On the other hand results might have been affected by possum disturbance or rodent activity may have been reduced by higher mustelid numbers.

Previous to 2006-07 the highest mice tracking rates within the RNRP core was in May 2001 with rates of 93%. Tracking rates for mice have been comparatively low (below 30%) since then.

Recommendations

This data needs more intensive analysis to determine if this form of monitoring can identify any impact from the different management treatments.

4.2.3 Friends of Rotoiti rodent control

The Friends of Rotoiti (FOR), since 2001 have maintained a network of 238 victor snap traps in coreflute tunnels, spaced 50 metres apart along lines around the village of St Arnaud. This area was initially chosen as it would act as a corridor between the mainland island's rat control on the St Arnaud Range and the Big Bush Conservation Area. Trap checks and bait changes are carried out fortnightly and a combination of peanut butter and rolled oats is used as bait.

The Friends of Rotoiti considered using different methods for rat control but decided that toxins might not be acceptable within the St Arnaud Village.

In March, two trapping lines which have historically caught the highest number of rats per trap were chosen to test trap spacing at 25 metres. Results will be reported in the 2007–08 report once the trial has run for a year. Two new lines were also established along Holland and Robert Roads which back on to the RNRP core rat control grid on the St Arnaud Range. Traps along these new lines are at 25 metre spacing – bringing the total number of traps to 259.

The total catch for the year is shown in Table 3. This year a marked increase in rat captures is seen with an early peak in November and another peak in February. This increase in rat captures is thought to be in response to the second biggest beech mast recorded in the RNRP core since 1997.

TABLE 3: FRIENDS OF ROTOITI RAT TRAP CAPTURES

	RAT	MOUSE	HEDGEHOG	STOAT	FERRET	WEASEL
2006-07	253	1405	0	6	0	3

4.3 MUSTELID (STOAT, FERRET AND WEASEL) CONTROL AND MONITORING

4.3.1 Rotoiti Nature Recovery Project mustelid control

Predator control is used to maintain mustelid at low numbers to allow for the local recovery of resident birds (particularly kaka) and establishment of re-introduced species vulnerable to predation (i.e. great spotted kiwi). The intention is to refine and maximise the efficiency of predator control programmes within the Rotoiti Nature Recovery Project.

Methods

The project services 89km of trap lines consisting of 890 Mark 6 Fenns™ spaced at 100m intervals along 21 lines that encompass the project area (5000ha). Refer to Figure 1 for trap lines.

Traps are baited with white hens' eggs which are replaced 2 monthly as part of the trap checking cycle.

In 2006-07 traps were checked: monthly in July, August, September, May and June; fortnightly in October, November, February, March and April; weekly in December and January. See Table 4 for predator control results, Figure 7 for a map of stoat captures, and Graph 4 for capture rates per line.

The decision was made to move to fortnightly checks in February 2007 after RNRP and technical support staff reviewed trapping data. Analysis revealed that few mustelids would have been missed by dropping the checks to fortnightly in previous years. Analysis also suggested that by-catch was not at a high enough level to significantly impact on the availability of traps to mustelids.

Captures are no longer sexed within the RNRP. Data relating to the sex of captures has been collected over the preceding 10 years, but has not been analysed. There are concerns over the accuracy of this data set, as field staff may not have always been able to correctly sex captured animals.

Results

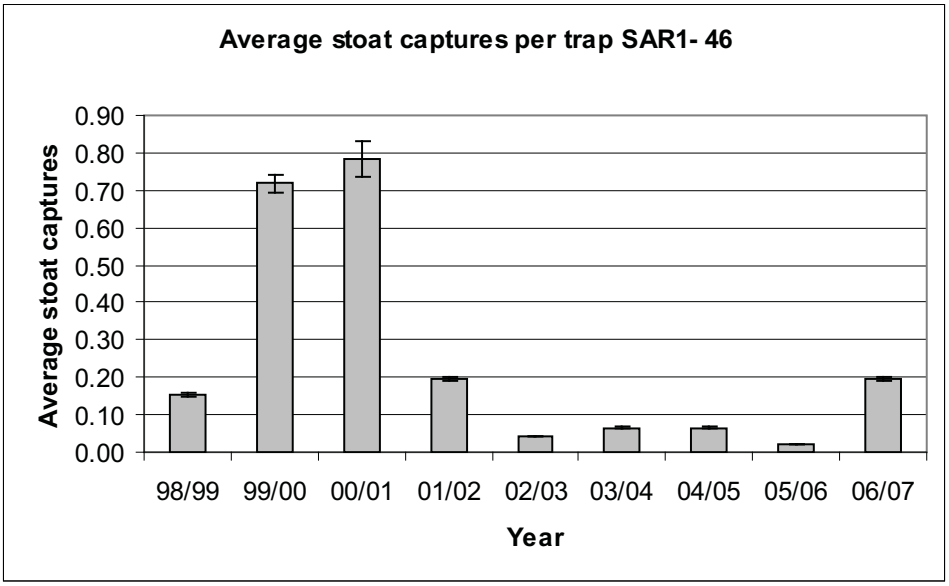
TABLE 4: PREDATOR CONTROL RESULTS FOR MARK 6 FENN™ TRAPS IN THE RNRP AREA

MONTH	NUMBER OF ANIMALS CAUGHT			
	FERRET	STOAT	WEASEL	CAT
July	1	8	0	1
August	2	7	0	2
September	0	6	1	0
October	1	13	4	0
November	0	4	4	1
December	1	65	9	1
January	5	71	3	0
February	5	27	0	1
March	1	34	7	1
April	0	24	1	4
May	0	21	2	9
June	0	5	1	2
Total	**16**	**285**	**32**	**22**

Given the beech mast in 2006-07, stoat numbers were expected to be high within the RNRP. This was based on the stoat numbers seen in 2000-01 in response to the 2000 beach mast year. Stoat numbers were not especially high in 2006-07 compared to previous years.

The effect that the Friends of Rotoiti Rainbow line has had on stoat captures on the St Arnaud Range (traps 1-46) was analysed. In 2000-01 there was an average stoat capture of 0.78 per trap. Since then the stoat captures have been very low along the range with between 0.02 and 0.20 stoats caught per trap. Despite The Friends of Rotoiti Rainbow line recording its highest capture rate for stoats in 2006-07 the capture rate on top of the range remained low. The Rainbow line may be acting as a buffer to the St Arnaud Range line and RNRP core (refer to Graph 3).

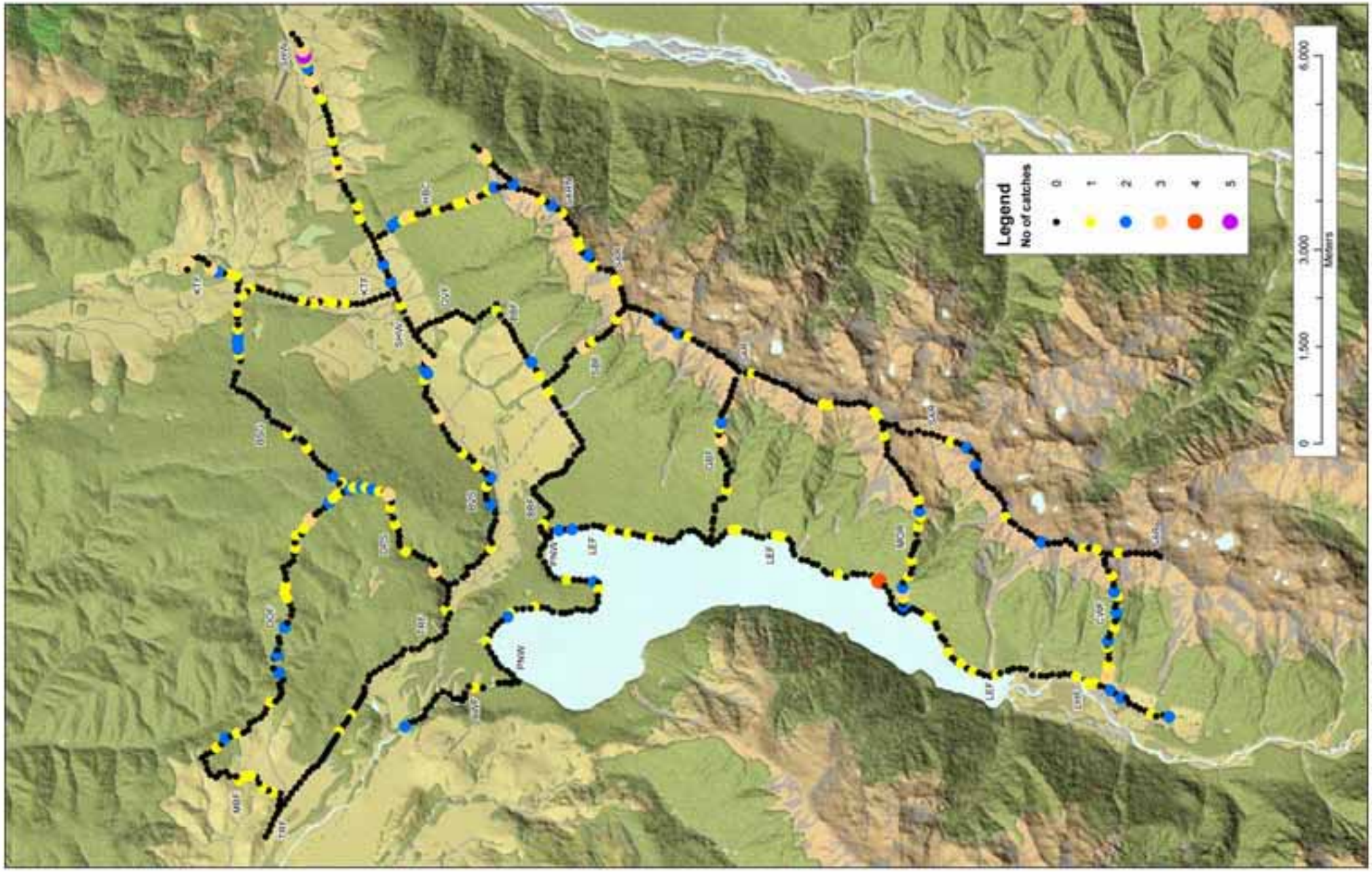
GRAPH 3: ST ARNAUD RANGE STOAT CAPTURES IN TRAPS 1-46



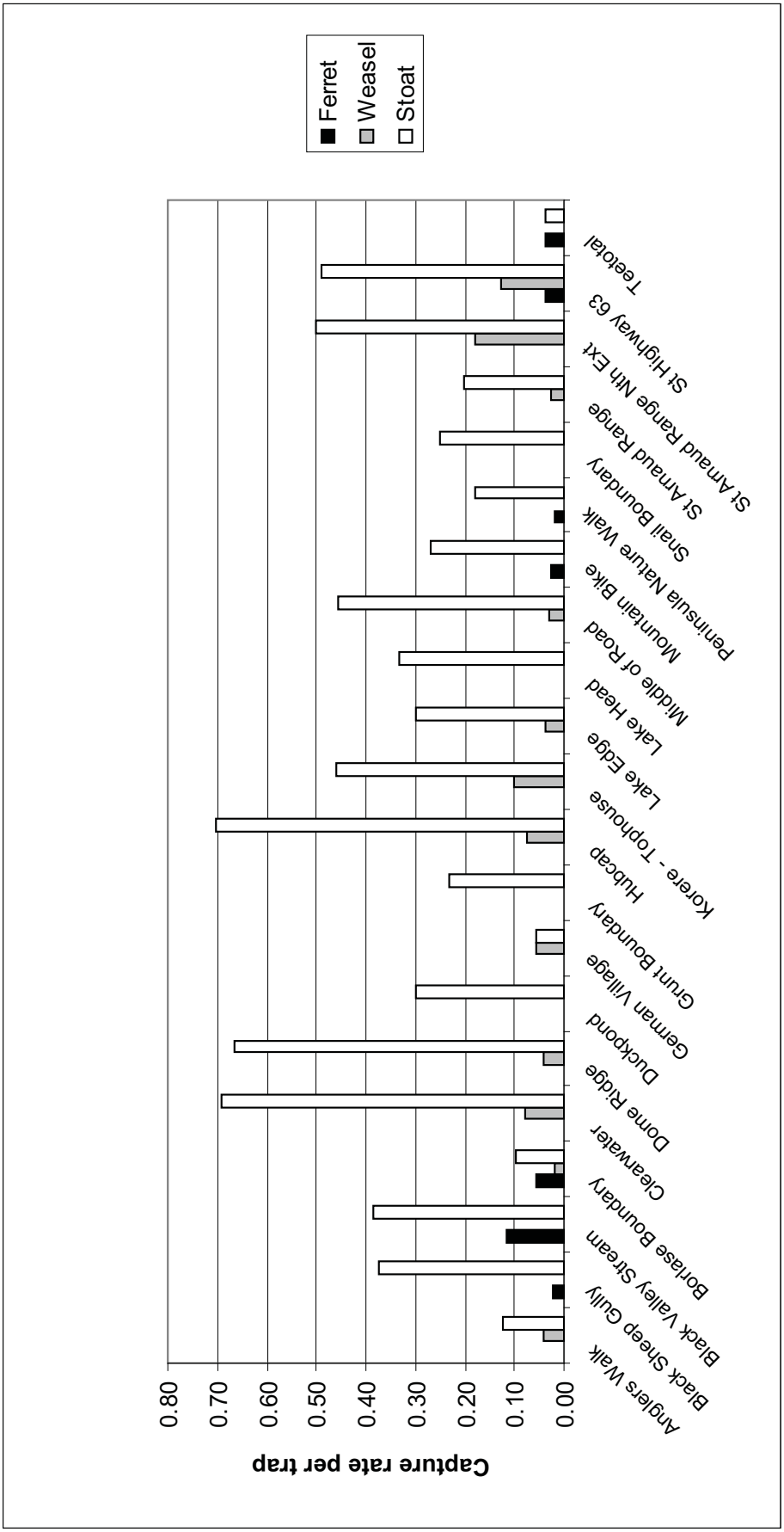
The 2006-07 trap catch data has been analysed per line. Boundary lines (Black Sheep Gully, Clearwater, Dome, Hubcap, Korere-Tophouse, Lakehead, Mountain Bike, State Highway 63) generally had higher capture rates compared to lines with water boundaries (Anglers Walk, Lake Edge, Peninsula Nature Walk) and internal lines (Black Valley Stream, Borlase Boundary, Duckpond, German Village, Grunt Boundary, Snail Boundary, Teetotal). The exception is MOR which has higher than expected stoat captures. Rates were slightly lower than expected on lines which had Friends of Rotoiti lines acting as buffers (St Arnaud Range, St Arnaud Range Northern).

Fig 7

Stoat Captures in Fenn Traps 2006-07



GRAPH 4: CAPTURE RATE OF MUSTELIDS PER LINE DURING 2006-07



No mustelids were caught in rat traps or cat traps in 2006-07 within the RNRP. Six stoats and three weasels were caught in Friends of Rotoiti rat traps during 2006-07.

The Fenn™ traps continued to capture non-target species (Table 5). Although only five native birds were caught, this number is likely to be reduced as new DOC 200 and 250 traps and trap boxes are introduced to the project.

TABLE 5: FENN™ TRAP NON-TARGET CAPTURES 2006-07

SPECIES	NUMBER OF NON TARGET CAPTURES
Cat	22
Ship rat	828
Hedgehog	279
Possum	1
Rabbit	96
Bird	12

Native bird captures included a robin at Lake Edge Fenn (LEF) 74, a weka at Black Sheep Gully (BSG) 13, a tui at Mountain Bike Fenn (MBF) 05, a pipit at St Arnaud Range (SAR) 32 and a possible pipit at St Arnaud Range (SAR) 06 – (body missing, feathers only).

Introduced bird captures included four thrush, a starling, an unidentified bird (feathers remain only) and a blackbird – the majority of these captures were on the Borlase Boundary Fenn ™ line.

4.3.2 Friends of Rotoiti mustelid control

Since 2001 the Friends of Rotoiti have maintained a network of 314 traps, spaced 100 metres apart on 3 lines bordering the RNRP. Two lines, one running along the Rainbow Valley Road to the Rainbow Skifield and the other running from the base of Mt Robert to the Mt Robert carpark, were initially set up to act as 'buffers' to the mainland island project.

A third line, along the Lakeside Track to Whisky Falls was established in 2005. This line also acts as a buffer to the RNRP and it is hoped that the line will be extended to Coldwater Hut in the future. Fenns™ are used on the Rainbow Valley and Mt Robert lines and a combination of Fenns and DOC 200's are used on the Whisky Falls line. The Fenn traps on the Whisky Falls line will eventually be replaced with DOC 200 traps.

During 2006-07, traps were checked monthly from May to September, fortnightly in October, November and March, April and weekly from December to the end of March. White hen eggs were used as bait and bait changes were carried out at eight weekly intervals.

The total catch for the year is shown in Table 6.

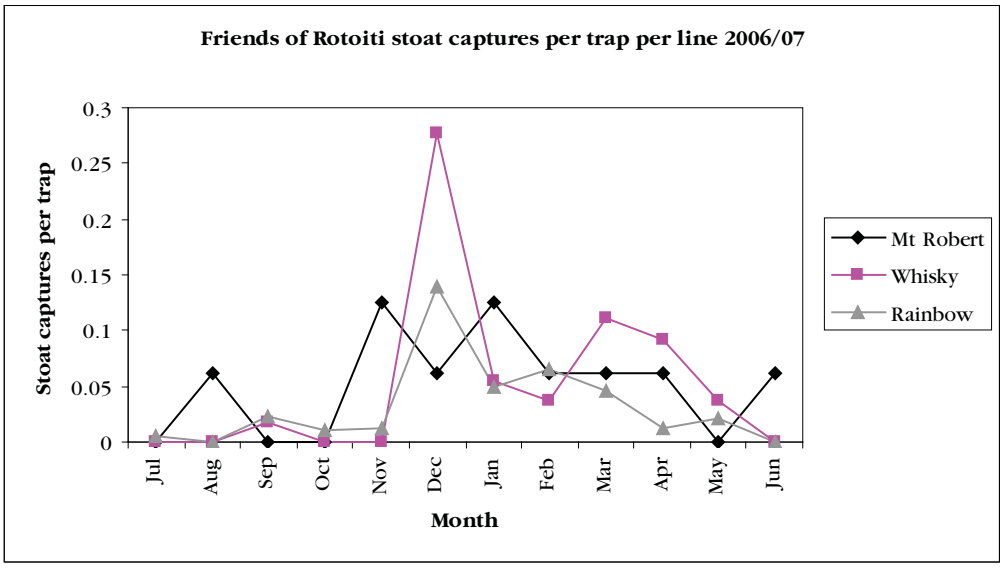
Due to the absence of any previous stoat control on the western side of Lake Rotoiti, the Whisky Falls line is shown to have caught the highest amount of stoats per trap per line for 2006–07, refer to Graph 5, Graph 6 and Table 6.

TABLE 6: FRIENDS OF ROTOITI TOTAL STOAT CAPTURES 2006-07.

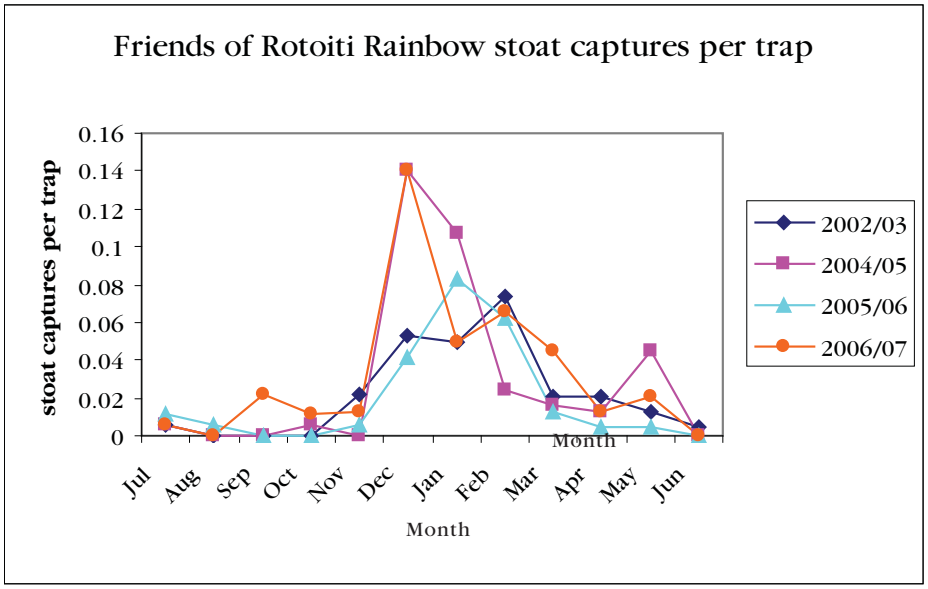
MONTH N = *243	RAINBOW VALLEY N = 17	MT ROBERT N = 54	WHISKY FALLS
July	1	0	0
August	0	1	0
September	4	0	1
October	2	0	0
November	3	2	0
December	34	1	15
January	12	2	3
February	16	1	2
March	11	1	6
April	3	1	5
May	5	0	2
June	0	1	0
Total	91	10	34

* From October 2006 – June 2007 64 traps were put out on the Rainbow Skifield Road for the summer season.

GRAPH 5: FRIENDS OF ROTOITI STOAT CAPTURES PER LINE 2006-07.



GRAPH 6: RAINBOW LINE STOAT CAPTURES PER TRAP 2006-07



This year a marked increase in stoat capture is seen with an early peak comparable to 2004-05. This increase in stoat captures is thought to be in response to the second biggest beech mast recorded in the RNRP core since 1997.

Non-target captures

Six ferrets and three weasels were caught during the year (refer to Table 7 for line details). A relatively high number of ship rats were caught which is a probable response to the beech mast.

TABLE 7: FRIENDS OF ROTOITI FENN™ TRAP NON-TARGET CAPTURES 2006-07.

SPECIES	MT ROBERT ROAD	WHISKY FALLS	RAINBOW LINE
Ferret	0	2	4
Weasel	0	0	3
Cat	0	0	0
Ship rat	18	74	162
Hedgehog	4	0	128
Possum	0	0	10
Rabbit	2	0	128
Bird	0	0	0

4.3.3 Neighbouring pest control operations

Possum control operations on neighbouring land were contracted out by the Animal Health Board (refer to section 4.1). It is acknowledged that the wider Tb vector control programme may have some impact on numbers of mustelids invading the RNRP.

The Wairau TB survey - contracted out to Marlborough District Council -- killed 48 ferrets and 18 stoats on both sides of the Wairau Valley from the southern end of the Rainbow homestead access road downstream to the Goulter, including the tracks around Manuka Island (true left bank); and all of the Raglan Farm from Bull Paddock Flat downstream to the Wash Bridge (true right bank). Cats were not counted but the number killed was in excess of the ferret catch (Jamie Sigmund, MDC pers. comm.).

An unknown number of mustelids were killed in the AHB Tophouse and Upper Motueka possum operations.

Maintenance of lines

During 2006-07 there was an effort to improve flagging and tagging along trapping lines, replace rusty traps with waxed traps, rewire wrongly wired traps and encourage quality trapping amongst staff. A third of the traps (~230 traps) had some form of maintenance carried out on them.

Two traps went missing on Anglers Walk – presumed stolen.

When the St Arnaud Range and St Arnaud Range Northern line was reopened following winter, 21 traps and tunnels had blown away. It took significant effort to replace the traps and tunnels through the summer.

Flagging was put in for Black Valley Stream to realign the line so that it no longer encroaches on the section of land in the village that is to be subdivided.

Management of data

Trapping data (2002 onwards) was entered onto Excel spreadsheets developed by Craig Gillies. The 2006-07 spreadsheet included egg change schedules, trap inventories, detailed capture records, graphing and pivot table which helped greatly in the field delivery and analysis of the predator programme.

Seasonal staff reviewed and improved the trap line descriptions and data sheets to improve their usefulness in the field.

Monitoring methods

Tracking tunnels are used to compare mustelid tracking rates under two treatment regimes–trapping of mustelids and no trapping of mustelids. For each mustelid tracking session 120 tunnels are set on 24 permanent lines. Five tunnels are set on permanent lines at a distance of 100m. The minimum distance between lines is 1km. The tracking tunnels in the project are a mixture of coreflute and galvanised tunnels.

During a mustelid set, numbered papers are placed on each end of a tray within the tunnel and an ink sprayed sponge is set between the two papers. The tunnels are baited centrally with rabbit meat. The tunnels are set for three nights. In 2006-07 these tunnels were run in August, November, February within the Core, Lakehead, Big Bush and Rotoroa sites (see Figure 1-3). Tracking tunnels for mustelids were not carried out in May at either Rotoiti or Rotoroa on advice of the RNRP advisory group.

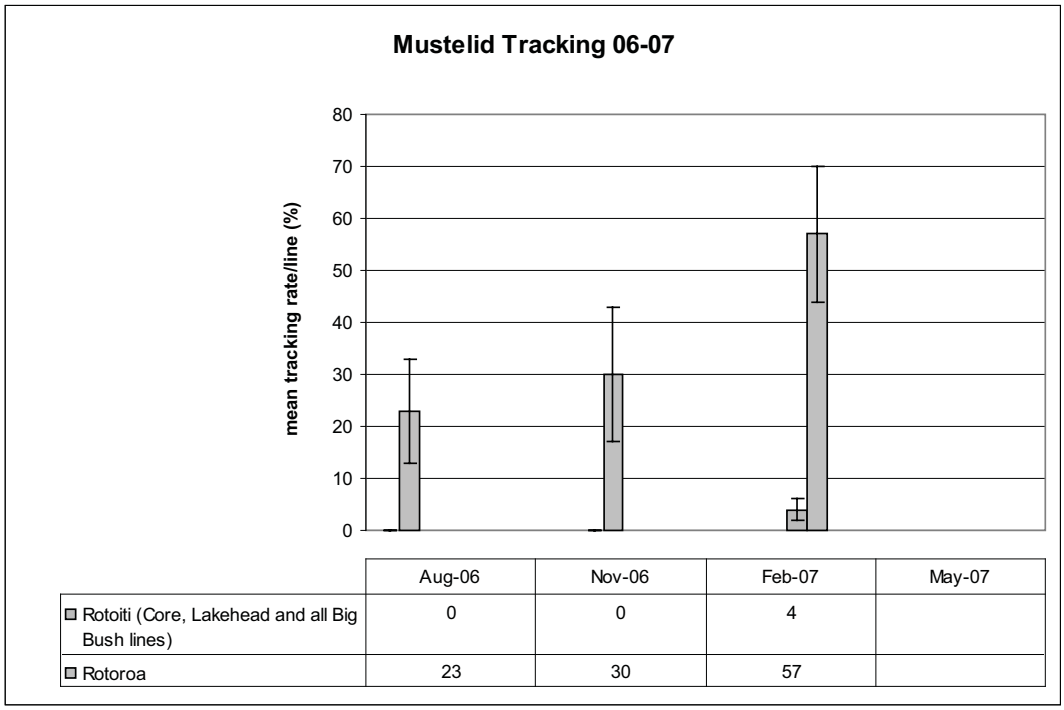
In 2006-07 tracking tunnels throughout the project were realigned so that they met DOC best practise. All tunnels were realigned at least one month prior to the next session to reduce the possibility of a neophobic aversion by stoats.

Monitoring results

There were no mustelid tracks detected within the RNRP Core. Mustelid tracks were detected on the W, X and Y lines with one tunnel tracked per line in the February session.

Rotoroa mustelid tracks peaked at 57% (+/- 13%) in February 2007 (Graph 7) which is the highest recorded tracking rate for mustelids since the start of the project. Tunnel disturbance can be high at Rotoroa so it is important to interpret the result with caution.

GRAPH 7: MUSTELID TRACKING RATES 2006-07 (+/- SE).



	Aug-06	Nov-06	Feb-07	May-07
Rotoiti (Core, Lakehead and all Big Bush lines)	0	0	4	
Rotoroa	23	30	57	

Tracking data was entered into the tracking calculator which was amended to suit the re-aligned lines.

The Wairau tracking tunnels were run by the Nelson Marlborough Institute of Technology (NMIT) trainee ranger class in August 2006 and February 2007. The November set was not undertaken as the Trainee Ranger responsible for organising this was unavailable, and the May set was not carried out in line with dropping the mustelid sets throughout the rest of the project during May. The mean Wairau mustelid tracking rate per line was 2% +/- 2% in August and 0% in February.

Discussion

Live captures of target animals (stoat and ferret) and inhumane captures of cats, hedgehogs and rats – provided justification for moving to DOC200's and 250's. Funding was secured via Research Development and Improvement (RD&I) to replace every second Fenn™ with DOC 200's and DOC 250's. Ferret capture data was analysed to determine which lines should be replaced with DOC 200's and which lines should be replaced with DOC 250's. A contractor built 'Rickerby design' boxes to national best practise standards. The boxes included safety catches to prevent easy access for children in public areas. The traps are to be installed in 2007-08.

Tracking results suggest that trapping in the RNRP is having a significant impact on mustelid numbers. Since inception of mustelid tracking tunnel monitoring (December 2002) the mean track rate per line in the RNRP has been held within the 5% threshold recommended by Greene et. al. (2004), as providing the most benefit to kaka populations. Friends of Rotoiti and Marlborough District Council captures suggest that the 2006-07 year was high in terms of stoat numbers in the surrounding environment.

The quality of the NMIT set (missed lines and tunnels) raised issues about the reliability of the results and the value to the RNRP. Given that mustelid tracking tunnels are to be run in November, December and February in 2007-08 this raises issues re staffing the Wairau tracking lines during a time when Trainee Rangers are on placement.

The productivity of kaka nests provided earlier evidence of how effective the stoat trapping was. The survival of kiwi chicks is also encouraging but the value of stoat control for great spotted kiwi is not so well understood.

Recommendations

- Based on advice from the Technical Advisory Group and the RNRP Advisory Group the decision has been made to replace Fenn™ traps with a DOC 200 or a DOC 250 at every second station on the predator control lines. Ongoing monitoring will be important to determine the effectiveness of DOC 200's and DOC 250's as a control tool compared to the Fenns ™.
- Kiwi chick monitoring should continue in an effort to determine how beneficial stoat control is for their survival.
- Kaka encounter rates should be adopted to provide an indication of whether kaka are continuing to do well under the current trapping regime.
- Mustelid monitoring on the Wairau lines may need to be stopped due to difficulties in getting competent volunteers for this work.

4.4 FERAL CAT CONTROL AND MONITORING

A feral cat control project using Steve Allan Conibear™ style kill traps located in areas of historical cat sign/sightings has been the prescribed control method since 2001-02 when twenty sites were established. From the date of establishment up until this year a variety of baits have been used to lure the cats into the traps i.e. jelly meat, rabbit, eel, rat, possum, hare and mixed mince.

Objectives

To reduce feral cat numbers within the Recovery Area to benefit resident native bird populations (particularly kiwi).

To eventually reduce to zero the number of pet cats in St Arnaud, with support of the local community.

Performance target

Run and maintain cat trapping regime as described in the Operational Plan 2006-07.

Investigate alternative cat control methods and baits to improve our current regime.

Provide information and support to advocacy team as required.

Methods

This year fourteen 'Steve Allan Conibear™' kill traps in raised "cubby" sets with ramps for access set up trees (as per Best Practise) operated for eight months. The cat traps were checked in conjunction with the Fenn™ trapping programme. For cost effectiveness halved rats were used as bait.

Results

This year the traps operated for ~3136 kill trap nights, one rat was caught.

Throughout the entirety of the cat control project a total of 13 cats, 5 possums and 4 stoats were caught in the 'Steve Allan Conibear™'cat traps (see Figure 8 for cat capture locations). During this time the mustelid/ Fenn™ trap network (~890 traps) caught a share of cats acting as a supplementary type of cat control (see table below for results.)

Between the years 2002-2005 six cat traps were removed from project for unknown reasons.

Discussion

Although the majority of cats caught within the RNRP project area were caught in mustelid/Fenn™ traps (proportionally), the Steve Allan Conibear traps did prove to be a more successful style of trap based on capture rate per percentage of traps. However the number of cats caught throughout the entirety of this 6-7 year project is still very low.

This topic was discussed at the annual RNRP Strategic Advisory Group meeting this year, and it was decided to close down and remove the remaining cat traps from the project area, look at where the majority of cats are getting caught in the Fenn™ traps and establish a fixed line of chimney style cat traps; which are apparently better at targeting cats than raised sets (Darren Peters and Craig Gillies pers comm.)

Advocacy

It has been necessary to provide information to the local community on their legal and welfare responsibilities in trapping cats. Advice has been given on humane and effective trap techniques.

Several FOR members ran live capture traps around their baches and at the water tank during autumn when cats started appearing around the village. Eight cats were caught between April and June by FOR members setting live-traps in the village and at the water tank. Live cage traps were also lent to members of the public at this time, an unknown number of cats were killed by residents and bach owners.

No advocacy work was done to discourage residents from keeping pet cats; however discussions were held with owners on a casual basis when the opportunity arose.

Recommendations

Develop a new cat trapping project that reflects the importance of cat control in the presence of a breeding population of great spotted kiwi.

Support development of a 'wasp proof' cat attractant if the opportunity arises.

Support the advocacy team in encouraging responsible ownership of pet cats and discouraging acquisition of new cats by St Arnaud residents.

GRAPH 8: CAT CAPTURES IN FENNS VS. STEVE ALLAN CONIBEAR TRAPS

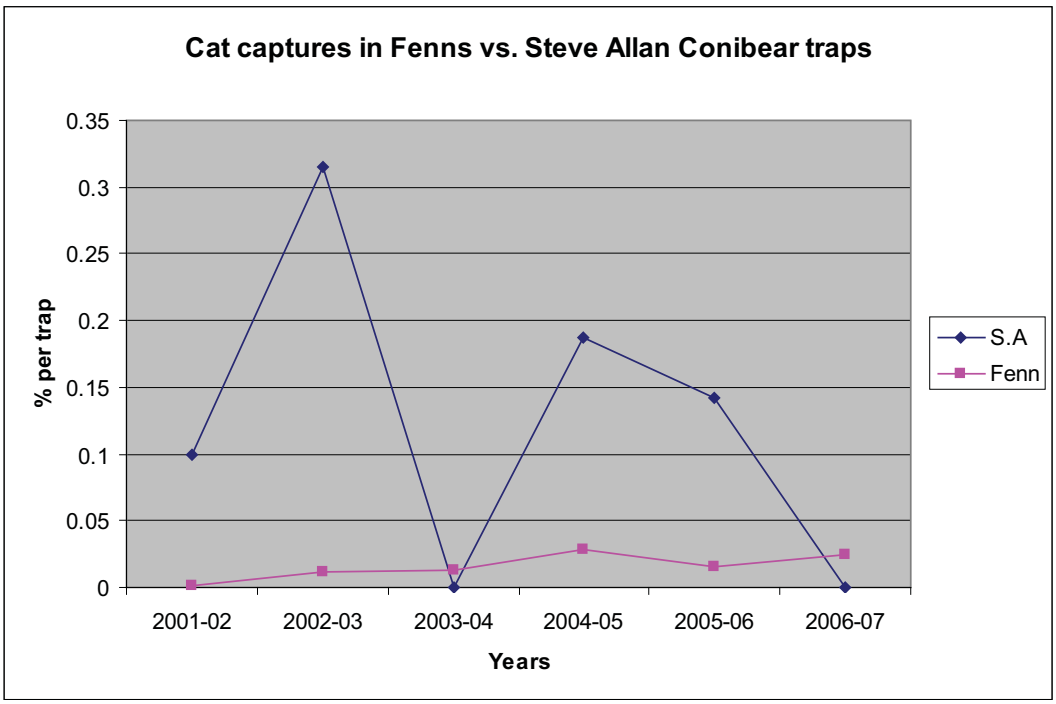
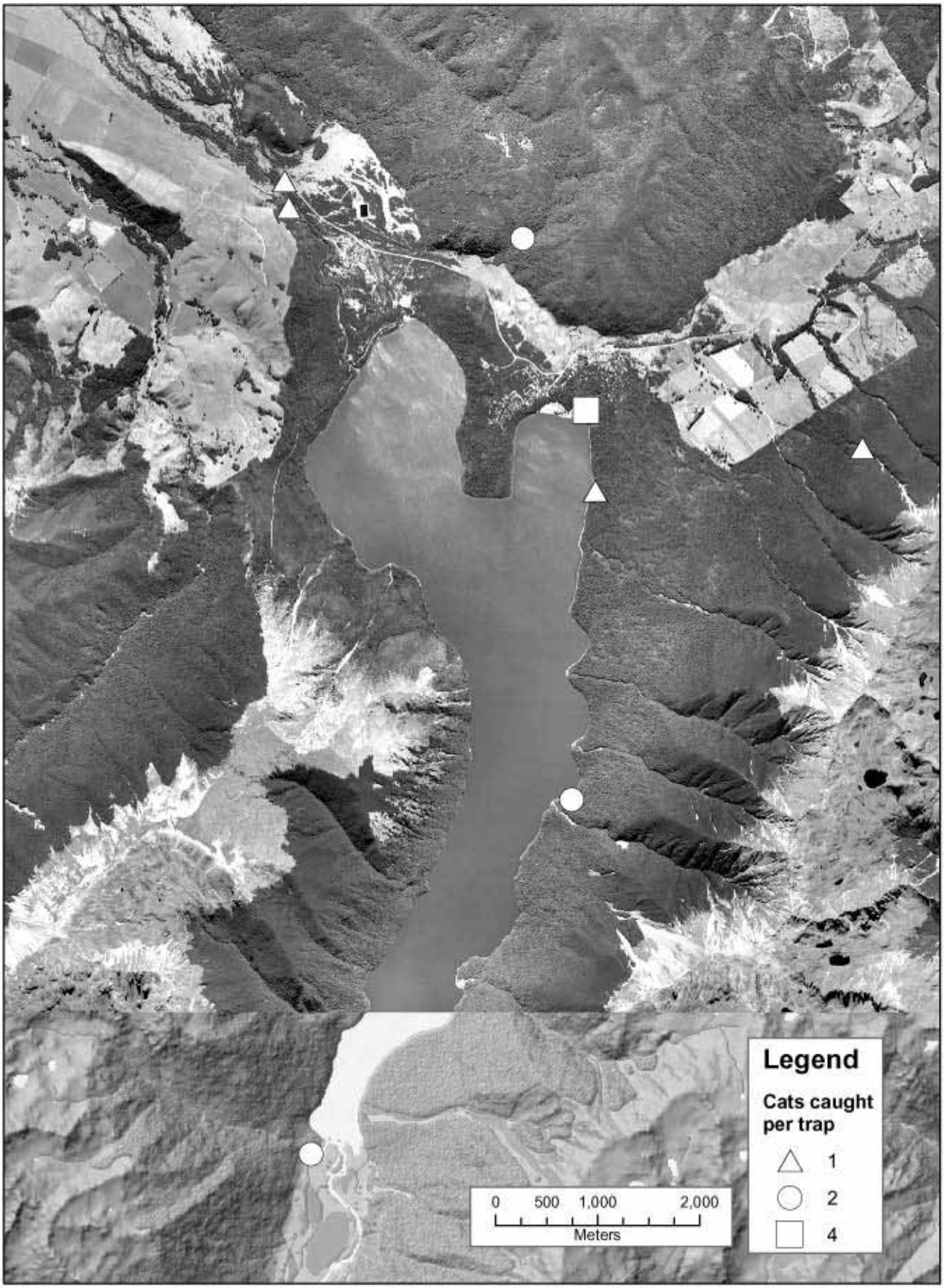


Fig 8 Feral cat control; total catches 2001-2006



Compiled by IMU, Business Services, Nelson/Marlborough Conservancy

G:\Projects_Nelson_Lakes\mrp_annual_report_2007\fig_8_feral cat control total catches

4.5 WASP (*VESPULA VULGARIS*) CONTROL AND MONITORING

Introduced common wasps build up to very high densities in the honeydew beech forest during summer. Wasps impact on native species by competing for the available honeydew, leaving less available for bellbirds, tui and other native fauna, and by predating invertebrates and some smaller vertebrates (e.g. lizards and nestling birds).

Objectives

The objectives of wasp control are:

- To ensure more honeydew is available for indigenous species.
- To reduce predation of native invertebrates and bird nestlings (Moller 1990) to an insignificant level.
- To improve the public's experience visiting the beech forest in summer.

Wasp control

Two toxins have been used to control wasps in RNRP in previous years: Finitron™ (sulfuramid) was used in 1998, 2004, 2005 and 2006; and Fipronil™ was used from 1999-2003. Both toxins can be applied in a meat or fish bait that wasps carry to their nests. This approach means that individual nests do not need to be found and destroyed: large areas can be effectively treated using a bait station grid.

Fipronil™ was used in RNRP under a Landcare experimental use permit, and proved to be the faster-acting of the two toxins. Unfortunately Fipronil™ has been unavailable since 2003 due to several legal and commercial issues. Due to the unavailability of Fipronil™, Finitron™ was used from 2004 to 2006. Remaining stocks of Finitron™ were sold in 2006 in anticipation of Fipronil™ becoming available again for 2007. Fipronil™ was expected to become available again by 2006, and then by 2007; however some of the legal issues were unresolved in early 2007 and Fipronil™ continued to be unavailable. A Fipronil™ operation is confirmed for 2008.

Wasp monitoring

Monitoring has in the past included Malaise trapping to monitor wasp and other invertebrate populations; monitoring of non-toxic bait take to guide the control operation; and wasp nest monitoring on strip transects as a form of result monitoring.

Malaise trapping was discontinued from 2006, as it had been decided that the two other forms of monitoring (non-toxic bait take, and wasp nest transects) were sufficient to manage and determine the result of the operation. Malaise trapping produced more general information about population levels of wasps and outcome for native invertebrates. There are currently a large number of malaise trap samples from previous years that are waiting to be processed.

Wasp nest monitoring (strip plot transects) is usually undertaken to measure the success of the toxin operation. Monitoring is undertaken both before and after the toxin is applied. Non-toxic bait take monitoring was undertaken in anticipation of a toxin operation, as it was only close to this time that the unavailability of the toxin became apparent. No strip plot monitoring was undertaken.

Discussion

The unavailability of a suitable toxin has been a disappointment to the project, particularly as we know that Fipronil™ can produce a good result. Members of FOR have put in a considerable effort controlling wasp nests around the St Arnaud township, using Permex toxin applied to the entrance of individual nests. This approach can not reduce wasp densities as dramatically as the baiting approach; however it does make an appreciable difference to wasp activity around the township, thereby increasing the public's enjoyment of the area. Landcare Research may have a bio-control agent ready for field-trialling in the next year or two, and it is possible that Rotoiti may be a suitable site for trials. In the meantime, Fipronil™ is available for a wasp control operation in 2008.

4.6 UNGULATE CONTROL AND MONITORING

4.6.1 Deer *(Cerus elaphus scoticus)* and chamois *(Rupicapra rupicapra rupicapra)*

Introduction

Deer and chamois are found within the RNRP and deer are known to browse on broadleaf (*Griselinia littoralis*) and *Pittosporum patulum*.

Methods

Ground-based hunting has been used in the past within the RNRP but it has been costly with few kills.

Results

There have been a few sightings of deer and chamois in the RNRP core and Big Bush but no hunting was carried out this year. 20m x 20m paired deer proof exclosures were established at the beginning of the project and are due to be re-measured.

Discussion

Sightings of deer within the RNRP core were recorded but these have been too few to warrant more than low level occasional hunting. Several deer stomachs have been taken from hunted animals over the years. These samples have not been analysed and have now been discarded.

Recommendations

Continue to record sightings and sign of deer and chamois within the Rotoiti Nature Recovery Project to better understand any changes in their distribution and abundance.

4.6.2 Pig (*Sus scrofa*) control and monitoring

Introduction

While the northern St Arnaud Range and Big Bush hold resident populations of feral pigs they have traditionally been absent from the western St Arnaud Range and RNRP core. It is desirable to keep pigs out of this area to prevent them becoming an established pest and having them interfere with pest control, monitoring networks and kiwi.

Methods

No pig work was planned for 2006-07 although a hunter was contracted for several weeks in August 2006 in reaction to pig sightings near the Borlase Boundary Fenn™ line.

For the remainder of the financial year pig sign has been recorded onto a spreadsheet. Although this is an unreliable index (not all observers record sign, there could be multiple recordings of the same sign etc) it does give an indication of the range of the pigs within the project area.

Results

Three pigs were shot near the Borlase Boundary.

Discussion

The control of pigs within the project area has remained a low priority due to limited funding and concerns over the use of hunters and their dogs in areas where kiwi have been reintroduced. 'Bird safe' pig dogs and operators need to be used if pigs threaten to establish within the core RNRP.

Recommendation

Continue to collect information on pig sign in the project area and consider control work if there is a threat to vegetation, the trapping network or kiwi.

4.6.3 Hedgehog (*Erinaceus europaeus*) control and monitoring

No specific work was planned in 2006-07 for hedgehogs – refer to Table 5 in the mustelid section for numbers caught in Fenn™ traps. No hedgehogs were tracked during the tracking tunnel sessions.

4.6.4 Hare (*Lepus europaeus*) control and monitoring

No specific work was planned in 2006-07 for hares or rabbits – refer to Table 5 in the mustelid section for numbers caught in Fenn™ traps. No hares or rabbits were tracked during the tracking tunnel sessions.

5. Results – monitoring of native species and ecosystems

5.1 BIRD MONITORING

5.1.1 Kaka (*Nester meridonalis*) monitoring

Project objective

- Retrieval of live transmitters from breeding females.

Methods

Transmittered birds were radio tracked with a view to capture at the nest site.

Results

The two remaining kaka with transmitters were monitored fortnightly throughout the year but as they did not breed there was no opportunity for capture.

Recommendations

Remove the transmitters from the two females during the next breeding season.

Record their nesting results as per operational plan.

Establish a kaka encounter rate study to measure any changes in abundance.

5.1.2 Robin (*Petroica australis*) monitoring

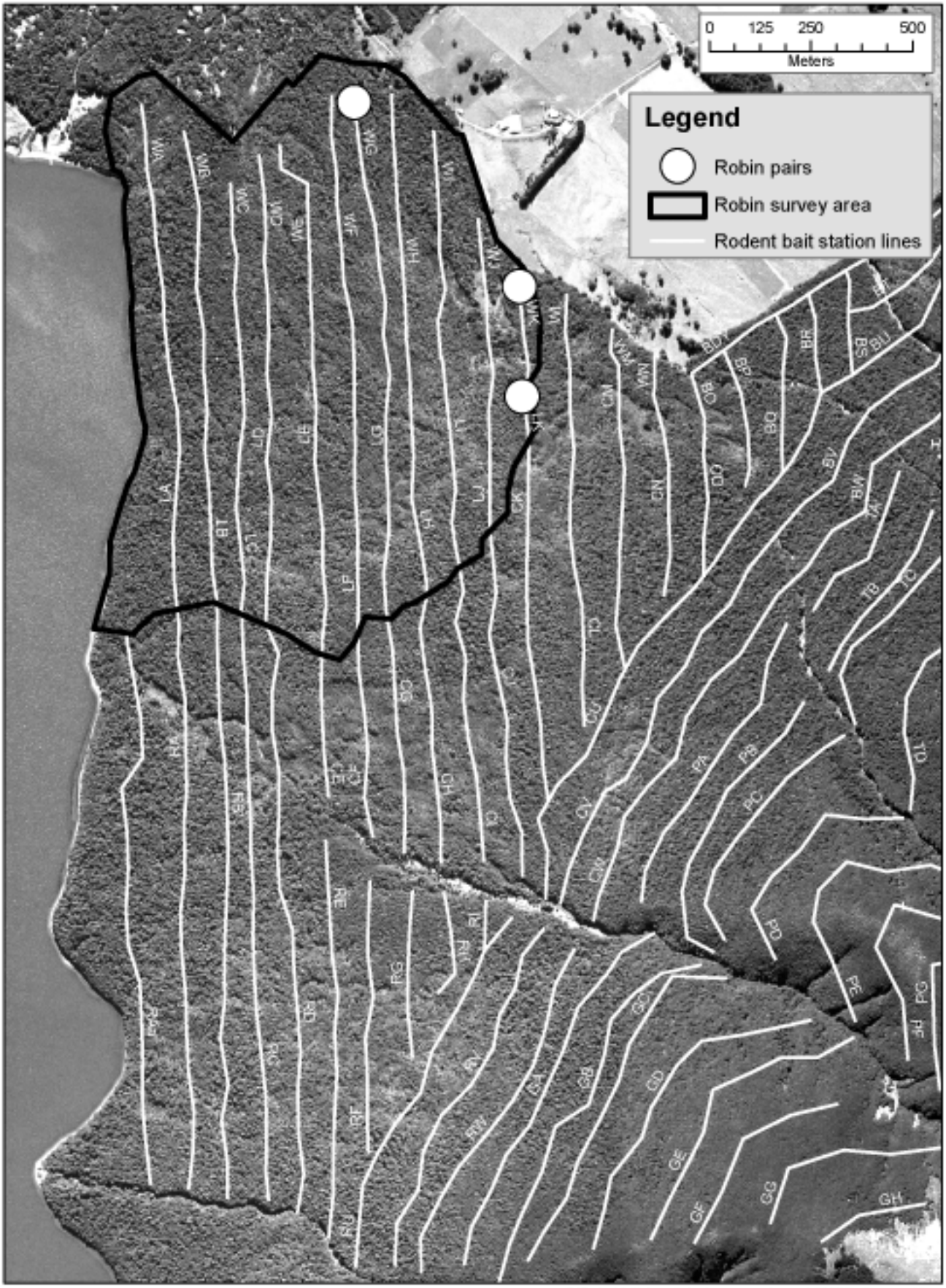
Objective

- To assess the effectiveness of the rat control regime in protecting the robin population.

Methods

Territory mapping was undertaken in September, as in previous seasons, using survey methods as set out by Powlesland (1997). Refer to Figure 10 for details.

Fig 9 Robins pairs 2006-07



Compiled by IMU, Business Services, Nelson/Marlborough Conservancy

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Results

Three pairs of robins and two single males were present within the survey area in 2006-07.

Discussion

The robin survey was conducted as usual once a week over four weeks during September, three months after the rat trapping network in the core area had been "turned off" allowing rat numbers to build up prior to the 1080 toxin operation in late November. This was the first time the survey had been conducted without some form of rodent treatment. Not surprisingly rodent tracking rates recorded an all time high for the annual RNRP August monitor and a further decline in the numbers of robins holding territories within the survey area.

Recommendations

Clearly define the objectives of the robin programme.

Continue robin territory mapping in the absence of rodent control.

Consider increasing the size of the survey area to include different habitats and increase sample size.

Consider undertaking breeding success measures in the future as the outcomes are more directly related to rat control.

Identify the need for further health surveillance of the local robin population and respond accordingly.

5 1.3 Five minute bird counts

Introduction

Five Minute Bird Counts have been running since 1997 as a technique to detect changes in bird numbers as a result of pest control. There are five minute bird count lines in the 3 treatment sites – treatment for rodents and mustelids (St Arnaud), non treatment for rodents and treatment for mustelids (Lakehead) and non treatment for rodents and mustelids (Rotoroa/Misery Track).

Methods

Five minute bird counts are conducted in November, February and May on the St Arnaud Track, Lakehead and Misery Track bird count lines. The counts are done to a standard technique based on Dawson & Bull (1975). Each station is regarded as being independent and counts are unbounded. A summary of the bird counts undertaken throughout the project's history is on file. A May count at Lakehead and at Rotoiti were not done because of key staff being away on bereavement leave. One new staff member was trained in five minute bird counts.

Results

A complete set of five minute bird count graphs are include in Appendix 1. The graphs summarise the results for a range of native and introduced species at the St Arnaud, Lakehead and Rotoroa sites. Other species detected in five minute bird counts in low numbers and not presented in the graphs are: shining cuckoo, hedge sparrow, kingfisher, falcon, paradise shelduck, spur-winged plover, NZ pipit, greenfinch, goldfinch, black swan, harrier, kea and kereru

May data only is presented in the graphs as this is thought to most accurately represent the numbers of birds recruited into the local populations following breeding. May counts are less influenced by breeding behaviours or differences in the breeding season, with the possible exception of yellow-crowned parakeets which are capable of breeding all winter during a beech mast. Graphs show confidence limits rather than standard error as in previous reports.

Discussion

Robins were included in the graphs for this annual report following a review of robin monitoring within the RNRP in May 2007.

It is beyond the scope of this annual report to provide a thorough analysis of the bird counts through time although there are some interesting trends in 2006-07.

Many of the species show a decline in 2006-07 across the three sites. This trend is seen in fantail, grey warbler, rifleman, tomtit, blackbird, chaffinch and redpoll. Several of the species show an increase in 2006-07 across the three sites. This trend is seen in robin, yellow-crowned parakeet and greenfinch.

Interestingly, bellbird, brown creeper and kaka showed an increase at Rotoroa while showing a decrease at the two Rotoiti lines.

Dave Kelly (Professor at University of Canterbury) and Ceisha Poirot (previous student of Dave Kelly) have drafted two papers looking at the counts. These papers are to the point of being edited for submission to journals.

Recommendation

Continue doing the five minute bird counts to detect changes in the bird populations at the three sites.

Work with Ian Westbrooke to further analyse data to try and draw conclusions about the value of the predator control to the project and the use of five minute bird counts as a monitoring tool.

5.2 NON-WASP INVERTEBRATE MONITORING

Invertebrate sign on tracking papers has been recorded and sent to Eric Spurr at Landcare. All tracking tunnel papers are filed to enable further analysis.

Snail abundance was not monitored in 2006-07. The resurveying of snail plots is planned for 2007-08.

5.3 LIZARD SURVEY AND MONITORING

Introduction

To record changes in lizard populations in the FOR rat-trapping area and identify cause of change.

Methods

As in previous years, Terra Dumont, a FOR member, operated two transects of 20 pitfall traps each for four days at a time in November and December 2006 and twice in January 2007 (Table 8). Refer to RNRP 2003-04 Annual Report for further detail on Friends of Rotoiti lizard pitfall trapping.

Terra has recently completed a report titled 'A Study of the skink populations of the St Arnaud area with emphasis on how they are affected by mammalian predators'. This report is in the library at the Nelson Lakes Area Office.

Results

TABLE 8: TOTAL LIZARD CAPTURES (EXCLUDING RECAPTURES) ON THE FRIENDS OF ROTOITI PITFALL TRAPPING TRANSECTS DURING 2006-07.

YEAR	MONTH	DATES OPEN	MAX TEMP RANGE °C	TOTAL RAINFALL MM	WARD STREET	BLACK HILL		
					O. nig. pol.[1]	*O. nig. pol.*	*O. lin.*[2]	*O. inf.*[3]
2006	November	3 - 6	14 – 19.7	3.8	9	2	0	2
2006	December	16 - 19	17.9 – 21.4	2.4	12	8	0	3
2007	January	4 - 8	13.8 – 23.9	0.2	12	6	0	3
2007	January	23 - 26	22.3 – 26.8	0.2	9	5	0	6

1 *Oligosoma nigriplantare polychroma* Common skink

2 *Oligosoma lineoocellatum* Spotted skink

3 *Oligosoma infrapunctatum* Speckled skink

Discussion

FOR traps have been operated every summer since November 2000. Because the work is undertaken by volunteers, with restricted time, weather conditions are not always ideal. While Terra Dumont 2007 has attempted some analysis of the data it may take many more years before trends are apparent.

Recommendations

FOR pitfall trapping should continue on an annual basis as an education tool and potentially for identifying population trends.

5.4 PLANT AND VEGETATION MONITORING

5.4.1 Vegetation plots

Introduction

There are 32 vegetation plots within the Rotoiti Nature Recovery Project. 20 of these plots are found within the RNRP Core. 12 plots are non-treatment – 10 located at Lakehead and two located at Rotoroa.

Methods

Five plots were fully resurveyed between October 2006 and May 2007. Two people were trained in this method.

Results

All plots need to be re-surveyed before analysis of the data.

Discussion

There are issues relating to the location of the Lakehead non- treatment plots (which are now bounded with an area surrounded by mustelid trapping lines) and the usefulness of the Rotoroa vegetation plots as a true non-treatment in that the vegetation at Rotoroa is markedly different from the vegetation at Rotoiti. This has sparked discussion as to the usefulness of any conclusions that could be drawn from the data.

Recommendation

Continue re-surveying vegetation plots understanding the limitation of their use to the RNRP in terms of lacking a statistically appropriate true non-treatment sample.

Bring in RD&I staff and Trainee Rangers to help with plot remeasurement and see plots as an opportunity for plant ID and vegetation plot training.

5.4.2 Mistletoe

Introduction

Mistletoe have been studied as they are a species likely to respond to lowered numbers of possums.

Methods

A modified foliar browse index has been used to monitor mistletoe in the past.

Results

No work was carried out in 2006-07 as the research question was poorly defined and energy was better spent progressing other plant and vegetation monitoring and developing a better defined line of enquiry.

Recommendation

To have discussions with Conservancy Technical Support Officers and biodiversity staff in other areas about an appropriate sample size and field programme which furthers knowledge of mistletoe within a site where pests are managed.

5.4.3 Pittosporum patulum

Introduction

Pittosporum patulum ("Pitpat") is an endangered South Island endemic species. The RNRP has a significant number of Pitpat recorded within the RNRP Core and these are susceptible to browse from possum and deer.

Methods

A modified foliar browse technique is used, the work being done from early December to late June.

Results

There are 135 plants recorded within the RNRP Core. They are generally found in sparse stands on spurs but occasionally are found as individual plants.

One new plant was found in 2006-07 by seasonal staff. Two plants could not be found and two plants have died since they were previously surveyed in 2004-05.

One plant is an adult; less than a dozen are sub adults and the remaining plants are juvenile in their growth form. There are also several healthy stands of Pitpat on private land or QEII Covenant outside of the RNRP Core which include sub adult plants.

A subset of 40 plants were analysed for growth and health. The subset was selected based on which plants had the most data to track through time. The plants used were fully measured in 1998-99, 2004-05 and 2006-07. In 2006-07 the health remained the same in 22 of the plants compared with the 2004-05 survey. Thirteen had declined in health (seven had declined during the previous period); four had improved health (nine during the previous period). One plant died during the last period and one plant did not have a health measure taken in 2004-05.

Discussion

Based on a sample of 40 plants there has been a slight decline in the health of Pitpat plants since 1998-99. Despite this, plant survival within the rest of the population remains high with very few plant deaths. The increasing number of plants found through time is best attributed to staff stumbling across new plants when doing other work rather than recruitment. The very low number of sub adult and adult plants is a concern in terms of further recruitment into the site. Some stands of plants have been browsed by deer. The few healthy stands of plants were located in steep and rugged sites where access would have been difficult for deer.

Much of 2006-07 was spent sorting through disorganised files and data sets to try to make sense of the project. Previous decisions about the direction that sampling should take have been poorly recorded or reported in files and previous annual reports. Changes of observers and a lack of a consistent approach, especially in relation to determining stem browse, has made this a difficult data set to draw meaningful conclusions from.

Recommendation

Map Pitpat sites onto an accurate rodent grid map and resurvey a sample of representative plants in 2008-09.

Time the 2008-09 survey to coincide with fruiting to establish the health of the population and potential future work on recruitment.

Review the value of the stem browse technique for determining plant health.

Consider including a stand of Pitpat in any future exclosure plots to determine whether deer or possum are having the most impact.

There is a need to review the importance of the site for Pitpat to determine how a threatened plant fits into the priorities and goals of the RNRP. This may include reassessing the value of ungulate control.

5.4.4 Foliar browse indices

Introduction

Foliar Browse Indices (FBI) are used to determine effect of possum and deer on browse-sensitive plants within the RNRP core.

Methods

FBI were generated for tagged broadleaf and raukawa (Raukawa simplex) between October and November 2006. Raukawa is considered to be the most sensitive of the species within the RNRP core to possum browse and has the most complete data set.

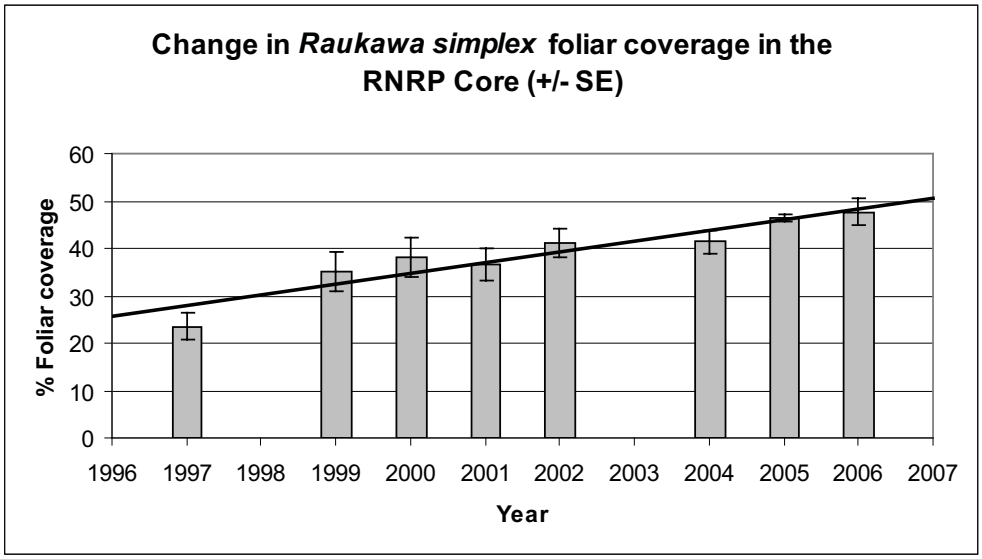
FBI is only used as a health measure for broadleaf plants that have epicormic shooting so as to provide a measure of deer browse.

A digital photograph of each plant was taken and stored under S drive on Nelson Lakes Area Office server and on a CD in the FBI box in the RNRP office.

Results

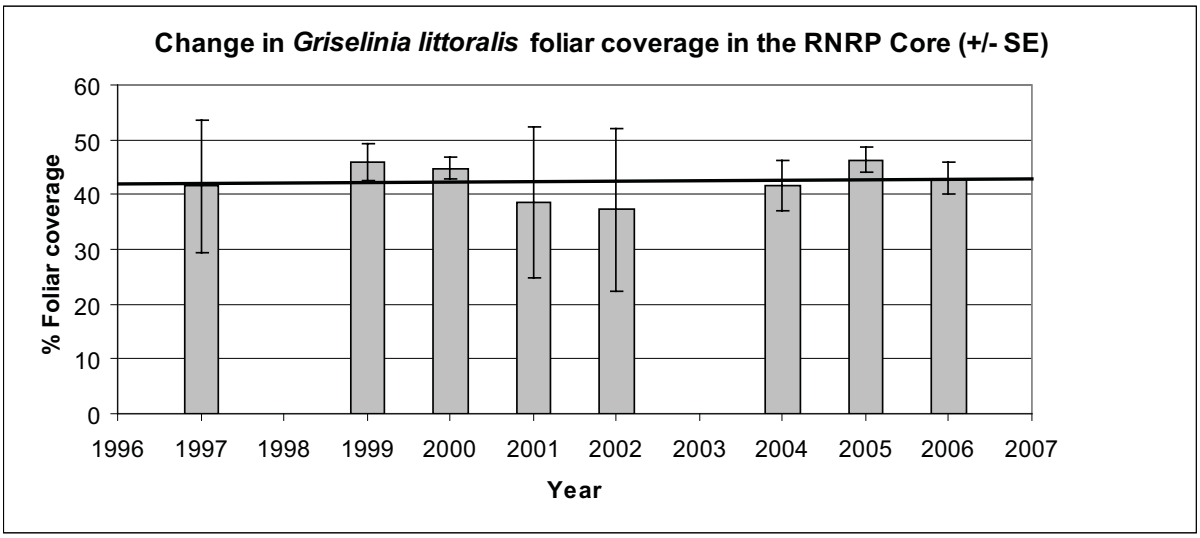
The mean foliage coverage of raukawa has increased from 46.43% (+/- 0.68% S.E.) in 2005-06 to 47.76% (+/- 2.84% S.E.) in 2006-07. This continues the upwards trend in foliar coverage since 1997 (Graph 8).

GRAPH 9: CHANGE IN RAUKAWA FOLIAR COVERAGE IN THE RNRP CORE.



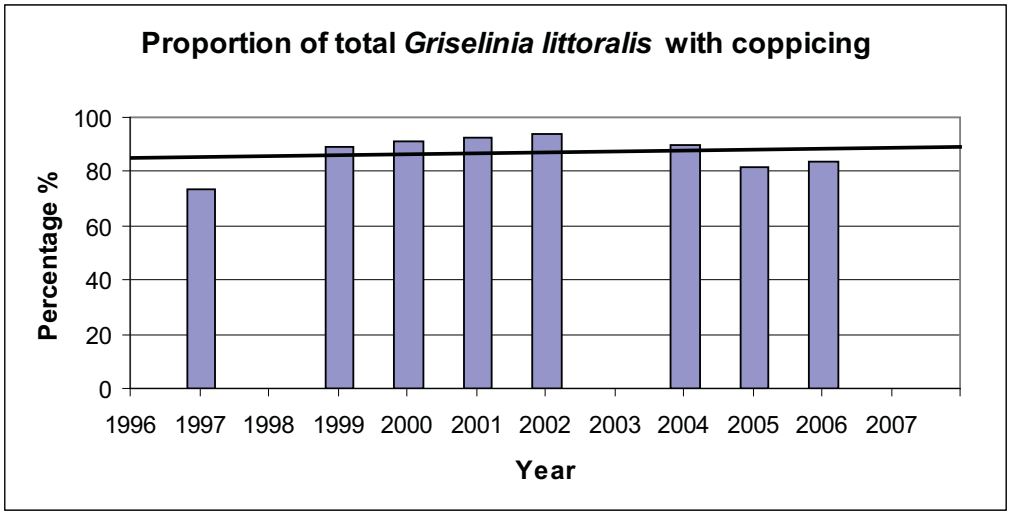
Foliar coverage for Griselinia (Graph 9) has not changed since the study began. Foliar coverage is used as a health measure of *Griselinia littoralis*.

GRAPH 10: CHANGE IN BROADLEAF FOLIAR COVERAGE IN THE RNRP CORE



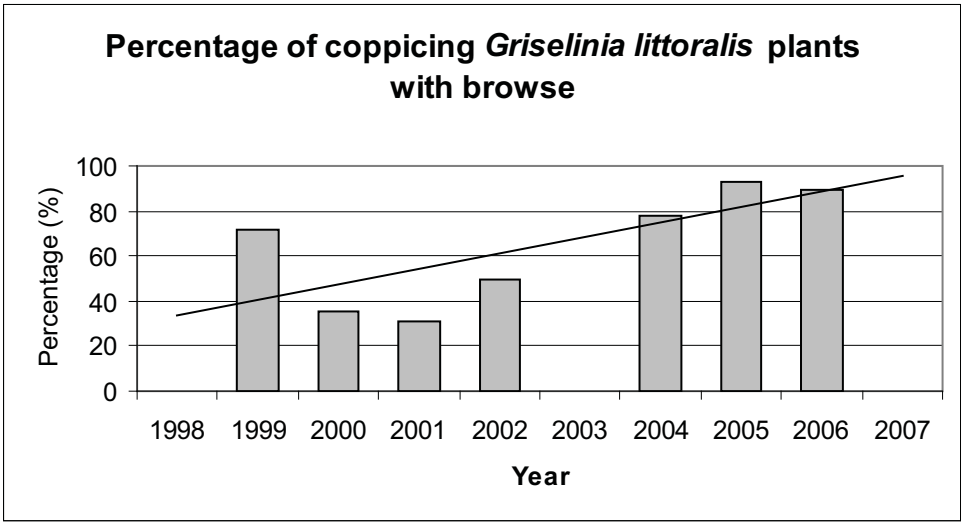
There has been little change in the proportion of broadleaf plants with coppicing (see Graph 10). The range of rates is between 73% to 94%. The lower rates in tagged plants after 2002 highlight a concern with this technique in that it is attempting to derive a measure from plant material that has been taken away by browse rather than the impact of browse on plant health or remaining plant material.

GRAPH 11: PROPORTION OF TOTAL BROADLEAF WITH COPPICING



The average coppice browse per coppicing *Griselinia littoralis* has increased since 1999 (Graph 11).

GRAPH 12: PERCENTAGE OF COPPICING *GRISELINIA LITTORALIS* PLANTS WITH BROWSE



Discussion

The increase in foliage cover for raukawa is consistent with what would be expected after sustained possum control. Note that there has been no concurrent monitoring at a non-treatment site.

Broadleaf foliage cover has stayed constant. The percentage of coppices browsed has increased from 30% in 2001 to 89% in 2006.

Recommendation

Review the role of foliar browse monitoring and coppice browse as indicators of possum and ungulate browse.

5.4.5 Beech seed

Introduction

Beech seeding is monitored within the RNRP core and at Rotoroa to determine the number, viability and energy contribution of beech seeds to the beech ecosystem. Beech seed counts help to inform pest management and species monitoring in the next year. Counts are carried out for red beech (*Nothofagus fusca*), silver beech (*N. menziesii*) and mountain beech (*N. solandri*).

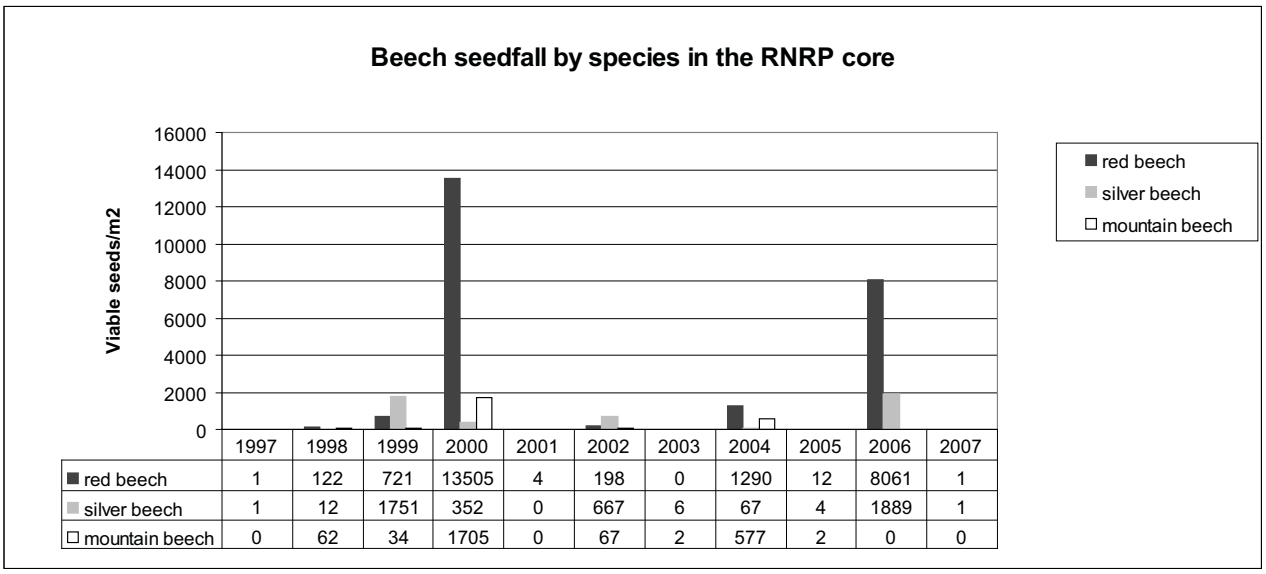
Methods

Seed fall trays (0.28m2 funnel shaped traps developed by DSIR) are used to measure beech seeding within the Rotoiti Nature Recovery Project. There are twenty trays within the RNRP core and 20 along the Mount Misery track at Rotoroa. Seed collection bags are attached to the trays in March 2006. They are replaced with new bags in May. In June, the bags are brought in and are hung to dry in the RNRP lab before being sorted and counted. The beech seeds are counted within May and June samples and the total count analyzed. Seeds are tested for viability by floating them in absolute alcohol. Energy is calculated by multiplying the number of viable seeds per square metre by the energy values for each seed (red 180kJ, silver 60kJ, mountain 120kJ).

Results

2007 was a non-mast year for all species (Graph 12). Of the 11 seeds collected in 2007 only two seeds were viable (18%).

GRAPH 13: BEECH SEEDFALL BY SPECIES IN THE RNRP CORE



	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
red beech	1	122	721	13505	4	198	0	1290	12	8061	1
silver beech	1	12	1751	352	0	667	6	67	4	1889	1
mountain beech	0	62	34	1705	0	67	2	577	2	0	0

Discussion

The low seed viability suggests that the seeds may have been from the previous beech mast and were seeds that had failed to drop through the canopy in 2006. Big Bush data collection was discontinued in 2000.

Recommendation

Continue monitoring beech seed to help inform management decisions and to better understand beech forest cycles.

6. Reintroductions – Great spotted kiwi *Apteryx haastii*

6.1 BACKGROUND

During 2006-07 year telemetry monitoring was increased. Seven new adults that were transferred from the Gouland Downs during winter 2006 (RNRP Annual Report 2005-06) were monitored in addition to the adults originally transferred during winter 2004 and RNRP-hatched birds. Adults were monitored for survival and retention in the RNRP area, and for breeding activity. "Egg timer" transmitters were applied to seven adults, to trial whether this type of transmitter produces useful information for great spotted kiwi. One sub-adult (hatched in 05/06) and one new chick were monitored for survival and dispersal. Near the end of the 06/07 year a previously unknown sub-adult was found and radio-tagged.

Two of the adult females originally collected from the Gouland Downs are no longer in the RNRP population, and one male has been unaccounted for since April 2006 (RNRP Annual Report 2003/04). At the end of the 06/07 year there were a total of 16 radio-tagged kiwi in the recovery area: 13 translocated adults (six males and seven females) and three RNRP-hatched kiwi. Another adult male (with failed transmitter) was relocated by a kiwi dog and radio-tagged early in the 07/08 financial year, bringing the total number of radio-tagged kiwi to 17, equivalent to the total number of adult kiwi collected in the 2004 and 2006 operations combined. Thus the RNRP population is reasonably stable, with potential to grow in coming breeding seasons.

6.2 THREAT MANAGEMENT

6.2.1 Mustelid control

Stoats are known to be the main threat to brown kiwi populations through predation of kiwi chicks. It is likely that great spotted kiwi populations are also reduced through predation by stoats, although there is a lack of specific data. Stoats are controlled by trapping in the RNRP area. Because this species of kiwi persists elsewhere in the presence of stoats (Robertson et al. 2005) we are unsure whether stoat trapping provides useful protection.

6.2.2 Dog incursion and prosecution

Uncontrolled dogs are known to kill kiwi, sometimes having catastrophic consequences for kiwi populations. Dogs are not permitted in Nelson Lakes National Park other than under some very specific and tightly controlled circumstances; nevertheless there are occasional reports of dogs wandering or being taken into the Park. During 2006-07 one person took a dog into the RNRP area, and a prosecution relating to this incident was successfully completed in the 07-08 financial year.

6.3 KIWI MONITORING

6.3.1 Adult kiwi handling and transmitter changes

Annual transmitter changes at Rotoiti are undertaken in winter (May-July) to avoid impacting on kiwi breeding activity. Following breeding there is an opportunity to check the condition of adult transmitter harnesses from March onwards.

2006 transmitter changes

During 2006-07 we trialled seven "egg timer"[1] transmitters that had been programmed for use on rowi (Okarito brown kiwi). Four of the transmitters used in 06/07 were simple egg timer (ET) transmitters that transmitted only one data stream (signifying the number of days since "change of state") in addition to the pulse rate. Three of the transmitters were egg time diagnostic (ETD) type, which transmit four data streams in addition to the pulse rate. This additional information is used by the designers to tailor future versions of the transmitters to the kiwi taxa being studied. ET transmitters were placed on three males and one female (including one known pair); and ETD transmitters were placed on two males and one female (including one known pair). Standard mortality transmitters were used on the remainder of adults.

The annual transmitter changes were scheduled for May-June 2006, and all birds that could be caught during that period were radio-tagged using the standard transmitters that were available. The egg timer transmitters were not available at that time so the seven birds selected for these transmitters had to be recaptured in July. Malcolm Wylie (Waimakariri Area Office) visited RNRP during the 2006 transmitter changes, in order to gain further experience handling great spotted kiwi.

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[1] Kiwi transmitters have the capacity to collect and transmit information relating to a bird's levels of activity. Software engineers at Wildtech have built programmes into "egg timer" transmitters which interpret kiwis' activity and indicate the onset of incubation by transmitting a new pulse rate. A new pulse rate is called a "change of state": a pulse rate of 30ppm signifies normal non-breeding state; 48ppm signifies incubating state, and 80ppm signifies mortality. Additional information relating to a bird's activity levels can be transmitted in "data streams" which are sequences of pulses relating to various measures of activity.

2007 transmitter changes

The majority of the winter 2007 transmitter changes were undertaken during June. One male was recaptured in July, and another (with failed transmitter) was relocated and radio-tagged in August. Egg timer transmitters (Haast tokoeka version) were deployed on seven kiwi (six males and one female) including one pair that successfully bred in 05/06. The Haast tokoeka version of the egg timer transmitter could be more applicable to great spotted kiwi than the rowi version trialled in 06/07 (John Wilks, Wildtech, pers. comm.). Sandy Yong (Ranger, Waimakariri Area Office) assisted with the winter 2007 transmitter changes in order to gain further experience handling great spotted kiwi.

6.3.2 Adult survival and population size

There were no deaths of adult kiwi observed through 2006-07. The adult male "Onetahua" (transferred 2004) remains unaccounted for since April 2006 (refer to 2005-06 RNRP annual report). At the end of the 2006-07 year there were a total of 13 adult kiwi radio-tagged in the recovery area. Another adult male "Takaka" (transferred 2004) was relocated and radio-tagged early in the 07/08 year after his transmitter failed in early 2007. This brings the total number of radio-tagged adults to 14, comprising seven from the 2004 transfer, seven from the 2006 transfer, and seven each of males and females.

6.3.3 Adult health

Annual health checks were undertaken in conjunction with the transmitter changes in May and June 2007. Health checks involved assessing the birds for body condition (as described in the *Kiwi Best Practice Manual*) plus weighing kiwi and inspecting them for abnormalities. Body condition values collected during the winter 2007 transmitter changes ranged from "moderately good" to "excellent". These values appear to be rather subjective, and trends in the body condition value assigned to an adult bird do not always reflect trends in the weight of the bird.

Weight changes: winter 2006 - winter 2007

From winter 2006 to winter 2007 there was a decrease in the average of body weights of adult male and female kiwi in both the 2004 transfer group and the 2006 transfer group. The results need to be treated with caution because sample sizes are small (n=2-4 per group of males and females) with some individuals gaining weight or exhibiting no change; however there is an average loss over the year of 79 grams across all transferred adults (n=13; 2006 data was not available for "Wainui" a female transferred in 2004).

Male kiwi transferred in 2006 showed the least change during the winter 2006 – winter 2007 period, with an average loss of 3 grams (n=3).

Females transferred in 2006 lost an average of 72 grams (n=4), but this average must be treated with extra caution because of the influence of a large gain (Waitapu) and a large weight loss (Onekaka), both of which are discussed below.

Waitapu gained 560 grams (from 2.8 kg to 3.36 kg) between winter 2006 and winter 2007 and this weight gain coincided with a recorded increase in bill length from 129.7 mm to 139.6 mm, suggesting that Waitapu is a young bird that continued to grow through 2006-07. The bill measurement of 139.6mm is slightly suspect, as it falls outside the range of female great spotted kiwi bills lengths in the Saxon study area on the Gouland Downs (range 114–135mm; McLennan and McCann 1991). The next opportunity to re-measure Waitapu's bill length will be during annual transmitter changes in June 2008. If Waitapu is removed from the sample, females transferred in 2006 lost an average of 283 grams during the winter 2006 – winter 2007 period (n = 3).

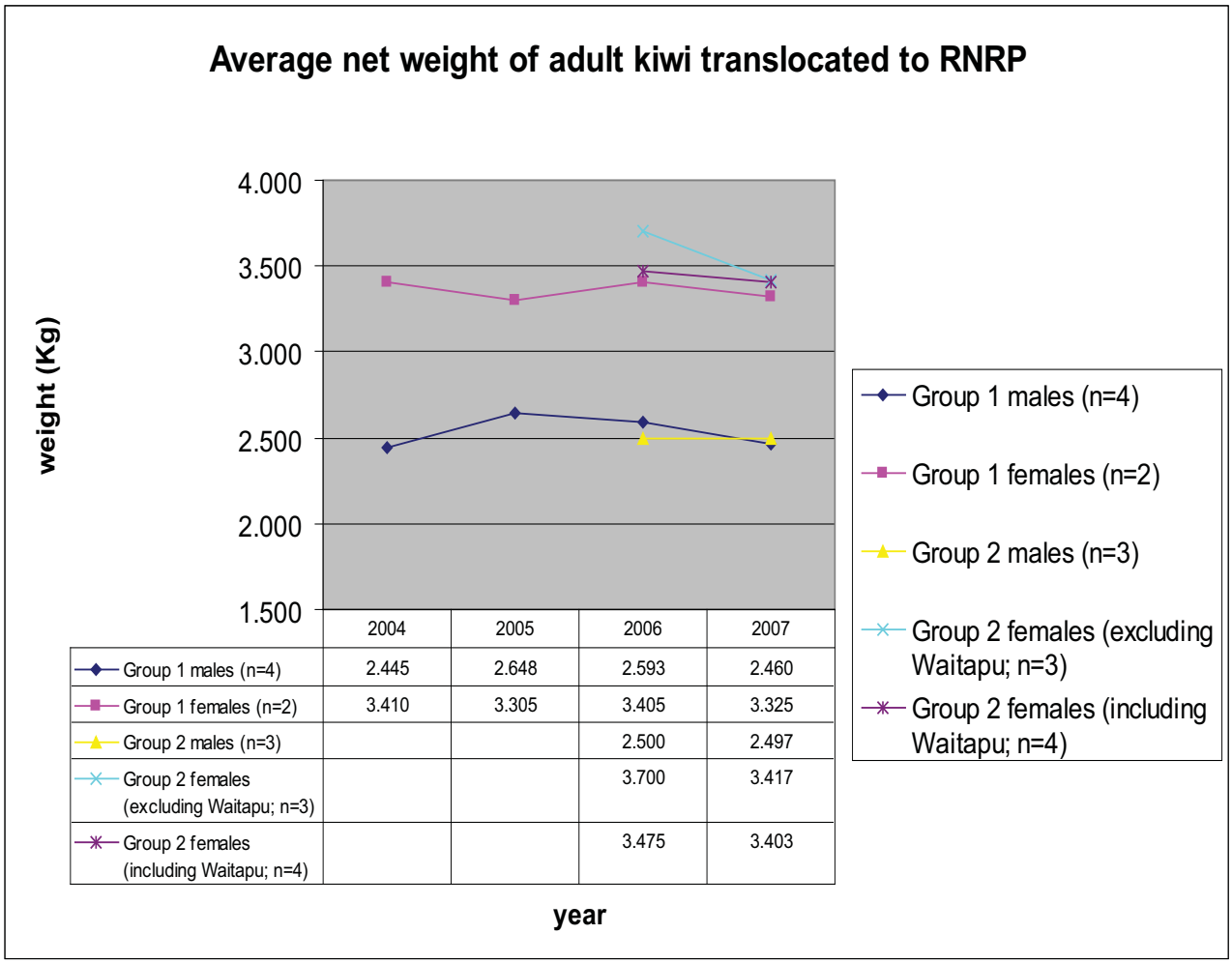
Onekaka lost the greatest amount of weight of any kiwi in the recovery area during the same period. This female lost 550g (from 4.15kg pre-transfer in winter 2006 down to 3.6kg in winter 2007) but appeared otherwise healthy. Onekaka's pre-transfer weight is the heaviest recorded amongst any of the transferred adults, and even her winter 2007 weight is at the top end of the pre-transfer weight range for female great spotted kiwi collected from Gouland Downs. The average pre-transfer weight of seven female kiwi collected from the Gouland Downs in 2004 and 2006 is 3.39 kg, and the range is 3.1 – 3.62 kg (Onekaka and Waitapu are excluded from this sample). McLennan and McCann (1991) recorded female great spotted kiwi weights ranging from 3.0 to 4.3 kg, (mean 3.431) in the Saxon study area.

Females that were transferred in 2004 lost an average of 108 grams during the winter 2006 – winter 2007 period (n=2, due to failure to recapture Wainui for weighing in winter 2006) whereas males that were transferred in 2004 lost an average of 133 grams during the same period (n=4). Despite this loss, in winter 2007 the average weight of the 2004 males was slightly higher than the average pre-transfer weight recorded in 2004 (refer to Graph 13 below).

One possible explanation for the decline in the average of adult kiwi weights between winter 2006 and winter 2007 is that established and establishing kiwi had high energy requirements during this period due to the need to sort out new territorial boundaries. This explanation could not apply to Tata, a 2004 male that lost 220g and had a territory well isolated from other birds. Tata successfully raised a chick in 2006-07 and it is possible that this contributed to his weight loss.

It may not be possible to identify a single cause for weight loss across the whole population of kiwi. No new abnormalities were noted in the adult population during the winter transmitter changes in 2007; and given that general observations and body condition assessments indicated that all of the birds were normal and apparently healthy, there is no need to be concerned about the decline in average body weight from winter 2006 to winter 2007.

GRAPH 14: MEAN WEIGHT OF MALE AND FEMALE GREAT SPOTTED KIWI IN RNRP 2004-2007



	2004	2005	2006	2007
Group 1 males (n=4)	2.445	2.648	2.593	2.460
Group 1 females (n=2)	3.410	3.305	3.405	3.325
Group 2 males (n=3)			2.500	2.497
Group 2 females (excluding Waitapu; n=3)			3.700	3.417
Group 2 females (including Waitapu; n=4)			3.475	3.403

6.3.4 Adult dispersal

2006 transfer group

None of the kiwi transferred in 2006 dispersed from the RNRP recovery area. Telemetry monitoring undertaken weekly to fortnightly throughout the year provided frequent but approximate indications of which areas the kiwi were occupying during the daytime. The sites of recaptures in winter 2007 were recorded with a high degree of precision (GPS accuracy of 8-13m) and these locations are used in this report as a measure of dispersal from the original release points.

Kiwi released in winter 2006 were recaptured a mean distance of 1309 metres from their release points in winter 2007. The median value was 1255 metres (range 588 metres to 2688 metres).

The female Waitapu -- that was released directly into the male Takaka's territory in 2006 (Annual Report 2005-06) – did not disperse further than the mean dispersal distance for others in the 2006 release group (refer to Table 9 below). All of the other birds were released into specially prepared burrows in parts of the recovery area that were considered to be more or less vacant.

TABLE 9: KIWI DISPERSAL FROM RELEASE POINTS TO 2007 CAPTURE SITE (2006 TRANSFER GROUP).

NAME	2006 RELEASE GRID REF	2007 RECAPTURE GRID REF	PERIOD	DISTANCE
Onahau	2497160 5929131	2497713 5930258	393 days	1255 metres
Puremahaia	2496370 5927856	2497611 5928489	380 days	1393 metres
Pariwhakaoho	2496370 5927856	2495686 5927118	377 days	1006 metres
Waitapu	2497519 5931103	2498224 5930913	378 days	730 metres
Onekaka	2497160 5929131	2497750 5931754	377 days	2688 metres
Anatoki	2498021 5932057	2497547 5931708	376 days	588 metres
Motupipi	2498021 5932057	2499527 5932059	392 days	1506 metres
Mean			**382 days**	**1309 metres**
Median value			**378 days**	**1255 metres**

2004 transfer group

In winter 2007, adult kiwi belonging to the original 2004 transfer group were recaptured an average of 385 metres (median = 373) from their winter 2006 recapture points.

TABLE 10: KIWI DISPERSAL FROM 2006 CAPTURE SITES TO 2007 CAPTURE SITES (2004 TRANSFER GROUP).

NAME	2006 RECAPTURE GRID REF	2007 RECAPTURE GRID REF	PERIOD	DISTANCE
Kahurangi	2498012 5928714	2498190 5928720	430 days	178 metres
Tai Tapu	2497851 5930605	2497713 5930258	383 days	373 metres
Te Matau	2497851 5930605	2497620 5929930	383 days	713 metres
Takaka	2497950 5931480	2497677 5931267	458 days	346 metres
Awaroa	2498012 5928714	2497611 5928489	402 days	459 metres
Tata	2499194 5929645	2498995 5930007	393 days	413 metres
Wainui	2498794 5929938	2498995 5930007	403 days	212 metres
Mean			**407 days**	**385 metres**
Median value			**402 days**	**373 metres**

Comparison of dispersal values

During the winter 2006 – winter 2007 period, the 2004 transfer group dispersed substantially less than the 2006 transfer group. The median distance travelled by 2004 birds (373 metres) is only 30% of the median distance travelled by the 2006 release group during the same period (1255 metres). This difference in dispersal values suggests that through 2006-07 the original birds generally held defined territories that they were loyal to, in contrast with the recently transferred birds which were in the position of having to find new territories to occupy.

On average, kiwi released in 2006 dispersed further in their first year than did kiwi released in 2004. For kiwi released in 2004, the mean distance between the original release points and the recapture points one year later was 918 metres, and the median value was 299 metres (Gasson 2005). This contrasts with a mean dispersal distance of 1309 metres and median value of 1255 metres for 2006 birds (above). The median value for 2006 birds in their first year was more than four times the equivalent value for 2004 birds in their first year.

The differences in mean and median values for dispersal of the two groups in their first year following release may reflect existing relationships between transferred birds (members of a previously established pair released together are considered likely to disperse less than unpaired individuals, Gasson 2005); or may reflect a situation in which individuals in the second group needed to disperse further than the original group of kiwi to find suitable territories, regardless of existing relationships. If the latter is the case, this is perhaps evidence that the second group were disadvantaged by the presence of the first group; however sample sizes and knowledge about prior relationships are insufficient to reach a conclusion regarding this matter.

6.3.5 Adult relationships

Groups of two or more kiwi sheltering together were encountered on five occasions during the winter 2007 recaptures. One female, Awaroa, was found sharing burrows with different males on separate occasions (below).

- Tata and Wainui – a 2004 pair considered to have been established at Gouland Downs prior to transfer – were recaptured with their chick Ngahere on 10 June 2007.
- Tai Tapu (2004 female) was found with Onahau (2006 male) on 12 June 2007. Tai Tapu's previous partner Te Matau was found alone more than 700m from his previous year's location on 27 June 2007, representing a substantial shift in his home range (refer to Table 10 above). Tai Tapu and Te Matau are considered to have been an established pair at the Gouland Downs prior to transfer in 2004, and shared shelter sites at Rotoiti through 2005 and 2006. The relationship between Te Matau and Tai Tapu is now questionable.

- A previously unknown kiwi the size of an adult male (subsequently named Miharo – "to wonder at and admire") was encountered sheltering with a 2006 female named Waitapu on 13 June 2007. Miharo is discussed in more detail in the section on chick and juvenile development and recruitment below.
- Awaroa (2004 female) was unexpectedly found sheltering with Puremahaia (2006 male) on 14 June 2007; but on 12 July 2007 Awaroa was with Kahurangi – her mate since late 2004 -- and their chick Rito. Awaroa's association with Puremahaia suggests that the stability of the Kahurangi = Awaroa pairing can not be taken for granted.

2006 transfer pair survivorship

Experience from the 2004 transfer suggested that the survival of previously existing pair bonds post-release was influenced by the capture, transfer and release history of pairs. The simultaneous capture, transfer and release of both partners in a pair was recommended for the 2006 transfer, as it was considered likely that this approach would result in pairs remaining intact at the release site (Gasson 2005).

In the 2006 transfer operation the putative pair Onahau=Onekaka was split up: although the supposed partners were released in the same area, they were transported and released on different days. Partners in the other two putative pairs (Puremahaia=Pariwhakaoho and Motupipi=Anatoki) were captured, transported and released together as recommended.

Contrary to expectations, all three putative pairs were not known to be persisting in 2007. Puremahaia was not found with his supposed partner Pariwhakaoho; and Onahau was not found with his supposed partner Onekaka. In both cases there had been "infidelity" (Table 11) to support the suggestion that these pairs were not intact. There is less reason to suppose that the pair Motupipi=Anatoki is not intact: no infidelity was observed; however the two birds were geographically separated by some hundreds of metres in distance and altitude during winter 2007, and have not been found together in RNRP.

The major difference between the 2004 and 2006 transfers was a resident population of kiwi in the release area in 2006 but not in 2004. While it seems possible that the resident population may have impacted on the transferred birds' pair bond survival in 2006-07, sample sizes and knowledge about prior relationships are insufficient to reach a conclusion.

Result of hard releasing a female in an unpaired male's territory

There is limited evidence that the 2006 female Waitapu (discussed above in relation to the new bird Miharo) formed a relationship with the 2004 male Takaka. Takaka lost his mate Rameka to misadventure in early 2006, and Waitapu was hard-released near Takaka during winter 2006 in the hope that the two would pair (refer to 2005-06 RNRP annual report). Takaka and Waitapu were found sharing a burrow in March 2007, but not during the winter recaptures. Waitapu's subsequent association with Miharo (above) casts some doubt on whether Takaka and Waitapu are paired.

TABLE 11: RELATIONSHIP BETWEEN ADULT KIWI IN RNRP, WINTER 2006 – WINTER 2007.

WINTER 2006	SUMMER 06/07	WINTER 2007
TATA & WAINUI		
Tata ± Wainui Sharing territory	**Tata ± Wainui** Confirmed breeding attempt November 2006 - January 2007	**Tata ± Wainui** Burrow sharing, with chick 10 June 2007
TE MATAU - TAI TAPU - ONAHAU - ONEKAKA - TAKAKA - WAITAPU - MIHARO		
Te Matau ± Tai Tapu Burrow sharing 9 May 2006 Burrow sharing 25 July 2006	**Te Matau ± Tai Tapu** Confirmed breeding November 2006 - January 2007	**Te Matau** Alone 27 June 2007
Onahau ± Onekaka Considered established pair ex Gouland Downs	No data for Onahau	**Onahau ± Tai Tapu** Burrow sharing 12 June 2007
	Onekaka Alone 17 January 2007	**Onekaka*** Alone 12 June 2007
Takaka Alone 1 August 2006	**Takaka ± Waitapu** Burrow sharing 1 March 2007	**Takaka*** Alone 16 August 2007
Waitapu Hard released in Takaka's territory 31 May 2006		
		Miharo ± Waitapu Burrow sharing 13 Junee 2007; Miharo sex unknown. Too young to breed?
KAHURANGI - AWAROA - PUREMAHAIA - PARIWHAKAOHO		
Kahurangi ± Awaroa Burrow sharing, plus chick 8 May & 28 June 2006	**Kahurangi ± Awaroa** Burrow sharing, plus chick 18 January 2007	**Kahurangi ± Awaroa** Burrow sharing, plus chick 12 July 2007
Puremahaia ± Pariwhakaoho Considered established pair ex Gouland Downs	No data for Puremahaia	**Puremahaia ± Awaroa** Burrow sharing 14 June 2007; not considered to be a breeding pair at this stage
Puremahaia Alone 27 July 2006	**Pariwhakaoho** Alone 5 January 2007	**Pariwhakaoho** Alone 11 June 2007
MOTUPIPI & ANATOKI		
Motupipi = Anatoki Considered established pair Gouland Downs	No data	**Motupipi** Alone 28 June 2007
Motupipi alone 3 July 2006 Anatoki alone 3 July 2006		**Anatoki** Alone 12 June 2007

* Takaka and Onekaka appear to be paired and breeding as of October 2007.

6.3.6 Adult breeding activity

Breeding season

Although McLennan and McCann (1991) found great spotted kiwi breeding as early as late July on the Gouland Downs great spotted kiwi at Rotoiti appear to be spring-summer breeders. At Rotoiti there have been four nests where egg laying has been confirmed and with these incubation probably commenced between the first week of September (one site) and early-mid November (three sites). In addition, a chick encountered with its parents in winter 2006 is considered to have hatched from an egg laid in early-mid October 2005 (RNRP annual report 2005-06). The Rotoiti information needs to be treated with caution until a larger sample of breeding attempts has been monitored.

Breeding attempts detected

Breeding behaviour was identified with two pairs during 2006-07, although egg-laying was only confirmed in one case (refer to "confirmed breeding" below). Unfortunately neither the male nor the female with the confirmed egg were wearing an egg timer (ET/ETD) transmitter. Telemetry close fixes suggested that a second pair might have been engaging in nesting behaviour; however this interpretation was not supported by the Rowi "egg timer" transmitters worn by both the male and female; and an inspection of a possible nest site revealed lining material but no eggshell.

Rowi egg timer transmitters

During 2006-07 two of the Okarito brown kiwi egg timer transmitters (an ET and an ETD) changed state to the incubating pulse rate (48ppm) for several days in August and December 2006, however breeding was not confirmed in either case.

Confirmed breeding

The only pair known to produce an egg in 2006-07 was Tata + Wainui, who were considered to be an established pair when transferred in 2004. Neither bird was carrying an egg timer transmitter, and Tata's incubation period was identified using the "close fix" method. The nest was visited at 92 days after confirmation of incubation, and a 240g chick subsequently named Ngahere was radio tagged.

6.3.7 Chick and juvenile development and recruitment

Two kiwi chicks were monitored during 2006-07. The eldest chick -- named Rito -- was found with both parents during winter 2006 (refer to 2005-06 RNRP annual report). The other chick – named Ngahere -- hatched during the 2006-07 summer season (above). Both chicks survived through the 2006-07 year.

Rito (2005-06 chick)

Rito began the 2006-07 year weighing 500g on 28/6/06, increasing to 1410g by 24/4/07. One kilogram is commonly held to be a target threshold above which predation by stoats is highly unlikely, thus Rito can now be regarded as safe from stoat predation.

Rito's growth rate is of particular interest because of the bird's unusual downward curving bill tip, with about 14mm of the bill affected (refer to 2005-06 RNRP annual report). Weights of both RNRP kiwi chicks are plotted against estimated ages in Graph 14 (Rito's age is estimated from parental nesting behaviour in the previous summer). There is an apparent lag in Rito's weight gain between 100-200 days old; however no conclusions are drawn from such a small data set.

Rito's bill length increased from 49.5mm (100 days old) to 71.3mm (451 days old) during the May 06 – April 07 period. The bill deformity became less conspicuous as the bill grew, since a relatively smaller proportion of the total length was affected.

On 9th May 2007, at an estimated 466 days old, Rito was found sheltering alone for the first time since being discovered in May 2006.

Ngahere (2006-07 chick)

Ngahere's weight increased from 240g (estimated 5 days old) in late January 2007, to 715g (142 days old) in early June and 825g (202 days old) in early August. The latter record is technically outside the reporting period, but is of interest because 800g has been used by some workers as a target threshold representing a reduced vulnerability to predation by stoats.

Ngahere's bill length was 40mm at 5 days old, and increased to 47mm at 89 days old, then 51mm at 142 days old. Assuming that Ngahere's bill development is normal, Rito's bill length at 100 days old (49.5mm above) does not appear unusual.

Ngahere was found sheltering alone at 89 days old; however the location was well inside the known territory of the parents, and in two subsequent encounters at 142 days and 188 days Ngahere was seen in association with one or both parents.

Miharo (2004-05 chick?)

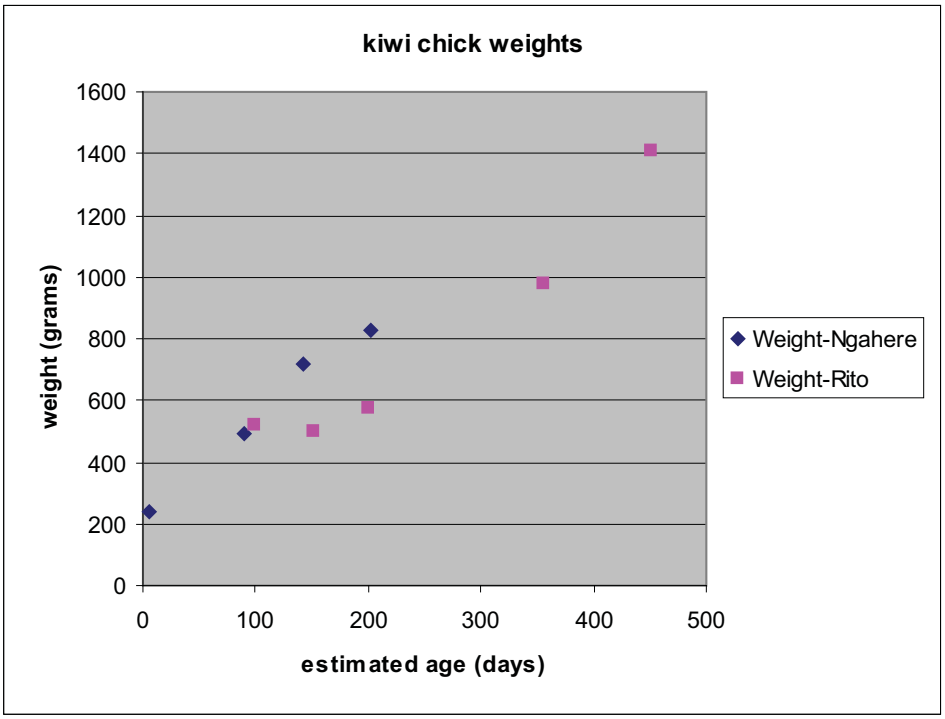
A previously unknown kiwi was discovered sheltering with a known adult (Waitapu) during the annual transmitter changes and health checks in June 2007. The new bird – subsequently named Miharo – weighed 2490g, and the bill length was 103.2mm. This bird is too big to have hatched in 2005-06 (John McLennan pers. comm.).

Despite being the size of an adult male there were several features that led staff to conclude that Miharo was a relatively young bird: claws and legs were dark, and the scaling on the legs appeared regular and unblemished. The eyes were clear and there were no abnormalities observed. Miharo also squealed when removed from the burrow, which is a behaviour that has otherwise been observed on occasion with great spotted kiwi chicks in RNRP, but not adults.

The relationship between Miharo and Waitapu is unclear. We know that Waitapu could not have raised Miharo, because Waitapu was transferred to RNRP in 2006. Waitapu is possibly a young bird (refer to Adult Health section above), and the burrow-sharing may represent a social behaviour unrelated to breeding.

It is considered likely that Miharo is the product of a nesting attempt in the first summer following the introduction to the first group of kiwi in 2004. One nesting attempt was monitored during the 2004/05 season but the chick was not found (Gasson 2005). Feathers were submitted to Dr Karen Nutt for genetic analysis in the future, and results from this should provide information on Miharo's parentage.

GRAPH 15: WEIGHTS OF TWO KIWI CHICKS (NGAHERE AND RITO) MONITORED IN RNRP



6.4 DISCUSSION

6.4.1 Effects of introducing the second group

The release approach taken in 2006 was to integrate the 2006 release group into apparent territory gaps in the existing population, by placing lone females near lone males, true pairs closer to the periphery of the existing population, and reconfigured pairs closer to the centre of the release area (RNRP annual report 2005-06).

It may be inferred that the introduction of the second group of kiwi caused disruption to the original group, and that the second group had more difficulty in establishing in the release area when compared to the first group. Evidence for this inference includes:

- The decrease in average bodyweights across 2004 and 2006 release groups following the 2006 transfer.
- The greater initial dispersal of birds released in 2006 when compared with the original founders.
- Unexpected changes in established pairings within both the 2004 and 2006 release groups following the 2006 transfer.
- The only confirmed breeding during 2006-07 was by one pair that was living in relative isolation at the tree line.

Individually these pieces of information may not be significant due to small sample sizes and other confounding factors (e.g. lack of knowledge about prior relationships in the source area); however collectively, the body of information indicates that there was disruption to kiwi in RNRP as the new birds were integrated into the existing population. Although there have been no obvious casualties or injuries attributable to fighting, there may have been an overall energy and productivity cost as new birds attempted to obtain new territories and existing birds attempted to defend theirs.

Given the possibility that the release approach taken in 2006 caused some disruption to the whole population, a precautionary approach would be to avoid this situation in any future transfers to a site where a great spotted kiwi population is to be established. For example, a better strategy might be to release subsequent groups of kiwi into completely unoccupied areas, rather than using transfers to increase the density of birds in occupied areas.

6.4.2 Chick survival and recruitment

Kiwi chick survival is not currently being used as an outcome monitoring measure for the RNRP mustelid control programme. For this to happen, all chicks would need to be intercepted and monitored from within a few days of hatching and results would need to be compared with chick survival in an un-trapped habitat. To date, interception and monitoring has been a mixture of planned and opportunistic, with two of three RNRP-hatched birds being intercepted at about 100 days old or older. Ongoing improvement of our monitoring techniques (e.g. use of "egg timer" transmitters, increasing knowledge about pre-laying behaviour and incubation periods) may allow RNRP staff to use great spotted kiwi chick survival as an outcome monitoring measure in the future.

Egg laying has occurred on at least five occasions, and three locally-hatched birds are currently being monitored. Notwithstanding the lack of rigour applied to monitoring chick production, the trend to date appears to bode well for the establishment and maintenance of this great spotted kiwi population.

Two chicks have lived in close association with their parents for some months, (e.g. exceeding a year in the case of the older of the two, Rito) and have not yet dispersed from their natal territories. It is possible that this close association with parents has helped chicks to evade predation. Although stoats are controlled in RNRP, they are not reduced to zero density. We do not know if the newly discovered bird Miharo lived with his/her parents before dispersing.

6.5 RECOMMENDATIONS

6.5.1 Threat management

- Maintain the current level of predator control for the time being; monitor closely the results from any future reduction in trap density.
- Dog control and compliance – targeted at protecting kiwi - should continue to be a high priority around the RNRP recovery area.

6.5.2 Kiwi management

- There is currently no need for any close order management (e.g. crèching kiwi chicks) to maintain the population in RNRP.

6.5.3 Kiwi monitoring

- Knowledge of the pairings of kiwi in the recovery area can assist with the interpretation of information regarding breeding and the adult population size. Given the current situation where the stability of two pairs of 2004 birds is questionable and the relationships of the 2006 birds are not well known, it is recommended that RNRP staff continue to maintain transmitters on female kiwi for another year or two.
- Trial Haast diagnostic "egg timer" transmitters on as many male kiwi as possible.
- Refine method for intercepting great spotted kiwi chicks at nest, proceeding with caution and rigour. Maintain close contact with the Paparoa and Hurunui great spotted kiwi management projects in order to accumulate and pool knowledge on chick interception.

6.5.4 Great spotted kiwi transfers

- It is recommended that where future transfers are contemplated, new birds should be added into adjacent areas rather than into apparent territory gaps.

7. Advocacy and education

7.1 OBJECTIVES

The Rotoiti Nature Recover Project's third overall objective is:

- To advocate for indigenous species conservation and long-term pest control, by providing an accessible example of a functioning honeydew beech forest ecosystem, so a large number of people can experience a beech forest in as near-to-pristine condition as possible.

The advocacy and education programme identified five aims as follows:

- Develop a high public profile for the project, enhancing opportunities for its key message to be put across.
- Develop and seek opportunities to express the key message that the conservation of indigenous species requires the control of pests. The use of poisons, shooting and traps are currently the only practical options for this control.
- Develop opportunities to involve the St Arnaud and wider community in the project.
- Extend the work of the project into the St Arnaud area through the involvement of its community.
- Develop opportunities for schools to contribute to the project and achieve education outcomes at the same time.

7.2 DEVELOPING AND MAINTAINING PROJECT PROFILE

7.2.1 Spreading the message

The Rotoiti Nature Recovery Project is readily accessible to visitors. The Bellbird and Honeydew Walks within the original core area at Kerr Bay offer all weather tracks with a series of detailed panels about many aspects of the project. Returning visitors often comment on the increased bird song and presence of native wildlife around the village and the tracks through the RNRP area. The presence of kiwi has increased interest in the project.

The potential threat of dogs to kiwi is an area of ongoing concern. 'Kiwi Zone / No Dogs' signs remain in place and have proven to be largely effective in reducing the incursion of dogs. The recent prosecution of someone who insisted on taking a dog into the park, despite being warned has raised public awareness of the issue.

The increasing number of 'mainland island' projects by non-DOC groups provide testimony to the inspiration that the early departmentally-managed projects have provided. RNRP staff also provided technical support to several community groups involved in mainland restoration work such as the Friends of Flora group and a broader Landcare Trust trapping workshop. RNRP staff participated in the department's annual mainland island hui held at Waimana Valley at which individuals from many groups were told of the work going on at Rotoiti.

Ongoing community support is vital to the long-term future of the project. We continue to keep the community informed through regular (at least monthly) contributions to the local newsletter, and indirectly through the media, and offer opportunities for more in-depth contact through talking to groups, providing guided walks and opportunities for 'hands on' involvement through involvement with the Friends of Rotoiti (refer Section 7.5 Volunteer involvement).

7.2.2 Revive Rotoiti newsletter

Two editions of Revive Rotoiti were published in the year (spring 2006, autumn 2007). The newsletter (including photocopies of back-issues) is available in the Nelson Lakes Visitor Centre.

7.2.3 Meetings

Project information has been supplied regularly to meetings of the Rotoiti District Community Council and community forums held by the department in Nelson.

7.3 MEDIA LIAISON

Media interest in the kiwi remains with the focus naturally moving from introductions to breeding successes. The highlight this year was the discovery of a kiwi chick, named Ngahere. Opportunities to highlight other aspects of the RNRP will be identified as they arise.

7.4 EDUCATION PROGRAMMES

7.4.1 Primary, intermediate, secondary and tertiary education and clubs

Groups given talks on the project in 2006-2007 included:

Nayland Primary School
Mauria Primary School
Murchison Area School
Reefton School
Nelson Central School
Nelson Girls College

Newlands College
Marlborough Girls College
Marlborough Boys College
Waimea College
Nayland College
Motueka High School
Queen Charlotte College
Victoria University
Victoria University – Continuing Education
Eastbourne Scouts Club
Kiwi Conservation Club
Ecoquest
Nelson Suburban Club – Fresh Focus
Brightwater Women's Fellowship Group

A talk was given at Rotoiti Lodge every week in term time. Two staff were involved in this activity. Through Rotoiti Lodge 1,170 secondary school students were given the Powerpoint presentations.

Groups given guided walks round the project site were:

Richmond Primary School
Waimea College
Nayland College
Marlborough Girls College
Canterbury University – Forestry Students
Principia College – USA
Youth Environmental Forum
Soroptimist International of Waimea

The total number of people given guided walks around the project in 2006-07 was 336. Many of these were Year 12 biology and geography students doing NCEA unit standards on conservation and resource management.

7.4.2 Primary school resource kit

Most primary schools that visited in 2006-07 used the, now updated, resource kit to plan their trips. They are still requesting a staff member to give an introductory talk to their classes

7.5 VOLUNTEER INVOLVEMENT

7.5.1 RNRP volunteers

RNRP received 106 volunteer work days this year from nine individuals.

(Note - This does not include the FOR hours)

7.5.2 Royal Society Teacher Fellowship

RNRP hosted Ken Ross, a geography teacher from Nelson Boys College from January 2007-January 2008. Throughout the fellowship Ken undertook baseline surveys on the Brunner Peninsula and created teaching resources for class room use. Ken contributed greatly to the RNRP team by contributing approximately 832 hours to core field work. Ken was involved in predator control, and small mammal monitoring (tracking tunnels), ungulate control, vegetation monitoring and fauna monitoring (kiwi, kaka and 5 minute bird counts.).

7.5.3 Friends of Rotoiti

The Friends of Rotoiti (FOR) community group was set up in 2001. Its objectives are to provide opportunities for the community to be involved in pest control, species monitoring, re-introductions and for individuals to receive training from the department in best practice techniques in these areas. This year there were two organised training days for all group members. All new members are inducted by either staff or experienced volunteers on their first day. The group conducts rat trapping in the village and they also run Fenn™ trap lines up the Wairau Valley to the top of the Rainbow Skifield, from the Buller Bridge to Mt Robert Car Park and from the Lakeside track to Whisky Falls. The Whisky Falls line has a combination of Fenn™ and DOC 200 traps. Results can be found in Sections 4.2 and 4.3. Friends of Rotoiti had over 80 members at the end of 2007. The Friends of Rotoiti did 333 volunteer days of work over the 2006-07 period.

7.6 VISITOR SERVICES

No major activity took place in this area. Nelson Lakes Visitor Centre staff continued to distribute information about the project. Most requests for information come from school and tertiary students.

8. Research

Projects funded or assisted by RNRP to differing levels in 2006-07:

1. This year we hosted Terra Dumont for 12 weeks over summer. She has been an active FOR member since the group formed in 2002, running the lizard monitoring programme. Terra was awarded a Bayerboost Scholarship to analyse the FOR rat data which neighbours the lizard survey sites and establish any links between the two. Findings showed that the actual numbers of rodents caught within the survey area have been consistently low since both projects began. Because of this it was hard to show what effect the rodent control may or may not be having on the lizard population within this area. Lizard figures were also examined against other pest species caught in neighbouring Fenn traps to see if there appeared to be any trends. Terra's report can be found in the library at Nelson Lakes Area Office. (For more information on the 'Bayerboost Scholarship' see below).

2. Daniela Schenk, University of Applied Sciences, Germany, was awarded a RNRP scholarship for 2006-07. She conducted field work for her MSc on 'the role of introduced birds as possible competitors with native birds in the Nelson Lakes National Park', from September 2006-February 2007 (report received).

3. Rex Bartholomew (MSc student, University of Victoria) was awarded a RNRP scholarship in 2004-05. He completed his last field survey in December 2006, investigating factors influencing the recruitment and establishment of *Fuchsia excorticata* in the Nelson Lakes National Park (report awaited).

4. Catherine Duthie, (PhD student, University of Victoria) was provided with logistical support for her study on the competition between native ants and the invasive common wasp. The anticipated timeframe for the completion of her fieldwork is January 2009 (ongoing).

5. Genevieve Taylor, former RNRP ranger is writing up the results from the kaka research. The anticipated date for completion is May 2008 (report awaited).

6. Landcare Research, Nelson and Lincoln, completed their last season of fieldwork researching the impacts of mice and wasps on soil chemistry and soil microbes and invertebrates in a honeydew beech forest. This work was initiated by David Wardle but concluded by Brian Karl. No assistance was directly provided by RNRP (report awaited).

BAYERBOOST ENVIRONMENTAL SCHOLARSHIP

There has been an influx of interest from senior college students and post grad students inquiring about possible research topics in the area, due to a horticultural company 'Bayer NZ' offering environmental scholarships. The scheme is open to year 12-13 collage students and tertiary undergraduate students from New Zealand. The scheme's objective is to foster an understanding and awareness of New Zealand's unique environment, and environmental issues surrounding it. Students apply to potential host organisations where they can gain knowledge through application of science and technology in environmental research.

See www.BAYERBoost.co.nz for more details.

REPORT PUBLISHED

Wardhaugh, C. W. and Didham, R.K. 2005.

Density-dependent effects on the reproductive fitness of the New Zealand beech scale insect (*Ultracoelostoma assimile*) across multiple spatial scales

Ecological Entomology 30 (6), 733–738.

9. Project management

9.1 BUDGET

TABLE 12: BUSINESS PLAN SUMMARY 2006-07

ACTIVITY	STAFF HOURS[1]	OPERATING COSTS ($$)	TEMPORARY WAGE COSTS ($$)
Predator management	2,010	1,000	25,000
Wasp control	554	3,000	0
Management of rodents	300	0	0
Vegetation monitoring	200	0	0
Native fauna monitoring	230	0	0
Small mammal monitoring	690	3,000	8,200
Project management	3,859	8,517	0
Reintroductions	850	8,500	0
Possum control	161	0	0
Ungulate control & monitoring	0	0	0
Research support	80	0	0
Advocacy	490	2,200	0
TOTAL	9,424	$26,217	$33,200

[1] Does not include volunteer effort (refer Section 7.5 Volunteer involvement)

9.2 STAFFING

- Brian Paton, Programme Manager Biodiversity, 50% RNRP
- Matt Maitland, RNRP Team Leader (up to December 2006)
- Paul Gasson, RNRP Team Leader (from March 2007)
- Tammy Bruce, RNRP Ranger
- Anne Brow, RNRP Ranger
- Andrew Taylor, RNRP Ranger
- Brett Thompson fieldworker (temporary)
- Ruth Garland, fieldworker (temporary)
- Jack Mace, temp fieldworker (temporary)

Others that contributed business-planned hours were:

- John Wotherspoon, Programme Manager - Community Relations
- Sally Leggett, Ranger - Community Relations

- Dave Seelye, Ranger – Biodiversity
- Sandra Wotherspoon, Ranger – Biodiversity (casual)
- Dan Chisnall, Ranger - Biodiversity Threats.

9.3 RNRP ADVISORY GROUP

The RNRP Advisory Group continues to contribute valuable input in providing advice to the project team. RNRP Advisory Group members in 2006-07 were:

- Jacqueline Beggs, Auckland University
- Kerry Brown, DOC, Nelson/Marlborough Conservancy
- Dave Butler, Private Consultant, Nelson
- Graeme Elliott, DOC - Research Development & Improvement, Nelson
- Peter Gaze, DOC, Nelson/Marlborough Conservancy
- Mike Hawes, DOC, Nelson/Marlborough Conservancy
- David Kelly, Canterbury University
- Eric Spurr, Landcare Research, Lincoln
- Peter Wilson, former employee of Landcare Research, Nelson

9.4 TECHNICAL ADVISORY GROUP (TAG)

The Technical Advisory Group (TAG) model was revived in April 2007, and a new Terms of Reference document for the TAG was approved. The role of the TAG includes: supporting the RNRP Team Leader by providing technical advice around detail and in establishing systems; providing quality technical direction; reviewing work programmes; providing the framework and input into the write-up of reports and scientific papers, and into the planning, reporting reviewing system; prioritising research proposals; integrating advice of the RNRP Advisory Group. TAG members in 2006-07 were:

- Kerry Brown, Technical Support Officer, Nelson/Marlborough Conservancy
- Paul Gasson, RNRP Team Leader, Nelson Lakes Area
- Peter Gaze, Technical Support Officer, Nelson/Marlborough Conservancy
- Craig Gillies, Scientist, Research Development & Improvement, Hamilton
- Mike Hawes, Technical Support Officer, Nelson/Marlborough Conservancy
- Martin Heine, Technical Support Manager, Nelson/Marlborough Conservancy (open invitation to attend)
- Brian Paton, Biodiversity Programme Manager, Nelson Lakes Area
- Alison Rothschild, Area Manager, Nelson Lakes Area

10. Acknowledgements

Daniela Schenk volunteered many hours of fieldwork during summer 2006-07. Ken Ross (Royal Society Fellow 2007, of Nelson College) contributed hundreds of field hours to RNRP, and Tapawera High School student Kris Thomas contributed voluntary hours during the last two months of the 06/07 financial year. Trainee Rangers (associated with Nelson/Marlborough Institute of Technology) assisted with fieldwork at various stages; and the West Coast Conservation Corps assisted with removing redundant rat traps and tunnels from the St Arnaud Range.

The Friends of Rotoiti added value to RNRP core work by continuing and expanding some complimentary pest control activities (targeting predators, possums, wasps and rodents) over land adjacent to RNRP.

Nelson/Marlborough Conservancy Technical Support Officers Kerry Brown, Peter Gaze and Mike Hawes contributed time to the RNRP Technical Advisory Group: Peter Gaze also helped to bridge the gap between RNRP team leaders in early 2007. Geraldine Moore, Garry Holz and Charmayne King (Nelson/Marlborough Conservancy) assisted with various mapping and formatting tasks.

Craig Gillies (DOC Scientist, Research Development & Improvement, Hamilton) played a key role in the RNRP Advisory Group and Technical Advisory Group; and Ian Westbrooke (DOC Statistician, RD&I Christchurch) contributed statistical advice to the project.

Malcolm Wylie and Sandy Yong (Biodiversity Rangers, Waimakariri Area Office) assisted with kiwi transmitter changes during 2006-07. Mike Sextus (Community Relations Ranger, Marlborough Sounds Area Office) visited and assisted with a range of tasks including predator trapping.

RNRP staff and management wish to thank Phil and Fiona Borlase for their ongoing support and access across private farmland.

11. References

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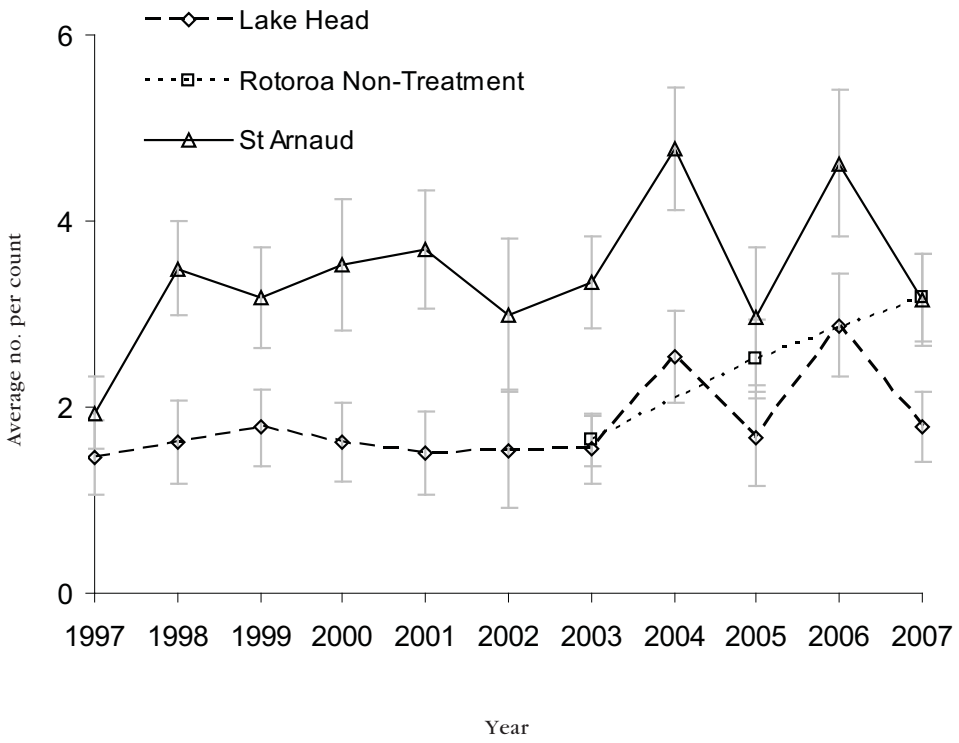
Jamie Sigmund, MDC Personal Communication 2007.

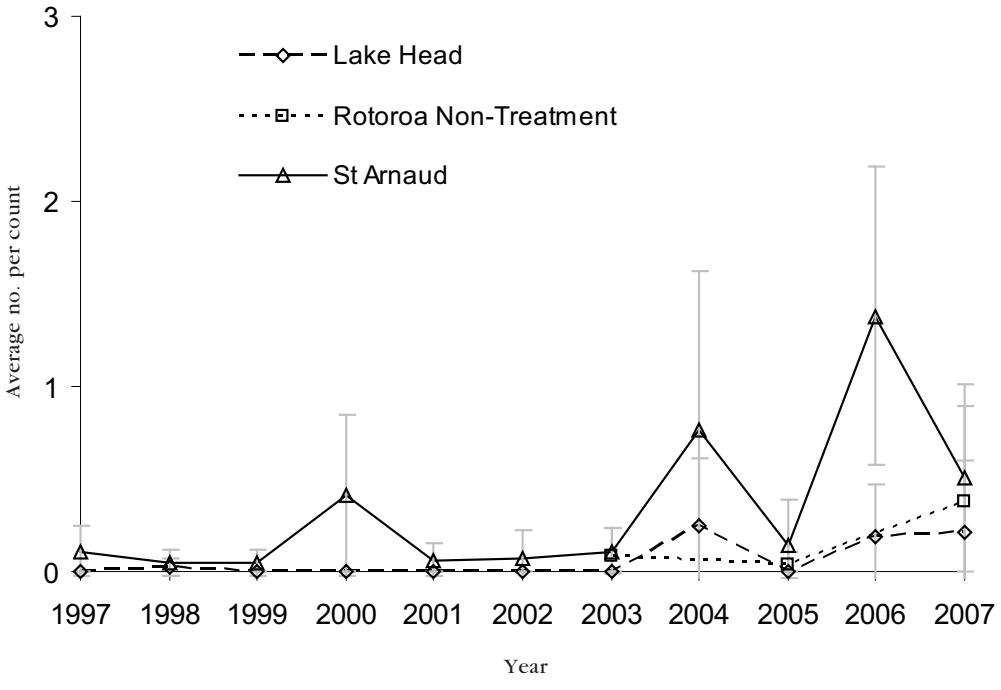
12. Appendix

FIVE MINUTE BIRD COUNT GRAPHS (WITH 95% CONFIDENCE LIMITS)

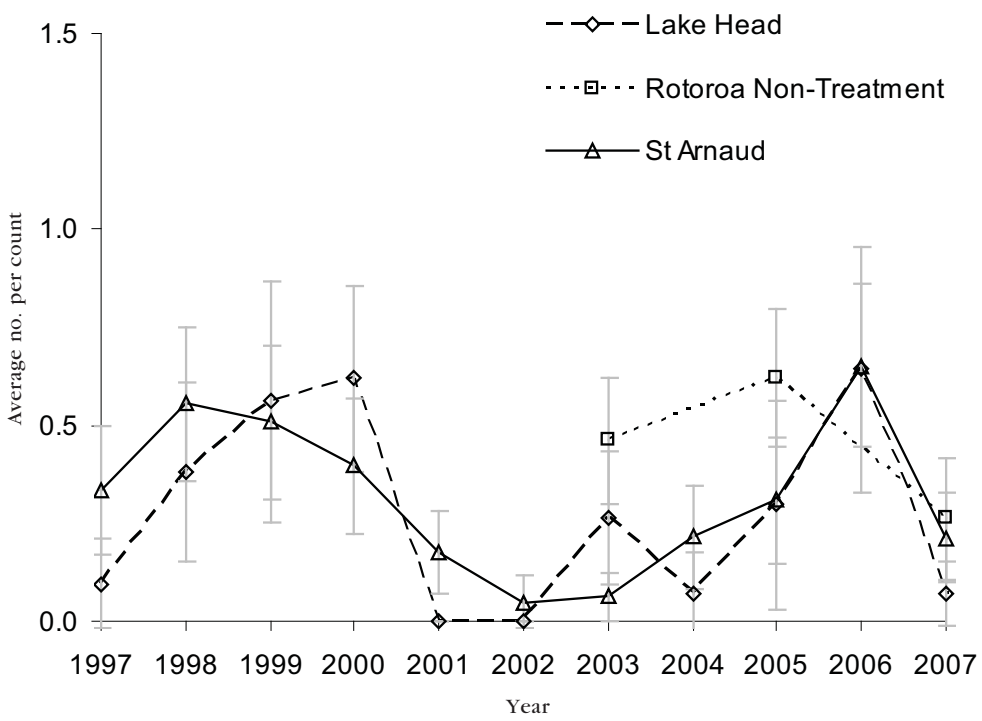
BELLBIRD



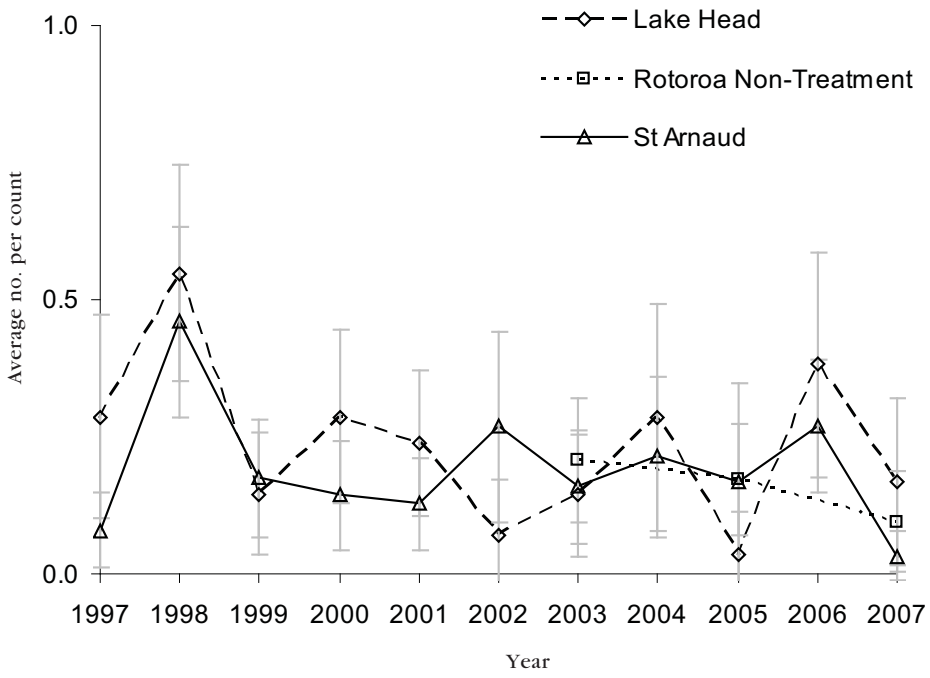
BROWN CREEPER



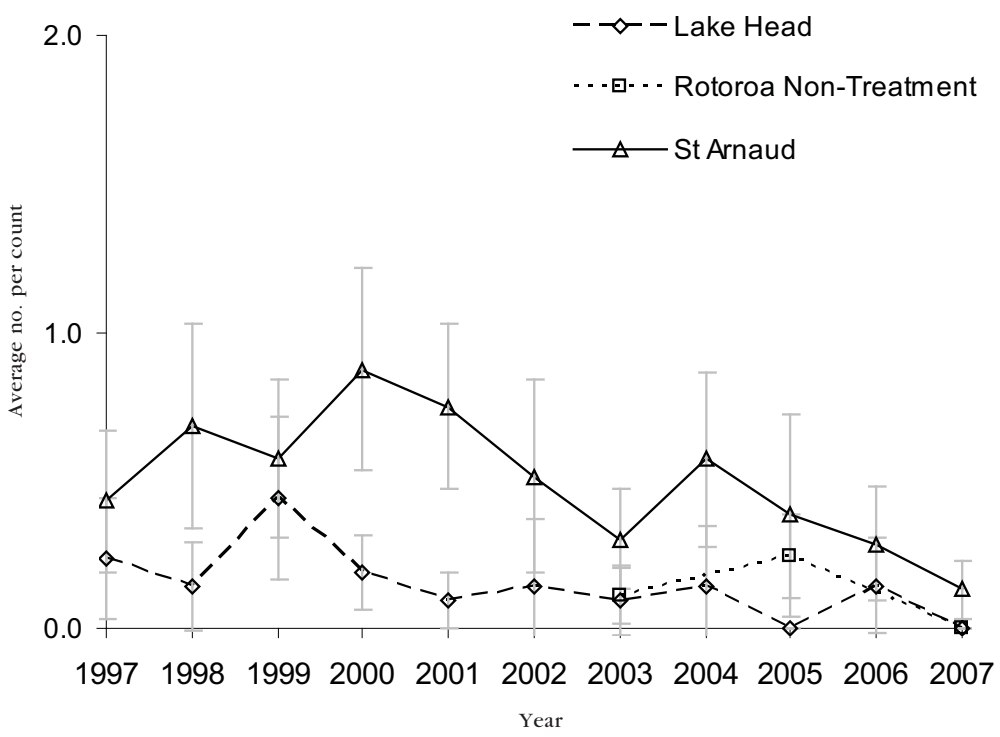
FANTAIL



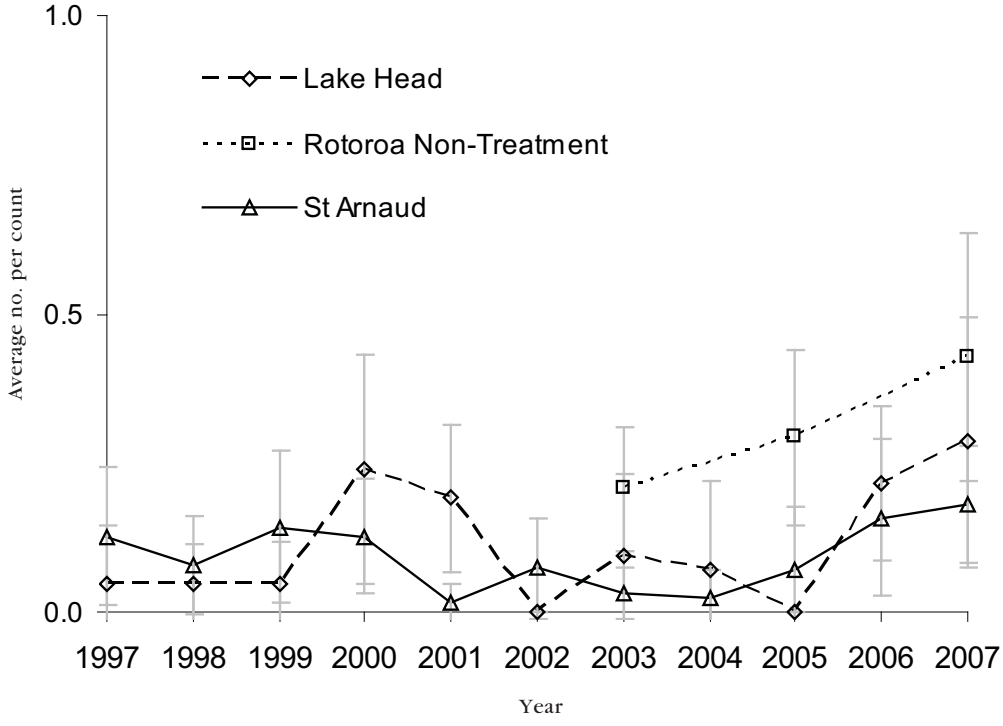
GREY WARBLER



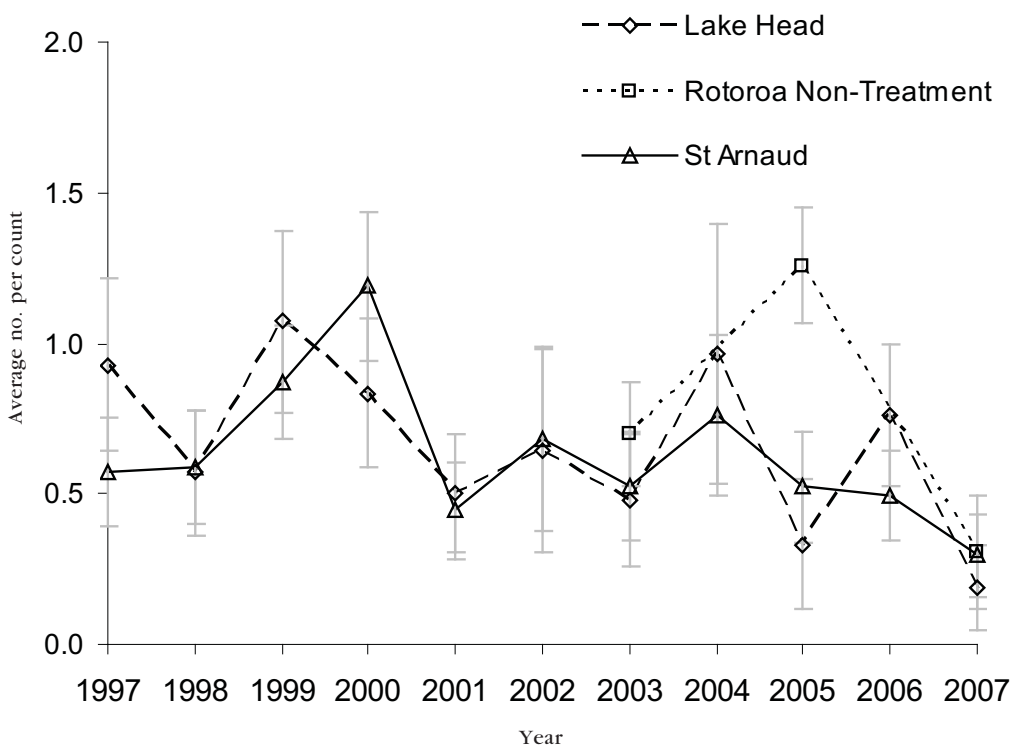
RIFLEMAN



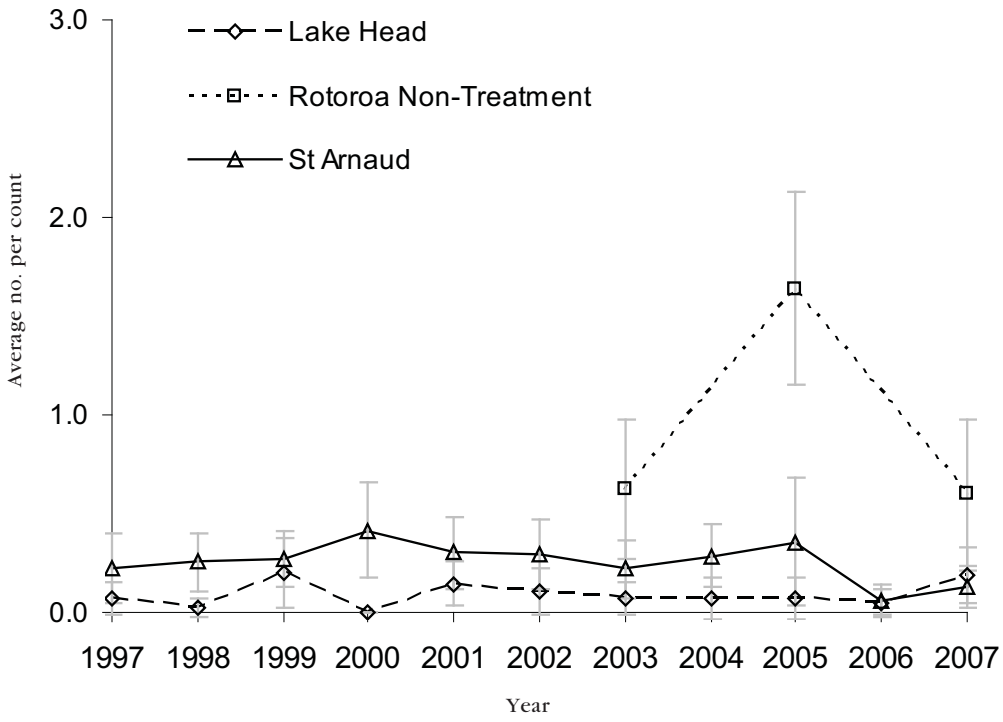
ROBIN



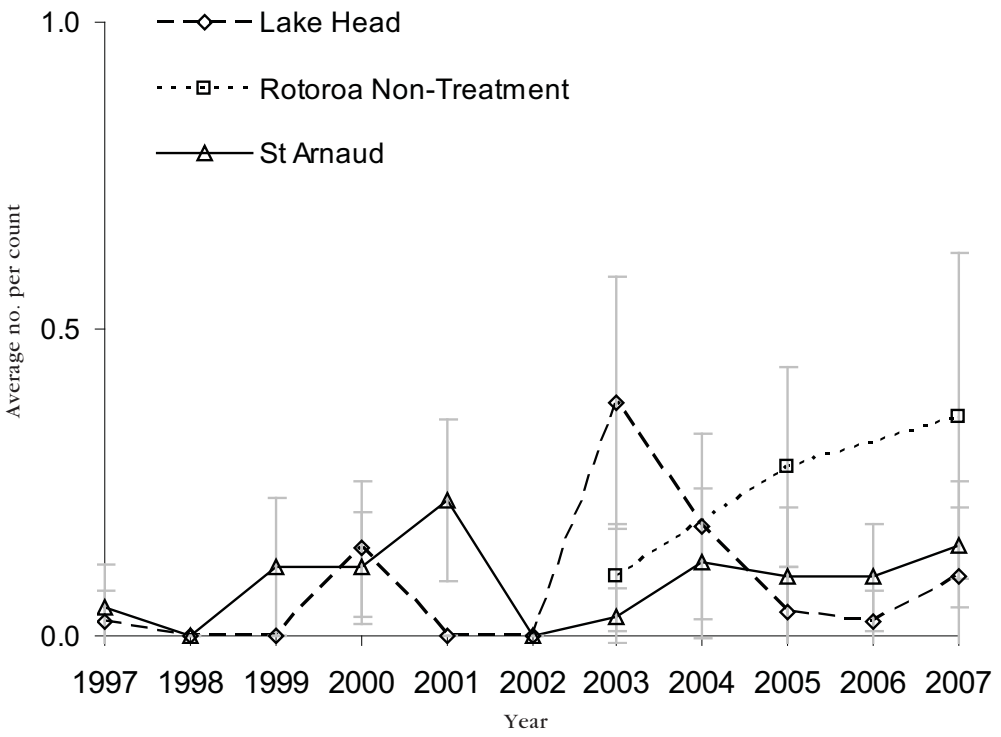
TOMTIT


Lake Head
Rotoroa Non-Treatment
St Arnaud
2.0
1.5
1.0
0.5
0.0
Average no. per count
1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007
Year

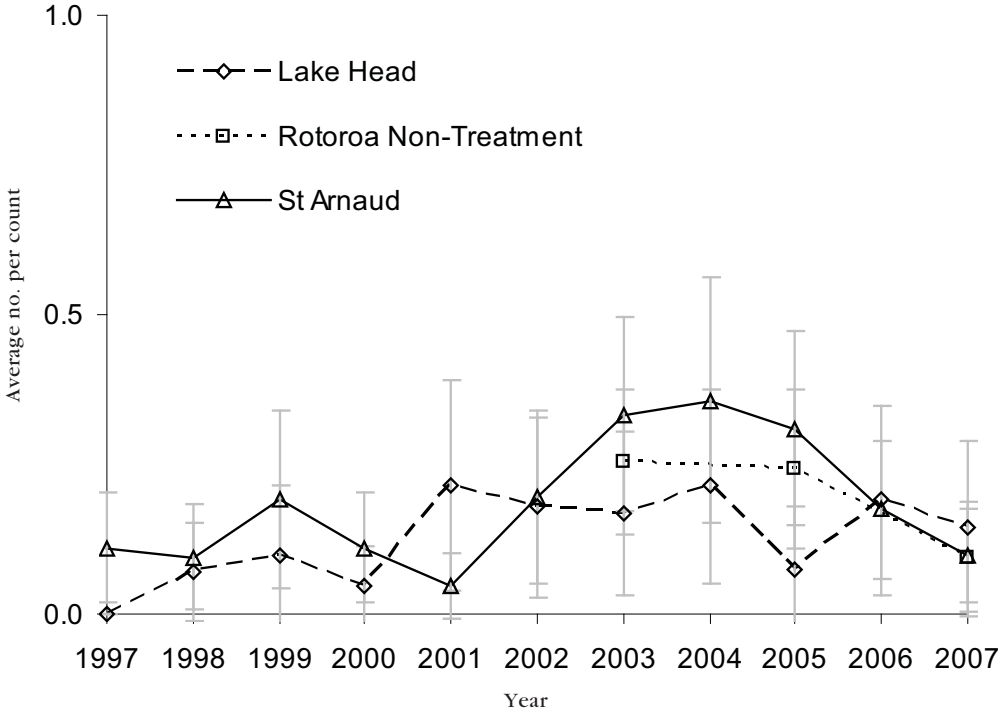
TUI


Lake Head
Rotoroa Non-Treatment
St Arnaud
3.0
2.0
1.0
0.0
Average no. per count
1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007
Year

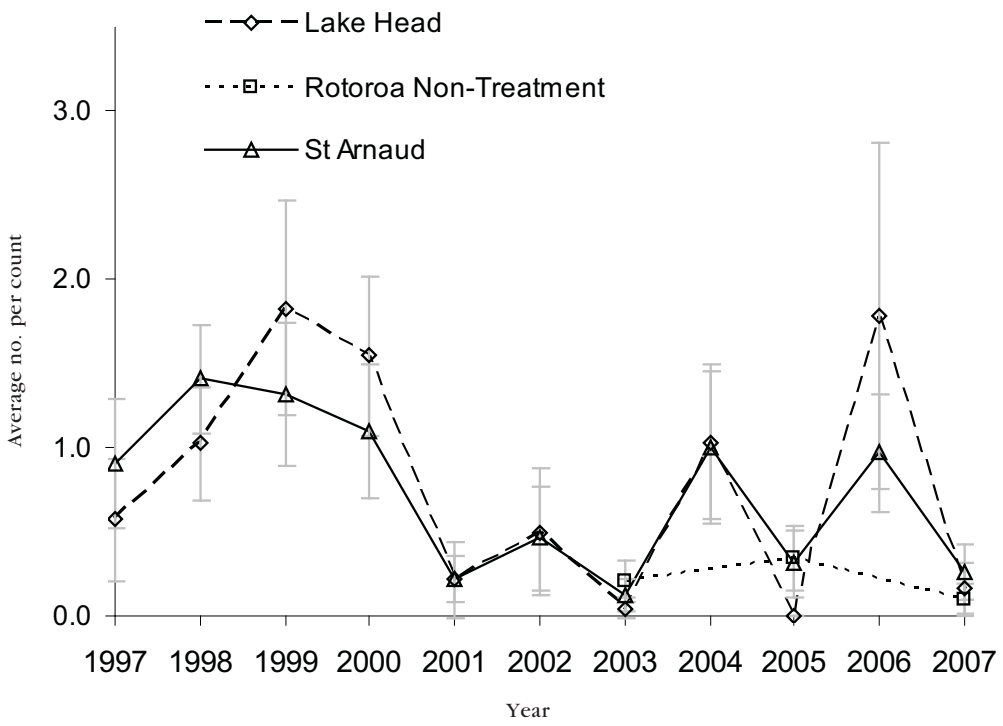
YELLOW-CROWNED PARAKEET



BLACKBIRD



CHAFFINCH



SONG THRUSH