

Rotoiti Nature Recovery Project Annual Report 2001–2002

ST ARNAUD'S MAINLAND ISLAND, NELSON LAKES
NATIONAL PARK.

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Executive Summary

This report documents the sixth year of the Rotoiti Nature Recovery Project (from 1 July 2001 to 30 June 2002 – based on the Department's financial year) which was the fifth season of comprehensive pest control. The two major developments this year were the extension of the project area and the formation of a community group 'Friends of Rotoiti' to work alongside the Department.

KEY RESULTS ARE AS FOLLOWS:

Possum control – Vegetation Response

Possum numbers were again maintained at low levels in the treatment area. Vegetation condition is good with increased canopy density for most species and no observed browse.

Rodent Control – Bird Response

The number of territories held by robins in part of the area was similar to previous years, indicating rodent control was effective in protecting these birds.

Mustelid Control – Bird Response

Stoat captures showed a different pattern to previous years with captures peaking earlier than usual. This is probably due to a lack of significant stoat breeding in the spring of 2001 (following a lack of beech seeding the previous year) resulting in no January influx of young animals into traps. Ferret and weasel captures were relatively low compared with previous years. Kaka nesting success in the old core area was down from 80% in previous years to 40% this year, indicating stoat control was not as effective. 5-minute bird counts were also down, especially in the case of bellbirds, and this may also indicate less effective mustelid control. In Big Bush mustelid trapping was not instigated early enough to protect nesting kaka.

Wasp Control – Invertebrate Response

An expanded area of wasp control was successfully treated. Wasp numbers were reduced and held below the Ecological Damage Threshold for the whole season for the first time. The response of native invertebrates is still difficult to determine.

Advocacy and Education

The Friends of Rotoiti was formed in August 2001 as a result of repeated requests from the community for opportunities to help with the project. The group decided that it would undertake rat trapping in St Arnaud, on Black Hill and Brunner Peninsula and mustelid trapping in the Wairau Valley up to Rainbow ski Area. The membership grew from 12 to 30 over the year.

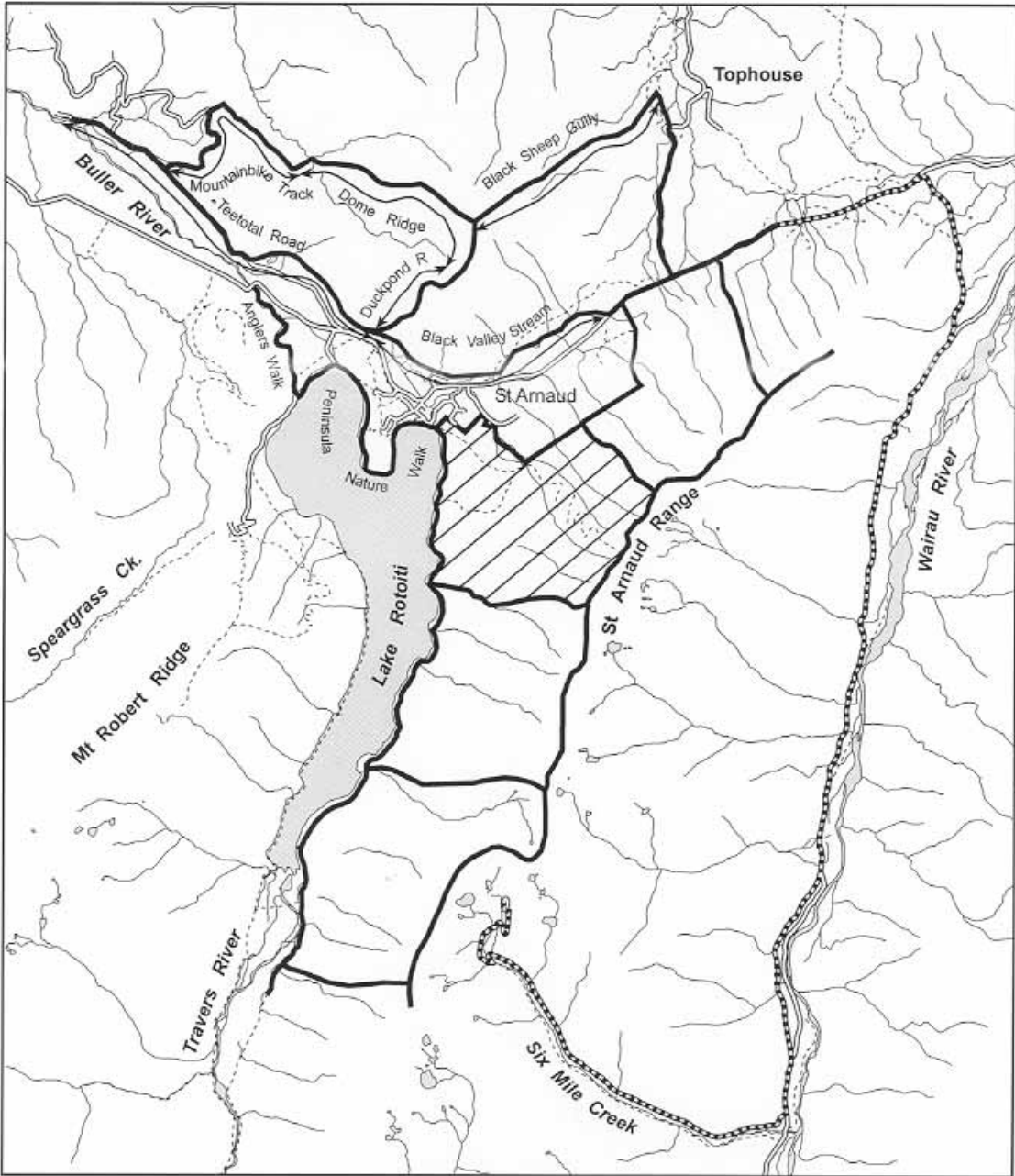
1. Introduction






The Rotoiti Nature Recovery Project is the title given to a 'mainland island' project based on beech forests containing honeydew, one of six such projects funded within a national programme focussed on different habitats. The project area was extended this year from the original 825ha 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. Figure 1 shows that different parts of the extended area are targeted for different pests and that some of the trapping is conducted by the recently-formed Friends of Rotoiti community group. The overall site was chosen as representative of a habitat type that occupies about 1 million hectares or 15% of New Zealand's indigenous forests (Beggs 2001) particularly in the northern South Island, at a location accessible to visitors. It is crossed by three popular walking tracks adjacent to St Arnaud, the main gateway into the National Park. A more detailed description of the original project area is available in the project's Strategic Plan (Butler, 1998).

The same two non-treatment sites were used as in previous years at Lakehead, situated at the head of Lake Rotoiti c.5km from the treatment area covering similar aspect and altitudinal range, and Rotoroa or Mt Misery, situated at Lake Rotoroa 18km to the west of Lake Rotoiti, which extends to lower altitude.

This report presents its results within the project's three objectives (2.0 below). Readers are referred to the Strategic Plan (*ibid*) for the thinking behind these objectives and their translation into a long-term programme of scientifically based activities. More detail on methodologies or past results can be found in the project's 1998-2001 Triennial Report (Butler, 2003).

Figure 1 Map of extended Project area



-  Rotoiti Nature Recovery Project core area
-  Rotoiti Nature Recovery Project stoat lines
-  Rotoiti Nature Recovery Project expanded rat/wasp control areas
-  Friends of Rotoiti stoat line
-  Friends of Rotoiti rat control area

2. Project Goal and Objectives

Goal

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

Objectives

1. 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).
2. To re-introduce recently depleted species, such as yellowhead (mohua), kiwi and kokako (S.I. sub-species if possible), once the beech forest ecosystem is sufficiently restored.
3. 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.

3. Results – Pest Control and Monitoring

3.1 BRUSHTAIL POSSUM (TRICHOSURUS VULPECULA) CONTROL AND MONITORING

Objectives

To reduce possum numbers and hold them continuously at a low level such that:

- preferred browse species (see 4.4 Plant Monitoring) show increased growth/productivity and further plants re-establish;
- impacts on invertebrates, particularly land-snails are reduced to a level that is insignificant compared to other mortality factors;
- impacts on birds through nest predation are reduced to a level that is insignificant compared to other mortality factors (see 4.1 Bird Monitoring);
- impacts on other forest biodiversity, e.g. fungi, are reduced to levels that are insignificant compared to other factors (no monitoring of these impacts is currently in place).

Performance Targets

Result - residual index using trap catch methodology (Warburton 1997) of <2% all years.

Outcome – see section 4.4 Plant Monitoring.

Methods

A range of different control methods have been applied this year as is generally recommended. Where and when they have been applied has depended on kill results and on observations of possum activity.

Cyanide operation on northern boundary

Feratox™ pellets were placed in the 55 Feratox bait stations - 100 metres apart as used in the previous year along the farm boundary and 'Snail' ridge - during July 2001. Baits in stations 1-24 were replaced during September 2001, stations 1-41 during October 2001, all stations in December 2001 and all again in late January/early February 2002. Feratox was then placed in 110 bags 50 metres apart in April 2002 and old/damaged bags replaced in May. In addition, cyanide paste was laid at 35 stations for 6 nights during November 2001 in a new area at the northern end of the farm where the farmer had reported higher possum numbers.

Leg-hold trapping on farm boundary

Three trapping sessions were undertaken using Victor No. 1 traps on raised sets extending along the complete farm/National Park boundary to the northern corner. Thirty-six traps were used over 4 nights (138 trap nights) during July 2001; 36 traps over 4 nights (144 trap nights) during October 2001; and 95 traps on raised sets over 3-4 nights (352 trap nights) during March 2002. White coreflute was nailed to trees as an attractant rather than using flour/sugar as in a trap-catch monitor.

Poisoning and leg-hold trapping on buffers (lines as in 2000/01)

- Pincushion and Tincan Ridges:

Prefeed (5gm grain-based baits) followed by cyanide paste were placed in Philproof bait stations during October 2001. The paste was located on masking tape on the lip of the station, for safe removal of any that was not used, while the pre-feed remained inside.

- Snail Ridge:

Nine Feracol™ (toxin: cholicalciferol) bags were placed during late February 2002 and 64 Feratox pellets in paper bags during March 2003 and the latter replaced during late April 2002.

- Totara Ridge:

Prefeed followed by cyanide paste were placed during October 2001 and paste alone applied during March 2002. Forty-eight Feracol bags were put out at 50m spacings during March 2002 and replaced with Feratox capsules in Ferafeed™ bait during May 2002.

Trap-catch monitoring

Annual monitoring of possum numbers was undertaken in April in the treatment area and non-treatment site at Lakehead using the standard method of Warburton (1997) (Version 4.0). Raised sets were used. The methodology was unchanged from that used in 2000/01, but new randomly selected start points were used for the lines.

Chew stick monitoring

Possum interference with wax chew sticks (designed by Pest Control Research as precursor to Wax-Tag™) on four occasions. The objectives of this monitoring were to:

- identify seasonal patterns in possum activity;
- identify 'hot spots' of possum activity;
- to calibrate a potentially low cost possum monitoring method with the national standard (leg hold trapping to NPCA protocol) at low possum densities.

Monitoring was undertaken concurrently with rodent tracking tunnel surveys in the possum treated area (RNRP core) at quarterly intervals (Feb, May, Aug, Nov). Rodent tracking and possum chew stick sites are identical: 5 lines of 20 stations at 50m intervals. Each chew stick station consists of a 50cm No.8 wire probe with one raspberry scented red coloured wax 'lollypop' attached with rubber bands. Immediately below the 'lollypop' is a square plate of galvanised steel approximately 250mm x 250mm (atop a 'pigtail' twist in the wire) to act as a barrier to rodents attempting to climb the probe. Chew sticks were set for one night. All marked chew

sticks were analysed and bite marks attributed to possum, rodent, bird etc. Unmarked chew sticks were recycled and re-used at subsequent monitors.

Results

TABLE 1: KILLS OF BUFFER OPERATION

Northern Boundary	Feratox: Cyanide Paste: Leghold Trapping:	20 possums recovered 3 possums recovered 18 possums recovered
Pincushion Ridge	Cyanide Paste:	1 possum recovered
Tincan Ridge	Cyanide Paste:	3 possums recovered
Snail Ridge	Feratox: Feracol	11 possums recovered (No possums recovered – cholicalciferol takes longer to kill possums so they die away from bait stations)
Totara Ridge	Cyanide Paste: Feratox: Feracol:	6 possums recovered 2 possums recovered (No possums recovered – see above)
Non-target kills:	No non-target kills were recorded	

Trap-catch monitoring

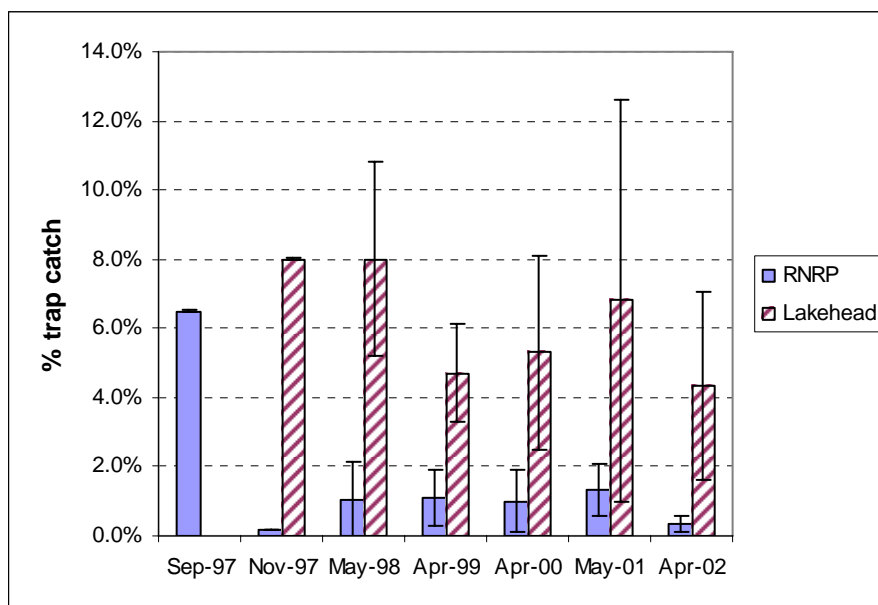
Possum trap-catch monitoring was undertaken during the week of 15-19 April 2002 with fine weather throughout using lines set on a bearing of 38 degrees (magnetic) (Table 2).

TABLE 2: POSSUM INDEX TRAPPING RESULTS

RNRP RESULTS										
Line	1	2	3	4	5	6	7	8	9	10
Start	LB3	RI2	TF15	WG4	PF10	GA21	RB7	SA11	SF13	CV19
Possums	0	0	0	0	1(Ad. ♀)	1(Ad. ♀)	0	0	0	0
2 possums / 600 trap nights = 0.33% RTC Standard Error =0.22										
NON-TREATMENT AREA RESULTS										
Line	1		2		3		4		5	
Start	N29 961273		N29 964269		N29 955267		N29 958262		N29 963256	
Possums	1 (1 x Ad. ♀)		1 (1 x Ad. ♀)		9 (3 x Ad. ♂) (3 x Ad. ♀) (1 x Juv. ♂) (1 x Juv. ♀) (1 x trap/sprung with fur)		2 (1 x Ad. ♂) (1 x Ad. ♀)		0	
13 possums / 300 trap nights = 4.33% RTC Standard Error = 2.72										

These results are shown alongside those from previous years in Figure 2.

FIGURE 2: POSSUM TRAP CATCH INDICES 1997-2002 ($\pm 1SE$)



Chew Stick Monitoring

Possum interference activity indices between 0-3% were recorded. In no survey were more than two 'areas of activity' identified. Higher indices were generated by more than one interference event at an area of activity, i.e. two consecutive stations yielding 'chews'. Thus there are some unresolved issues relating to independence of sample units; and how to interpret consecutive events. Correlation of trap-catch indices with chew stick interference is reasonable (0-3% chew vs. 0.33%RTC) but is limited by incomparable sample size (100 vs. 600 sample units), sample period (one night vs. three nights), and independence of sample units. It was recommended by the Technical Advisory Group that one night vs. three night monitors be compared in the 2002/03 year in conjunction with rodent and mustelid tracking surveys.

Aerial 1080 Operation

Marlborough District Council, funded by the Animal Health Board, conducted a large-scale possum control programme in the Upper Wairau Valley as part of TB vector control. The operation ran mid slope approximately 1.5km from the St Arnaud Range ridge top up the Wairau Valley to Sandfly Stream. The area was controlled with an aerial drop of 1080 (0.15%ww at 2.5kg/ha) in December 2001. The Wairau Valley flats were treated with feratox on the pasture margins. An RTC of less than 3% was achieved.

Ground Operation

The Animal Health Board also co-ordinated a Tophouse Operation which involved ground control using feratox up to the Borlase Boundary and Snail Ridge and throughout Big Bush. 1080 was also ground-laid 3 kilometres north of the Big Bush Fenn trap lines (section 3.3) and beyond into the Rainy River. This operation covered 18400ha and lowered possum numbers to an RTC of 3% or lower.

Discussion

These results continue the pattern of significantly reduced possum numbers in the treatment area seen since the project started (Figure 2), indeed the trap-catch there was the lowest since November 1997 just after the project's initial 1080 operation. There is evidently continuing pressure from possums on the farm and northern boundary ('Snail') and effort there has been increased to prevent more penetrating the core area. Insufficient control was carried out on the 'buffering' ridges like 'Tincan' and 'Pincushion' this year to reduce possum numbers on the farm and northern boundaries. Control efforts will have been assisted to some extent by the Animal Health Board's aerial 1080 operation in the Wairau and the ground control in the Tophouse area.

The continuing benefits of possum control are evident in the health of mistletoes and other susceptible plants (section 4.4).

3.2 RODENT CONTROL AND MONITORING

3.2.1 *Ship Rats (Rattus rattus)*

Objectives

To reduce rat numbers to levels at which:

- predation of nesting birds (see 4.1 bird monitoring);
- predation of ground dwelling invertebrates;
- inhibition of plant regeneration (through eating of fruit, seed) is insignificant alongside other mortality factors affecting these groups.

Performance Target

Tracking tunnel index of 5% maintained throughout the year.

Methods

Control – targeted trapping

Control was undertaken in 2001/02 by trapping as in the previous year. An additional 285 traps were established in the Duckpond Stream catchment of Big Bush. These traps vary from the RNRP core area in that all tunnels are white coreflute and have an entrance of 60 x 60mm. Trap data from 2000/01 showed no significant difference between black and white trap covers for all species trapped (mice, rats, stoats, weasels). The trapping grid was arranged as a 200 x 50m grid, giving the same trapping density (1/ha) as the RNRP core but a different configuration. It was designed to capitalise upon the new wasp control area established in Big Bush which uses this spacing (see section 3.5). The Big Bush traps became operational in October 2001.

The Friends of Rotoiti community group have undertaken rodent control in 'the gap' between the RNRP core and the Duckpond Stream control areas from December 2001. This covers St Arnaud Village, Brunner Peninsula and Black Hill. The trapping regime is identical to that in the Duckpond Stream catchment – white coreflute

tunnels with a 60x60mm entrance. The 200x50m grid has been 'warped' slightly to fit the existing network of roads and tracks in and around the village.

Non-targeted trapping

The Fenn traps set for mustelids also caught rats.

Monitoring

Monitoring was carried out quarterly using tracking tunnels set according to standard protocols (Gillies & Williams 2002) on the same lines as 2000/01 with the addition of two new lines in the new operational area of Big Bush. Tunnels at Lakehead and Big Bush vary from SOP in that they are 1m in length and constructed of galvanized steel with the tray set 23cm in from both ends of the tunnel. This design is to avoid possum interference by placing tray beyond reach of animal. All tunnels use the ferric/tannic medium for tracking in order to retain consistency with previous monitoring at this site.

Results

Targeted Trapping

Substantially fewer animals were caught in the core area in rat traps this year compared with the last, reflecting the lack of beech seed falling in autumn 2001. This is expressed in Table 2 as a ratio. (Data from Big Bush will be presented next year when more of a pattern may be present).

TABLE 2: TOTAL CAPTURES FROM RNRP CORE RAT TRAPS BY YEAR

	RAT	MICE	STOAT	WEASEL	TOTAL
2000/01	2174	4093	18	14	6299
2001/02	708	341	4	5	1058
Ratio 2001/02	3.1:1	12:1	4.5:1	2.8:1	

Trap covers in the core area are alternately black and white. Captures by cover colour were similar to last year with no preference by any species for either colour (Table 3). Colour choice has now been tested in both high and low pest years and is shown to have no significant effect upon trap efficacy.

TABLE 3: RAT TRAP CAPTURES BY COLOUR COVER

	MICE		RAT		STOAT		WEASEL		TOTAL	
	Black	White	Black	White	Black	White	Black	White	Black	White
2000/01	1988 (48.6%)	2105 (51.4%)	1131 (52.0%)	1043 (48.0%)	8 (44.4%)	10 (55.6%)	7 (50%)	7 (50%)	3134 (49.8%)	3165 (50.2%)
2001/02	176 (51.6%)	165 (48.3%)	385 (54.4%)	323 (45.6%)	2 (50%)	2 (50%)	3 (60%)	2 (40%)	566 (53.5%)	492 (46.5%)
Total to June 2002	2164 (48.8%)	2270 (51.2%)	1516 (52.6%)	1366 (47.4%)	10 (45.5%)	12 (54.5%)	10 (52.6%)	9 (47.4%)	3700 (50.3%)	3657 (49.7%)

Cover colour preference by sex of trapped animal was examined (Table 4), but is confounded by the high proportion (c.50%) of unsexed animals due to decomposition in the trap, or the differing skill levels or willingness of individual volunteers to sex animals. Mice were unsexed as they are considered non-targets.

TABLE 4: RAT TRAP CAPTURES BY COVER COLOUR BY SEX

		UNSEXED (PROPORTION OF SAMPLE)	MALE (PROPORTION OF SEXABLE SAMPLE)	FEMALE (PROPORTION OF SEXABLE SAMPLE)
2001/02	Black	219 (55.4%)	68 (41%)	98 (59%)
	White	176 (44.6%)	52 (35.4%)	95 (64.6%)
Total Aug 2000 to June 2002	Black	719 (51.7%)	440 (53.5%)	360 (50.3%)
	White	671 (48.3)	382 (46.5%)	316 (53.5%)

Friends of Rotoiti caught 74 rats between December 2001 and the end of June 2002, 8 on Black Hill, 35 in Black Valley and 31 on the Peninsula in a total of 106,630 uncorrected trap nights.

Non-targeted trapping

Ninety-six rats were caught in Fenn traps set for stoats (section 3.3).

Tracking tunnel monitoring

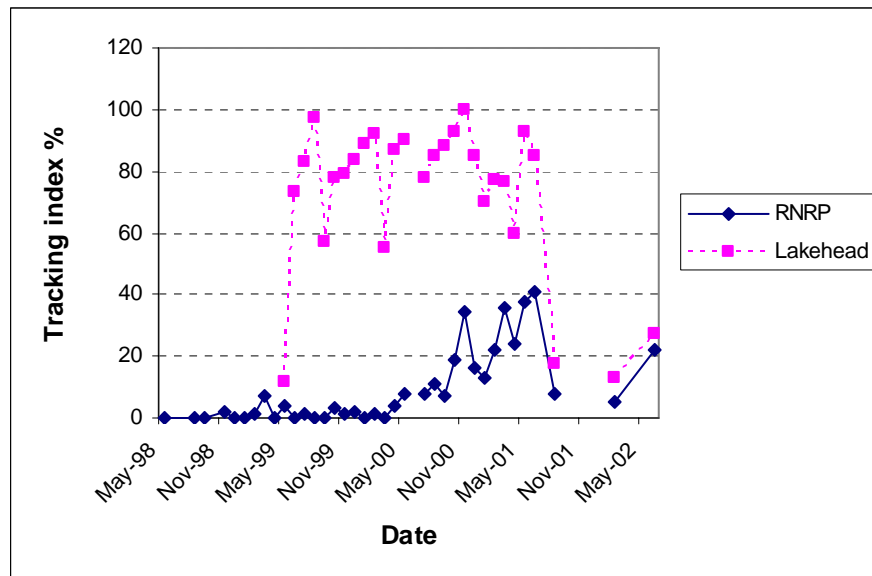
Tracking tunnel results for rats are shown in Table 5. Those for the RNRP and Lakehead are placed in a longer term context in Figure 3:

TABLE 5: 2001/02 RAT TRACKING INDICES

DATE	RNRP	BIG BUSH	LAKEHEAD	ROTOROA
Aug/Sep 2001	8%	-	17.5%	13.2%
Feb 2002	5%	0	12.8%	3%
June 2002	22.3 %	10%	27.5%	6.1%

Note: A November/December monitor was not achieved due to weather constraints.

FIGURE 3: TRACKING INDICES FOR RATS – LAKEHEAD AND RNRP



Note: Gaps indicate dates when no monitoring occurred – e.g. Lakehead was not initiated until May 1999 and the index that month may be an under-estimate as tunnels were not in place for long before being used.

Non target captures

Nine mustelids and 341 mice were caught as a by-catch in the traps set for rats.

Discussion

The 2001 beech seedfall was the lowest recorded since 1997 within the RNRP averaging 0.36 seeds/m² (combining all species) (section 4.4.4). It would have been expected to lead to reduced rat numbers and this largely proved the case. However the index in the treatment area (RNRP) was above the target level of 5% on two of the monitors and equal to it during the third.

A series of longer term plots have been produced as part of this discussion to look at the sequence of seeding events from 1998 to 2002 (including data from two periods after that covered by this report) and the response of rats. This is aimed at assessing the linkages between the two and the relative effectiveness of the poisoning and trapping used for rat control at different times. Figure 4 shows results from the Rotoroa non-treatment area where rats have been monitored quarterly since November 1998. The pattern is fairly consistent. Very slight seedfall in 1998 led to a negligible response from rats, the higher seedfall in 1999 was followed by some increase in numbers, and the dramatic seedfall in 2000 led to a huge response. The seedfall in 2001 closely matched that of 1998 though more rats were plentiful after the latter which is likely to be a carry-over effect from the high numbers of 2000/01. Similarly the seedfall in 2002 closely matched that of 1999 and the response from rats was almost identical.

FIGURE 4: RELATIONSHIP BETWEEN SEEDFALL AND RAT INDEX – ROTOROA 1998-2002

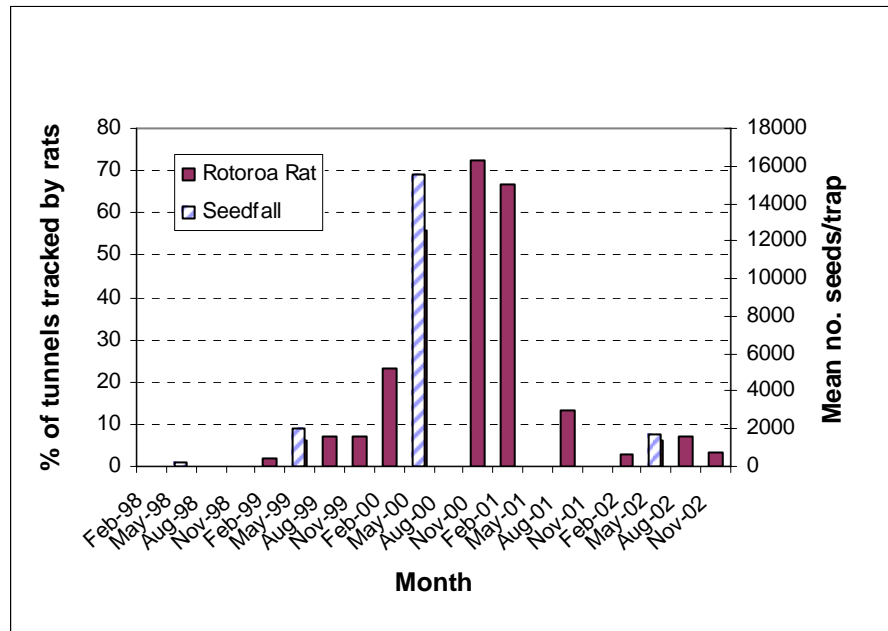


Figure 5 presents results from the Lakehead non-treatment area where rat monitoring generally occurred monthly from May 1999 and then quarterly in 2002. This plot shows one major difference from the Rotoroa results, the partial seedfall in 1999 producing a response from rats almost as great as in 2000/01. Such a response was not evident after the equivalent seedfall in 2002. This difference is not easy to explain though one factor, as discussed in the 1998-2001 report (Butler, 2003), is that the

Lakehead monitoring was all carried out at lower altitudes whereas some of the Rotoroa lines went almost to bushline.

FIGURE 5: RELATIONSHIP BETWEEN SEEDFALL AND RAT INDEX – LAKEHEAD 1998-2002

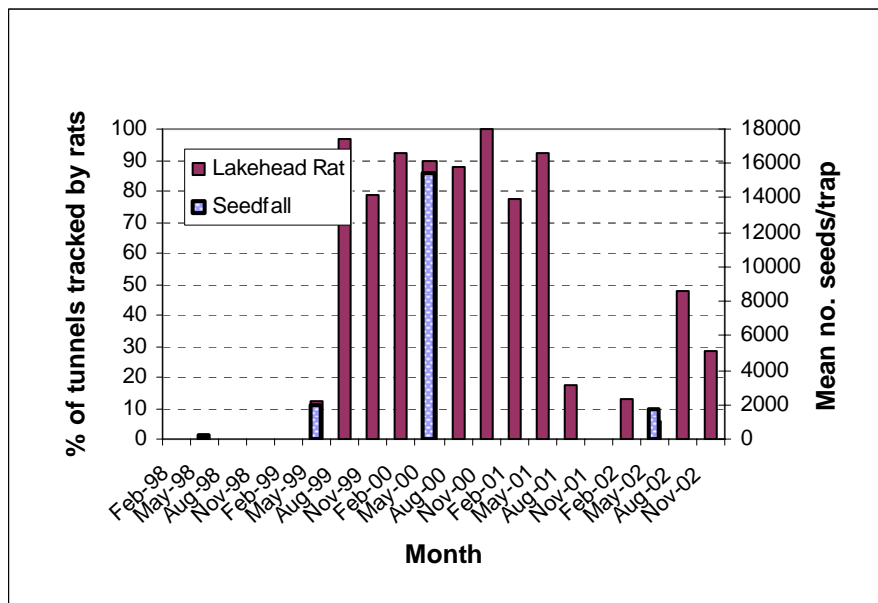


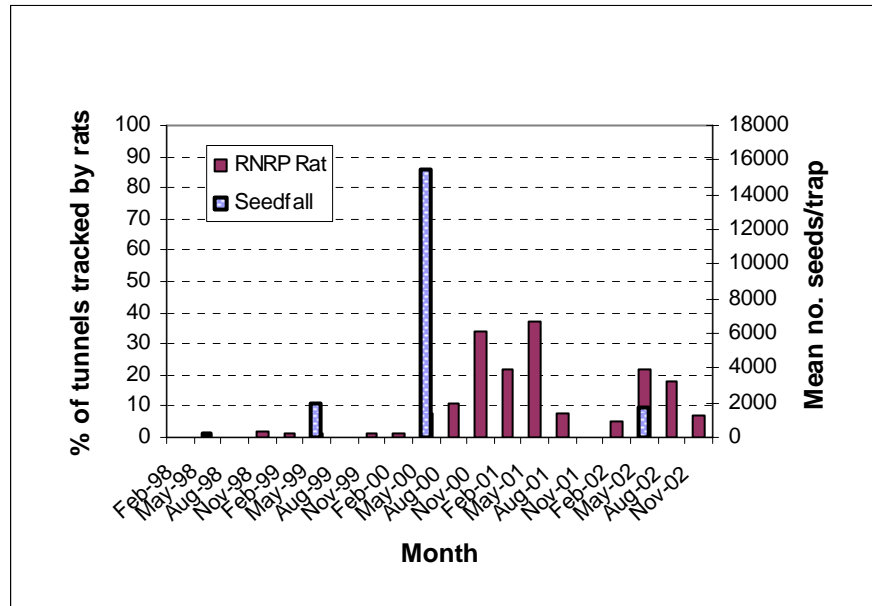
Figure 6 presents results from the treatment area (RNRP) where rats were monitored monthly from May 1998 to 2001 and quarterly in 2002. Here any pattern should reflect both natural changes and the effects of rat control – using toxins till July 2000 and trapping since. Comparing the results with the two non-treatment areas the following conclusions can be drawn on the effectiveness of the rat control:

- poisoning did suppress the response of rats to a partial seeding in 1999;
- trapping did reduce but not suppress the response of rats to the huge seeding of 2000;
- trapping did not reduce rat numbers after the negligible seeding in 2001 to the levels seen after the negligible seeding of 1998 when toxins were in use. This may largely reflect a carry-over in rat numbers from the peak of 2000/01 (also apparent at non-treatment areas) rather than differing effectiveness of the two techniques;
- trapping did not suppress the response of rats to the partial seeding in 2002 in the way that poisoning apparently did in 1999. This does provide clearer evidence that poisoning was more effective than trapping at these rat population levels, as any carry-over effect would have finished.

These findings, together with the fact that the rat index in the treatment area has been consistently above our target level of 5%, has led to plans to enhance the rat trapping programme in 2003/04 by reducing the spacing between traps along lines to 50m by adding extra traps.

The potential positive outcomes of rat control are discussed under bird monitoring (section 4.1).

FIGURE 6: RELATIONSHIP BETWEEN SEEDFALL AND RAT INDEX – RNRP 1998-2002



3.2.2 *Mice (Mus musculus)*

Since July 2000 mice have not been targeted for any control but they have been caught as a significant by-catch during rat trapping. Monitoring was carried out using tracking tunnels as for rats.

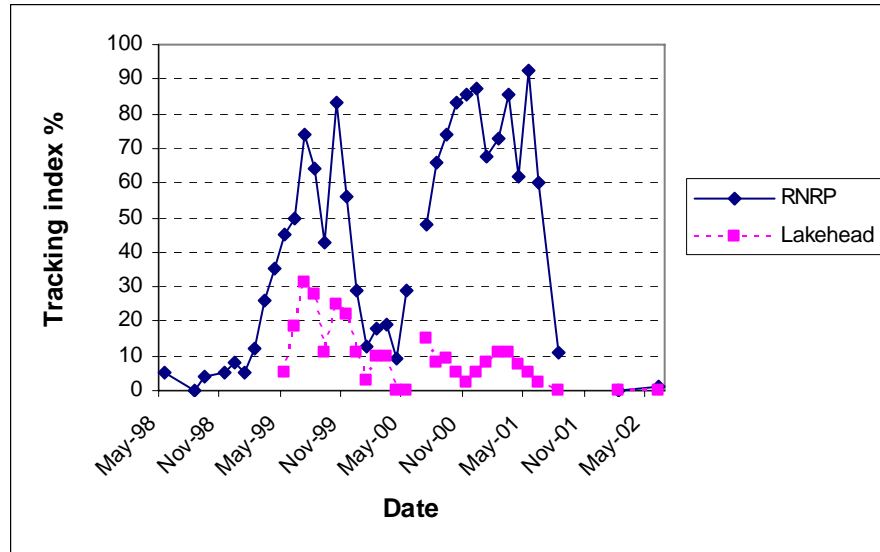
Results

Mice were only tracked in the treatment area (RNRP) during the period covered by this report and not recorded in the non-treatment areas (Table 6) (Figure 7).

TABLE 6: MOUSE TRACKING INDICES, ALL SITES 2001/02

DATE	RNRP	ROTOROA	LAKEHEAD
Aug/Sep 2001	11%	0	0
February 2002	0	0	0
June 2002	1.1%	0	0

FIGURE 7: TRACKING INDICES FOR MICE – RNRP & LAKEHEAD



Rat traps caught 341 mice as a by-catch.

Discussion

Mice were in very low numbers throughout this period, an expected response to the negligible beech seeding in autumn 2001. The higher index in the treatment area at the start of the period is considered a carry over from the situation in 2000/01 when mice were at very high numbers there following the huge seeding of 2000, combined with the effects of rat control (discussed in Butler 2003).

Mice did not present the same 'clogging effect' upon the rat traps as they did in the 2000/01 year. In fact the mouse to rat ratio was inverted between years, with 1.88 mice caught per rat in 2000/01 and 0.48 mice per rat in 2001/02.

3.3 MUSTELID (STOAT – MUSTELA ERMINEA, FERRET – MUSTELA FURO, WEASEL – MUSTELA NIVALIS) CONTROL AND MONITORING

Objectives

The overall objective remained to reduce mustelid numbers to a sufficiently low level that they had minimal negative impacts on the breeding success of resident birds (particularly kaka) and other fauna, and that would allow the re-introduction of other species vulnerable to mustelid predation (e.g. saddleback, mohua, kiwi). A secondary objective this year was to test the effectiveness of a modified trapping regime covering a much larger area but with reduced intensity.

Performance Target

Targets in terms of mustelid numbers have still not been put in place in the absence of an independent monitoring system. The main measure used to judge the effectiveness of control remained the breeding success of kaka (section 4.1.2).

Methods

Control

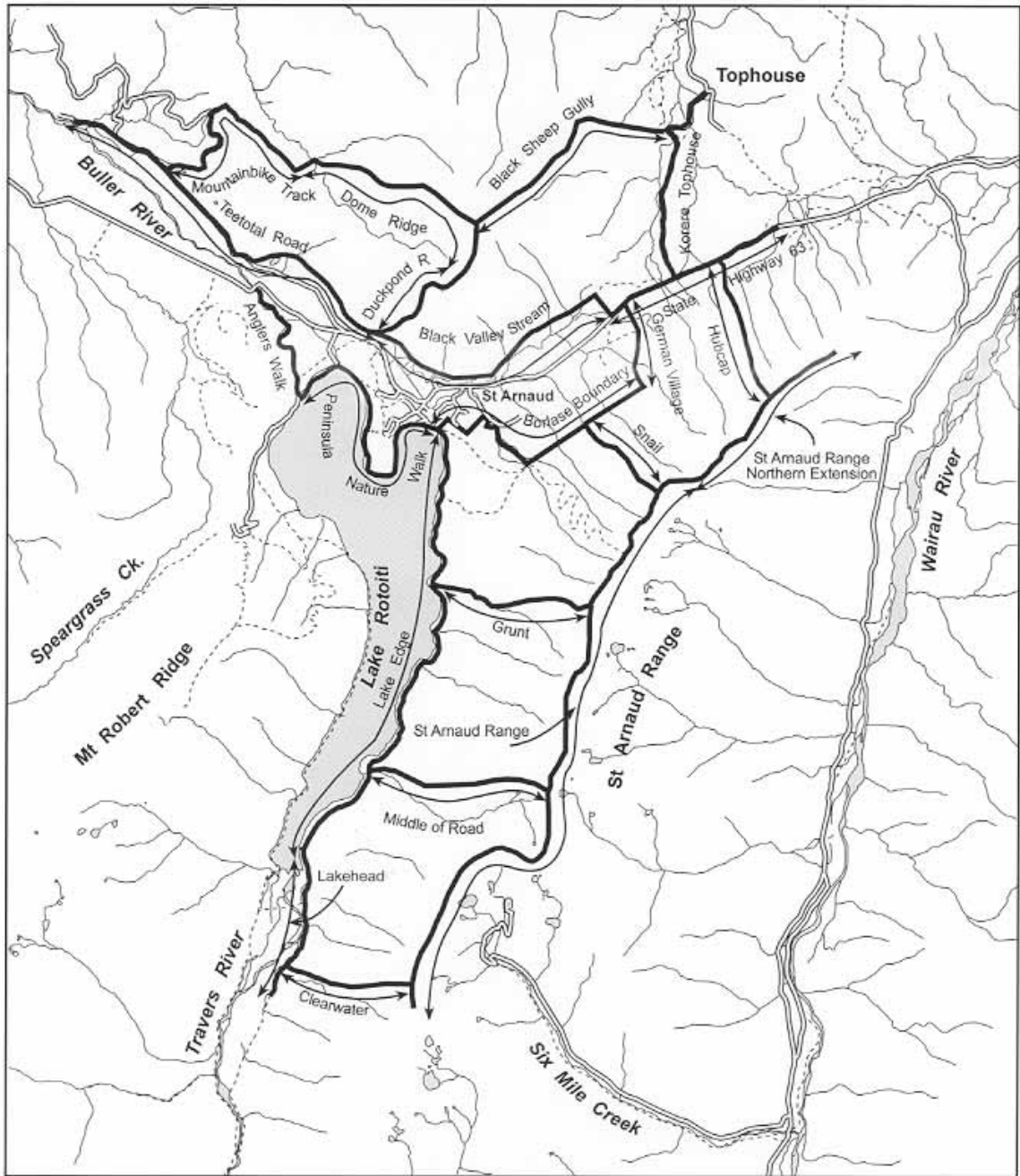
The system of single Mark VI Fenn™ traps set in wooden tunnels was expanded significantly in 2001/02, with new lines north into Big Bush, northwest towards the end of the St Arnaud range and south to the head of Lake Rotoiti (Figure 8). A total of 708 new traps were placed. In addition the Friends of Rotoiti community group (section 5.2) established a new line from the Wairau valley/State Highway 63 junction to the lower car park of the Rainbow Ski Field. The two internal lines within the original core area, 'Vet Legends' and 'Slave Driver' were not operated this year (traps and tunnels were left in place but not set). Trap spacings on Snail and Grunt boundary (original perimeter lines) were increased from 50m to 100m, resulting in the removal of 59 traps from these lines. Traps are spaced at 100m intervals on all other lines including the new ones.

The new lines were established in stages (Table 7).

TABLE 7: TIMING OF ESTABLISHMENT OF NEW FENN TRAPLINES

TRAP LINE (TRAP NOS.)	DATES ESTABLISHED
Lake Edge southern extension	10/08/01
Kerr Bay to Peninsula Nature Walk #14	28/08/01
Peninsula Nature Walk (#15 - #50)	10-18/09/01
Hubcap	11/09/01
Middle of Road	14-17/09/01
Anglers Walk	18-19/09/01
German Village	19/09/01
St Arnaud Range northern extension	12-19/09/01
Duckpond Stream	24/09/01
St Arnaud Range southern extension	25/9-1/10/01
Lakehead	10/8-1/10/01
Clearwater	5/10/01
Teetotal	28/10/01
Dome Ridge	12/10/01
Mountainbike	10/10/01
Black Valley Stream	13-15/11/01
Black Sheep Gully	15/11/01
Tophouse-Korere (#1 - #30)	15/11/01
State Highway 63	20/8-18/11/02
Tophouse-Korere (#31 - #39)	18/11/02

Figure 8 Stoat control network



— Rotoiti Nature Recovery Project stoat lines

Traps were checked on the following schedule (unless weather, e.g. snowfall, prevented this):

- July – September: once a month.
- October – November: once every two weeks.
- December – February: once a week.
- March – April: once every two weeks.
- May – June: once a month.

Monitoring

A tracking tunnel set-up to monitor mustelids at Rotoiti and the non-treatment sites was established at the end of this period and first operated in November 2002. However some animals were recorded during the usual monitoring for rodents.

Results

Fenn trapping captures – RNRP project

Figure 9 presents captures of stoats for the trap-lines that have been in place from the outset allowing comparison of annual patterns. Figure 10 plots captures of stoats for all the project's lines from November by which time most traps were in place, separating Big Bush from the St Arnaud Range.

FIGURE 9: STOAT CAPTURES ON PERIMETER LINES

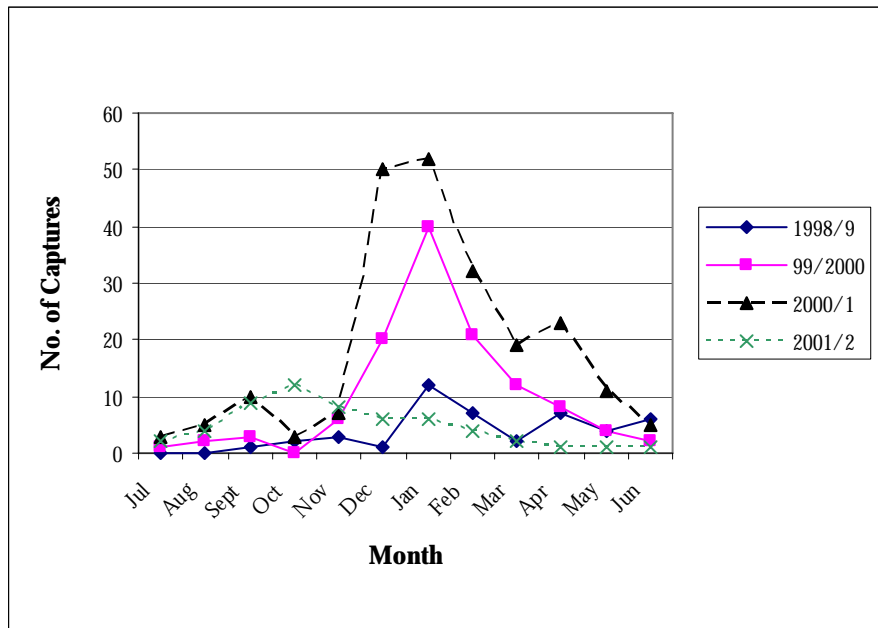
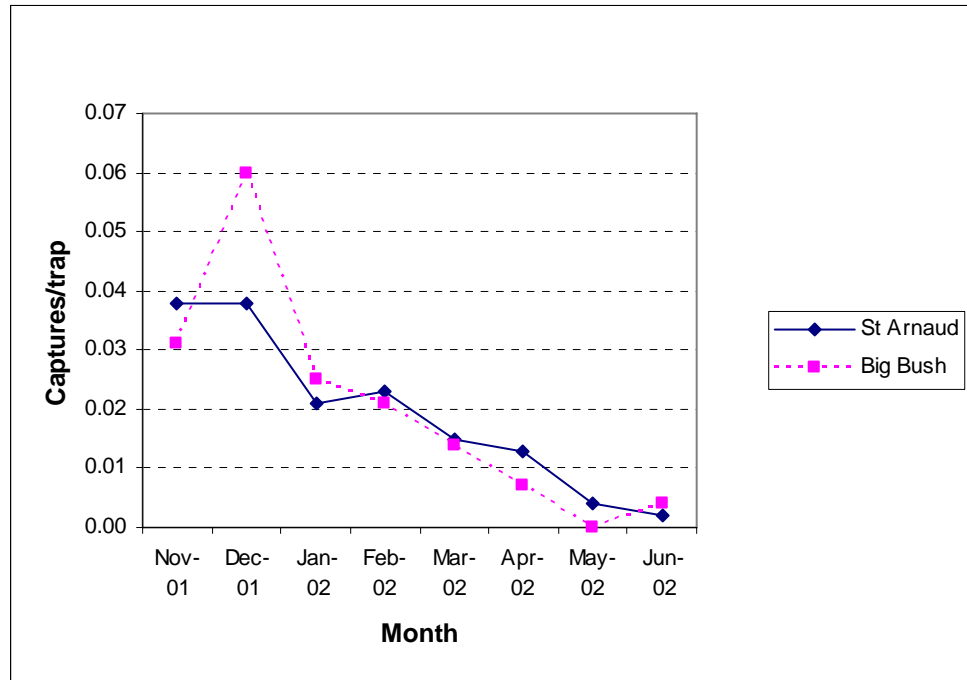


FIGURE 10: MONTHLY PATTERN OF STOAT CAPTURES, ST ARNAUD RANGE AND BIG BUSH



Only 2 ferrets (Dec & Jan) and two weasels (Jul & Aug) were caught in core area traps this year.

Fenn trapping captures – Friends of Rotoiti

Seventeen ferrets and 3 stoats were caught on the Rainbow valley trap line up to the end of June 2002 and one stoat on Black Hill.

By-catch in rat trapping

Rat traps (section 3.2.1) have caught ten mustelids as by-catch, five weasels and four stoats in the previous core area and one stoat at Big Bush. Only one animal (female weasel) was able to be sexed due to the deterioration of carcasses in the traps.

Tracking Tunnel monitoring

Mustelids were tracked incidentally during the rodent monitors at the Rotoroa (non-treatment) site only and not detected at RNRP or Lakehead. Indices for the August, February, and June periods at Rotoroa were 10%, 1%, and 3% respectively.

Discussion

The annual pattern of stoat captures on pre-existing lines within the core area (Figure 9) was quite different from previous years. Relatively high numbers of stoats were caught in September and October but captures declined from that point on, when in other years they would have climbed to a peak in January. A similar pattern was observed when new lines are included (Figure 10). The actual peak combining all lines is in December, later than in the core area, which is probably related to adult animals encountering the new trap lines then, but again January and February saw few captures. Overall these results most likely represent the absence of any significant breeding, recorded in other studies following low seedfall e.g. Murphy & Dowding (1994), resulting in no summer influx of juveniles.

Ferrets continued to be caught in very low numbers in the core area as they have been throughout the project (c.f. 2 caught in Fenns this year, 3 in 1998/1999, 3 in 1999/2000 and 4 in 2000/01). Weasels had dropped back to low levels after peaks in 1999/2000 and 2000/01 that coincided with the high rodent numbers following beech seeding (c.f. 2 in 2001/02, 25 in 2000/01 and 17 in 1999/2000).

The by-catch in rat traps in the core area was noticeably less than in 2000/01 (c.f. 4 stoats, 5 weasels in 2001/02 and 18 stoats, 13 weasels in 2000/01 (11 months trapping only). Eight of the nine were caught in the first part of the year (up to November) providing a similar pattern to the Fenn trapping results.

The effectiveness of the stoat control is largely assessed by the breeding success of kaka. Section 4.1.2. will reveal that kaka nesting success was 40% in the core area, down from the average of 80% recorded previously. Sample sizes are so small that developing conclusions from a single season is risky, but counts of other species (section 4.1.1), particularly bellbirds, also suggest that productivity was reduced this season and thus that stoat predation (among other possible causes of decline, e.g. rat predation, disease) was not controlled as effectively as previously. There could be several explanations for this and it is not yet possible to distinguish between them. Firstly the control system may have been less effective. This is the first season that kaka have bred since the rodent control programme switched from the use of brodifacoum to trapping. The former regime killed stoats by secondary poisoning though it is not possible to measure this effect, whereas the latter has trapped some (figures given above). Secondly there may have been more stoats present than previously though the lower captures both in Fenn and rat traps make this very unlikely. Thirdly the stoats may have behaved differently this season. The idea that stoats switch prey from small mammals to birds in seasons when the former are declining to low numbers in the absence of any beech flowering/seedfall, has received wide acceptance. However in fact there is little evidence for this. Both King (1983) and Murphy & Dowding (1995) found that the number of birds eaten by stoats varied little with mouse abundance.

Outside the core area, in Big Bush, it is considered that the new lines were not in place long enough prior to kaka nesting to afford much protection from stoats. Dramatic losses of female kaka occurred during November 2001 through to March 2002 (most lost during November) (section 4.1.2) while the network of lines there was being established in September-November.

The extended stoat control regime needs to be assessed through further kaka breeding seasons for its effectiveness to be judged against that of the previous regime and the c.80% nesting success that it produced. The ideal test would involve a sample of c.30 nesting attempts but it is considered likely that twenty could provide sufficient, particularly if they show consistently high success or failure rates. It would also involve years of different beech seeding intensity and consequent different mustelid densities.

There is now an opportunity to identify the response of stoats to differing levels of beech seedfall over four years and assess whether the latter can be used to predict the former. Figure 11 plots the two, though of course the effect is not a direct one but mediated through rodent populations. (It is also necessary to assume that trap capture rates are a fair measure of stoat numbers). Figure 12 shows a strong positive correlation between the two so that seedfall can be used as some predictor of stoat numbers.

3.4 FERAL CAT CONTROL & MONITORING

Objectives

To reduce feral cat numbers to a sufficiently low level that they have a minimal deleterious effect on the breeding success of resident birds and lizards and that would allow the re-introduction of other species vulnerable to cat predation (e.g. kiwi).

In the longer term to reduce the population of pet cats at St Arnaud with the support of the local community.

Performance Target

No comprehensive performance targets could be determined in the absence of a good method to monitor cats or judge their impacts. One identified in the operational plan was to ensure that there were no cat predations detected on monitored kaka fledglings.

FIGURE 11: RELATIONSHIP BETWEEN SEEDFALL AND STOAT CAPTURES

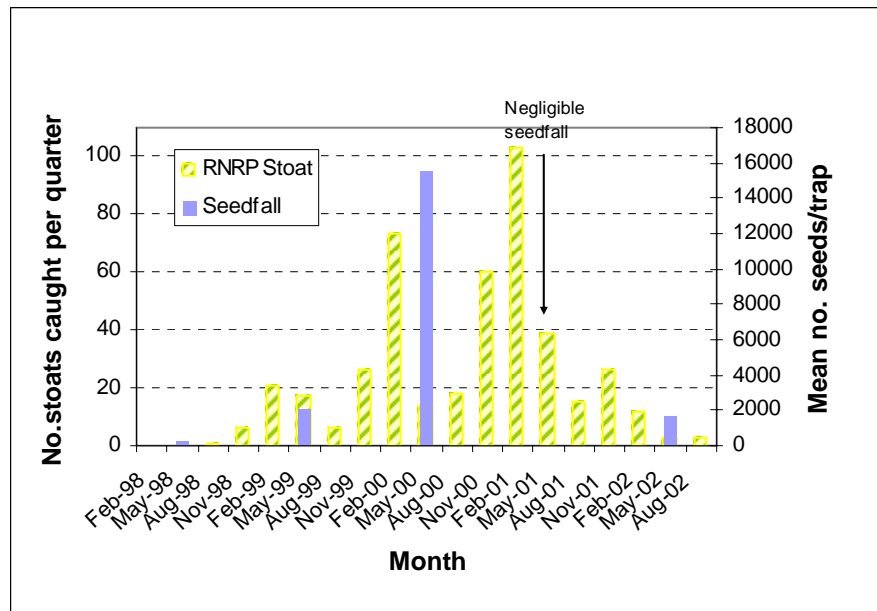
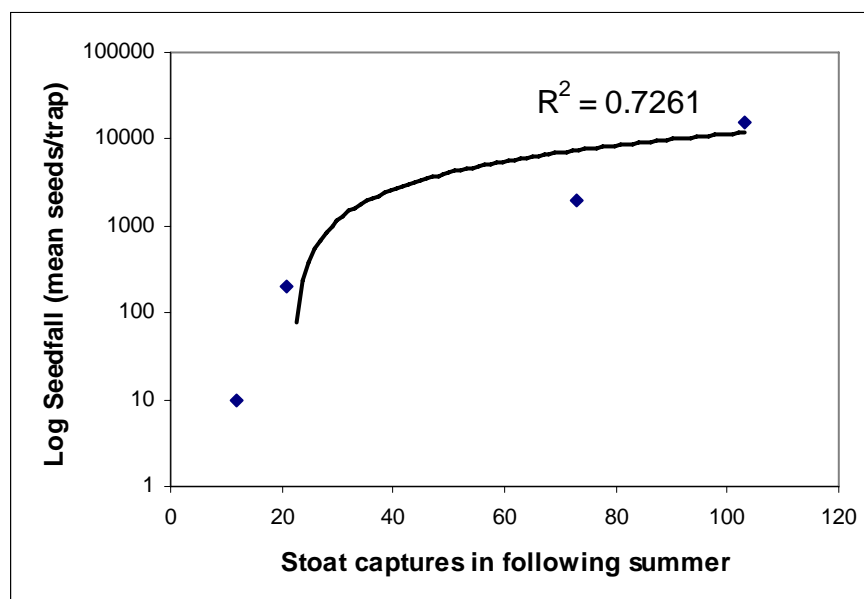


FIGURE 12: RELATIONSHIP BETWEEN SEEDFALL AND STOAT CAPTURES



Methods

Twenty 'Steve Allan Conibear-style' kill traps were purchased in mid 2001, following the successful testing of this design for humane killing action by Bruce Warburton of Landcare Research. It was decided to trial a cover protecting the traps from above to reduce the risks of catching birds. 6 covers were designed and built by J. McConchie, and 6 traps set: 4 up Duckpond Stream in Big Bush and 2 just inside the project area at Kerr Bay. Traps were either baited with rabbit, canned 'jellymeat' or canned fish-based cat food. 5 traps (3 up Duckpond, 2 at Kerr Bay) were set for 117 nights from 05/04 /02 to 31/07/02, and 1 trap (Duckpond) was set for 38 nights from 05/04/02 to 13/05/02. Covers were then made for the remaining traps early in the 2002-03 financial year.

Results

Three grey tabby cats were caught, 1 up Duckpond Stream (on 24/4/02 sex not identified) and 2 at Kerr Bay (28/6/02 – male and 2/7/02 – sex unidentified). No non-targets were caught.

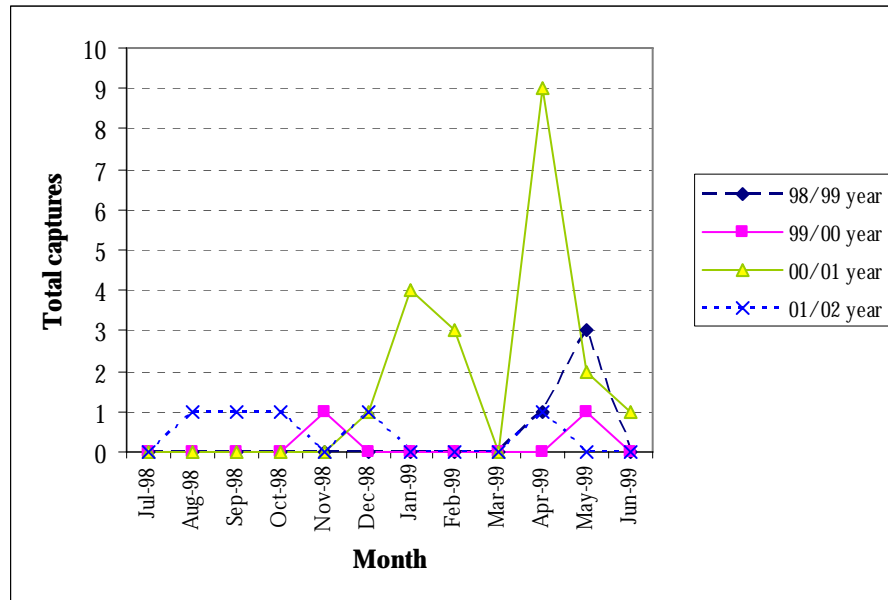
Five cats were caught in the Fenn traps set for mustelids in the original core area.

Discussion

This was the first season of scheduled trapping for cats, rather than the previous approach of only setting traps when and where cats were seen or sign encountered. It is difficult to evaluate the relative value of the two approaches as we have no independent measures of cat activity. The scheduled trapping also took place around areas where cats had been detected in the past rather than be located randomly in the block. However three captures within the core area in a year when we would have expected cat numbers to be lower with almost no mice present is significant, suggesting it is worth continuing with this new approach.

Figure 13 presents the captures of cats in the Fenn lines of the original core area that have been in continuous use. These can be used as some independent measure of cat activity and show how numbers appear to have been highest in 2000/01 which probably relates to the increased rodent populations following the heavy beech seeding.

FIGURE 13: CAT CAPTURES IN FENN TRAPS – ORIGINAL RNRP LINES



3.5 WASP (*VESPULA* SPP.) CONTROL AND MONITORING

Common wasps (*Vespula vulgaris*) build up to high densities in these forests in summer when they depress the levels of honeydew, which is a significant food source for native fauna, and take large numbers of native invertebrates.

Objectives

General objectives were:

- to reduce the take of honeydew;
- to reduce predation on native invertebrates and bird nestlings (Moller, 1990) so that the impacts of wasps are insignificant alongside other mortality factors affecting these groups;
- to improve the public's experience visiting the beech forest in late summer.

Performance Targets

The performance measure was based on the Ecological Damage Threshold (EDT) (Beggs & Rees, 1999) used in the previous two years, to maintain wasp activity levels below 2.7 captures per Malaise trap per day.

Methods

Wasp Control

Control was undertaken using the toxin fipronil in a chicken-based bait, applied in bait stations under an experimental use permit held by Landcare Research who are developing the formulation with Bayer (formerly Aventis Australia).

Experimental work by Landcare Research showed a poisoning effect at least 400m beyond the operational boundary in the 2000 season. Thus in 2002 the operational area was expanded to come within 400m of the upper limit of honeydew forest in the RNRP core increasing it from 300 to 500ha. A further 300ha was treated in the Duckpond Stream catchment of Big Bush to protect the honeydew resource there which is locally important for kaka and other honeyeaters. The St Arnaud village and Peninsula areas between these two 'core' areas were also treated to maximize coverage and enhance local and visitor experience giving a total area of c.1100ha.

Bait stations were spaced throughout on a grid of 200 x 50m which has been shown to be the optimum to maximize effectiveness while minimizing resources required. The grid was established using lines cut in the Big Bush and RNRP core areas, whereas in the village and Peninsula areas roads, tracks and other existing features were used to approximate it.

Poisoning was carried out on the 22nd January in accordance with the Wasp Poisoning Decision Maker flowchart prepared by Landcare Research (local document ref: STAAO-8221). 80g of bait was applied per KK bait station giving a loading of 0.08kg/ha. Any remaining bait was removed on the 28th January.

An Assessment of Environmental Effect (AEE) for Control of Common Wasps was prepared in December 2002 and can be viewed at local document ref: STAAO-7293.

Results

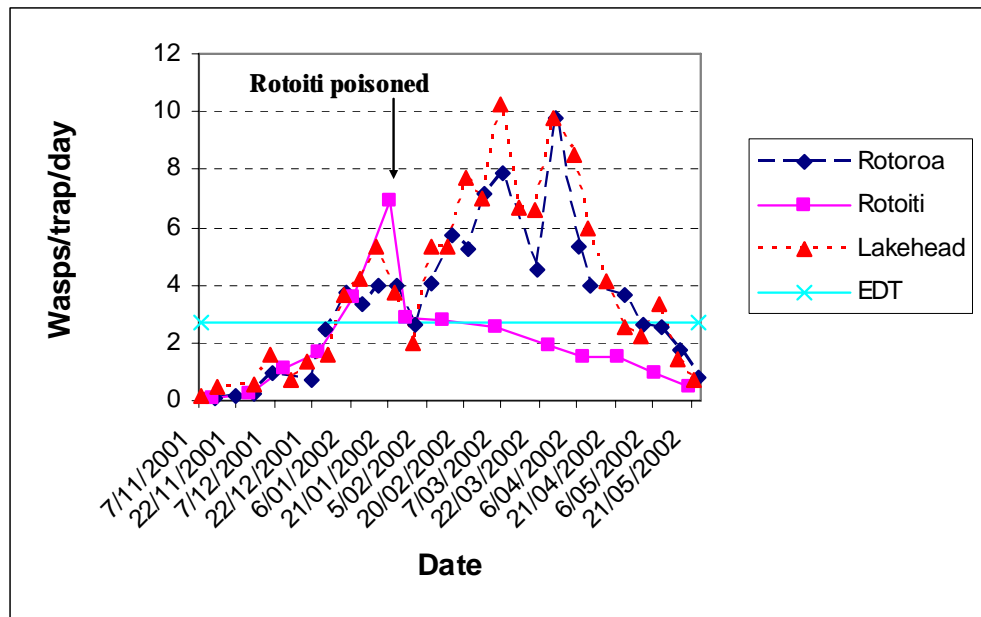
Individual nest results

Strip plot transects were not undertaken this year, as a robust link between malaise traps and nest activity has been demonstrated in previous seasons. A small number of nests incidentally encountered in course of other work were monitored as a 'reality check' to the malaise traps.

Malaise trapping

The malaise trapping results are presented in Figure 14.

FIGURE 14: CAPTURES OF WASPS IN MALAISE TRAPS



Caterpillar experiment

The predation of free living caterpillars is an indicator of predation pressure exerted upon invertebrates by wasps (Beggs & Rees 1999). Thirty caterpillars of the kowhai moth were placed towards the centre of the treatment area and in the non-treatment area on the 18th January, prior to wasp control, and the 14th February following poisoning. The predation rates were as follows:

	ROTOITI	ROTOROA
Pre 18/01/02	43% Predation	50%
Post 14/02/02	70%	90%

Honeydew

The honeydew resource was not monitored this year as a clear link between wasp reduction and honeydew recovery has been demonstrated from previous operations. Honeydew quality was to be inferred from wasp reduction.

Non target impacts

Invertebrates found dead at bait stations were collected and forwarded to Ian Millar, TSO (Invertebrates), Nelson/Marlborough Conservancy for identification. Those identifiable were:

Blowflies (Calliphoridae); lacewings (Neuroptera); *'Necrophilus' prolongatus* (Agyrtidae); large, small and very small rove beetles (Staphylinidae); and a carabid beetle (Carabidae). None of these animals are communal or colonial species. Most are carrion feeders and are either attracted to the protein bait or to dead flies and other invertebrates stuck on the bait. The beetles are mostly ground dwellers and are unlikely to have significant contact with the elevated bait stations.

No vertebrates were observed feeding on baits or found dead following the operation.

Discussion

This season was most successful being the first in which a single poisoning operation suppressed wasp numbers in malaise traps below the EDT and maintained them below this level for the remainder of season. Past seasons have always seen a late summer (April) increase in malaise trap catch, thought to be due to reinvasion by worker wasps from untreated areas as opposed to recovery of any nests within the area. Replication of the expanded area next season will help to test if the greater area treated has been the cause of keeping wasp numbers low, i.e. poisoning neighbouring nests that would previously have invaded the area. An alternative explanation is that wasp numbers were down on previous season and there is some evidence for this with peak captures from malaise traps at 10/trap/day compared with c.30-35/trap/day in previous seasons.

The effect of wasp poisoning was not as rapid as in past seasons. Up to one week passed before a removal effect was obvious to the casual observer, whereas previously there have been dramatic declines in wasps within 24 hours of poisoning with fipronil. Although wasp numbers were high enough for poisoning to take place according to malaise trap figures, it took some time before worker wasps showed an interest in non-toxic baits. Observations showed wasps leaving nests and heading straight up to the forest canopy. Wet weather was experienced throughout December and early January, and the break in the weather may have resulted in increased invertebrate activity in the canopy, thus providing a food alternative to our non toxic and toxic baits.

The caterpillar experiment produced similar results to previous years – cf. 30% survival in treatment area and 10% survival in the non-treatment area this year with 37% and 10% respectively in 2000.

Non-wasp invertebrates from the malaise traps are currently being analysed to assess whether any benefits of wasp control are yet apparent.

As the non-target kills included no communal or colonial invertebrates we are confident that this operation poses no significant threat to native invertebrates at a population or community level.

St Arnaud Community Association's (SACA) wasp control programme:

The SACA did not undertake any poison baiting of wasps this year. Several individuals did undertake individual nest destruction using Permex™ (a pyrethroid powder) killing 90 nests (80 in village/Black Valley, 10 in Peninsula). This compares with c.150 nests treated last season for similar effort.

3.6 DEER (*CERVUS ELAPHUS*) AND CHAMOIS (*RUPICAPRA RUPICAPRA*) CONTROL AND MONITORING

Objective

The target of hunting is red deer but any chamois encountered are to be shot too. Hunting is primarily focussed upon gathering stomach samples to assess diet to guide outcome monitoring relating to deer impacts.

Performance Target

No biological outcome or result performance measures exist for this activity. A performance measure for a fixed effort of forty hours ground hunting with a dog is to be achieved.

Methods

A combination of aerial hunting (one hour) in summer and ground hunting in both winter and summer was planned. Winter ground hunting was not achieved and the summer ground hunting employed contract hunters with dogs.

For all animals shot their age category, sex, associates, location and habitat were recorded; livers were removed for toxin assay by Landcare Research as part of brodifacoum profiling investigation and stomachs were removed for diet analysis.

Results

Sightings/incidental encounters

RNRP core: Eight reports of pellets or prints were received, but not all of these get reported so this is an unreliable measure of deer activity. One sighting of a hind and fawn together was made and one sighting of an un-sexed or -aged deer.

Big Bush: Six reports of pellets or prints were received - again an unreliable measure of activity. Two separate encounters with unidentified animals (probably deer) occurred, one recently shot hind was found, and there were two separate encounters of individual animals.

Hunting

Aerial: One hour's flying was undertaken along the St Arnaud Range above bushline during the last hour of daylight on 24th March 2002. Two deer were sighted at GR 24995 593302 and one shot though it could not be recovered. Three chamois were sighted at GR 25001 59273 and one young buck shot. Liver and stomach samples were taken.

Ground: Summer ground hunting used D. Barker and his dog for approximately 24 hunting hours in mid March and early April, and D. Singer and his dog for six hunting hours in early March. A combination of bush, bush edge, and tops was covered. No animals were seen or scented.

Discussion

Aerial hunting has returned very few animals for the effort and costs involved and will be discontinued. Ground-based hunting with dogs has shown no yield thus far. Comments from hunters suggest that conditions (particularly wind) must be optimal to have any hope of encountering animals at the low numbers apparently present. Both hunters encountered animal sign of varying age and believe the area to be utilised by deer at low levels. They felt unable to comment upon the residence or transience of animals using this area.

3.7 PIG (*SUS SCROFA*) CONTROL AND MONITORING

No pig control work was planned this year. However some targeted hunting was undertaken as there was an expansion of the previous pig range and they were considered to be the cause of disturbance to Fenn trap tunnels towards the top of the bush on the St Arnaud Range.

Results

Approximately 40 hours of ground hunting with two dogs were used to follow up a mob of pigs in the northern St Arnaud Range and follow up sign in mid St Arnaud Range (Parachute Rocks area).

Six animals were killed and stomach and liver samples taken.

Discussion

Pigs appear to be well established in the Wairau Valley (Rainbow station area) and the southern end of Richmond Ranges. This makes any eradication of pigs from the local area challenging. History suggests that pigs make only occasional incursions into the recovery area. Thus further control will be reactive and focus upon new sightings/sign/trap disturbance as they occur.

3.8 HEDGEHOG (*ERINACEUS EUROPAEUS*) CONTROL AND MONITORING

Fenn traps caught 161 hedgehogs in the year, most between October and April. Friends of Rotoiti caught an additional 77 on their lines, most of them (63) in the Rainbow valley.

No hedgehog prints were recorded incidentally through the rodent tracking tunnel programme at any site.

3.9 HARE AND RABBIT CONTROL AND MONITORING

No planned hare or rabbit control was undertaken. Chris Berg, a BSc (Hons) student from University of Canterbury studied the foraging behaviour of hares, in particular their food and habitat preferences with respect to plant secondary metabolites. Fieldwork includes faecal pellet analysis, plant collection and analysis, and indicator plant inspection.

3.10 WEED CONTROL AND MONITORING

Weed control within the mainland island falls under the Area Office weed programmes. Weed sightings are reported by RNRP staff, and small incidental encounters of weeds were often treated manually at the time of encounter (e.g. rowan, cotoneaster and Douglas fir).

4. Results – Monitoring of Native Species and Systems

The results of monitoring native flora and fauna are presented here, by groups or species. Performance targets could rarely be determined from existing knowledge. Performance is thus generally measured by assessing whether there has been positive change in numbers or productivity, either compared to a base level before pest control started or compared with a non-treatment area where no control is taking place.

4.1 BIRD MONITORING

Objectives

Programme objective: to increase bird numbers through the reduction of predation and competition by pest species.

Monitoring objective: to document changes in bird populations and determine those that relate to pest control programmes.

4.1.1 *Multi-Species Bird Monitoring – 5-Minute Counts*

Objectives

To record changes in the full range of bird populations and identify which of these are likely to be due to pest control by comparison with a non-treatment area.

Methods

Five-minute counts were conducted on the same transect lines within the project area and at Lakehead as in previous years. Bad weather and other commitments forced the end of November census into mid-December (only two days of counts done) and allowed only two counts in the end of May census (in early June). Two further staff were trained in the technique.

Results

Figure 15 to 23 summarise the results for the range of native species covered in previous reports.

Discussion

These results show a rather different picture from that reported on previously, with a negative trend shown in the St Arnaud treatment area over the past year or so for several species. In the case of bellbirds the 'May' count in 2002 was only slightly lower at St Arnaud than in the previous four years with pest control (Figure 15), however the February count was very much lower (Figure 16). The dramatic increase seen between November/December and February in the previous four years (Figure 17) was apparently absent, presumably due either to higher mortality than usual or breeding failure, or a combination of the two.

FIGURE 15: MEAN NO. BELLBIRDS/COUNT – MAY 1997-2002

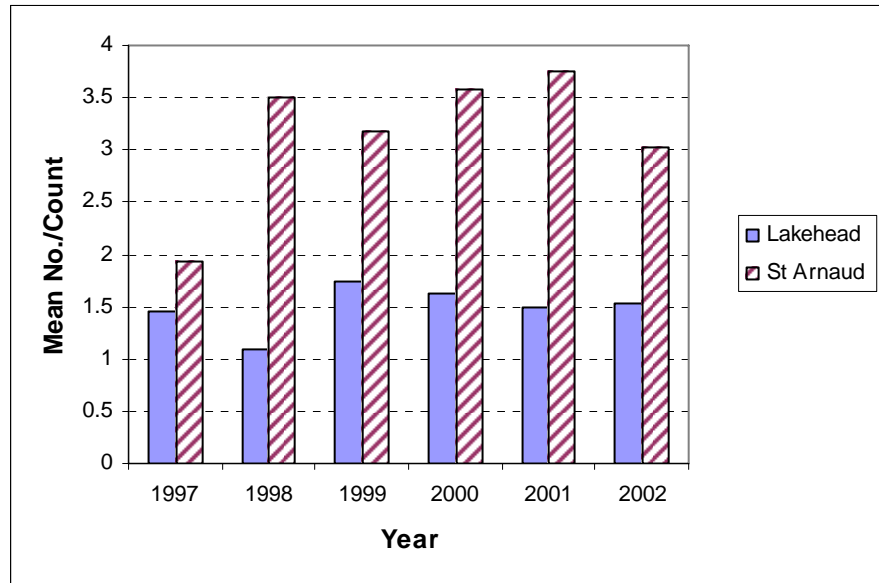


FIGURE 16: MEAN NO. BELLBIRDS/COUNT – FEBRUARY 1997-2002

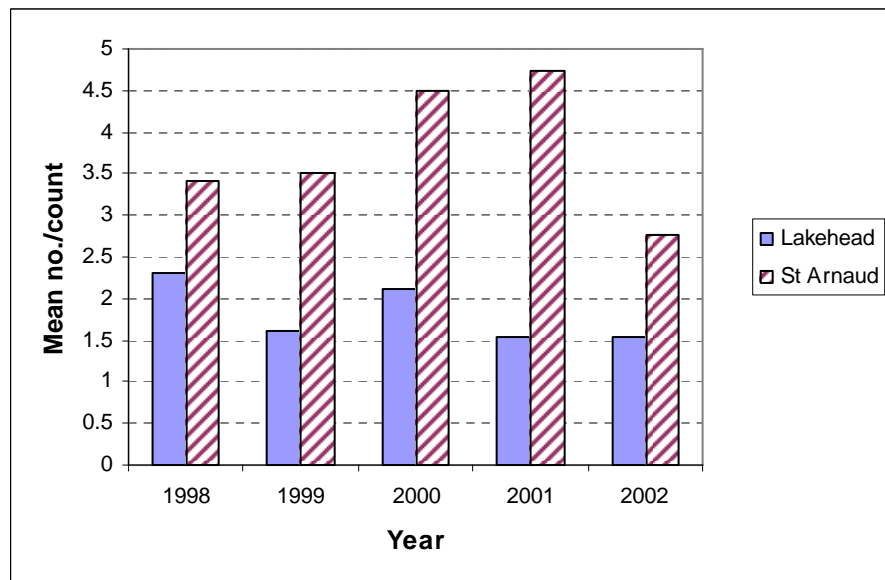
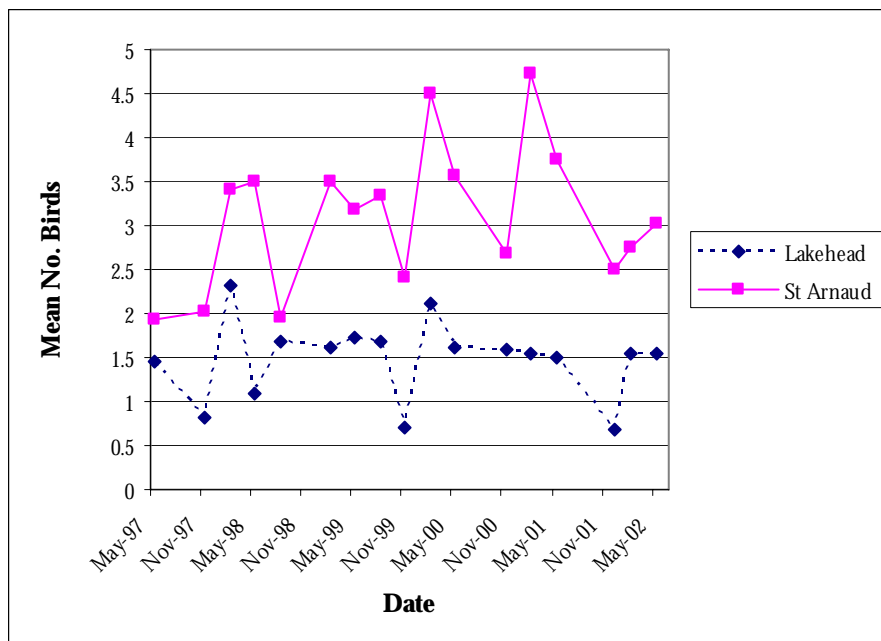


FIGURE 17: MEAN NO. BELLBIRDS/COUNT 1997-2002



For parakeets, tomtits and rifleman an increasing trend from 1997 to early 2001 was reversed after that point, leaving the May 2002 totals similar to those for May 1997 soon after the project began (Figures 18-20). In the case of parakeets none were detected during the May 2002 counts (note the different scale on the parakeet plot reflecting their relative rarity).

FIGURE 18: MEAN NO. PARAKEETS/COUNT 1997-2002

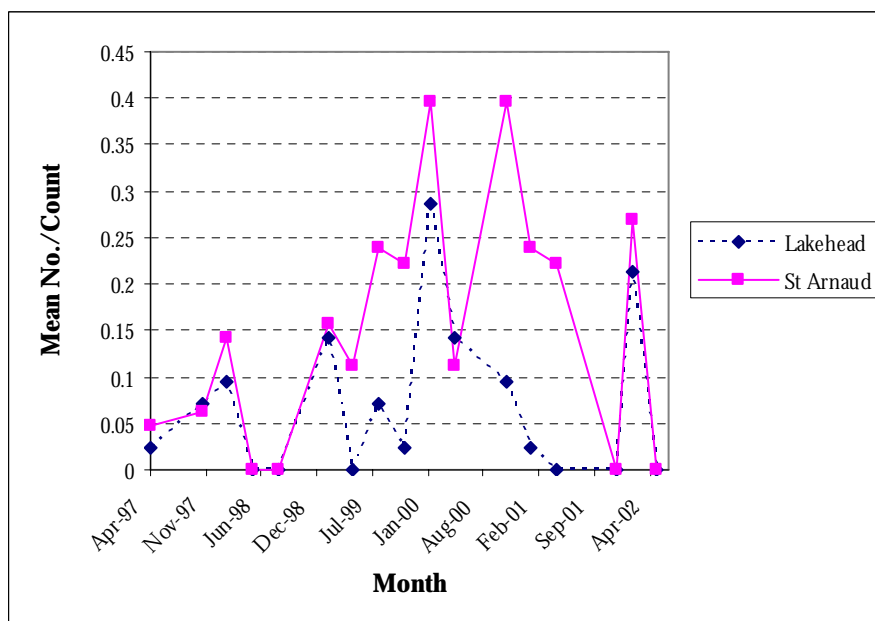


FIGURE 19: MEAN NO. TOMTITS/COUNT 1997-2002

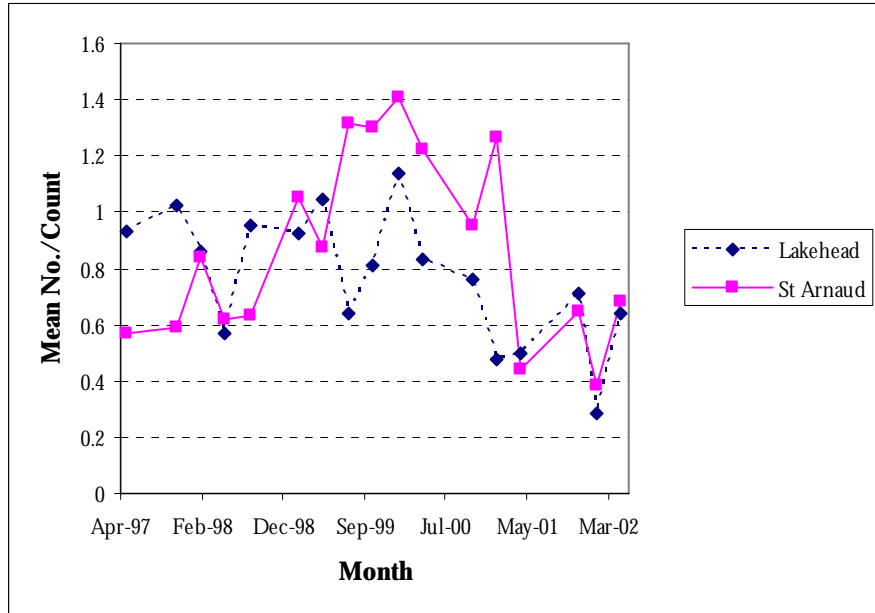
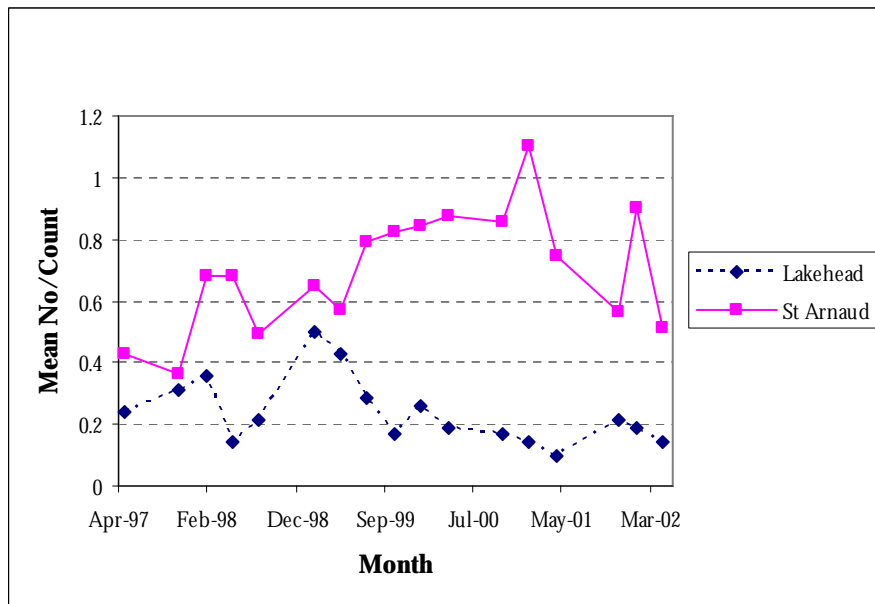


FIGURE 20: MEAN NO. RIFLEMAN/COUNT 1997-2002



Tui and grey warbler counts (Figures 21-22) continue to fluctuate dramatically, the former at least partly due to seasonal movements in and out of the area. Fantails (Figure 23) have shown an alarming decline to low levels at both treatment and non-treatment sites.

FIGURE 21: MEAN NO. TUI/COUNT 1997-2002

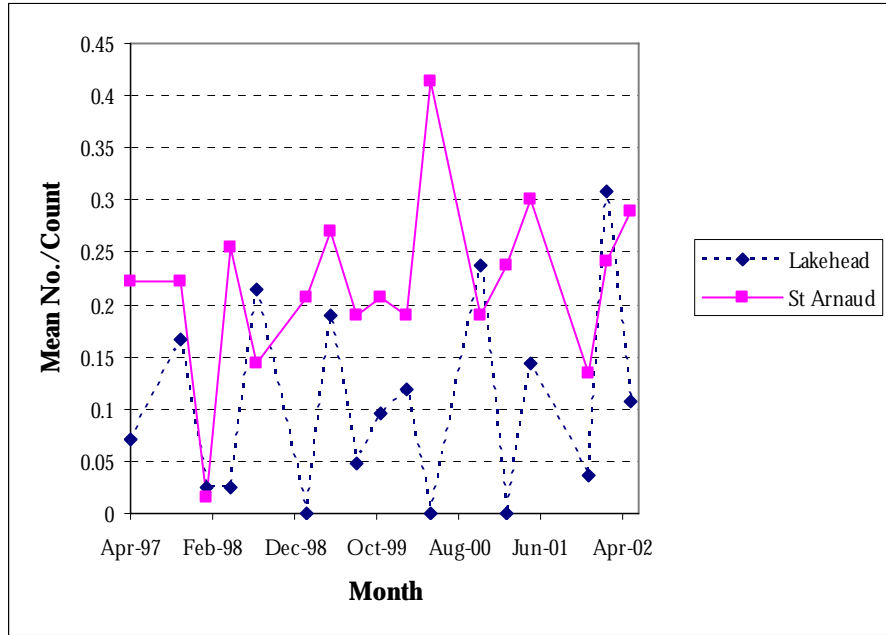


FIGURE 22: MEAN NO. GREY WARBLER/COUNT 1997-2002

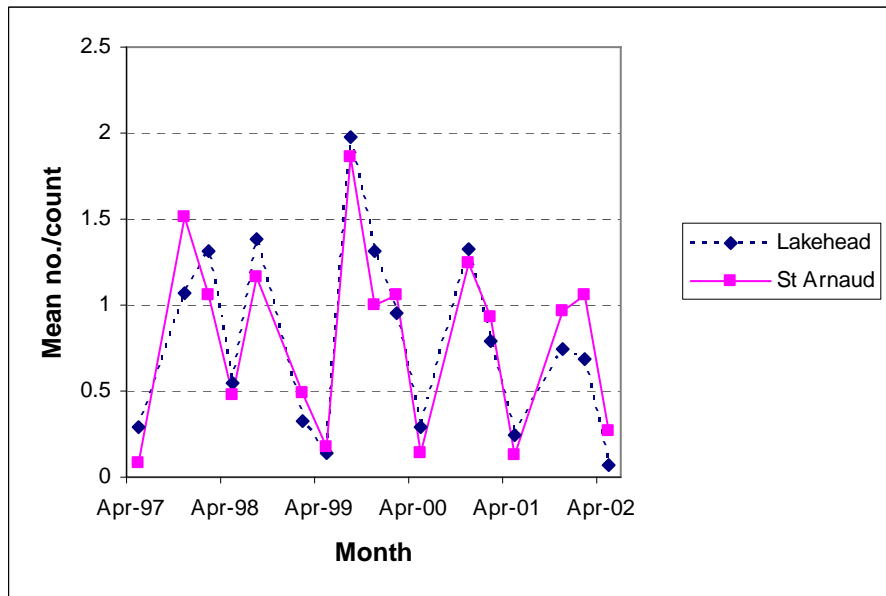
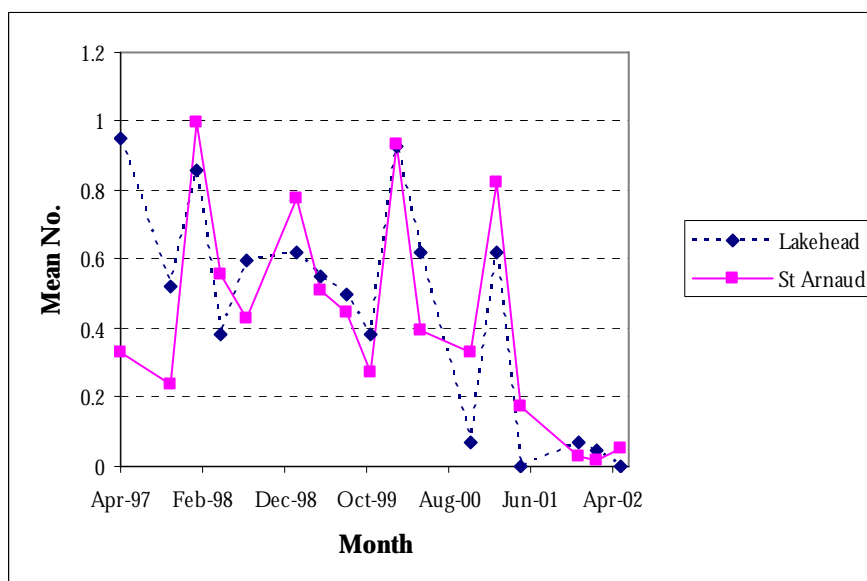


FIGURE 23: MEAN NO. FANTAILS/COUNT 1997-2002



The species that previously seemed to have been benefiting most from the project's pest control, bellbirds, parakeets, rifleman and perhaps tomtits, clearly did not fare so well in the past year. Counts suggest that numbers are almost back to the same levels at St Arnaud as when the project started, though bellbirds still show some gains. The following section (4.1.2) also shows reduced breeding success for kaka. It has been concluded in earlier reports that increased numbers or productivity of these species was due to reduced predation levels through pest control. The corollary of this is that reduced numbers are due to higher predation levels. Certainly stoats were associated with kaka mortality (in section 4.1.2) and rats were well above target levels in 2001 when numbers of several species began to trend downwards, however other factors may also have been involved. Fantails, which were fluctuating in a similar way in treatment and non-treatment areas suggesting limited influence of predators, dropped dramatically at both sites in 2001/02. They were also recorded as 'disappearing' from various sites in the Nelson and Marlborough regions over the same period. Disease has been suggested as a possible factor behind this though there is no clear evidence of this. But it is interesting to note that the next section documents the deaths of kaka fledglings associated with the presence of salmonella. More counts over further cycles of predators in response to beech seeding may provide a clearer picture in time.

4.1.2 *Kaka (Nestor meridionalis) Monitoring*

Objective

To test the effectiveness of predator control methods for protecting kaka in the St Arnaud area by:

- monitoring all nesting attempts by 'transmittered' kaka in the managed area of the RNRP;
- monitoring survival of a sample of radio-tagged fledglings.

Methods

Kaka monitoring

The key activity has been to document nesting success through locating nest sites, monitoring the outcome of all nesting attempts and determining causes of nest failure as in previous years. This has been based on following adults (mostly females) that have been caught in mist-nets and fitted with radio-transmitters. Nestlings have been banded in the nest and a sample radio-tagged to monitor their post-fledging survival and dispersal.

A Science and Research team also worked within the managed area videoing nesting attempts over the season to identify predators of kaka during nesting.

Nest protection

In the managed area within Big Bush a contingency protocol was activated following the deaths of 2 adult females on the nest. All subsequent nesting attempts within the managed area were individually protected with aluminium bands above and below the nest entrance, and a ring of 5 Fenn traps. Getting to nests before they were destroyed proved a challenge. Birds' transmitters were checked morning and evening to check on their movement, and once detected as stationary, sheet aluminium was taken into the field, the bird located and nest tree (if bird nesting) banded below the nest entrance. Even this process was not fast enough to protect some nests. In some cases stoats killed female kaka during egg laying or before they could be detected nesting. Only 2 nests were successfully protected with tree bands.

Predator control

The regime in action at the time was as follows:

- RNRP old core area (825ha) surrounded by a ring of Mk 6 Fenn traps, single sets, spaced at 100m, baited with white fresh eggs, total of 188 trap sets. These lines were established in 1998 and have been open continuously since then. Spacings on northern and southern boundary lines increased to 100m in July 2001. Old internal Fenn lines ('Vet Legends' and 'Slave Driver') were discontinued in July 2001.
- Fenn trapping established in extended area north (800ha) and south (1600ha) of old core 10/08/01 to 5/10/01. (A 1km section of road still requires trapping.) Configuration of 800ha plots ringed with Fenn traps spaced at 100m, single sets baited with white fresh eggs.
- Fenn trapping established in extended area in Big Bush (1600ha) 24/09/01 to 15/11/01. (A 1.5 section of road still requires trapping.) Trapping configuration as above.

Kaka started nesting in the Big Bush extension and extension north of the old RNRP core before all proposed Fenn trap lines were established.

Results

A total of 17 adult females were monitored, 15 of these bred (Table 8). However these figures include some nests protected by banding and these have then been removed to give totals for nests whose only protection may have been the stoat/possum/rat trapping regimes (Table 9).

TABLE 8: KAKA NESTING SUCCESS, 2001-02 SEASON

	BIG BUSH	RNRP CORE	NORTH OF RNRP CORE
No. of breeding females	9	4	2
No. of nesting attempts	12	5	2
No. of successful nests	3	2	2
% nesting success	25	40	100

Notes to Table:

- Because Fenn trapping had not been in place long enough to achieve a knockdown of stoats in Big Bush before kaka started breeding there, this area was effectively a non-treatment site for the old core area this season. Thus all nests monitored in Big Bush, whether inside the extended treatment area (8 nests) or outside (4 nests), have been grouped together in this table.
- No monitored birds nested in the area south of the RNRP core.

TABLE 9: SUCCESS OF UNPROTECTED NESTS

	BIG BUSH	RNRP CORE	NORTH OF RNRP CORE
No. of breeding females	7	4	1
No. of nesting attempts	8*	5**	1**
No. of successful nests	0	2	1
% nesting success	0	40	100

* Three of these nests were outside the Fenn trapping regime, 5 inside.

** All nests inside Fenn trapping regime.

Of the 3 successful nests in Big Bush (Table 8), F27 (nest outside Fenn trap regime) was partially protected during incubation and close brooding only (aluminium band around bottom of tree); F88 and F86 (both nests inside Fenn trap regime) were fully protected for the full term of the nest (aluminium bands above and below nest entrance and ring of 5 Fenn traps around each nest). 1 stoat was caught around F88's nest, and 3 stoats and 1 juvenile possum were caught around F86's nest.

One of 4 females transferred from Whenua Hou (Codfish Island) in 1998 has settled in the old core area. This bird attempted to nest twice in the 2001-02 season. The first nest (2 chicks) was destroyed by an unknown predator when the chicks were 4 days old and the second nest (1 chick) was destroyed by a stoat (on film) when the chick was 21 days old. The female survived.

All nests outside the managed area, and some within, were monitored by a Science and Research team as detailed in Moran (2002).

Table 10 shows that most nest failures (10 of 12) were as a result of predation of adults or nestlings.

TABLE 10: CAUSES OF KAKA NEST FAILURE, 2001-02 SEASON

	BIG BUSH	RNRP CORE	NORTH OF RNRP CORE
Female killed on nest	7*	0	0
Eggs failed to hatch and nest subsequently abandoned	1	0	0
Eggs eaten by predator	0	0	0
Nestlings died – adverse weather at the time	1#	0	0
Nestlings killed by predator	0	3@	0

Notes to table:

* All killed during laying or incubation, two during their second nesting attempts.

Nestlings died of suspected hypothermia - nest was open to weather and deaths occurred during the spring rains.

@ Two nests were lost to stoats (captured on video) and in the third case the predator was not identified and the carcasses of the chicks were never found.

Overall 15 fledglings were produced and fitted with transmitters and 5 of these died soon after fledging (Table 11), a 33.3% mortality rate.

TABLE 11: KAKA FLEDGLING SURVIVAL, 2001-02 SEASON

	BIG BUSH	RNRP CORE	NORTH OF RNRP CORE
Total chicks fledged	5	3	7
Total chicks alive @ 2 months post-fledging	5	2	3
% fledgling survival @ 2 months post-fledging	100	67	43

Ten of the chicks fledged were males and four of these died. All mortalities occurred between 4 and 30 days post fledging. One of the males that died was cached, suggesting it was killed by a stoat.

The four that died north of the RNRP core made up the clutch of one nest and appeared to fledge 'prematurely' – all had down on their bodies, and 2 had distinctly yellow gapes. One of the male fledglings from this nest was found dead without any signs of predation and autopsy results indicated that the bird was infected with salmonella DT160, the same strain that caused mass mortality in wild birds during winter and spring 2000 (Maurice Alley, pers comm.). The remaining 3 fledgling carcasses from this nest were all found partially/wholly eaten and lying on top of the ground, suggesting a predator such as cat or possum. One of the carcasses consisted of feathers and leg bands only, suggesting the legs had been broken and eaten, again by a predator such as cat or possum. This strain of salmonella is contagious (Maurice Alley, pers comm.) and it is possible that all fledglings from this nest contracted this disease and were killed in a weakened state, or died from the disease and their carcasses were scavenged.

The longer term fate of one male chick from this season, fledged in Big Bush, is unknown. The transmitter appears to be hung up high in a tree from which it has not yet been retrieved and must have either dropped off or be attached to a dead bird.

No instances of mortality of non-breeding birds post-2 months fledging were observed during the 2001-02 year.

Nesting for the first time this season were F86 and F23, chicks produced in the RNRP core in the 1997-98 season; and F88, a chick produced in the RNRP core in the 1998-99 season. This is the first recruitment observed in this study.

Discussion

Nesting success in the RNRP was lower this season (40%) compared to previous years (80%), and combining the results with those reported previously gives an overall figure of 66.7%. The success of un-banded nests in unprotected areas was 0% compared to 5 and 10% documented previously.

The reduced success in the core area could be due to the less intensive predator trapping regime present following the removal of the two internal lines. This was also the first kaka breeding season since rat control had switched from using brodifacoum, with its demonstrated secondary poisoning of mustelids, to trapping. Though some stoats were killed in rat traps (section 3.2.1) it is not known how this compares with the numbers previously being poisoned. However the sample size of nests is small and further seasons are required before any conclusions can be drawn. The fact that no adult females were lost from the four nesting in the RNRP core whereas seven were killed from the nine birds nesting in the Big Bush area is a very positive result in itself.

Post-fledging survival was very similar to previous years (cf. 33.3% this year and 31% 1997-1999). Previous results had indicated that female fledglings might have a higher mortality rate than males though the data was not statistically significant. This year it was males that showed the higher mortality (40% 4 of 10 compared to 20% 1 of 5 for females), suggesting that overall there is probably no differential mortality and that the results are biased each year by small sample sizes.

This season represented a first for the project, the recruitment of three chicks produced in the core area in previous years into the breeding population, one at 3 years of age and two at four. Two nested in Big Bush between 3 and 4km from their natal sites and one in the Howard 4km away.

For the first time this season microwave links were used to monitor some nests (Table 12). Signals were transmitted back to the Visitor's Centre, Cummings Cottage and the home of two of the staff, where live footage of the nest could be watched. All these nests were videoed 24 hours continuously to enable identification of predators entering the nest. In addition a nest at the Lakeside in the RNRP core was videoed using a recorder placed at the foot of the nest tree.

TABLE 12: SUMMARY OF ALL THE CAMERA RESULTS FROM MORAN (2002)

NESTCAM SUMMARY			
TX NO.	PERIOD NEST ACTIVE	OUTCOME	NEST LOCATION / PREDATOR CONTROL
13	c 8.1.01 - 4.2.01	Failed. 2 x 4-day-old chicks died of hypothermia. Waterlogged nest. Recorded on video.	Big Bush. 2km outside stoat trap perimeter line of M.I. No possum control. No aluminium bands on tree.
27	c15.11.01 - 8.2.02	Fledged. 2 chicks.	Big Bush. c400m outside stoat trap perimeter line of M.I. No possum control. Aluminium band below nest entrance for incubation and close brooding.

NESTCAM SUMMARY			
TX NO.	PERIOD NEST ACTIVE	OUTCOME	NEST LOCATION / PREDATOR CONTROL
76	c22.11.01 - 23.2.02	Fledged. 3 chicks. Rat attacked? 31-day-old chick but was frightened off by alarmed chick. Rat visited nest over 7 nights and gleaned matter from nest floor. Recorded on video.	St Arnaud Range. In extended M.I. c100m to nearest stoat trap on perimeter line. Possum control (M.I. outlier trap lines). Aluminium band below nest entrance for incubation and close brooding.
21	c28.11.01 - 9.3.02	Fledged. 1 chick (found dead and cached 10 days post fledging).	St Arnaud Range. In M.I. core (old M.I.). 1km to nearest stoat trap on internal ('Grunt') line. Possum control.
79	c 7.12.01 - 12.3.02	Fledged. 2 chicks.	St Arnaud Range. In M.I. core. 50m to nearest stoat trap at lake edge. Possum control.
04	c 4.2.02 - 9.3.02	Failed. 3 x 12-day-old chicks killed by stoat. Recorded on video.	St Arnaud Range. In M.I. core. c400m to nearest stoat trap on internal ('Snail') line. Possum control.
49	c 9.2.01 - 7.5.02	Fledged. 4 chicks.	St Arnaud Range. In extended M.I. c200m to nearest stoat trap on internal ('Hubcap') line. No possum control.
00	c 7.3.02 - 19.4.02	Failed. 1 x 14-day-old chicks killed by stoat. Recorded on video.	St Arnaud Range. In M.I. core. 1km to nearest stoat trap on internal ('Grunt') line. Possum control.

4.1.3 *Robin (Petroica australis) Monitoring*

Introduction

The South Island robin (*Petroica australis australis*) population is monitored in the RNRP to assess the effectiveness of rat control in the area. From 1998 to 2001 detailed monitoring of nesting success had shown that both control by using brodifacoum and by trapping had resulted in increased nesting success and then increased numbers of territories held within the recovery area. This year monitoring effort was reduced and focussed on measuring numbers of territories held in a given area, as a measure of continuing population recovery.

Hypothesis

- That recovery of local robin population will result from rat control programme operating in treatment area.

Objectives

- To conduct a survey of robins in a defined area within the core treatment area in September 2001.
- To design a 5-year programme to measure birds encountered in a given area by February 2002, to incorporate into 2002-2003 business plan.

Methods

The survey area (c120ha) covers the lower slopes of the block within the Loop Track. The length of each rat trapping line in this area was walked slowly while tapping a plastic container to attract robins to the observer. Every 100m the observer stopped for 15-20 seconds, and looked around for robins while tapping and whistling. When a robin was encountered, a mealworm was offered to attract the bird closer. Unbanded birds were fed a few worms to habituate them to being fed with a tapping noise as stimulant. When deemed suitable by the observer, unbanded birds were banded, sometimes on the first encounter or on subsequent visits. Band combination, location, age (adult/juvenile), sex and nesting status (nesting/not nesting and nest location) of birds encountered were recorded. The entire survey area was walked four times at weekly intervals during the period 12/09/01 to 08/10/01. This method follows the protocol of Powlesland (1997).

Results

A total of 6 pairs holding territories were detected in the survey area over the 2001/02 season. Two single males were also present in this area. This compares with 5 pairs holding territories in the same area in 2000/01, and 4 pairs in 1998/99 and 1999/00. Note that 2001/02 was the first time Powlesland's protocol was followed for territory mapping so these figures are not strictly comparable.

Pair observations

- Female BM/- had a mate in 2001/02, different from her mate the season before. Her 2000/01 mate was not observed in 2001/02.
- Male YM/GW was single in 2001/02, but paired with an unbanded female in the same area the season before.
- One pair bond in 2001/02 remained the same from the season before (-/RM and BM/GR).

Discussion

Few conclusions can be drawn from this year's survey as it was the first using a mapping technique and it will be repeated in 2002/03 to detect any changes in the robin population in the RNRP core.

4.1.4 *Falcon (*Falco novaeseelandiae*) Monitoring*

We have continued to monitor falcon nesting in the treatment area, locating breeding territories by the aggressive behaviour of the occupants and then locating nests when possible by ground searches.

One nest was monitored in the RNRP core area at the site within the 'Rata' block used previously in the 1997/8, 1998/9 and 2000/01 seasons. Three eggs were laid in the same scrape as the previous season and three chicks hatched. All three chicks were colour-banded at about 21 days old, on 3 January 2002. A female chick disappeared between banding and fledging, and only a few well-developed primary feathers were found 7 metres from the nest scrape. The other two chicks (a male and a female) fledged successfully and the female was seen in the vicinity of St Arnaud during April. In May, the juvenile male was reported from Rapaura (near Blenheim), where he had been caught feeding on domestic game-birds. He was subsequently relocated to the Waihopai Valley, and has not been reported since. In mid-August the juvenile female's carcass was found on farmland adjacent to RNRP. We presume that she was unable to fend for herself during the winter.

One bird was seen in the vicinity of the other RNRP site used in the 1999/2000 and 2000/01 seasons, but no territorial behaviour was observed and it is considered very likely that no breeding took place.

One nest was monitored in the part of Big Bush that had been recently brought into RNRP predator control. Three eggs were seen in the nest on 30 November 2001, but only two eggs were seen in the nest on 8 December. Seven days later, on 15 December, no eggs were remaining in the nest. There were no clues to indicate why the nest had failed.

4.2 NON-WASP INVERTEBRATE MONITORING

Objectives

To document the beneficial impacts of the control of wasps on the populations of the native insects that make up their prey.

Methods

Analysis of non-wasp invertebrates has continued using a sub-sample of the material collected in malaise traps. An entomologist has again separated and counted crane-flies (Tipulids) and bristle-flies (Tachinids) from samples before (late Nov/Dec) and during two periods after wasp poisoning (mid-Feb & early Mar) (Sandlant, 2003) using the key of Toft & Dugdale (1997). This has allowed comparisons to be drawn for similar periods over three years 1999-2000, 2000-01 and 2001-02.

Results

There was considerable seasonal and annual variation in numbers of tipulids. One species, *Austrolimnophila argus*, shows a slight indication of benefit from wasp control with numbers generally higher at Rotoroa than Rotoiti prior to wasp control and lower after it. Of the tachinids, the A-guild which parasitise shrub and tree-dwelling caterpillars and B-guild which parasitise ground dwelling caterpillars show more evidence of a response to wasp control than the C-guild which parasitises subterranean beetle larvae. This response is again difficult to prove in the face of huge annual variation in numbers.

Discussion

It remains very difficult to detect changes in invertebrate populations associated with wasp control due to the significant background variability seen. It has been suggested that we try and characterise the wasp population in the different area each summer as the area in the numbers curve above the ecological damage threshold (Sandlant, op. cit.). This could then be evaluated alongside the tachinid data in particular to look for a relationship. It is intended to continue the current sampling regime as any patterns are likely to become clearer over time.

4.3 LIZARD SURVEY AND MONITORING

A survey for lizards was done in November 2001 by Glen Greaves, a BSc student from the University of Otago. Due to bad weather only a small area was surveyed. Summary results are presented below - for more detail see Greaves (2002).

Four sites were surveyed: West Bay, Black Hill, and the farm and lake boundaries of the project's original core treatment area. Techniques used were day and night searching as per Whitaker (1994), pitfall trapping and minnow trapping.

Four species of lizard were detected (Table 13).

TABLE 13: CAPTURES, LIZARD SURVEY 2001

SITE	SPECIES	SURVEY METHOD	# INDIVIDUALS
Black Hill	<i>Oligosoma polychroma</i>	Pitfall and minnow trap	3
		Day search	2
	<i>Oligosoma lineoocellatum</i>	Pitfall and minnow trap	3
		Day search	1
	<i>Oligosoma infrapunctatum</i>	Pitfall and minnow trap	2
	Farm Boundary	<i>Oligosoma polychroma</i>	Pitfall trap
<i>Naultinus stellatus</i>		Day search	1

It was concluded that lizards are present in low numbers in the recovery area. Further monitoring is required to assess the possible benefits of predator control. Greaves's work will be replicated in future years to assess this using this current data as a baseline, though bearing in mind the small sample size and lack of replication caused by bad weather conditions at the time of the survey.

4.4 PLANT AND VEGETATION MONITORING

4.4.1 *Mistletoes*

Objectives

Monitor the health of selected plants within the treatment and non-treatment areas, to test the hypothesis that the apparent decline is the result of possum browse.

Record the anticipated recovery of the mistletoe population with sustained possum control.

Use mistletoes to monitor possum presence/impact within the treatment area.

Methods

Further plants continue to be located in the course of other work in the treatment area and non-treatment sites. All plants monitored have been tagged and a standard set of data collected from each, including measurements and amounts of browse using the Foliar Browse Index methodology (Payton et al., 1997). This concurs with the internal document 'Best practice for survey and monitoring of Loranthaceous mistletoe' (WSCCO-22338). Such recording will continue on an annual basis with all new plants to be tagged until a suitable sample (30+) is obtained for each species.

A recruitment survey was undertaken with the help of five members of the Nelson Botanical Society. Four 50m x 20m plots (10m each side of management tracks) were studied with every potential host tree being searched for mistletoe. No new plants were encountered. All existing plants were found. As observers were not made aware of the presence of these it indicates that search effort was thorough and that it is highly likely that any new plants would have been found.

Results

Data from the 2002 summer monitoring has not been analysed. No browse was observed. Monitoring effort was limited due to a very wet summer and clashes with other work programmes.

Additional plants were encountered in the course of other work, principally from one observer (Jimbo McConchie): by location: New Fenn lines 80 plants; Big Bush 23 plants; RNRP core 54 plants (PER tet n=36, PER col n=13, ALE fla n=5). Fewer new plants were found in the core area compared with the previous year (n=139). Most plants would be described as previously undiscovered, or recovered. None could be described as recruited due to the location on the host plant and size of haustorium.

Discussion

These results show that detectable browse by possums has been eliminated in the treatment area and that the canopy foliage density of plants is gradually increasing. There is no indication yet of recruitment.

4.4.2 *Pittosporum patulum*

Pittosporum patulum is an endangered South Island endemic species subject to browse by deer and possums.

Objectives

To use *Pittosporum patulum* to monitor possum presence/impact within the treatment area and to document improved growth and survival of seedlings in response to possum control.

Methods

As for mistletoes, though details of measurements taken differ. No work was undertaken in this programme this year.

4.4.3 Foliar Browse Index

Objectives

Foliar browse analyses are used to detect responses to herbivore control in relatively abundant, browse-sensitive and herbivore palatable plants.

Methods

A standard methodology developed by Landcare Research was used (Payton et al., 1997). Marked trees re-assessed annually. Sample sizes for some species are limited for various reasons: e.g. naturally scarce (*Podocarpus hallii* (POD hal), *Pseudopanax colensoi* (PSE col)); monitored for other programmes run by the Area Office (*Metrosideros umbellata*) (MET umb); and bad weather prevented monitoring *Libocedrus bidwillii* (LIB bid).

Griselinia littoralis (GRI lit) is monitored for ungulate outcome monitoring, with its canopy density a 'health' measure. All other species are used for possum outcome monitoring

Results

Table 14 presents all the Foliar Browse Index results. (Note the small sample sizes for some of the rarer species in the block)

TABLE 14: FOLIAR BROWSE MONITORING

SPECIES	YEAR	N	CFD	S.E.	B0	B0+1
Ela hoo	2001	16	45	4.83	100%	100%
GRI lit	2001	14	39	3.72	100%	100%
LIB bid	2001	2	70	5	100%	100%
MET umb	2001	2	50	5	100%	100%
PSE cra	2001	12	48	3.51	100%	100%
PSE col	2001	1	45	n/a	100%	100%
RAU sim	2001	13	37	3.37	100%	100%

Species codes not listed above:

Ela hoo – *Elaeocarpus hookerianus*; Pse cra – *Pseudopanax crassifolius*; Rau sim – *Raukawa simplex*.

Discussion

A situation of 'no observed browse' continues for all species indicating ongoing success of the possum control operation. Most species have shown nil browse for several years, with the exception of *Raukawa simplex* and *Libocedrus bidwillii*. These plants are considered to be the only plants to be sensitive to browse at current possum densities. Mistletoe shows similar sensitivity.

4.4.4 Beech Seeding

Objectives

The periodic seeding of beech is the primary determinant of the population cycles of rodents and mustelid, and for native invertebrates and birds such as kaka in this forest. Monitoring of beech seedfall allows the placement of each annual seed event, and subsequent response, in an historical context.

Methods

Twenty 0.28m² funnel shaped seed traps collect seed and litter fall from canopy between 1st March and 30th June at each Mt Misery and RNRP. Seed is separated from litter, sorted to species and tested for viability.

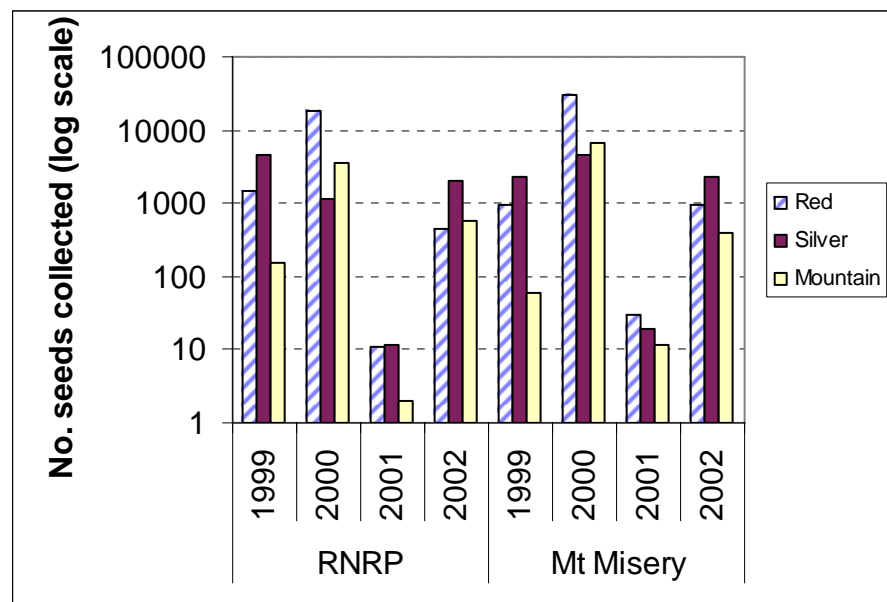
Results

Results are presented in Table 15 and Figure 24.

TABLE 15: BEECH SEED ANALYSES

LOCATION	<i>Nothofagus fusca</i>		<i>N. menziesii</i>		<i>N. solandri</i>		ALL SPECIES		
	TOTAL SEED	% VIABLE SEED	TOTAL SEED	% VIABLE SEED	TOTAL SEED	% VIABLE SEED	GRAND TOTAL VIABLE SEED	VIABLE SEED/M ²	LOG10 VIABLE SEED/M ²
RNRP	460	43.0	2038	32.7	565	11.9	932	166.4	2.22
Mt Misery	933	29.2	2352	37.4	388	10.1	1191	212.7	2.33

FIGURE 24: BEECH SEEDFALL – RNRP AND MT MISERY 1999-2002



Discussion

2002 may be described as a 'partial mast' year with low to moderate seedfall and viability (the latter determining the energetic value of the event). The calorific value of the event would indeed be relatively low with the seedfall being dominated numerically by silver beech (*N. menziesii*), the species with the 'lightest' seed. The fall of red and silver seeds was very similar to the 1999 event at Mt Misery though somewhat lower than that experienced in the RNRP, and the mountain beech seedfall was higher than 1999 at both sites. The proportion of viable seed is generally slightly lower than in 1999 (cf. figures in Table 15 with 1999 ones: red - RNRP 49%, Mt Misery 44%, silver – RNRP 39%, Mt Misery 36%, mountain: RNRP 22%, Mt Misery 8%).

4.4.5 Tussock Seeding

Objectives

Seeding of tussock is used as a good indication of the intensity of beech seeding that can be expected that year, although the relationship is not mathematically perfect.

Methods

Two species of tussock are monitored over a 1000m transect at Mt Misery (200 counts) and a 500m transect at RNRP (100 counts). (The full methodology is in internal document STAAO-1869.)

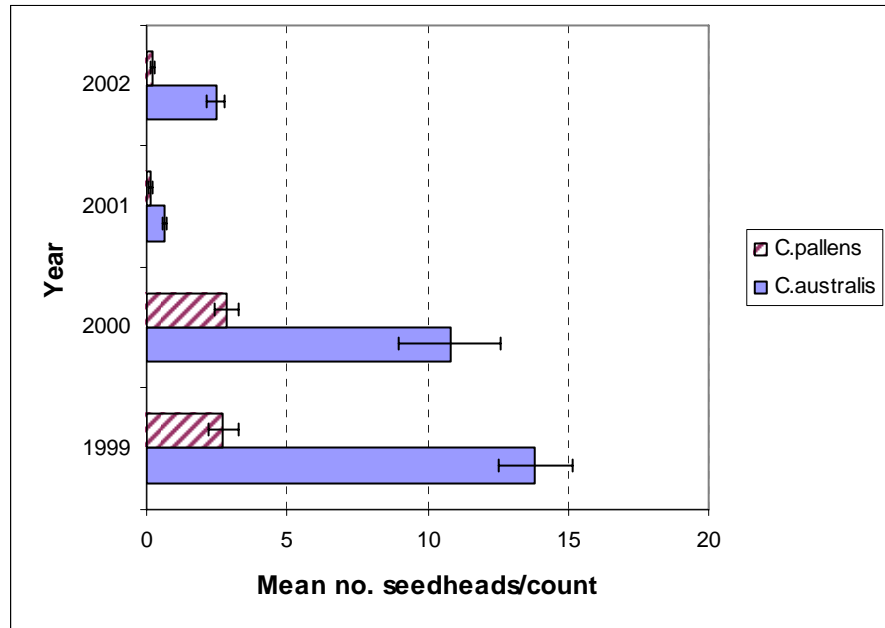
Results

The 2001/02 results are set out below expressed as mean seedheads per count (\pm standard error).

SPECIES	MT MISERY	RNRP
<i>Chionochloa pallens</i>	0.215 (0.05)	1.48 (0.44)
<i>Chionochloa australis</i>	2.48 (0.31)	0.45 (0.18)

Figure 25 shows these in relation to other years for the Mt Misery dataset which is the more complete of the two (no counts were done at RNRP in 2001).

FIGURE 25: TUSSOCK COUNTS – MT MISERY



Discussion

Tussock seeding was low to moderate compared to other years indicating that a low to moderate beech seedfall was expected.

5. Advocacy and Education

Objectives

The 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 under development aims is working towards this, and has identified five aims as follows:

- Develop a high public profile for the project, enhancing opportunities for its key message (below) 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.

This has been the first full year of a Community Relations position with significant time dedicated to Rotoiti Nature Recovery Project advocacy and education. Support to the community and to schools has increased as a result.

5.1 DEVELOPING AND MAINTAINING PROJECT PROFILE

Internet Coverage

A search using the project's title in 2002 turned up 30 sites, some with brief mention, some with full colour pages and in depth coverage. The LEARNZ site is still one of the most comprehensive, but others are also good. The project is now being mentioned in web sites aimed at tourists, with two German sites added to the New Zealand ones noted in 2001.

Spreading the Message

Project staff participated in the annual mainland island hui held in Northland at which individuals from a number of groups outside the Department were exposed to the work going on at Rotoiti.

Butler and Maitland co-authored a talk "Do we know enough about beech forests to manage them for the conservation of their indigenous biodiversity, or just the bits we like?" presented at the annual conference of the New Zealand Ecological Society. Maitland also gave a presentation to the Wildlife Society of the New Zealand Veterinary Association's Conference at Westport.

Dr Jacqueline Beggs, Landcare Research, a member of the project's Advisory Group, included project material in two talks:

Beggs, J.R.; Toft, R.J. 2001: Impact of an invasive social wasp on New Zealand's forest invertebrate community. Invited opening speaker for "Impact of Invasive Species Symposium" (5th Invertebrate Biodiversity & Conservation Conference), Australia.

Beggs, J.R.; Toft, R.J. 2001: Restructuring of native invertebrate communities in beech forest by invasive wasps. Invited speaker "Beech Forest Symposium" (New Zealand Ecological Society), New Zealand.

Staff have also provided technical support to several community groups involved in mainland restoration work: Friends of Flora, Bushy Park, French Pass Residents Association.

5.2 COMMUNITY LIAISON

Ongoing community support is vital to the long-term future of the project. We continue to aim to keep the community informed through a newsletter, and indirectly through the media, and offer opportunities for more in-depth contact through talking to groups or providing guided walks. A key development in this area has been the development of the Friends of Rotoiti community group (below) which has allowed individuals to assist the project in a very practical way.

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 and re-introductions and for individuals to receive training from the Department in best practice techniques in these areas. The group conducts rat trapping in the village, 'filling the gap' between the old core and the new rat control area at Duckpond Stream and also run a Fenn trap line up the Wairau Valley and from Six Mile to the Rainbow Ski Area car park. Predator control methods are identical to RNRP techniques, with the frequency of trap checking also the same where possible.

Over the 2001/02 kaka breeding season FOR members helped with nest monitoring, with six members regularly checking nests. This freed up RNRP staff for other tasks, and ensured checks occurred during the Christmas break.

FOR began in October 2001 with 13 people attending the first meeting, and by the end of June 2002 had over 30 members.

Feedback from the group indicates that there is ongoing commitment to the project, and members have expressed great satisfaction in being able to make a positive, hands-on contribution to the RNRP.

Revive Rotoiti Newsletter

Only one edition of Revive Rotoiti was published in the year (Winter 2001)(Appendix 1). The newsletters (including photocopies of back-issues) are available in the Nelson Lakes National Park Visitor Centre. The distribution list continues to grow steadily, totalling over 520. Updates are regularly placed in the Lake Rotoiti Community News (published every three weeks during the school term).

Meetings

Project information has been supplied regularly to meetings of the St Arnaud Community Association, the Rotoiti District Community Council, and to Community forums held by the Department in Nelson, Blenheim and Murchison and the Murchison A & P Show.

Talks and Guided Walks

Groups given talks on the project in 2001/2002 included:

Nelson College for Girls
Newlands College
Marlborough Girls College
Marlborough Boys College
Waimea College
Nayland College
Motueka High School
Queen Charlotte College
Golden Bay School
Collingwood School
Salisbury College
Blenheim Forest and Bird
NZ Mountain Safety Council conference attendees
Bishopdale Ramblers
Ecoquest
Nelson Marlborough Institute of Technology Trainee Ranger class
Massey University

Groups given guided walks round the project site were:

Riwaka School
Nelson Central School
Mapua Probus
Richmond Probus
Attendees at the DOC national concessions workshop
Waimea College
Mapua School
Lynton Downs School
Broadgreen Intermediate
Motueka Conservation Corps
Abel Tasman Conservation Corps
Richmond Rovers
Rangers from Regional Parks in Auckland and Christchurch
Landcare Research group

5.3 MEDIA LIAISON

A media release went out in early September 2001 announcing the expansion of the project's pest control and this was publicised by Nelson and Marlborough media.

The Friends of Rotoiti were a new 'species' attracting media coverage during the year. They were the subject of a second media release in September, announcing the formation of the group and inviting people to get involved. This also was covered by the region's media. They were then the subject of a feature article in the Nelson Mail in January as a result of a Nelson Mail reporter and photographer being invited to go out with members to see them in action. That visit also resulted in a news story in the Nelson Mail about the new "kakacam" which beamed live pictures from kaka nests into the St Arnaud Visitor Centre.

The subsequent attack by a stoat on a kaka nest caught by "kakacam" also received media coverage including an appearance on TV3's evening news.

The wasp control programme was also covered by the media over the summer including National Radio and the Press.

5.4 EDUCATION PROGRAMMES

Secondary School Programmes

A talk was given at Rotoiti Lodge nearly every week in term time and six staff were involved in this activity. Most schools continue to run their programmes as they have for the past few years, but Waimea College have adapted their programme to use the resources developed by Margaret McFarlane during 2001. This involves a staff member giving a guided walk rather than a slide show and some modified field projects including Black Valley stream monitoring.

Primary School Resource Kit

The resource kit was published in November 2001 and distributed to all primary schools in Nelson/Marlborough. It has also been sent to schools in Christchurch and Wellington on request. Because it did not get to schools until 2002 planning had been largely completed it was not used by a primary schools in the first two terms of 2002, however it has started to be used since the end of the reporting period.

5.5 VOLUNTEER INVOLVEMENT

Margaret McFarlane completed her Royal Society Fellowship with the project in December 2001. Ten further individuals worked as volunteers in the project in 2001/02, providing a total of 18 volunteer days, including three members of the Nelson Botanical Society and two rangers from the Australian National parks and Wildlife Service. Two of the volunteers had worked with the project as members of Conservation Corps and came back as individuals seeking further work experience.

Five four-day visits were made by the Whenua Iti Conservation Corps, assisting with rat kill trapping, malaise trapping, wasp nest counts, and rat trap cover construction for Friends of Rotoiti.

One four-day visit was made by the Omaka Marae Conservation Corps, assisting with rat kill trapping.

One visit was made by the Nelson Marlborough Institute of Technology Trainee Ranger Class.

One visit was undertaken by six people (x 0.75 day) Nelson Botanical Society for a mistletoe recruitment survey (See section 4.4.1).

5.6 VISITOR SERVICES

A new 'trapping and toxins' display was created in the Visitor Centre's reception area and a notice board with current project results was erected in the display area. The information panels around the Bellbird and Honeydew Walks were numbered to facilitate use of the Education Kit by Primary Schools.

Alterations were made to the Kerr Bay parking areas and foreshore to improve the use of this area. Space was provided for coaches to drop people off at the entrance to the project area and more well-defined parking spaces provided. Further planning for this area is being worked through with a community group convened for this purpose.

6. Research

Research Funded or Assisted by the Project

Chris Berg, MSc Hons, Canterbury University for research on the impacts of hares.

Eric Spurr, Landcare Research, profiling persistence of Brodifacoum in selected pest species (ongoing).

Fraser Maddigan and Elaine Murphy, Science and Research, DOC, stoat diet analysis (ongoing).

Kim King, Robbie McDonald, University of Waikato, contribution of carcasses and funds for stoat and weasel diet analysis.

7. Project Management

7.1 BUDGET

TABLE 16: BUSINESS PLAN BREAKDOWN BY MAIN TASKS, 2001-02 – 2000-01 DATA IN BRACKETS

ACTIVITY	STAFF HOURS	OPERATING COSTS (\$\$) [EXCLUDING COSTS OF TEMPORARY STAFF HOURS]
Wasp control and monitoring	1256 (1071)	4600 (8120)
Rodent control and monitoring	2542 (*)	3050 (*)
Stoat and cat control and monitoring	2158 (2090)	13459 (2300)
Vegetation monitoring	760 (1066)	1555 (2205)
Native fauna monitoring	2287 (2028)	4178 (15527)
Possum control and monitoring	556 (*)	800 (*)
Ungulate control and monitoring	240 (*)	1000 (*)
Advocacy and education	634 (922)	12000 (10900)
Project management **	2266 (1777)	12500 (11776)

* In 2000/01 these three activities were combined to use 3548 hours and \$10187. 2001/02 total for the three is 3338 hours and \$4850.

** This activity was divided into 'RNRP management', 're-introduction planning and management' and 'research support' in 2001/02 but they have been grouped for this table.

7.2 STAFFING

The following Area Office staff ('permanent' unless otherwise stated) had all their work time allocated to the project:

Bruce Waddell (to end Oct)
 Eric MacDonald (acting PM Oct to Jan)
 Brian Paton
 Matt Maitland
 Genevieve Taylor (Temporary to permanent)
 James McConchie (Temp. to permanent)
 Andrew Taylor (Temp.)
 Jeanette Wynn (Temp.)
 Sam Symonds (Temp.)
 Ian Hutchison (Trainee Ranger as 1-yr Temp.)
 Rob Fraser (Temp.)
 Gavin Collis (Temp.)

The following permanent staff had a proportion of their time allocated to the project: Paul Gasson (399 hours), Graeme Omlo (266 hours), Ross Campbell & John Wotherspoon (168 hours between them), Kimberley Parlane (184 hours) and David Butler (based in the Conservancy office) (576 hours).

7.3 SKILLS SHARING

Several specific activities can be recorded which involved project staff sharing and/or furthering their skills:

- Maitland and Taylor visited the 'kiwi zone' at Moehau.
- Maitland and Hutchison assisted with a transfer of saddleback (tieke) from transfer Motuara Island to Long Island.
- Maitland and Taylor visited the French Pass and Te Kopi restoration projects.
- Maitland provided advice to Friends of Flora, Milnthorpe, and Puramahoi (Onekaka) projects and to a Pelorus wasp control programme.
- Parlane, Maitland, Taylor and McConchie provided support to Friends of Rotoiti.

8. Acknowledgements

This report reflects the efforts of a large number of people, particularly the core project team in the St Arnaud Area Office supported by other staff in that office, in the Nelson/Marlborough Conservancy Office, and at other levels in the Department. A team from Science & Research completed their last year of kaka research alongside the project and their contribution will be missed. Technical review of the project was provided by the Technical Advisory Group (Appendix 2). A wide range of individuals and groups also assisted as volunteers.

The project continues to be grateful for the support shown by the local community and this year this was translated into the formation of the 'Friends of Rotoiti' which made a very practical contribution.

Garry Holz prepared the maps for the report and co-ordinated the printing and Charmayne King undertook the formatting and layout.

Expanding the project area this year brought its own challenges and the field crew now cover more kilometres than ever before. Their unstinting efforts continue to underpin the project's success.

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Appendix 1

REVIVE ROTOITI NEWSLETTER



Farewell to David Butler

In July the RNRP as a whole farewelled Dr David Butler whose leadership of the project in its first five years has contributed greatly to its success. While we are all sorry to see him leave DOC we wish him well in his future ventures which not surprisingly will include continued involvement in conservation, and continued input into the RNRP as a member of its Technical Advisory Group.



David Butler leaves DOC.

Dave became the RNRP co-ordinator in 1996 and led the project team until transferring to the Conservancy office in Nelson in 2001. In his new role, Dave continued to advise and support the project while at the same time providing expert advice and technical support to other DOC work.

Dave is highly respected for his ecological expertise but he has also earned high regard for both his skilful leadership of the project team and his excellent advocacy of the project. The resounding chorus of bellbirds and flocking kaka that have once again become a regular feature of the Rotoiti lakeside area are to a large extent a tribute to Dave's work and achievements with the Rotoiti Nature Recovery Project team.

Dave's colleagues at St Arnaud and elsewhere in DOC thank him for his tremendous work and contribution to conservation. And Dave himself has this to say:

"It's good to have the chance to thank you all for your support since I first started with the project in October 1996. I don't think any of us back then expected the project to have achieved so much in a relatively short time and the credit for this goes to many dedicated staff over the years with strong support from the Area and Conservancy offices.

I am moving on to do some other things in conservation, particularly assisting with the development of a Karori-style sanctuary in the Brook Valley behind Nelson. I do so knowing that the Rotoiti project is in very good hands with strong support from you as a community. I look forward to be able to closely follow the project's progress in the years ahead. Go well." - David

Friends of Rotoiti news



Trappers, from left, Pat Terry, Quaid Hutchinson, Bryce Buckland, Drew Hunter, Wayne Sowman and Shirley Terry.

Stoat and rat trapping

The Friends of Rotoiti have had a terrific summer with the Rainbow stoat line now complete (224 traps) and a new line of 22 traps up the Mt Robert Road to the top car park. Both lines have been running hot, with high stoat numbers – especially the new Mt Robert line. Rat trapping has been chugging along with checks happening at least as often as is needed (with always lots of checks over Christmas and New Year!). Rat numbers have been moderate this summer but mouse numbers have been very high.



Wayne Sowman, Annette Walker, Brian Neill and Pam Dovey get stuck into some weeding for the restoration of Black Valley Stream.

Black Valley Stream restoration

The Friends have taken on a new project – the restoration of Black Valley Stream. This covers the area from the road bridge downstream to the lake. The project has a plan spanning 30 years so we are not going to see fast changes but a gradual restoration of the natural forest cover along the stream banks. There will be some open space left on the school side with places planted in locally-occurring rare and threatened plants. The project was kicked off on Easter Saturday with 11 people working on the old oxbow area, removing willow, raspberry and blackberry.

The nursery at the workshop will be redeveloped to allow more room for propagating and raising locally-sourced plants for the revegetation. Weeding will begin again in spring.

Lizard monitoring

Garin College student, Terra Dumont, has been running lizard pitfall traps on Black Hill and in the village. The information gathered from this may be useful in determining the success of the Friends' rat trapping. Several lizard species in and around St Arnaud would be vulnerable to rats.



Terra Dumont checks a pitfall trap for lizards.

The traps are large fruit tins sunk into the ground with metal covers to keep out rain. The traps are usually filled with sticks to prevent anything getting caught, but during the monitoring periods the twigs are removed and pieces of tinned pear are placed in the bottom for bait. Lizards go in to get the bait and cannot climb back out. They get checked daily, for four nights, and then are closed again until the next monitoring period. Caught lizards are measured, sexed and then released.

Terra has done three monitors over summer, and the results have been variable. The traps are catching only skinks (geckoes tend to stay in the trees and shrubs), and three species are present - common, speckled and spotted skinks. Over time we should start to build up a good picture of the lizard populations in the area. Thanks to Anna Millard, Alex Maule and Diana Dumont for digging most of the holes.

Victoria University study

Students from Victoria University's School of Biological Sciences have been undertaking a study on the relationship between trap sites and capture rates using the Friends of Rotoiti Rainbow Valley Fenn line. The project supervisor, Ed Abdool, has provided an explanation of the study:

"The aim of our project is to determine if there is a relationship between the trapping success rate of stoat traps along the Friends of Rotoiti Fenn line and the surrounding ground cover. The data collected includes percentage cover of, among other variables, grass, shrubs, native and non-native trees, dead logs, road, stones and leaf litter – all within a 20m radius around the trap's position on the day the data was collected. We are currently analysing this data for 100+ traps along the Fenn line in collaboration with the data on trap success provided by DOC. An identifiable relationship will have obvious conservation implications for the future positioning of these traps in order to maximise trapping success rates in Rotoiti and elsewhere. The team of Victoria students would like to thank Kimberley Parlane and Matt Maitland from the DOC office together with Drew and Marg Hunter from the Friends of Rotoiti for their ongoing help and support with this project, without which our work would not be possible." - Ed Abdool, School of Biological Sciences, Victoria University

Snail monitoring



Powelliphanta "Nelson Lakes".

In early March this year four staff spent two days at the bushline on the St Arnaud Range searching for snails. The animal of interest is a large (up to 3.7cm diameter) native, carnivorous land snail, currently known as *Powelliphanta* "Nelson Lakes", but yet to be taxonomically described and named. The snails live in the moist leaf litter layer under alpine shrubs and tussocks. Searching, therefore, involves many hours of crawling on hands and knees, sifting over every inch of ground in the search area. Unfortunately, for some this method also released a variety of hayfever-inducing allergens into the immediate atmosphere.

Powelliphanta are a good animal to monitor because they are susceptible to being preyed upon by rodents, possums and pigs. Thus, if our population of snails is healthy, with few empty shells showing predator sign, we know we are doing a good job controlling such pests. The recent survey indicates we are doing well: we found 28 live snails, some very small (1cm in diameter), indicating they are breeding successfully. Also, of the 11 empty shells found, only four were broken suggesting they had died from a predator attack.

Because the monitoring method is so disruptive of the snail habitat we only do it every 4-5 years. This prevents long-term modification of the habitat, maintaining its suitability for snails.

Breeding expected

The golden weather we experienced up at Rotoiti last summer created ideal conditions for a beech seeding next spring. Beech trees respond to warm summers by seeding the following spring, and the warmer the summer the more seed is produced. With average maximum temperatures in the 20's for January, February and March this year, we are anticipating good beech flowering and seed set next November/December. This should mean plentiful food available to forest birds like kaka and kakariki, and we are expecting vigorous breeding activity from both. In fact, all forest animals should breed like crazy, maximising the good food supply: insects, birds and also, unfortunately, rats, mice, cats, and, then in the following spring, stoats. We will have monitoring programmes in place again to assess the benefit of our pest control to robins and kaka.

Next breeding season we'll have three students conducting research in the mainland island, to contribute to their individual Masters studies at university.

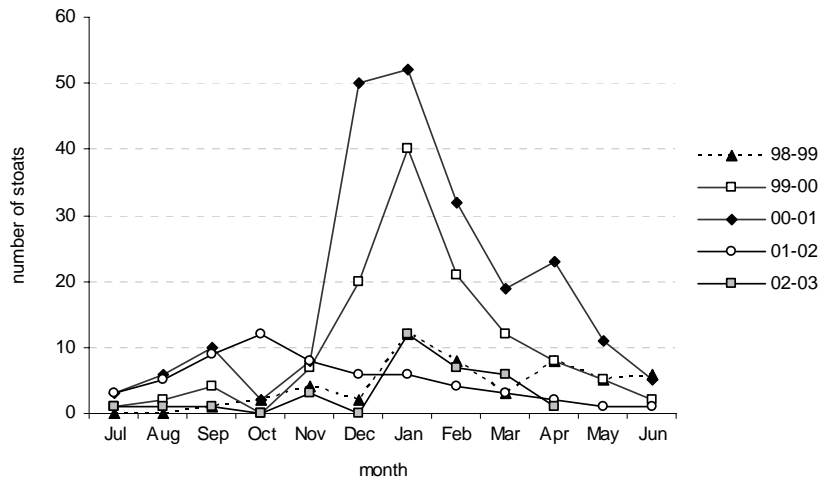
- Ceisha Poirot from the University of Canterbury will undertake a second field season of bellbird activity and nest monitoring. This will help us assess specific benefits of pest control to bellbirds in the area, and hopefully aid targeting of pest control to benefit bellbirds in the future.
- Carl Wardhaugh, also from the University of Canterbury, will undertake a second season of research looking at the effects of wasp predation on the honeydew scale insect. This research will aid assessment of the impact of wasps on the greater honeydew beech forest ecology.
- Our third student is Minna Sarvala, studying at the University of Turku, in Finland. Her work is yet to be finalised. As she has visited almost every nation on the planet she will add a cosmopolitan feel to the team next season.

Stoat captures

The following graph shows numbers of stoats caught on the old perimeter lines in the mainland island core area (188 traps total). Stoat captures this year were about as low as they get (in five years of trapping). This is due to a small beech seeding in the spring of 2001. The 2003 January peak of 12 captures is equal to that in our first year of trapping, now considered a relatively low stoat year. The January peaks of 40 captures (1999-2000) and 52 captures (2000-2001) show what happens following a huge beech seeding event. These numbers were the result of the double beech mast experienced during 1999 and 2000.

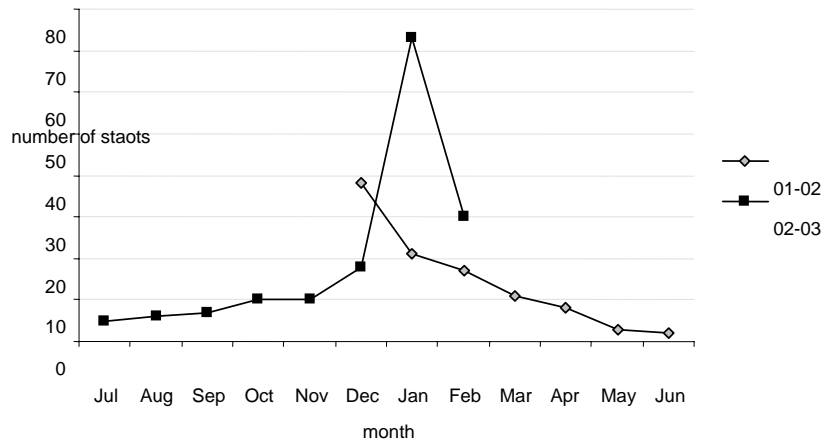
Join the Friends
If you are interested in helping the Friends of Rotoiti with trapping, or the Black Valley Stream restoration, contact Kimberley Parlane at the St Arnaud Area Office, phone 03 521 1806 or email kparlane@doc.govt.nz

RNRP total stoat captures by year, original perimeter lines



The graph below shows number of stoat captures in all Fenn traps, following the 2001 extension to the mainland island (897 traps total).

RNRP total stoat captures by year, all traps



Tracking tunnels – what’s out there?

How do we know if our trapping programmes are working? Result monitoring is the term applied to measuring the effect our pest control operations have upon the target pest. Why not just examine trap capture rates? This can only tell us what goes into our traps, not how many are left behind or choose not to be trapped. We use tracking tunnels to monitor activity levels of rodents and mustelids in both the treated and non-treated area.

Tunnels are set in lines of 10 or 20 tunnels, each 50m apart. Each line is at least 1km from the next to provide some confidence of independence; it is unlikely that the same animal will move from one line to the next. A tunnel consists of a central inkpad, with paper either side of it. Bait in the centre entices the target animal in, which gets ink on its feet, and leaves its footprints behind as it exits. Staff then get to decipher what sort of animal it is, judging by the footprint - not always an easy task.

We bait and track one night with peanut butter to target rodents, followed by three nights with rabbit meat for mustelids. This takes place in February, May, August and November. Spare a thought for the staff servicing a tunnel baited with rabbit meat for four days and three nights in the February heat, very attractive to wasps, and particularly unattractive to humans.

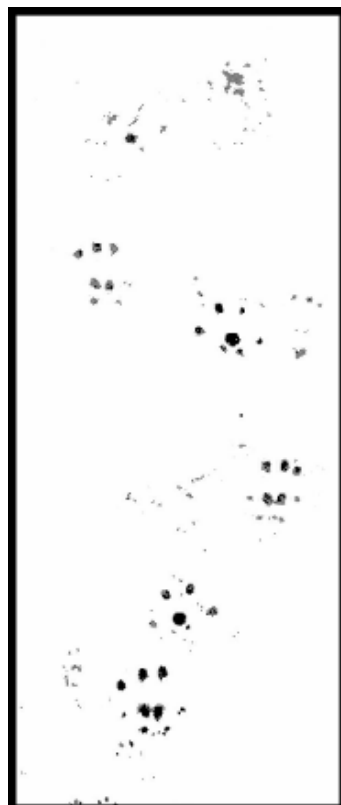
While we have been tracking for rodents since 1998, it is only recently that we have targeted mustelids. We have been waiting for the technique to be tested and now we know it works we're away.

MUSTELID RESULTS FROM THE FIRST THREE MONITORS (NOV, FEB AND MAY)

	NOVEMBER	FEBRUARY	MAY
Rotoiti (treatment)	1%	3%	0%
Rotoroa (non-treatment)	16%	25%	17%

This monitoring contributes to a national DOC Science and Research Unit investigation looking at rodent and mustelid populations throughout the country. Rotoiti and Rotoroa are but one pair of 10 paired sites in each of the North and South Islands.

With time this will allow us to calibrate tracking rates against the outcomes of the values we aim to protect, e.g. kaka nesting success. This may allow us later to rely upon the tracking indices, which is substantially easier and cheaper to undertake than nest monitoring programmes. Other information it may yield is habitat preferences of the target pests, and the effect that trapping any given species may have on the composition of the predator suite.



Rat and mouse footprints



Stoat footprints

Some interesting statistics

Did you know the RNRP team undertakes over 60,000 trap checks every year, walking some 4700km of trap line? Some periods are busier than others; every week in summer sees 130km covered. During our annual possum monitor we performed 2000 trap visits in a single week.

The black and yellow peril

It has been a “good year” for wasps with reasonably high numbers of nests, many of which have been very large and active. A lack of autumn rain meant wasps continued being active late into the season. All this spells bad news for the honeydew resource and invertebrate populations.

Wasps were once again targeted with Fipronil bait with 1100ha of the Rotoiti Nature Recovery Project was treated on January 16. This saw wasp numbers reduced to levels below that at which they are known to cause unacceptable ecological damage. This was maintained until mid March when numbers crept above the damage threshold again, although still well below levels found in untreated areas.

The possibility of a follow up poisoning operation was investigated but we were unable to interest the wasps in protein baits. This is because the wasps were by then back to feeding on sugar-rich honeydew. Our wasp control using protein baits is carried out during the period each summer when wasps switch from honeydew to protein for food (usually native insects but occasionally birds). Once the wasps have swapped back to feeding on honeydew our wasp control is less effective.

Planning for reintroductions

Proposals for reintroducing kiwi, tieke (saddleback) and other species to the Rotoiti area are still being investigated. Tieke were to have been the first species brought back but this was put on hold when numbers fell in the intended source population on Motuara Island in the Marlborough Sounds.

It is now looking likely that great spotted kiwi will be the first species to be reintroduced. We are currently looking at possible great spotted kiwi source populations. Only a small number of birds would be transferred initially as the reintroduction would be experimental to test how the species adapts to the new habitat and whether our pest control regime can sufficiently protect them. Only adult birds would be moved as they would be big and robust enough to fend off attacks from predators such as stoats. Any transfer would only take place after the breeding season which runs from around the end of June to the end of February.

It is hoped that the reintroduction of kiwi will be followed in due course by the return of tieke, red-crowned parakeets and mohua.

Spreading the word

The Rotoiti Nature Recovery Project displays in the St Arnaud Visitor Centre were upgraded and added to in December. The new displays explain more fully why we have a mainland island, and how we do our work. Janet Bathgate designed three new panels each with a different theme: Pests Destroy (about introduced pests and the effect they have), Controlling Pests (how we control pests and the benefits of control) and Honeydew (the scale insect, honeydew and wasps). Two flip-books have more detailed information about the project. Old favourites are included: the kaka tree is still there as is the mustelid display – now with the cover off so visitors can touch the animals. The older panels have been updated to reflect project changes and now include more information about community involvement.



A kaka tree and mustelid display, part of the updated RNRP display at the St Arnaud Visitor Centre. The TV “Kakacam” is used to show live footage of nesting

The opening took place in December. As with all openings a few last minute jobs were being completed just before the guests arrived!

A new full-colour brochure on the project has also been developed and is being distributed to regional visitor centres as well as being available at St Arnaud. A copy of the pamphlet is enclosed with this edition of Revive Rotoiti.

Appendix 2

ADVISORY GROUP MEMBERS

Jacqueline Beggs (Landcare Research, Nelson).

Peter Wilson (Landcare Research, Nelson).

Eric Spurr (Landcare Research, Lincoln).

David Norton, School of Forestry, Canterbury University.

Peter Gaze, Mike Hawes, Martin Heine, Nelson/Marlborough Conservancy.

Alan Saunders, National Technical Co-ordinator (Mainland Islands).