

Ohope Scenic Reserve Bait Station Operation 2009

Prepared by Bruce Bancroft, Wayne O'Keefe and David Paine



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P O Box 364
Whakatane
NEW ZEALAND

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E mahi ngatahi e pai ake ai te taiao*





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PO Box 364
Whakatane 3158
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Prepared for the Department of Conservation by Bruce Bancroft,
Wayne O'Keefe and David Paine

Cover Photo:
Bait station success, photo supplied by Bruce Bancroft

Executive summary

At Ōhope Scenic Reserve (OSR) control of possums and rats was successfully carried out during September through December 2009 using two toxins placed simultaneously in bait stations on an intensive bait station network over 528 ha.

The toxins used were; Pindone pellets RS5 (0.5g/kg) and Feratox (475g/kg) encapsulated cyanide.

The year of 2009, was the first year of maintenance control after an initial control operation in 2008 on a naive possum and rat population. Ōhope SR has a history of sporadic possum control over the last two decades but no targeted rat control before 2008.

All bait stations were fully loaded once with 1.5 Kg of Pindone and three Feratox capsules, none of the bait stations required a second feed.

The operation is based on ground based bait stations laid out at 1.8-2.0 bait stations per ha. Bait was left in the field for a minimum of six weeks before complete removal. This was sufficient to retard rodent repopulation for 16 weeks until February 2010 when densities would probably have risen above 10% tracking index. Post control densities returned to pre control levels 12 weeks sooner than during the 2008 year.

While this is probably sufficient time to ensure first clutches are successfully raised in the absence of rats or in very low numbers of rats we would ideally like to see very low rat indices for the full spring/summer bird breeding season and into autumn. The benefit of this would hopefully be a greater chance of breeding success in second and third clutch nesting and to reduce pre-control densities and thus costs for the following treatment period. This summer was very dry and prolonged but there are many other variables which may have contributed to rapid rat build up.

Rats were reduced from 48% TI with 40% high use to 0% TI (10 lines x 10 tunnels). The 2009 pre assessment tracking index is slightly less than the 2008 (55%) with high use (31%).

Post control – no rats tracked on 100 cards over 528 ha!

Both years show a rapid rodent build up to similar pre control density from undetectable levels post control. This is consistent with national findings but ideally we would prefer our baiting strategy to give longer protection and to reliably give us lower rodent densities going into the next winter.

Possum density within Ōhope SR varied from 0% post control in 2008 to 0.7% Residual trap catch index (RTCI) post control in 2009 using raised sets over 10 lines. There were 77 known kills.

This small difference in RTCI may seem an increase but essentially means no real change from last year and is a very good result. This index should also be considered an underestimate due to the use of raised sets (Traps set off the ground to protect kiwi).

There are many variables acting on rat populations and we believe effort should be expended to consider variations to baiting strategies intended to extend the protection period. We think this should be achievable while low possum density remains at the site. We would hope to remain within the current cost.

Table 1 Bait statistics for Ōhope Scenic Reserve 2009

Site	Total Pindone delivered kg	Total Pindone consumed kg	Total consumption Kg/ha	Total Feratox delivered	Known Possum kills	Kills/ha found
Ōhope (528ha)	1,452	191.3	0.36	2,904	77	0.15

Insufficient recognition was given to last years possum result and too much bait was applied. In hind site 500 grams/bait station should have been sufficient to achieve target.

Our preferred programme for 2010 is an alteration to the 2009 plan and intended to reduce total bait delivered but extend the protected period. We intend to deliver an initial feed of 500 grams of Pindone with 2 x Feratox cyanide capsules. This will be followed by a second fresh feed of 250 gm Pindone at time of bait removal. Removal of cyanide contaminated bait before school holidays is a requirement of the medical officer of health. Second feed bait would be left in stations until the following treatment program begins. Bait condition and consumption would be monitored.

Department of Conservation standards for ground based rodent control operations have been changed since this operation to more readily accommodate this control methodology. The condition relating to possums being below 5% RTCI has changed to being “at very low abundance, controlled simultaneously or excluded from bait stations.”

We believe this is now makes the Pindone & Feratox method deliverable on DOC lands within acceptable conditions.

Contract delivery was carried out through Department of Conservation (DOC) Programme Manager Threats John Lucas. John was able to contract Wayne O’Keefe of Opotiki to deliver works on both DOC and Ngāti Awa lands.

Whakatane District Council also contracted Wayne O’Keefe to deliver the programme to Kohi Point Scenic Reserve. No works were carried out in Mokorua Scenic Reserve due to deterioration of the bait station track system after five years of re-growth. This layout was constructed in 2005 using compass and hip chain laying straight lines regardless of contour. We now use contour lines only as they are easier on the person carrying bait. A full rework of the bait station network is underway to upgrade the layout for 2010 (243ha).

Contents

Executive summary	iii
Part 1: Introduction	1
Part 2: Operation design and method	3
2.1 Outcome monitoring	3
2.2 Operational monitoring	4
2.3 Proposed alteration to current method	5
2.4 Timeline 2009	7
Part 3: Discussion	9
3.1 Conclusions	9
3.2 Recommendations	10
Appendix 1 – Ōhope Scenic Reserve pre-assessment rodent data sheet	13
Appendix 2 – Ōhope Scenic Reserve first post control rodent data sheet	15
Appendix 3 – Ōhope Scenic Reserve second post control rodent data sheet	17
Appendix 4 – Ōhope Scenic Reserve rodent tracking data and graph	19
Appendix 5 – Excerpt from post control possum monitor report	21
Tables and Figures	
Table 1 Bait statistics for Ōhope Scenic Reserve 2009	iv

Part 1: Introduction

The purposes of this report is to provide detail of the 2009 bait station operation in Ōhope Scenic Reserve using a combination of Pindone cereal bait and Feratox encapsulated cyanide in the simultaneous control of possums and rats.

Possums and ship rats are undoubtedly the most destructive predators inhabiting our forests. The ship rat's ability to quickly reproduce, repopulate and re-establish over wide areas after control makes it a formidable and expensive pest to control particularly with ground based operations.

The operational philosophy follows the basic principles of pest control by ensuring very high percentages of target pest populations are put at mortal risk simultaneously with sufficient highly palatable bait to kill them all when they are most hungry and to have some bait left over. Residual bait is then removed from all bait stations.

This baiting regime has proved effective at managing possum and rat populations in the Manawahe Ecological Corridor to low levels over five years with no sign of reduced effectiveness through bait shyness or aversion.

Part 2: Operation design and method

At Ōhope Scenic Reserve (Total 528 ha) 977 large Philproof bait stations have been established in contiguous bush at a pre planned grid of ~75 m x ~75 m. Pre planning of bait stations was carried out using Arc 9 software to determine optimum bait station distribution. Location points were then loaded into a Garmin Map 60 CSX handheld GPS and delivered to the field. Placement was on best site within 5.0 m of the pre planned location. All tracks were marked with pink track markers and tracks cut with minimum vegetation disturbance required to see two consecutive markers in either direction. Stations were set at 300 mm off the ground.

Consultation and consents were jointly managed by John Lucas and David Paine with the able assistance of Rachel Janes from DOC in Murupara.

Due to very short time frame required to plan and execute the operation within the Medical Officer of Health consent requirements critical path (that no controlled substances be in bait stations during school holidays) contractors were chosen from a local company able to quickly provide sufficient person power at short notice.

To ensure a sufficient number of these were qualified people able to handle controlled substances in time for the operation a training course was organised and held over two days at the Bay of Plenty Regional Council head quarters in Whakatane.

All bait was pre bagged in 750 gm bags using the bagging machine at Whakatane toxin store. Individual bagging skills varied with the top operator able to bag half a ton (20 x 25 kg bags) in a six hour day varying down to half that for another operator.

The control operation follows normal Bay of Plenty Regional Council (Eastern) operational methodology for rodent control operations for biodiversity protection and is based on a single annual application of bait at each site with partial top up during knockdown operations if required.

Follow up or top up baiting is carried out if need is determined by a wide spread 10% bait station monitor.

All bait is removed from stations and buried on site no less than six weeks after delivery (eight weeks in 2009).

All bait stations received 1.5 kg of pre-bagged Pindone with three Feratox pellets.

No bait station required top up in 2009.

Considerable value was gained from support and ground based knowledge provided by Bruce Bancroft contracted to the Bay of Plenty Regional Council to provided on site audit and advice to contractors. Contractors were able to quickly plan where bait dumps were required to minimise empty walking and so maintain efficiency and reduce costs.

2.1 Outcome monitoring

2.1.1 Foliar browse index

To assess forest canopy health and possum browse levels, Foliar Browse Index monitoring was established along five lines consisting of 10-16 plots of preferred tree species (kohekohe and mangeao). Trees in the plots are scored for foliage cover, dieback, browse, stem use, flowering and fruit. Data were collected during

February 2008, February 2009 and February-March 2010. The report by Beattie and Willems is currently in preparation. A small decrease in mangleo cover over the monitoring period is not statistically significant, but there is a significant increase in kohekohe cover. There was a small increase in browse on mangleo between 2008 and 2009, but none was recorded in 2010. In 2008 and 2009 browse was recorded in over one third of kohekohe plots, but was only recorded on one plot in 2010.

Initially FBI data will be collected annually (dropping to biennially once trends are established) and correlated to post control possum monitoring results. So far this data has been collected in house.

2.1.2 **Small bird monitoring**

To measure the effects of pest control on small bird populations the five minute bird count method and the slow walk transect method have been established within the reserve. Listening stations and transects were established in winter 2009, and base line count data was collected in winter and spring 2009. Determining a statistically robust effect requires a series of measurements over time and thus further data will need to be collected annually in spring for up to five years. The frequency may be reduced at this time. Initial results suggest high numbers of tui, less bell bird and very low numbers of tomtit and robin. Typically robin and Tomtits are the first to drop out of diverse populations in the absence of pest animal control. Provided a remnant population is still present, they usually respond very well to sustained control. Bird counting is a specialised time consuming skill not held within the Bay of Plenty Regional Council so this data collection was contracted out.

2.2 **Operational monitoring**

Possums were monitored pre and post operation using 10 x 10 trap lines on raised sets according to the national protocol due to kiwi presence.

Rodents were monitored pre and post operation using 10 x 10 tracking tunnel lines semi randomly located at ~ 1 line / 50 ha. Tunnels were baited with peanut butter placed on the centre of the cards set out for one fine night. A further monitor occurred during June to assess rat population recovery.

The monitoring data would have benefited from a further monitor during March to better identify the length of the protected period.

2.2.1 **Pest animal targets**

To reduce the rodent population to <5%TI and maintain possums at <5% RTCI.

2.2.2 **Results by target**

1. The possum control target is maintained at < 5%RTCI.

The 2009 possum result at Ōhope Scenic Reserve was 0.7% RTCI.

(That is two possums captured in 297 trap nights off 10 lines of 10 traps using raised sets).

2. Rats are reduced to <5% TI.

Rats were reduced from 48% with 40% high use to 0.0% TI over 10 lines of 10 tunnels. This is a spectacular result but typical of this methodology.

Generally rodents will remain low most of the spring and summer immediately post control. By June 2009 rat tracking had returned to the previous year's level ~12 weeks earlier than 2008. This indicates a very rapid population build up.

Comment

Clearly the possum target has been exceeded easily. It is proposed that this target be reduced to 2% RTCI in future operations to recognise the underestimate result given by raised sets and to ensure that possum densities do not rise to levels where they will effect rodent bait consumption. (An RTCI of 2 % will allow for six possums to be caught over 300 trap nights.) Critically this will allow managers to minimise rodent control bait volumes delivered into the environment with very high confidence of success.

Typically during these operations rats are largely undetectable through remaining spring and most of the summer. This summer was very long and dry extending well into April with a mild autumn without significant rain until late May/June. This may well have allowed two full breeding cycles and high survival rate within litters supported by very heavy fruiting from drought stressed vegetation. Indeed anecdotal evidence from some sites (Awakeri SR) suggested some drought induced vegetation die off occurred through this period. (Damien Jones pers. comms.)

All surplus bait was removed from stations and buried on site after eight weeks in the field and a post control rodent monitor had confirmed success.

In hind site 500 grams/bait station should have been sufficient to achieve target.

Greater cognisance of the 2008 possum result may have led to a better decision. However the take home learning is that in very low possum densities, 500 gm of Pindone/station or less should be sufficient to reduce high levels of high use rodents to target.

2.3 Proposed alteration to current method

For two years now rodent indices have risen sharply at this site from being undetectable directly post control. Many variables affect breeding rate of rats.

Some examples:

- 1 Low stocking rates on nearby pasture. This could lead to rank seeded grass with increased grass seed as an extra food supply and support breeding in fragmented bush/pasture environments leading to rapid reinvasion.
- 2 Ecosystem suppression with whiplash effect. Removing large numbers of rodents and possums for a period of time when forest growth is very productive and vigorous creates an abundant food source easily accessible and supporting accelerating breeding in rodent survivorship.
- 3 Extra fruiting effect. Caused from extra seeding due to drought stressed vegetation producing extra heavy flowering, extra food available to breeding rodents.

- 4 Additional food supply from elevated invertebrate hatchings. Possibly as a result of increased egg laying in cicada populations seven years previous.
- 5 Combinations of these.

We have experience in previous years at other sites where rodent indexes have remained low well into autumn and so allowed lower indexes at the start of operations. Intuitively this must have beneficial effects on both the ecosystem and potentially on operational costs.

Alterations to management could be focussed either around timing of operations bringing forward, starting earlier as suggested by Paul Jansen (pers comms). This would need to be very early, perhaps May, to prevent rat build up.

The other option is to extend the effective baiting period with a product able to withstand several months of weathering yet be available and attractive to rodents but also remain compliant with consents.

The first is problematic with school holidays and the use of cyanide and also does not recognise that rats are undetectable at the end of our operations.

The second is unfettered by public health consent concerns as it is a non controlled VTA and could be placed as the cyanide laden bait is removed thus eliminating any major labour cost increase. Conversely if the bait deteriorated to unpalatable well before the following year's operation it may be wise to remove it in a separate operation.

2.3.1 **Benefits**

- Potentially two to three extra rat free months.
- Potentially two to three extra successful clutches.
- Potentially better adult survival in winter leading to stronger breeding success fatter chicks going in to winter stronger in next breeding season.
- Likely reduced bait volume delivery and therefore reduced labour cost of next year's operation.

2.3.2 **Costs**

- Potential extra labour round.

2.4 Timeline 2009

Date task carried out	Task
17/09/09	Pre assessment rats
23/10/09	Bait lay 1
3/11/09	Bait monitor
10/12/09	Bait removed
9/12/09	First post monitor rats
3/03/10	Post monitor possums
15/06/10	Second post monitor rats
15-30/6/10	Reporting

2.4.1 Costs

The total cost of the Ōhope Scenic Reserve possum and rat control operation for 2010 was \$44,597.00 spread over 528 ha effective treatment. This equates to \$84.46/ha. This cost includes all control materials, contract labour to deliver and remove bait, and operational monitoring of both possum and rat control effectiveness. No overhead costs are recorded.

Total monitoring cost for possums was \$3,500.00. Total cost for rodent control was \$6,000 spent over three monitors or roughly \$11.36 per ha. In future this rodent monitor should include a fourth monitor until we are confident enough to drop it. This monitoring component is absolutely critical to refining and improving this operational plan and must be maintained.

Part 3: Discussion

For single visit bait delivery the maximum bait quantity to be delivered for a successful single feed each operation is $\leq 1.5\text{kg}$, being the full capacity of a large Philproof station. Any quantity less than this brings efficiencies. We accept that in higher possum densities (initial control) there may be greater bait consumption and that this may necessitate a complete or partial top up of stations to ensure sufficient bait to kill rodents.

In our experience a complete fill and top up with Pindone and Feratox is only required for initial control operations or adjacent to untreated areas. This method gives good possum control with very little effort and cost. Potential to reduce bait delivery volumes is demonstrated further this year where with low possum density and high rat density, $< 0.25\text{ kg}$ of bait was consumed on average at each station.

For sustained control (maintenance) operations we regularly have regularly applied 750 gms/station and always achieve $<5\%$ TI. (During 2008 control season over $2,500\text{ ha}$ we tracked two rats on over 410 cards.)

In hind sight and with greater experience we believe 500 grams would have been sufficient to give a good result and have plenty left over.

A good operation will give about three months of low rodent numbers however the longer the controlled period the lower the following year's rodent pre-control densities should be. We have high confidence in our monitoring programme sample size but feel a fourth monitor should be used to show rodent recovery after summer and to help us understand the build up curve.

Good pre-control rodent and possum monitoring data can be used to reduce bait delivery volumes.

3.1 Conclusions

- Excellent possum and rat control has been achieved with Pindone bait delivered with Feratox for possum control over two years at this site.
- Operational monitoring is being used to back up decisions and tweak the method.
- Outcome monitoring is established but it is too early to measure confirmed effects on vegetation or bird numbers.
- Managers continuously review methods.
- Minimising possum density helps to reduce volumes of pesticide delivered to the environment.
- Managers recognise the need to seek improved cost effectiveness along with improved operational effectiveness.

3.2 Recommendations

- The current method is retained and tweaked continuously for improved pest control target effectiveness using a “research by management” approach. Bait volumes are to be reduced and delivered more effectively where possible.
- The possum control target is reduced to 2% to reflect the need to ensure possums have no detectable effect on rodent baits and to help negate the imprecise trap catch value of raised set monitoring.
- The rodent monitoring program is strengthened to provide better data on which to make management decisions. (Four monitors/annum).

Appendices

Appendix 1 – Ōhope Scenic Reserve pre-assessment rodent data sheet

Rodent tracking tunnel data recording sheet																																																				
Site:		Ōhope Scenic Reserve																																																		
Date and survey number:		17 September 2009 Pre																																																		
Date toxins laid:																																																				
Date toxins removed:																																																				
Name of toxin:																																																				
Quantity of toxin:																																																				
Number of feeds:																																																				
Weather conditions:		Warm, some rain																																																		
Recorder:		Bruce Bancroft																																																		
Mean rat tracking rate										48.00% ± Std error					6.87%																																					
Mean mouse tracking rate										10.00% ± Std error					3.65%																																					
Mean hedgehog tracking rate										0.00% ± Std error					0.00%																																					
Mean possum tracking rate										2.00% ± Std error					1.33%																																					
Mean insect tracking rate										38.00% ± Std error					4.67%																																					
High rat use										40.00%					High mouse use					4.00%																																
High mouse use										4.00%					High insect use					4.00%																																
Line 1										Line 2										Line 3										Line 4										Line 5												
No'	Rat	Hgh use	Mo	Hgh use	Hhog	Poss	Insect	Hgh use		No'	Rat	Hgh use	Mo	Hgh use	Hhog	Poss	Insect	Hgh use		No'	Rat	Hgh use	Mo	Hgh use	Hhog	Poss	Insect	Hgh use		No'	Rat	Hgh use	Mo	Hgh use	Hhog	Poss	Insect	Hgh use		No'	Rat	Hgh use	Mo	Hgh use	Hhog	Poss	Insect	Hgh use				
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No'	Rat	Hgh use	Mo	Hgh use	Hhog	Poss	Insect	Hgh use		No'	Rat	Hgh use	Mo	Hgh use	Hhog	Poss	Insect	Hgh use		No'	Rat	Hgh use	Mo	Hgh use	Hhog	Poss	Insect	Hgh use		No'	Rat	Hgh use	Mo	Hgh use	Hhog	Poss	Insect	Hgh use		No'	Rat	Hgh use	Mo	Hgh use	Hhog	Poss	Insect	Hgh use				
1	1	1								1	1	1								1								1			1	1	1								1	1										
2	1									2	1	1	1							2											2	1										2										
3	1	1								3	1	1	1	1						3								1			3	1	1									3										
4	1	1								4	1	1								4			1	1							4											4										
5	1									5										5			1								5								1			5	1	1								1
6										6			1	1						6											6											6	1	1								
7										7										7								1			7								1	1		7	1	1								
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10										10										10								1	1		10											10										1
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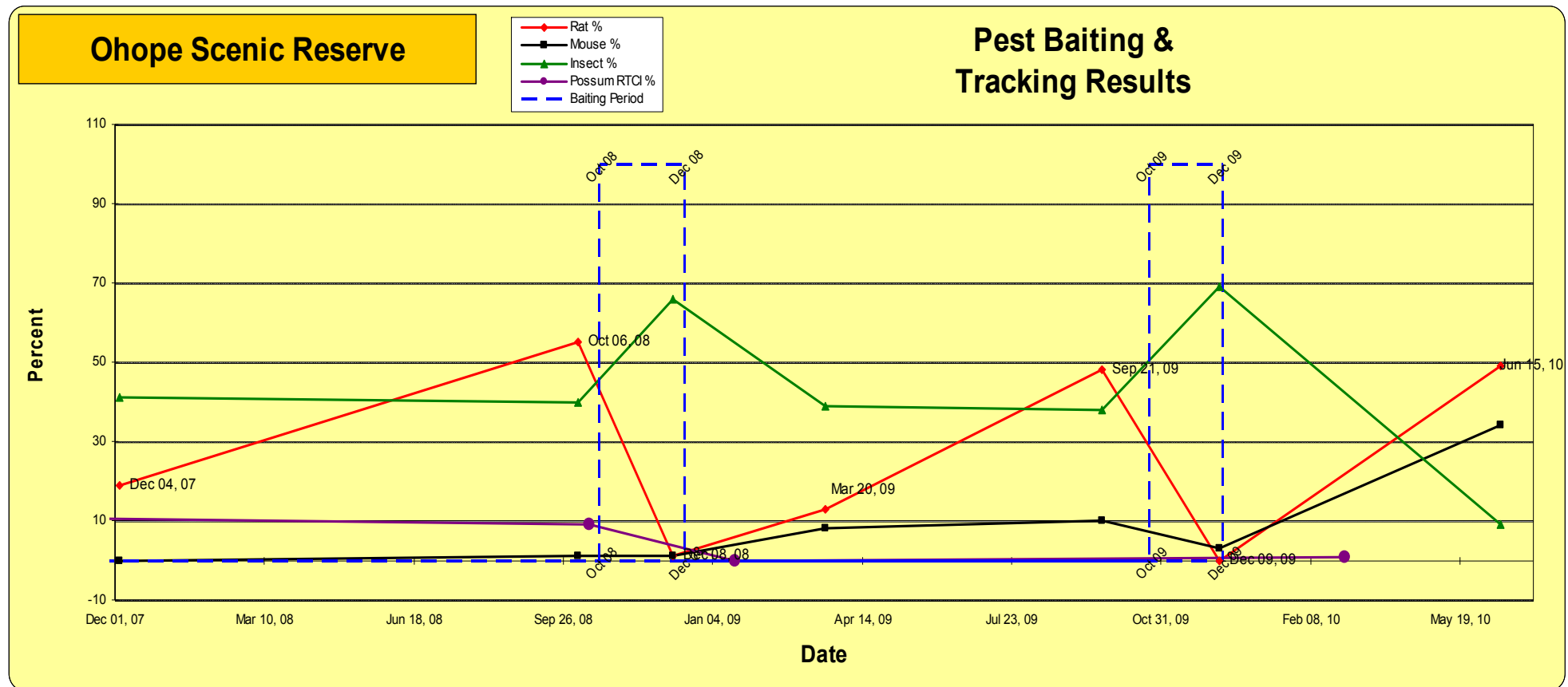
Appendix 2 – Ōhope Scenic Reserve first post control rodent data sheet

Rodent tracking tunnel data recording sheet																			
Site:		Ōhope Scenic Reserve																	
Date and survey number:		9 December 2009 Post																	
Date toxins laid:		Friday, 23 October 2009																	
Date toxins removed:		Thursday, 10 December 2009																	
Name of toxin:		Pindone & Feratox																	
Quantity of toxin:		1.5kg Pindone & 5 Feratox																	
Number of feeds:		One																	
Weather conditions:		Fine, warm																	
Recorder:		B Bancroft																	
Mean rat tracking rate		0.00% ± Std error			0.00%			High rat use		0.00%									
Mean mouse tracking rate		3.00% ± Std error			2.13%			High mouse use		2.00%									
Mean hedgehog tracking rate		0.00% ± Std error			0.00%			High insect use		9.00%									
Mean possum tracking rate		0.00% ± Std error			0.00%														
Mean insect tracking rate		69.00% ± Std error			5.47%														
Line 1				Line 2				Line 3				Line 4				Line 5			
No'	Rat	Hgh use	Mo	No'	Rat	Hgh use	Mo	No'	Rat	Hgh use	Mo	No'	Rat	Hgh use	Mo	No'	Rat	Hgh use	Mo
1		1		1				1				1				1			
2			1	2			1	2			1	2				2			1
3				3				3				3			1	3			
4				4			1	4			1	4				4			1
5				5			1	5			1	5			1	5			1
6			1	6			1	6			1	6			1	6			1
7				7				7				7				7			
8				8				8				8				8			1
9				9				9				9				9			
10				10				10				10				10			
Tot. 0 0 2 2 0 0 5 0				Tot. 0 0 0 0 0 0 8 5				Tot. 0 0 0 0 0 0 7 2				Tot. 0 0 1 0 0 0 5 0							
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Line 6				Line 7				Line 8				Line 9				Line 10			
No'	Rat	Hgh use	Mo	No'	Rat	Hgh use	Mo	No'	Rat	Hgh use	Mo	No'	Rat	Hgh use	Mo	No'	Rat	Hgh use	Mo
1				1				1				1				1			
2				2				2				2				2			
3				3				3				3				3			
4				4				4				4				4			
5			1	5			1	5			1	5			1	5			1
6				6				6				6				6			
7				7				7				7				7			
8				8				8				8				8			
9				9				9				9				9			
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Appendix 3 – Ōhope Scenic Reserve second post control rodent data sheet

Rodent tracking tunnel data recording sheet																																																		
Site: Ōhope Scenic Reserve																																																		
Date and survey number: 15 Jne 2010 Interim																																																		
Date toxins laid:																																																		
Date toxins removed:																																																		
Name of toxin:																																																		
Quantity of toxin:																																																		
Number of feeds:																																																		
Weather conditions:																																																		
Recorder: D Kennedy																																																		
Mean rat tracking rate 49.00% ± Std error 10.67%										High rat use 9.00%																																								
Mean mouse tracking rate 34.00% ± Std error 7.75%										High mouse use 6.00%																																								
Mean hedgehog tracking rate 0.00% ± Std error 0.00%										High insect use 0.00%																																								
Mean possum tracking rate 2.00% ± Std error 1.33%																																																		
Mean insect tracking rate 9.00% ± Std error 2.77%																																																		
Line 1										Line 2										Line 3										Line 4										Line 5										
No'	Rat	Hgh use	Mo	Hgh use	Hhog	Poss	Insect	Hgh use		No'	Rat	Hgh use	Mo	Hgh use	Hhog	Poss	Insect	Hgh use		No'	Rat	Hgh use	Mo	Hgh use	Hhog	Poss	Insect	Hgh use		No'	Rat	Hgh use	Mo	Hgh use	Hhog	Poss	Insect	Hgh use		No'	Rat	Hgh use	Mo	Hgh use	Hhog	Poss	Insect	Hgh use		
1			1							1			1								1										1	1									1								1	
2										2	1	1	1							2	1	1	1							2										2	1							1		
3										3		1	1							3	1	1	1							3				1						3										
4	1			1						4		1	1							4				1						4										4										
5	1			1	1					5		1								5				1						5	1									5	1							1	1	
6										6		1								6							1			6	1									6										
7	1	1								7										7		1								7	1			1						7	1									
8	1	1								8										8		1								8	1			1						8									1	
9	1									9								1		9		1								9	1									9	1									
10				1						10			1	1						10	1			1						10								1		10	1									
Tot.	5	2	4	1	0	0	0	0	0	Tot.	0	0	6	3	0	0	0	1	0	0	Tot.	3	2	8	0	0	0	0	1	0	Tot.	7	2	3	0	0	0	0	1	0	Tot.	9	0	2	1	0	0	1	0	0
cn=	10									cn=	10									cn=	10									cn=	10									cn=	10									
%	50%	20%	40%	10%	0%	0%	0%	0%	0%	%	0%	0%	60%	30%	0%	0%	10%	0%	0%	%	30%	20%	80%	0%	0%	0%	10%	0%	0%	%	70%	20%	30%	0%	0%	0%	10%	0%	0%	%	90%	0%	20%	10%	0%	10%	0%	0%	0%	
Line 6										Line 7										Line 8										Line 9										Line 10										
No'	Rat	Hgh use	Mo	Hgh use	Hhog	Poss	Insect	Hgh use		No'	Rat	Hgh use	Mo	Hgh use	Hhog	Poss	Insect	Hgh use		No'	Rat	Hgh use	Mo	Hgh use	Hhog	Poss	Insect	Hgh use		No'	Rat	Hgh use	Mo	Hgh use	Hhog	Poss	Insect	Hgh use		No'	Rat	Hgh use	Mo	Hgh use	Hhog	Poss	Insect	Hgh use		
1	1									1	1									1								1		1										1	1									
2	1									2		1								2	1									2								1		2	1									
3	1									3		1								3	1	1								3	1									3	1									
4	1			1						4								1		4				1						4									1	4	1									
5				1						5										5	1									5								1		5	1									
6				1						6										6										6	1									6	1									
7				1						7		1								7	1									7										7	1									
8				1						8										8										8										8	1									
9				1						9	1									9				1						9	1									9	1									
10				1						10										10								1		10	1									10	1									
Tot.	4	0	7	1	0	0	0	1	0	Tot.	3	0	4	0	0	0	1	1	0	0	Tot.	4	1	2	0	0	0	0	3	0	Tot.	4	0	4	0	0	0	0	1	0	Tot.	10	2	0	0	0	0	0	0	0
cn=	10									cn=	10									cn=	10									cn=	10									cn=	10									
%	40%	0%	70%	10%	0%	0%	10%	10%	0%	%	30%	0%	40%	0%	0%	10%	10%	0%	0%	%	40%	10%	20%	0%	0%	0%	30%	0%	0%	%	40%	0%	40%	0%	0%	0%	10%	0%	0%	%	100%	20%	0%	0%	0%	0%	0%	0%	0%	

Appendix 4 – Ōhope Scenic Reserve rodent tracking data and graph



Appendix 5 – Excerpt from post control possum monitor report

TRAP-CATCH MONITORING REPORT

Operation name:	Ōhope Scenic Reserve
Area involved:	487 hectares
Monitoring method:	NPCA “Protocol for Possum Population Monitoring using the Trap-Catch Method”.
Field operative:	G. Knopers – Registration nr. 1324 R Wade – Registration nr. 1617
Timing:	Monitoring carried out on 27/02/10 to 03/3/10
Weather conditions:	Night one - fine and calm Night two - fine and calm Night three - fine and calm
Trap type and set:	Victor No. 1, raised of the ground
Trapping regime:	Lines of ten traps, set for tree nights
Number of lines:	10
Line locations:	See attached map

Summary of results: (Also see line summary sheet)

Ōhope Scenic Reserve

Weighted catch rate:	0.7 %
	0.9 Approximate 95% confidence interval +/-
Combined standard error:	0.4 %

Discussion

All traps were raised set as there is Kiwi-birds present in the area which might have some affect (less catching) on trapping the possums.

Observation

Good numbers of native birds present with 2 rats caught on the post monitor.

TRAP-LINE SUMMARY

Ōhope S.R February 2010

Line number	Pre	Post	Maint	Trap-nights	Habitat	Stratum	Possums caught	Possum escapes	Non-targets	Sprung/empty
1	*			30		1	-	-	-	-
2	*			30		1	-	-	-	-
3	*			30		1	-	-	-	-
4	*			29		1	-	-	1	1
5	*			30		1	1	-	-	-
6	*			30		1	-	-	-	-
7	*			30		1	-	-	-	-
8	*			30		1	-	-	-	-
9	*			29.5		1	1	-	1	-
10	*			30		1	-	-	-	-