BAY OF PLENTY REGIONAL COUNCIL
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Wallaby Control Trial 2019

Paehinahina-Mourea

Trap and Trigger Limited

Bay of Plenty Regional Council
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Special thanks are owed to Philip Commins for setting up the camera monitoring, conducting basic auditing and providing well thought out feedback along with the monitoring results. Tim Day for helping Phil with that work.

Jordan Munn and the team from Trap and Trigger Limited did a great job, considering the extremely challenging undergrowth and at times unpleasant weather. Thanks for your positive attitude and willingness to try out a few new ideas.

Des Smith from Wildland Consultants Limited needs a special mention for the work he has put into gaining the consents required for the 'Provisional Registration' to use pindone on dama wallabies. The wheels of bureaucracy move slowly Des, hang in there!

Executive summary

Request for Proposals – contact wallaby control

A ‘Request for proposals’ (RFP) was run to test the market for new wallaby control contractors and new ideas, and to develop and test new wallaby control techniques.

Trap and Trigger Limited were awarded three areas to trial a combination of team hunting with indicating dogs, Feratox encapsulated cyanide in strikers, and ‘set-nets’ for sensitive areas where shooting or poisoning wasn’t appropriate. This is the work covered by this report.

Wildland Consultants Limited were awarded one area to trial pindone in bait stations, provided they were able to gain provisional registration to use pindone on dama wallabies. This work will take place in 2020.

The location

The majority of the work took place on private Māori land administered by the Paehinahina-Mourea Trust, containing plantation pine forest managed by Hancock Forest Management. The Okahu block, administered by the Ruahine-Kuharua Trust was included but contained few wallabies, young pines and dense blackberry, so therefore received minimal work.

The trial area (south of Lake Rotoiti and north of State Highway 30) was chosen because:

- it offered a “Strategic advantage”, in that control would reduce the risk of wallabies dispersing north across the road bridge at Mourea;
- it held a moderate to high density population of wallabies; and
- it contains a variety of habitat, typical of that occupied by wallabies and challenging for contractors.

The results

Team hunting with indicating dogs

The hunters walked a total of 189 km to shoot 10 wallabies from 40 plus encounters. The kill/unit effort proved too low, so they switched to night shooting on clearings.

Set nets

Some trial work was carried out but there was no real need for the method, so further development was not pursued.

Night shooting

Night shooting resulted in a total of 71 wallabies shot from six nights with three hunters.

Feratox encapsulated cyanide

Two applications of Feratox were laid through Paehinahina-Mourea areas 2 and 3. Area 1, “Okahu” received a single treatment.

A total of 4500 strikers (most containing two Feratox capsules) were laid, resulting in a 71% +/- 15% (approximately 95% CI) reduction in wallaby numbers (based on camera monitoring in areas 2 and 3 only).

Following the poisoning, 70 wallaby carcasses were located but this was from only the poison lines nearest to houses, roads and any tracks frequently used by people (about 50% of the total). Many carcasses from the first application would have been scavenged by pigs.

Key learnings

- Allow time to get responses from a wide range of contractors and encourage 'thinking outside of the box'.
- Hunting dama wallabies during day light, in dense undergrowth, is not productive but warrants further investigation for use in other habitats.
- Nets to capture wallabies, deserve further investigation for eradication operations.
- Night shooting with thermal imaging equipment can be productive in ideal conditions. Further development could improve the efficacy and efficiency of night shooting.
- Feratox encapsulated cyanide consistently achieves a 70% reduction in wallaby numbers.
- "Prescriptive contracts" could contain a 70% reduction target, as the minimum standard to be achieved.
- Further research is needed to improve the efficacy of Feratox.
- Poisoning first then shooting as a follow-up, may result in a better kill percentage.

Wallaby control – research needs

Areas where further research could improve the efficiency and efficacy of wallaby control are:

- Timing of control operations;
- Combining control techniques;
- Managing other pests to improve wallaby control;
- Fine tuning existing control techniques;
- Investigating methods to prevent wallabies from crossing bridges or triggering an alert if they do
- Improving our understanding of wallaby behaviour and ecology; and
- Use robust monitoring and an 'Adaptive management' approach to learn from every management operation.

Contents

Part 1:
Wallaby control Request for Proposals (RFP)

1.1 Objectives of carrying out an RFP

The idea of a “Request for Proposals” (RFP) for contract wallaby control came about through the availability of funds from outside of the Biosecurity budget. This allowed the Bay of Plenty Regional Council (BOPRC) to undertake wallaby control that was outside of the current priorities (i.e. the current programme focuses on controlling and/or eradicating wallaby populations that are outside of the “wallaby containment area”. See Appendix 1, Map of dama wallaby containment area).

It was, however, decided that this work should complement our existing programme.

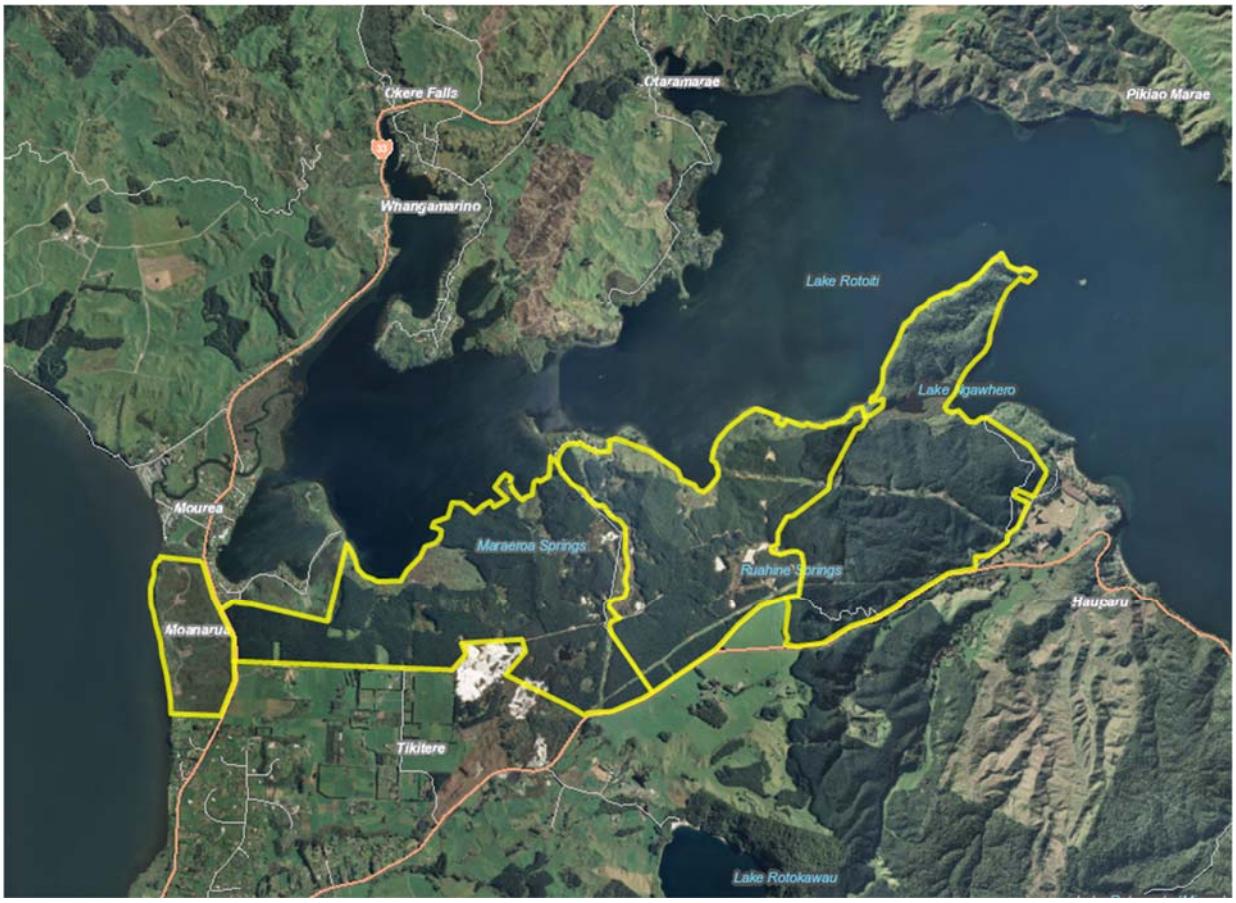
Carrying out an RFP presented an opportunity to:

(i) Test the market for new contractors and new ideas; and

(ii) Develop and test new wallaby control techniques.

1.2 The RFP process

1.2.1 Location for the wallaby control trial



Map 1. *Map of the proposed wallaby control area; Okahu block (west of State Highway 33) and Pehinahina-Mourea block (east of State Highway 33 and north of State Highway 30).*

The Paehinahina-Mourea block (north of State Highway 30 and south of Lake Rotoiti) was chosen as the site to carry out the wallaby control trial for the following reasons:

- The location of the site offered a "Strategic advantage". The Paehinahina-Mourea block is within the "Containment Area Buffer Zone". Based on the assumption that population density[1] is one of the drivers of wallaby dispersal, reducing wallaby numbers within the Paehinahina-Mourea block should reduce the risk of them dispersing across the road bridge over the Ohau Channel at Mourea.
- The site held a moderate to high density population of wallabies, so the chance of showing a difference following control is greater than at most of the current control sites which have few wallabies.
- The site contains a variety of habitat; various age classes of pines, ranging from mature forest with open understorey to younger stands with dense blackberry understorey, open grassland, recent cutover, native scrub/shrubland and native forest. This is a good representation of the typical habitat occupied by wallabies and it would offer a challenging test for contractors and their chosen control methods.
- The site is privately owned Maori land, administered by the Paehinahina-Mourea Trust. The Bay of Plenty Regional Council (BOPRC) has a good working relationship with the Trust's Chair, Barnett Vercoe, and Hancock Forest Management (HFM) who manage the pine forest covering most of the site. Hancock Forest Management operate a permit only access system for their pine plantation, however, Tumoana Road and Ruahine/Paehinahina Road provide vehicle access to private land on the southern shore of Lake Rotoiti so these roads remain open to the public. It was initially thought that the site would have limited public access, however, it appears to be commonly used for walking, cycling and some unauthorised hunting.

The Okahu block (west of State Highway 33 and east of Lake Rotorua), which is administered by the Ruahine-Kuharua Trust, was included in the proposal because strategically it made little sense controlling wallabies in the Paehinahina-Mourea block without treating this area as well. It turned out, this area contained very few wallabies, and the dense undergrowth made it very challenging for ground based wallaby control.

1.2.2 Information provided to contactors as part of the RFP process

The information provided as part of the RFP process is included in Appendix 2 and 3.

Developing the RFP was both difficult and time consuming. One of the objectives was to "Test the market for new contractors and new ideas" so care had to be taken not to 'spoon feed' contractors into simply repeating what has been done in the past. On the other hand they had to be given enough information to steer them away from methods that are; illegal, inhumane, likely to be unacceptable to the landowners or had already been shown to be unsuccessful.

Contractors were informed that RFP was seeking "*Innovative ground-based solutions*" therefore aerial broadcast Sodium fluroacetate (1080) was not considered for the RFP.

[1]Once wallaby numbers build up, food resources become limited and intra-species conflict increases therefore, some wallabies will disperse in search of new habitat.

This was primarily because the blocks were small, relatively accessible and aerial 1080 has already been proven to be very effective elsewhere.

Because we could not inform the landowners what wallaby control method(s) would be used, to gain their permission for the RFP to proceed, they needed to trust that they would have the final 'right of veto' if any proposed method were unacceptable to them.

1.2.3 Timeframe for the RFP

The Request for Proposals was released at 5:00 PM on 13 March 2019.

The deadline for questions was 5:00 PM on 25 March 2019.

The deadline for Proposals was 5:00 PM on 1 April 2019.

It was hoped that the bulk of the work would be completed by 30 June 2019. This turned out to be an unrealistic time frame and the repercussions are discussed later in this report.

1.2.4 Response from contractors

A total of four contractors completed the RFP (Trap and Trigger Limited, Wildland Consultants Limited, Puna Consultants and Radich Wildlife Management). Three other contractors made contact to say they were very interested in the work but could not realistically complete the RFP or deliver the work within the prescribed deadline (Tim Day, EPRO Ltd and Pestpro). Paul Barton expressed an interest in submitting a RFP but opted to offer his services and specialist thermal imaging and night shooting equipment to Wildland Consultants Limited.

1.2.5 Evaluation of proposals

A weighted attribute evaluation process was used based on the criteria supplied to the contractors with the RFP documentation.

Criteria		Weighting
1	Viability of the proposal	30%
2	Capacity of the respondent to deliver	30%
3	Capability and proven track record, in ground based pest animal control	30%
4	Value for money	10%
	Total weightings	**100%**

Shane Grayling (Team Leader Biosecurity, BOPRC), Dale Williams (Biosecurity Officer, BOPRC) and David Byers (Biosecurity Officer, Waikato Regional Council) evaluated the RFPs.

1.2.6 Outcome of the RFP

Trap and Trigger Limited

The RFP from Trap and Trigger Limited (T&T) scored the highest from the evaluation process. As a result they were awarded the contract to carry out wallaby control in areas 1, 2 and 3 (the three most westerly areas).

Their proposal involved team hunting during daylight with indicating dogs. The hunters planned to move through the block in a line, while in constant communication with GPS

based comms. As the dogs indicate wallabies these are located and shot with suppressed .22 calibre rifles. This 'team hunting' method had never been tried on dama wallabies.

They also planned to use this phase of the work to define areas of high wallaby density/activity so that they could tailor the subsequent application of pesticide to suit (i.e. they proposed laying more Feratox encapsulated cyanide where wallaby numbers appeared to be high). Trap and Trigger Limited also planned to use thermal imaging equipment at night to gather further information on wallaby distribution and density.

Trap and Trigger Limited were also keen to develop and test the use of nets to capture wallabies as they fled 'actively' from the dogs and hunters or moved 'passively' to and from 'feed areas'. Nets had been used successfully by Landcare Research to capture Bennett's wallabies to attach radio collars. Trap and Trigger Limited proposed to use nets in any "*Sensitive areas*" where shooting or poisons were not appropriate.

Wildland Consultants Limited

The second highest scoring applicant from the PFP process was Wildland Consultants Limited (WCL). Part of their proposal was to use pindone possum and rat bait in bait stations.

Currently 1080 and Feratox encapsulated cyanide are the only pesticides registered for use on dama wallabies.

Wildland Consultants Limited worked on cage trials with Key Industries, who hold the registration for pindone. Field trials are required to evaluate the effectiveness of pindone on dama wallabies, as part the process of including dama wallabies on the registration for pindone.

For this reason WLC were awarded the tender for Area 4, conditional on them gaining 'Provisional Registration' to use pindone on dama wallabies. Area 4 (Ruahine/Paehinahina Road east to Curtis Road) is the most easterly block.

Due to the length of time it is taking to gain 'Provisional Registration' this work has been postponed and will take place in autumn/winter 2020.

If pindone in bait stations is proven to be effective for controlling dama wallabies, this will add another tool to a very limited arsenal.

1.2.7 Key learnings from the RFP process

(i) It is extremely difficult to provide information to contractors that will not influence their decisions. Attempting to prevent them from suggesting unviable options runs a high risk of stifling innovation. In hindsight it would have been better to accept a higher risk of receiving wacky ideas, then ideas that are never going to fly, could have been filtered out during the RFP evaluation process. Landowners also need to have faith that they will be able to veto any methods they are unhappy with.

(ii) The RPF process has the potential to uncover new contractors and new ideas, but in this case the time frames were unreasonably short and this clearly put off several contractors from applying.

Part 2:
Wallaby control – Trap and Trigger Limited's control operation

2.1 Summary of control operation

The details of the wallaby control operation are contained in T&T's post operation report (Appendix 4. *Dama wallaby control trial, Bay of Plenty*, Trap and Trigger Limited October 2019).

Timeline	
6-9 June	first phase of the control operation took place (training, ground survey/hunting)
25 June	consent granted by Medical Officer of Health to lay Feratox encapsulated cyanide
7-9 July	follow up ground survey/hunting and thermal night shooting
23-26 July	initial application of Feratox
27-30 August	follow up application of Feratox
30 August – 5 September	Detox and clearing carcasses from tracks

2.2 Outcome of the control

As can be seen from the timeline in the previous section the work was completed more than two months after the original planned completion date of 30 June 2019.

Most of the delays were due to bad weather, which was exacerbated by T&T being based in Wellington. They needed a long enough spell of good weather to justify bringing the team up to Rotorua for three to five days, whilst juggling other demands on their time.

2.2.1 Team hunting with indicating dogs

Despite some extreme scepticism about the likely effectiveness of team hunting with indicating dogs the hunters managed to shoot 10 wallabies, from 40 plus encounters. Collectively the hunters walked 189 km. This is a credit to their skill and dedication, trying to find knee high animals in waste high undergrowth is extremely difficult, however, the kill/unit effort proved too low to justify continuing with this method, so they switched to night shooting on clearings.

2.2.2 Set nets

Some trial work was carried out to develop this methodology. The primary aim of the nets was for them to be used in 'sensitive' areas where shooting or poisoning was not appropriate. It turned out there was no real need for the method, so further development was not pursued.

2.2.3 Night shooting

Night shooting, with two shooters and a 3rd person using a thermal imaging scope, was more productive than team hunting with dogs. Trap and Trigger Limited staff killed a total of 71 wallabies from six nights hunting.

2.2.4 Feratox encapsulated cyanide (initial application)

Two weeks after the completion of the shooting operation, T&T laid Feratox encapsulated cyanide strikers throughout areas 2 and 3. Based on information gained from the hunting phase of the operation they laid more bait in areas which they believed held the most wallabies.

Striker baits were stapled to trees or stumps 20 cm above the ground. In areas of high wallaby abundance such as grassy clearings, stakes with four strikers attached were installed. Otherwise, strikers were laid at 10 m intervals along lines, 150 m apart. For moderate density areas, strikers were laid 20 m apart on lines, 200 m apart, and some of these strikers only contained a single Feratox capsule.

2.2.5 Initial camera monitoring result

At the conclusion of the first pulse of Feratox baiting, data from a sample of cameras from the high density areas, indicated that the reduction in wallaby numbers from the hunting, night shooting and first pulse of Feratox, was 43% +/- 33.5% (see Appendix 5. *Monitoring report for Paehinahina-Mourea wallaby control contract blocks 2 and 3.* Philip Commins, November 2019)

Review of the GPS tracks showed gaps of up to 400 m between some bait lines. Following discussion between T&T and the Contract Manager, “Infill lines” were plotted on a map and these lines were added in during the second pulse of bait.

2.2.6 Feratox encapsulated cyanide (second application)

During the second application of Feratox (27-30 August) the initial bait lines were retreated, the infill lines were added, and Area 1, the Okahu block, received a single treatment with Feratox.

All striker baits contained two Feratox capsules, and the frequency of strikers was increased to 10 metre intervals along all lines.

Following the first application of Feratox, auditing indicated that some strikers had been placed where they were visible from the main access roads, and others were in locations that would be easily accessed by possums but were not necessarily the best place to target wallabies. For the second application of Feratox, T&T staff took particular care to place strikers where they were not visible from the main roads and they were instructed by the Contract Manager to “*think like a wallaby*” when choosing the best locations to lay bait.

2.2.7 Detox and clearing carcasses

Once the second Feratox application had been completed, T&T staff travelled back over the main bait lines, removing the remains of any uneaten strikers, collecting DNA samples from any wallaby carcasses and removing possum and wallaby carcasses from the tracks. Effort was focused on lines nearest to houses, roads and any tracks frequently used by people.

Trap and Trigger Limited located 70 dead wallabies, from checking approximately 50% of their bait lines. Therefore, it is likely they killed in excess of 100 wallabies from 4,500 Feratox strikers. This estimate will be conservative. Due to the number of feral pigs in the area, many carcasses, particularly those from the first pulse of bait, would have been scavenged.

2.2.8 Final camera monitoring result

Camera monitoring indicated a reduction of 71% +/- 15% (approximately 95% CI) (See Appendix 5, Monitoring report for Paehinahina-Mourea wallaby control contract blocks 2 and 3).

Analysis of the effect of the distance between bait lines showed no discernible correlation. Because wallabies have large home ranges, large gaps between bait lines may not be a problem. The poor initial kill may have been due to insufficient bait, exacerbated by competition with possums and rats or increased "*neophobia*" due to disturbance from shooting altering their feeding behaviour and increasing their caution towards novel foods.

2.3 Key learnings/discussion

- When running a RFP process, allow sufficient time to encourage responses from a wide range of contractors and don't 'spoon feed' them too much information on past control methods. To encourage 'thinking outside of the box' the scope for the control options must be kept broad. Contractor needs to know almost any idea will be considered and the landowners/occupiers need to trust they will be able to veto any proposals that they aren't happy with.
- Hunting dama wallabies, during day light, in forest with dense undergrowth is not productive, even with highly skilled professional hunters using good indicating dogs. In habitat with more open forest understorey hunting with dogs may be feasible and warrants further investigation.
- The use of nets to capture wallabies as they flee 'actively' from dogs and hunters or move 'passively' to and from 'feed areas', was not pursued beyond some initial experimentation. This is, however, a method that warrants further investigation, particularly for areas with few wallabies, where eradication is the goal.
- Night shooting with the aid of thermal imaging equipment can be productive, in ideal conditions, with skilled hunters. Trap and Trigger Limited's staff killed a total of 71 wallabies from six nights hunting. The numbers of wallabies seen on any one night was variable. Further research into wallaby behaviour to identify feeding habits and therefore ideal shooting conditions, could improve the efficacy and efficiency of night shooting.
- Feratox encapsulated cyanide in striker baits appears to be good for initial 'knockdown' control of wallabies. A reduction of around 70% was achieved which is consistent with other wallaby control operations where Feratox has been used as the initial 'knockdown'. In this case 81 wallabies were killed through shooting prior to the Feratox being laid, but it is impossible to tell how many of those wallabies would have been killed during the poisoning operation had that been done first.
- Traditional pest control theory suggests shooting prior to poisoning may reduce the effectiveness of the subsequent poisoning operation, due to disturbance unsettling the surviving animals. Regardless of whether this is true or not, conducting a shooting operations after poisoning may increase the overall kill percentage by targeting surviving wallabies which may be 'bait shy'. Also with fewer wallabies, night shooting clearings may result in a better kill percentage as there may be a better chance of killing all animals encountered (rather than two out of 11 as described in T&T's report).

- An advantage of cyanide is that because it is very fast acting, carcasses are normally located within a metre or two of the baits. This allows the contractor to get good feedback on the number of animals killed and their distribution. Laying Feratox systematically across the whole block first, may give the contractors a better indication of where wallabies are located, rather than attempting to learn that while hunting the block. A second pulse of bait, could target areas with the highest initial kills. Following on from the poisoning, night shooting could also be concentrated in the most productive areas identified during the poisoning phase.
- One situation where shooting prior to poisoning may be justified is when a Landowner wants to harvest wallabies (and possums) for pet food. In this case, sufficient time should be allowed, after shooting, to allow the wallabies to settle back into their normal feeding behaviour, before poisons are laid.
- An ongoing issues with Feratox is the large number of baits that are laid for a moderate number of kills. 4,500 strikers, most containing two Feratox capsules were laid to kill 100 plus wallabies. This is due to a number of possible causes; Rats eat the baits and destroy the Feratox capsules, possum compete with wallabies for the baits, or possums and wallabies eat the bait and reject or fail to crush the Feratox capsule. Further research is needed to resolve these issues.
- The camera monitoring methodology is not robust enough for “Performance based contracts”, where a contractor is set a pest reduction target and paid once they achieve the target. However, because it appears contractors can consistently achieve a 70% reduction in wallaby numbers from initial control with Feratox, future “Prescriptive contracts” could contain a 70% target as the minimum standard.

Part 3:
Wallaby control – future challenges, opportunities and research needs

3.1 Timing of control operations

Traditionally, pesticide operations are conducted in winter. This is based on the theory that pest animals are under stress through cold weather and low food availability, so are more likely to take novel food (e.g. toxic baits) and may be more vulnerable to poisoning.

Night shooting operations may be more efficient in spring when animals take advantage of fresh grass, crop or leaf burst on seedlings. Animals may move more in spring and summer which may make them more (or less) vulnerable to some control techniques.

Based on this traditional approach it makes sense to time wallaby pesticide operations in winter then follow up with shooting operations in spring, if the vegetation cover permits this. However, little is known about dama wallaby feeding behaviour and seasonal movement patterns. Learning more about this could greatly improve the efficacy and efficiency of wallaby control.

3.2 Combining control techniques

Wallabies are highly vulnerable to aerial baiting with 1080 and kills in excess of 90% can be expected. Feratox encapsulated cyanide operations regularly achieve ‘initial knock down’ reductions of around 70%. When conditions are suitable (e.g. farm/forest margins), night-shooting can be productive and at least one small population of wallabies (<10 animals) has been eradicated through night-shooting alone.

Where eradication is the goal, no one technique is likely to be successful and a combination of methods will be required. As wallaby numbers decrease the surviving animals become increasingly difficult (and costly) to kill.

Fine tuning existing techniques, timing combinations of techniques and developing new techniques (and products) will be required to eradicate wallabies.

3.3 Fine tuning existing control techniques

3.3.1 Sodium fluroacetate (1080)

As mentioned above aerial broadcast 1080 is very effective on wallabies. They are a grazing animals so any bait laid directly onto the ground, either aerially or hand broadcast is likely to be encountered by wallabies. Bait consumption can be influenced by a number of factors and early field trials (Llewellyn 1985 in Williams 1995[2]) and cage trials conducted in 2013[3] indicated standard possum baits, most of which contain cinnamon lure are not particularly attractive to dama wallabies. Despite this, an aerial 1080 possum and rat control operation at Rotoehu[4], using cinnamon laced cereal bait achieved a very good kill on wallabies (96.9% +/- 2.4%).

Moving forward, if even better kills can be achieved with better baits and lures that are attractive to wallabies, these should be pursued.

There is significant public concern about 1080 and aerial baiting in particularly. As more members of the public gain an understanding that 'landscape scale' pest control requires such tools and the outcome of this work can produce outstanding environmental benefits, 'social license' for 1080 may improve.

3.3.2 Feratox encapsulated cyanide

Feratox encapsulated cyanide offers a number of advantages for wallaby control. It can be used in relatively small areas close to built-up areas, as it presents a low secondary poisoning risk to domestic animals. Because carcasses are usually located close to where the bait was laid, good feedback is gained on how many animals were killed.

Research to improve the efficacy and efficiency of Feratox should concentrate on the following areas:

- Reducing interference from rats by adding a rat repellent to the bait or by physically excluding rats from accessing baits (e.g. through the use of Romark bait stations).

[2] Evaluation of bait stations and management options for control of dama wallabies (*Macropus eugenii*) in Bay of Plenty, New Zealand, Dale Williams, Unpublished Otago University report, January 1997, **A1799786**

[3] Baits lures and bait delivery systems for control of dama wallabies, Ray Henderson, Phil Commins and Dale Williams, unpublished contract report 2014/01, February 2014, **A1831872**

[4] Rotoehu Forest aerial pest control camera-trap monitoring report, Philip Commins, unpublished contract report, October 2017, **A3129149**

- Increasing the likelihood of wallabies taking a bait containing a Feratox capsule by improving the bait type or placement. If it can be shown that wallabies are more likely to take a bait directly off the ground, either change the existing registration for bait bags and/or strikers so they can be laid on the ground or develop a new bait and registration that allows this.
- Increasing the likelihood of wallabies crushing the Feratox capsule and inhaling the cyanide gas by developing a more attractive placebo that more closely resembles the size, shape and crush strength of Feratox.

3.3.3 Night-shooting and hunting with dogs

As outlined in Part 2, Section 2.3 this trial has highlighted a number areas where hunting with dogs and night shooting could be improved. The use of thermal imaging and infra-red night vision equipment is an area that is rapidly evolving. The technology is improving and the price of this equipment is reducing. This equipment definitely warrants further investigation.

3.4 Managing other pests (possums and rats) to improve wallaby control

Possums and rats will always be present in areas containing wallabies. Rats can destroy some wallaby baits (e.g. Feratox) and possums compete aggressively with wallabies for bait, particularly when presented in bait stations. Possums are also likely to be caught in any type of trap that is designed to catch wallabies.

Developing control techniques that either kill rats and possums first or simultaneously or minimise conflict with these species is high priority in order to improve the efficacy of wallaby control.

3.5 Developing new control tools

3.5.1 Nets or traps for wallabies

Though only limited development of nets to catch wallabies was carried out as part of this trial, this is an area that deserved further investigation, particularly for getting the last few animals in an eradication operation.

3.5.2 Bait stations

Using bait station to control dama wallabies is hampered by two key problems (Williams 1997):

- Wallabies are strongly neophobic (they are afraid of new things) and they don't like feeding from "Philproof" bait stations; and
- Possums are more aggressive than dama wallabies and will dominate access to bait stations.

Despite these limitations, bait station offer significant advantages, therefore, resolving these issues is worth pursuing.

Registering new baits suitable for bait stations (e.g. slow acting anticoagulants such as pindone) or baiting regimes (e.g. multiple pulses on non-toxic pre-feed and 1080) need to be investigated to improve the efficacy of bait stations.

3.6 Preventing wallabies from crossing bridges

One of the goals of this RFP was to reduce the density of wallabies south of the Mourea Bridge, hoping that this would reduce the risk of them crossing the Ōhau Channel.

This is based on the assumption that one factor influencing wallaby dispersal is population density i.e. when numbers build up completion for food or mates force some wallabies to disperse looking for new habitat or mates.

We do not know if this assumption is true and we don't really understand how wallabies behave once they disperse into new territory.

- These question warrant further research through the use of wallabies carrying radio collars.

Investigating other methods to prevent wallabies from crossing bridges also warrants investigation (e.g. roadside fencing and cattle stops).

New software, computer algorithms and 'Artificial Intelligence' have been developed to recognised animals via their footprints and/or gait. Wallabies have very distinctive gait and foot prints so it is likely these systems could be adapted to identify wallabies and trigger an alert. These technologies should be investigated.

3.7 Improving our understanding of wallaby behaviour and ecology

As well as the behavioural aspects outlined in Part 3, Section 3.1, understanding the factors that drive dispersal (i.e. is density or disturbance the biggest issue?) and learning how wallabies move through the landscape when dispersing, could lead to huge gains in efficiency by improving the targeting of surveillance and control operations.

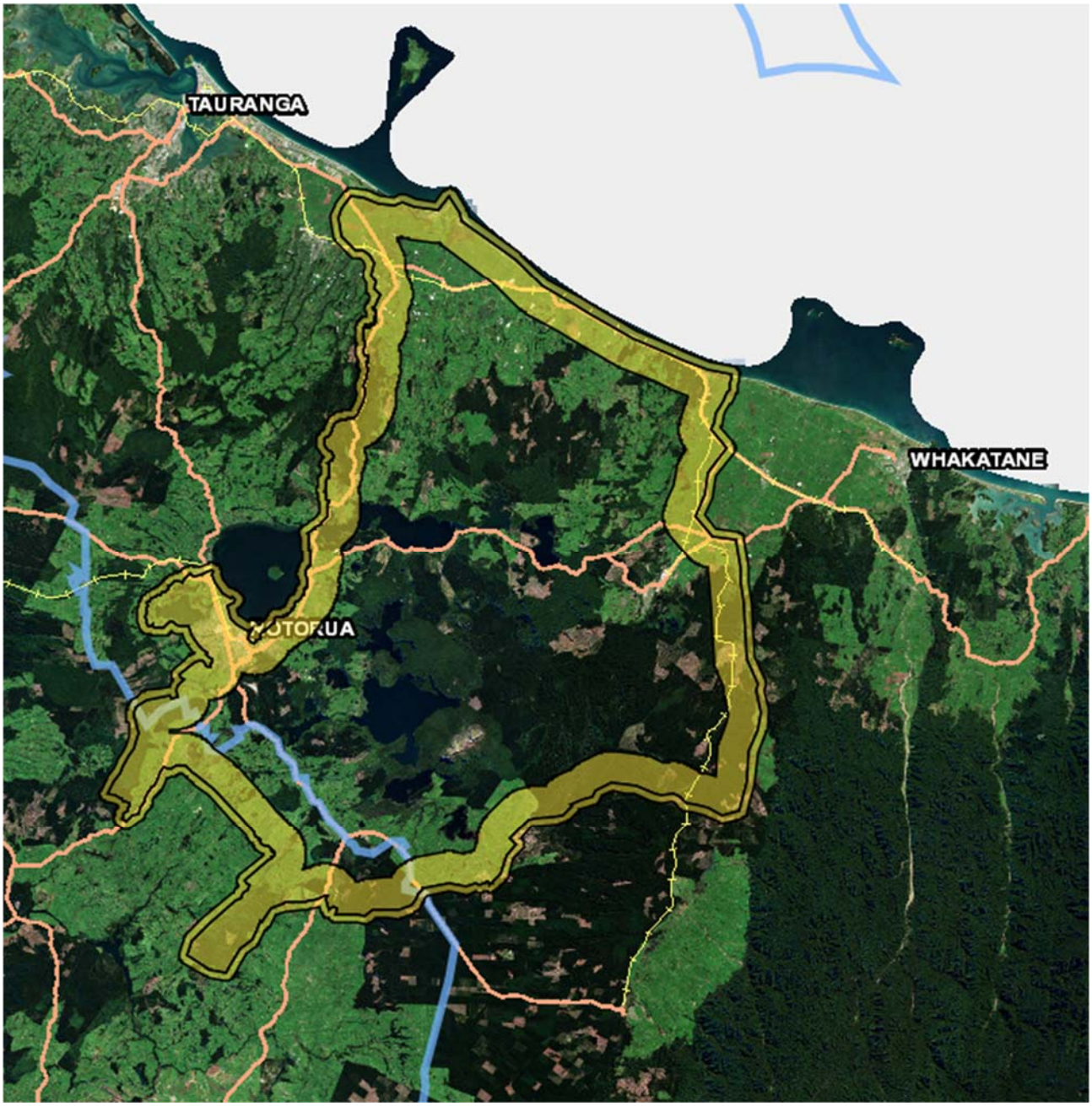
We need to learn more about what make these critters tick!

3.8 Adaptive management or Learning by doing

Even though research is needed to develop new wallaby control and surveillance methods and to improve the efficacy of existing methods we currently have sufficiently robust control and surveillance tools to pursue the goal of "Progressive containment" of dama wallabies.

It is however important that we take every opportunity to learn from every management operation, through robust monitoring. Key learnings should then be applied to future management operations.

Appendix 1:
Map of dama wallaby containment area



Appendix 2:
Information provided to contractors as part of the RFP process

Bay of Plenty Regional Council, 2019.

Request for Proposals

(simple version)

2019 0102

Paehinahina-Mourea, Ruahine-Kuharua Wallaby Control

Bay of Plenty Regional Council
5-11 Quay Street
PO Box 364
Whakatāne 3158
New Zealand

RFP released: 5:00 PM 13 03 19

Deadline for questions: 5:00 PM 25 03 19

Deadline for Proposals: 5:00 PM 01 04 19

SECTION 1: Key information

1.1 Context

a. This Request for Proposals (RFP) is an invitation to suitably qualified suppliers to submit a proposal for the **Paehinahina-Mourea, Ruahine-Kuharua Wallaby Control** contract opportunity (Proposal).

1.2 Our timeline

a. Here is our timeline for this RFP.

Deadline for questions from suppliers:	**5:00PM 25-03-19**
Deadline for Proposals:	**5:00PM 01-04-19**
Anticipated contract start date:	**29-04-19**

1.3 Communications

a. All enquiries must be directed to our point of contact specified in paragraph b below. We will manage all external communications through this point of contact.

b. **Our Point of Contact**

Name: Dale Williams

Email address: dale.williams@boprc.govt.nz

c. If, after publishing the RFP, we need to change anything about the RFP, or RFP process, or want to provide suppliers with additional information, we will let all suppliers know by email.

1.4 Developing and submitting your Proposal

a. For helpful hints on tendering and access to a supplier resource centre go to: www.procurement.govt.nz / for suppliers.

b. You must use the response form provided.

c. Emailed Proposals should not exceed 5MB.

1.5 Address for submitting your Proposal

a. Proposals must be submitted by email to the following address:

Procurement@boprc.govt.nz

b. Proposals sent by post or fax, or hard copy delivered to our office, will not be accepted.

1.6 Our RFP Process, Terms and Conditions

In submitting your Proposal you are deemed to have read, understood and agree to be bound by the following terms and conditions that apply to the RFP and the RFP process:

a. Your Proposal will remain open for acceptance for 3 calendar months from the Deadline for Proposals, as stated this Section 1, paragraph 1.2.

b. You must bear all of your own costs in preparing and submitting your Proposal.

c. The pricing information included in your Proposal must meet all of the requirements set out in Section 4 of the RFP.

d. You represent and warrant that all information provided to us is complete, true and accurate, is not misleading in any material respect and does not breach any third party's intellectual property rights.

e. We may rely upon all statements made in your Proposal.

f. We may amend, suspend, cancel and/or re-issue the RFP at any time.

g. We may amend the proposed contract included in Section 5 of the RFP at any time, including during negotiations with suppliers. If you do not state your position in the response form provided in relation to the proposed contract, you are deemed to have accepted the terms and conditions in the proposed contract in full.

h. We are not bound to accept the lowest priced Proposal, or any Proposal.

i. In evaluating Proposals, we may take into account the best value for money over the whole-of-life of the goods or services.

j. We may cease evaluating a Proposal if it is determined that any mandatory requirement, as specified in Section 2, is not, or cannot be, met by you.

k. If none of the Proposals are acceptable to us we may enter into negotiations with one or more suppliers for a satisfactory offer.

l. We both agree to take reasonable steps to protect the other's confidential information.

m. You acknowledge that our obligation to protect your confidential information is subject to the Local Government Official Information and Meetings Act 1987 and that we may be required to disclose your confidential information under this Act.

n. There is no binding legal relationship between us, except in respect of these RFP terms and conditions unless and until we both enter into a contract or if we issue a purchase order to you.

o. The RFP comprises this document, and any subsequent information we provide to suppliers.

p. The laws of New Zealand shall govern the RFP and the RFP process.

q. We will not be liable in contract, tort, equity or in any other way whatsoever for any direct or indirect damage, loss or cost incurred by you or any other person in respect of the RFP process.

1.7 Complaints regarding procurement procedures

We are committed to ensuring that our procurement processes represent good public sector procurement practice.

If you wish to raise a concern regarding this RFP process, then the preferred point of contact is our Point of Contact, identified in Section 1, paragraph 1.3. If you are not satisfied with the manner in which the concerns are dealt with, or for any other reason, then you may contact:

Greg Corbett

Greg.Corbett@boprc.govt.nz

SECTION 2: Our Requirements

2.1 What we require

We are seeking proposals from skilled contractors or firms to carryout ground-based control of dama wallabies within the Paehinahina-Mourea and Ruahine-Kaharua blocks either side of SH33 south of Mourea.

The scope and specific requirements of the work are defined in **Schedule One**.

The required timeframe for delivery is for the work to start immediately upon signing the contract (as near as possible to 29 April 2019) and for the bulk of the work to be completed by 30 June 2019. The final completion date for the contract is anticipated to be 31 July 2019.

The contract will be administered by the Bay of Plenty Regional Council (BOPRC). Proposed pest control methods will need to be acceptable to BOPRC, the Māori Landowners and the forestry companies that administer the production forests on the land.

We are seeking innovative suppliers that have the capability and capacity to meet our requirements. In particular, experience in pest animal control, proven track-record in pest control, skills and appropriate qualifications (e.g. current Controlled Substances Licences and/or Firearms Licences), resourcing (the supplier must have their own vehicles, equipment and appropriate PPE), availability and capacity to complete the contract within the anticipated time frames (i.e. the supplier must have sufficient skilled staff to complete the work).

2.2 Health and Safety requirements for physical works

Because this RFP is for physical works, it is a mandatory requirement that the preferred supplier be pre-qualified for health and safety by SHE Software New Zealand Limited, please find the related information on our website https://www.boprc.govt.nz/procurement. If you are not already pre-qualified, you may apply to be pre-qualified as part of this RFP process**.** Pre-qualification is required before we can enter into a contract with you. To commence your application, please click here For the avoidance of doubt, mandatory requirement means a requirement of ours that is essential for you to meet in order to be considered.

Prior to accessing the forest administered by Hancock Forest Management, prospective contractors must complete the Health & Safety induction and obtain access permits from 1st Security (see attached PDF "Web based induction – Permit policy letter to Permit Applicants 3Dec2018").

SECTION 3: Our Evaluation Approach

3.1 Evaluation method

The evaluation method that will be used to assess Proposals is the Weighted Attribute method.

We reserve the right to undertake due diligence and use the results of due diligence to inform the evaluation of Proposals.

3.2 Evaluation criteria

Proposals will be evaluated on their merits according to the following evaluation criteria.

Criteria	Weighting
1. Viability of the proposal	**30%**
2. Capacity of the respondent to deliver	**30%**
3. Capability and proven track record, in ground-based pest animal control	**30%**
4. Value for money	**10%**
Total weightings	**100%**

SECTION 4: Pricing information

4.1 Pricing information to be provided by Respondents

a. You must use the pricing schedule template provided in the Response Form.

b. The pricing schedule must show a breakdown of all costs, fees, expenses and charges associated with the full delivery of the Requirements, as specified in **Schedule One**, over the whole of the life of the contract. It must also clearly state the total contract price exclusive of GST.

c. Where the price, or part of the price, is based on fee rates, all rates must be specified, either hourly or daily or both as required.

d. In preparing your Proposal you must consider all risks, contingencies and other circumstances relating to the delivery of the Requirements and include adequate provision in the Proposal and pricing information to manage such risks and contingencies.

e. You must document in your Proposal all assumptions and qualifications made about the delivery of the Requirements, as specified in Section 2, including in the financial pricing information. Any assumption that we, or a third party, will incur cost related to the delivery of the Requirements, as specified in **Schedule One**, must be stated, and the cost estimated, if possible.

f. Prices should be tendered in NZ$. Unless otherwise agreed, we will arrange contractual payments in NZ$.

SECTION 5: Our Proposed Contract

5.1 Proposed contract

The following is the proposed contract that we intend to use for the purchase and delivery of the Requirements set out in Section 2.

Contract for Services

In submitting your Proposal you must let us know if you wish to question and/or negotiate any of the terms or conditions in the proposed contract, or wish to negotiate new terms and/or conditions. The Response Form contains a section for you to state your position. If you do not state your position you will be deemed to have accepted the terms and conditions in the proposed contract in full.

Appendix 3:
Requirements for proposals for ground-based dama wallaby control – Contract 2019 0102

1 What we require

We are seeking proposals, from contractors, to carryout ground-based control of dama wallabies. The methods to be deployed must be acceptable to the landowners and the forest managers, legal (i.e. if pesticides are to be used they must be registered for use on dama wallabies), and safe (i.e. no firearms are to be used on main access roads or within close proximity of dwellings).

Proposals must be supplied on the Response Form provided and contain sufficient detail on the methodology and costs for the “Weighted Attribute” evaluation process.

The final methodology will be developed through consultation with the successful applicant, the Bay of Plenty Regional Council (BOPRC), the landowners and the forest managers.

2 The objectives of the work

Population density is one factor that influences wild animal dispersal and we believe this is the case with wallabies. The Bay of Plenty Regional Council (BOPRC) along with the Waikato Regional Council (WRC) and the Department of Conservation (DOC) are carrying out work to contain the current distribution of wallabies, progressively reduce the distribution then ultimately eradicate them from the Bay of Plenty and Waikato regions.

The primary objective of this contract is to minimise the risk of wallabies crossing the Ōhau Channel via the Mourea road bridge and establishing north of Lake Rotorua. We hope to achieve this by significantly reducing the wallaby population in the forested area either side of SH33, south of Mourea.

The Request for Proposals (RFP) is also an opportunity for us to test the market for motivated contractors, offering potentially innovative solutions, and to evaluate the effectiveness of ground-based wallaby control in a variety of habitats.

3 Timeframes

The required timeframe for delivery is for the work to start immediately upon signing the contract (as near as possible to 29 April 2019) and for the bulk of the work to be completed by 30 June 2019. The final completion date for the contract is anticipated to be 31 July 2019.

For the purposes of this contract we have divided the overall area into 4 smaller control areas (see Section 4). This will enable; us to manage the delivery of the work sequentially from west to east across the block, contractors will be able to fine tune the pricing and methodology of their proposals for the different habitat, and if it appears no individual contractor has the capacity to deliver all of the work across all of the areas we could consider running multiple contracts or reducing the scope of the work.

If the successful contract is awarded more than one area they will be expected to start in the west (e.g. Area 1) and work eastwards across the areas (i.e. finishing in Area 4).

No work is to start until all appropriate consents are in place. (i.e. landowner and forestry company approvals and Medical Officer of Health consent (if pesticides are to be used)).

4 The control areas

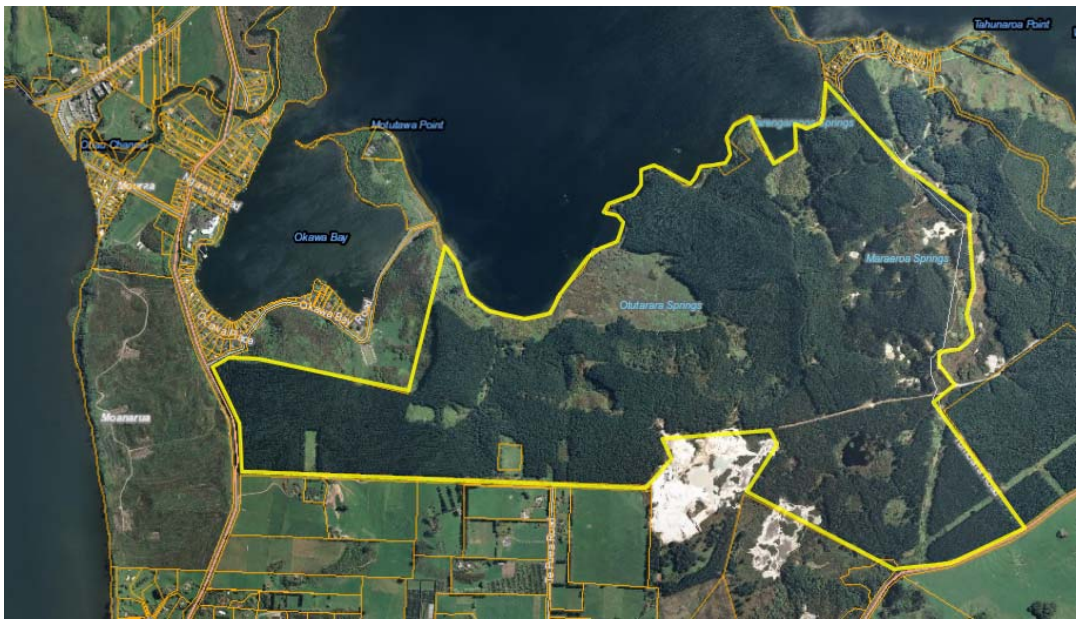
Area 1. Ruahine-Kuharua block

The Ruahine-Kuharua block is located on the western side of SH33 south of Mourea. It consists of 67 ha of 2 year old pines with limited access tracks and very little open ground. The plantation forest in this area is administered by Hardwood Management Ltd, Rotorua (contact Stef Kincheff, 0274 824 094).

Area 2. Paehinahina-Mourea block (SH33 to Tumoana Road)

Area 2. Paehinahina-Mourea block starts in the west on the edge of SH33 and runs to Tumoana Road in the east. The area is 337 ha and is predominantly pine forest ranging in age from 9-20 years old. The pine plantation in this area is administered by Hancock Forest Management. There is 3 ha of open grassed paddocks and the southern boundary of the block borders grassed farmland. The northern part of the area includes 24 ha of native scrubland either side of the Otutarara Springs. Access through this area is difficult. In the east and southeast of the area, 80 year old pines surround native “Geothermal” vegetation. These areas may be attractive to wallabies but contractors will need to take special care to manage risk working in and around these areas[5]. Tumoana Road is the main access road to a number of dwellings at Tumoana Bay and Tahunaroa Point. No shooting will be permitted in these areas.

[5] Hazard Management Plans will need to include controls to deal with risks such as; toxic sulphur dioxide and breaking through the ground surface into boiling water.



Area 3. Paehinahina-Mourea block (Tumoana Road to Ruahine Road)

Area 3. Paehinahina-Mourea block. This area runs east from Tumoana Road to Ruahine Road. The area is 277 ha and it contains a mixture pines ranging in age from 10-21 years old, and native “Geothermal vegetation” (around Ruahine Springs). The geothermal areas in this control area present similar hazards to those in Area 2. The native shrubland in the north of this block surrounds a number of private dwellings at Tumoana Bay and Tahunaroa Point. No shooting will be permitted in these areas.

The majority of the pine plantation in this area is administered by Hancock Forest Management; however 45 ha of 14 year old pines in the south western corner of this area are owned by the Paehinahina-Mourea Trust and administered by PF Olsen.

Area 4. Paehinahina-Mourea block (Ruahine Road to Curtis Road including the Paehinahina Peninsula)

Area 4. Paehinahina-Mourea block. This area runs east from Ruahine Road to Curtis Road. The area is 360 ha and it contains a mixture of pines 18 - 22 year old, native shrubland and the Paehinahina Peninsula which is native hardwood/broadleaf forest. The Peninsula contains a number of titles; private land, multiple owner Maori land and a narrow strip of Public Conservation Land (PCL) (along the western margin). Night shooting is not permitted on PCL and no shooting is allowed around the dwellings or public access roads.

5 Monitoring the success of the contracts

Camera monitoring, run for three weeks prior to and three weeks after the control, will be used to assess the percent reduction in the wallaby population in each area.

Payment of the contract will not be based on the camera monitoring (the monitoring method is not yet refined enough to be used for “Performance based contracting”). The contractor will be audited to assess whether they have delivered the work as per the methodology agreed in the contract documents. Provided the contractor delivers the work in accordance with the agreed methodology, the risk of the work failing to meet the desired reduction in wallaby numbers, will be carried by the BOPRC.

Contractors will be expected to record all of their “tracks” of all field related work on a GPS (of a standard equal to or better than a Garmin 60csx) and provide those to the BOPRC as the work progresses, along with the “way-points” of any wallabies killed or found dead during the course of the work. GPS data is to be collected using the NZTM format and sent to the BOPRC as a GPX file.

The ears of any wallabies killed or found dead during the course of the work, will be removed, labelled and stored (according to our DNA sampling requirements) and cross-referenced to the matching GPS “way-point”.

6 Approved pest control methods

Proposed pest control methods will need to be acceptable to BOPRC, the Māori Landowners and the forestry companies that administer the production forests on the land.

Proposals must be supplied on the Response Form provided and contain sufficient detail on the methodology and costs for the “Weighted Attribute” evaluation process.

The proposed methods and costs are to be broken down for each area and ideally for the different habitat types within each area.

The final methodology (or combination of methods) will be developed through consultation with the successful applicant(s), the Bay of Plenty Regional Council (BOPRC), the landowners and the forest managers. The landowners may also exclude or impose special conditions in areas of special interest (e.g. wāhi tapu) within any of the control areas.

When preparing a proposal, contractors will need to demonstrate they have the capability (i.e. proven track record) and capacity (i.e. sufficient staff and equipment) to complete the work within the given timeframes. Contractors will need to demonstrate they have the skills to deliver the proposed methodology and all the appropriate licences, vehicles, equipment and PPE for those methods.

Though an objective of this contract is to seek innovative wallaby control solutions there are a number legal limitations and efficacy issues. These are outlined below.

Trapping

Leg-hold traps used for possums (e.g. Victor No.1 or similar) are not humane or effective on dama wallabies. Dama wallabies will either break a leg or pull out of these traps, neither of which is desirable.

Other live capture techniques (developed by exporters in the 90’s) are unlikely to be catch-efficient enough for consideration as a control technique.

None of the kill traps developed for possums and been tested or proven effective on dama wallabies.

Poisoning

Only Sodium fluroacetate (1080) and Feratox encapsulated cyanide (Potassium cyanide) are registered for use on dama wallabies. To use 1080 or cyanide requires a Controlled Substances Licence, landowner approval and Medical Officer of Health (MoH) consent.

Aerial broadcast 1080 has proven to be extremely effective on dama wallabies (kills in excess of 95%), however given the objective of this contract (to seek innovative ground-based solutions), along with the relatively small size and accessibility of the control areas, aerial baiting will not be considered for this contract.

1080 cereal bait in bait stations is a method that is currently being trialled at another area. There are issues with this method (possums dominate access to bait stations). This may be overcome with multiple pulses of pre-feed and toxic bait.

Feratox encapsulated cyanide has proven to be effective as a “knock-down” for dama wallabies, consistently achieving about 70% kills. Most previous operations have used “Strikers” as the delivery method and the manufactures (Connovations) can supply Strikers containing a modified peanut paste that is highly attractive to dama wallabies. Feratox “Bio-bags” are another option but they have been used less often than Strikers for wallaby control. Generally to be effective Bio-bags or Strikers would have to be laid at 10 metre intervals along lines up to 200 metres apart. Past operations have killed approximately 10 possums for every wallaby and only 20% of baits kill either a possum or a wallaby.

Shooting

Night shooting, can be an effective option for controlling wallabies provides the ground vegetation conditions are suitable. A small population of wallabies (c. 9 animals) was removed from Okere Farm by night shooting, though conditions were near perfect for this method. The daytime resting habitat was a thin strip native bush on the edge of a steep gorge and mature pine forest with limited food in the understorey. This meant that all of the wallabies in this area were feeding in open pasture at night.

The control areas in this contract probably presents only limited opportunities for night shooting. Shooting will not be permitted along the public access roads or near to the dwellings at Tumoana Bay and Tahunaroa Point. It is up to the contractor to assess whether shooting is a viable option for this contract (see Section 7 Gaining access …).

Shooting also presents the opportunity for contractors to harvest animals for pet-food. We have no objection to contractors harvesting the wallabies they shoot, provided it doesn’t interfere with the objective of completing the contract within the agreed timeframes.

Provided the range is kept within 70-80 metres, and the shooter takes care placing the shot into a vital area, a supressed .22RF is an adequate calibre rifle for humanely killing dama wallabies. Hunters need to be aware that a heart/lung shot on a wallaby is level with their fore-legs which is well above central body mass. Shot-guns with #4 lead shot or larger are also effective on wallabies at close range (e.g. out to 40 metres).

7 Gaining Access to the control areas prior to preparing your proposal

Before entering the Paehinahina-Mourea block (Areas 2-4) to carry out a site inspection, contractors will need to complete the Hancock Forest Management Health and Safety Induction, which can be completed online (see attached PDF “Web based induction – Permit policy letter to Permit Applicants 3Dec2018”).

Once complete an access permit will be required from 1st Security.

Hancock Forest Management does not permit “quad-bikes” within their forests. Side by sides and 2 wheeled farm bikes are permitted.

To access the 45 ha block of 10 year old pines in the south western corner of Area 3, contact Ross Larcombe, at PF Olsen, 07 921 7224.

For access to the Ruahine-Kuharua block (Area 1) please contact Stef Kincheff, 0274 824 094.

Access to all blocks is conditional on the “Rural Fire Season Status”.

8 Health and Safety pre-approval

Because this RFP is for physical works, it is a mandatory requirement that you be pre-qualified for health and safety by SHE Software New Zealand Limited, please find the related information on our website https://www.boprc.govt.nz/procurement

Completing the “Health and Safety Pre-approval” prior to knowing whether your proposal is successful, will reduce unnecessary time delays before the work can commence if you are successful. Even if your proposal is unsuccessful, gaining the Pre-approval through the SHE process will make it easier for you to gain future contract pest control work with BOPRC.

Appendix 4:
Dama wallaby control trial

Trap and Trigger Limited, October 2019.

DAMA WALLABY

CONTROL TRIAL | BAY OF PLENTY

INTRODUCTION

Through a “Request for Proposals” process the Bay of Plenty Region Council awarded Trap and Trigger Limited the tender to carry out wallaby control within Area 1. Okahu 67 ha, Area 2. Paehinahina-Mourea (SH33 to Tumoana Road) 337 ha and Area 3. Paehinahina-Mourea (Tumoana Road to Ruahine Road) 277 ha. A total of 681 ha.

A variety of methods were used and Camera monitoring was used to help gauge the success of the control.

NEED FOR ENGAGEMENT

Invasive species of wallaby have been present in New Zealand for over 140 years, with a mainland North Island populations (dama wallaby) centred in Rotorua being established in 1912. Dama wallabies competes with livestock for pasture, browse seedlings in plantation forests and damage indigenous vegetation.

As part of the Bay of Plenty Regional Council’s Regional Pest Management Plan (RPMP), they plan to prevent wallabies from spreading outside – of a designated containment area. They do this by controlling or eliminating isolated populations outside of or near to the margins of the containment area.

BOP Regional Council (along with the Waikato Regional Council and DOC) is proactively countering the spread of Wallabies, identifying and managing populations with the help of progressive research to develop and test control, surveillance and detection tools.

PROJECT AIMS

+ Minimizing the risk of wallabies crossing the Ōhau Channel via the Mourea road bridge by reducing wallaby numbers in the forests south of Mourea. It is believed that the key drivers of dispersal are density (i.e. if wallaby populations reach high densities, the risk of wallabies spreading increases) and disturbance (e.g. logging operations or pig hunting with dogs).
+ Wallaby control tools are currently limited. This trial presented an opportunity to develop and test innovative wallaby control techniques. Accuracy and capacity were key points of innovation. Alongside the use of Feratox encapsulated cyanide strikers and set nets, Trap and Trigger tested conventional ungulate techniques (i.e. the use of indicating dogs and thermal imagery gear) to wallaby control.

CONTROL PHASES

This fusion of control methodologies had not been used in a dama wallaby control application. The strategy was to apply each control method to all strata/habitat types to gain systematic and consistent coverage, comparing each method to gain an understanding of its detection and dispatch ability.

There were four phases to the methodology:

+ Ground survey with detection dogs
+ Apply toxin across operational zone
+ Apply toxin to hot spot zones and fill gaps
+ Set nets in sensitive areas where firearms and toxins maybe less appropriate

SUMMARY OF EVENTS

Monday 6th May Site visit and consultation with Paehinahina-Morea Trust and Hancock Forest Management.

Thursday 6th June - Sunday 9th June Training and ground survey / hunting.

Sunday 7th July – Tuesday 9th July Follow up ground survey / hunting. Thermal night shooting.

Tuesday 23rd July – Friday 26th July Initial toxin application. Thermal night shooting.

Tuesday 27th – Friday 30th August Follow up toxin application.

Friday 30th August and Thursday 5th September Detox of bait lines and clearing carcasses from tracks

CONTROL APPLICATION

PHASE ONE - TEAM HUNTING WITH DETECTION DOGS

This method aimed to complete systematic coverage of the entire operation area with an optimum detection rate of potential Wallaby habitat, non-habitat and population hotspots. These hotspots were then targeted by ground hunters. The over-arching goal of this method was to achieve an initial knockdown of the population..

+ The team of hunters spread 70 – 100 metres apart, surveyed the operational area maintaining the form of a line
+ Each hunter used Alpha100 GPS which displayed each team members location, updating every 2.5 seconds
+ Each team member carried a suppressed 22cal firearm (for low profile noise)
+ Each hunter uses a detection dog, trained to indicate target species and the presence sign

The team maintained contact during field operations. Team members informed each other of detected wallaby presence, wallaby sightings or when a firearm was going to be discharged. During the ground hunting survey, all wallaby sign was recorded via GPS waypoints.

PHASE TWO – TOXIN APPLICATION

Based on the survey data/hotspot map, a toxin application map was created highlighting areas with zero-low, moderate and high wallaby presence. After the ground survey was completed, the team re-visited the sites to lay Feratox strikers containing encapsulated cyanide.

+ The strikers were applied at an average intensity of 15m x 150m
+ In areas of high wallaby abundance, stakes with 4 strikers attached were installed.
+ For Moderate density, baits were applied at 20m intervals with lines 200m apart.
+ For high-density areas, baits were applied at 10-metre intervals with lines 150m apart.

PHASE THREE – SENSITIVE AREAS, SET NETS

Where we encountered areas where the use of toxin and firearms were prohibited (due to a request from landowners or risk to the public), we used set nets. This is the same method Bruce Warburton used to capture and attach radio collars to Bennett's wallabies in South Canterbury.

HEALTH AND SAFETY

SAFE WORKING PRACTICES

The operation was completed without any accidents or injuries.

Several steps were taken to ensure the safety of all those involved.

+ Daily meetings prior to any field operation
+ Use of skilled staff
+ Possessing appropriate licenses (e.g. firearm license)
+ Staff involvement in identifying hazards

HAZARDS THAT WERE IDENTIFIED AND MANAGED

+ **GEOTHERMAL ACTIVITY**

  Education around identifying Geothermal areas and activity and the risks they can have.

+ **PUBLIC ENCOUNTERS, CONFRONTATION, AND PERCEIVED DANGER**

  Staff needed to understand the operation plan and methodology well. Each access point to the operational area had warning signs for both active shooting operations and the application of toxins. All directly adjoining landowners were either contacted directly or had an informative letter delivered explaining the intended methodology and timeframes of the operation. No public complaints were laid during the operation.

  Staff encounters with the public on the tracks or roads were positive and people understood the operation was happening. Many people encountered were supportive of the project and encouraging towards staff

  • A small number of public walkers were met on the forestry tracks.

  • All people encountered were advised of the operation and happy about the operation being undertaken in the area.

  • Signs were erected around the operation area warning public of the hazards

+ **DOGS**

  Dogs were kept under strict control. Each hunter carried a lead around their waist at all times. When approached by a member of the public, the dog was placed on a lead to show the member of the public that it was controlled.

+ **BLUFFS AND STEEP TERRAIN**
  - To minimize the risk of any slips, trips and falls the hunter ensured that they didn't exceed their limits and avoid terrain that was too steep or difficult for the hunter's ability.
  - Hunters carried PLB's and radios in case of accidents.

+ **FIREARMS**

  Trap and Trigger's ground hunting SOP was read during the H&S induction and hunters were familiarised with this comprehensive code of practice. Shooting directions and proximity of hunters was understood along with the danger of firearms and that members of the public may be present at any time. To ensure safety, we reinforced the 7 basic rules of firearm safety. These rules were obeyed at all times.
  - Hunters maintained a high level of firearm safety and remain disciplined at all times
  - Hunters observed their firing zone, backdrop and identified the target before every shot.
  - High visibility clothing was always worn

CONSULTATION - ACCESS

Trap and Trigger representatives attended a meeting held by contract supervisor Dale Williams and consulted with Barnett Vercoe – Trust Chair for the Paehinahina-Mourea Trust, and Ross Fisher – Forest Manager for Hancock Forest Management. Topics of discussions included:

+ Culturally sensitive sites
+ Methodology
+ Health and Safety
+ Access and Permits

Dale Williams made contact with the Trust chair for the Okahu Block (Fred Whata) via email.
The consultation resulted in transparency for landholders and land managers, as they understood and accepted the methodology. They supported Trap and Trigger by providing access permits and additional information about hazards.

METHODOLOGY APPLICATIONS

HUNTER SURVEY

Indicating dogs to were applideployed to detect and remove dama wallabies. While there was some skepticism, (this technique had never been explored on a commercial scale), dogs were used to establish their potential for future wallaby control operations.

Following field surveys, the original line spacing was revised, as it became apparent stalking the dense bush was not an option. Due to the density of the undergrowth, the line spacing was decreased from the proposed 150 meteres down to 70 meteres.

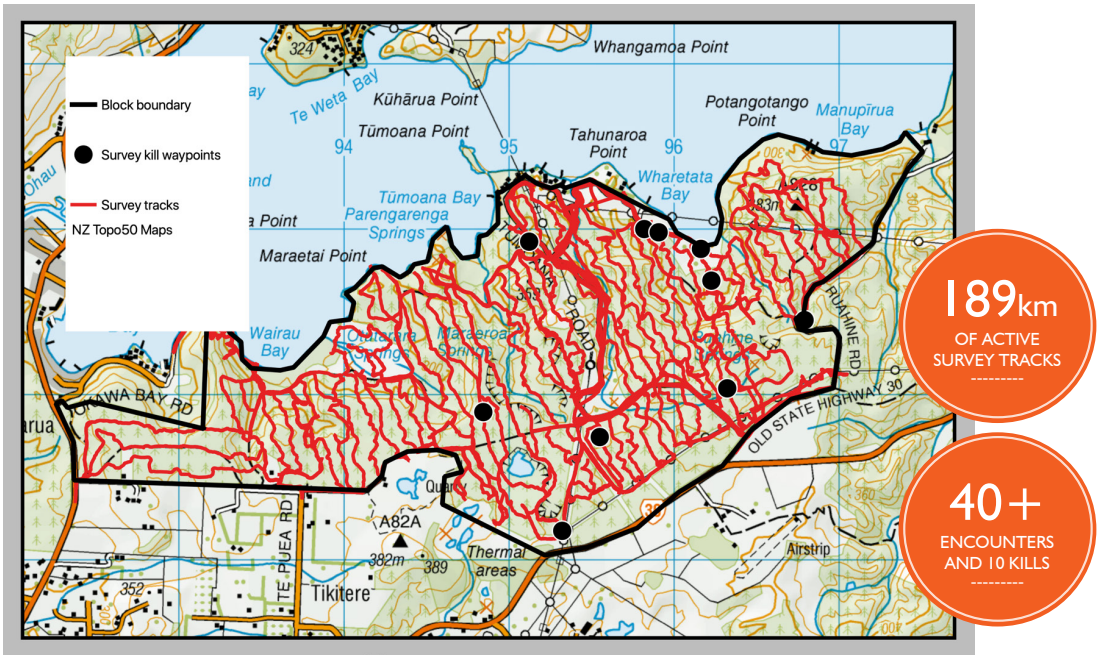
CHALLENGES

Only when specific circumstances were presented, were wallabies were able to be sited and shot. The biggest interference to successfully stalking and shooting wallabies was the dense vegetation/undergrowth. Although there were areas of mature forest with little understory (ideal for indicating) wallabies tended to pass through these areas on the way to feed zones, rather than residing there.

OBSERVATIONS

Wallabies were briefly sighted but not shot on 30+ occasions. Hunters would get glimpses of the wallaby moving off in the distance and the wallaby would not present any opportunity to discharge the firearm. The dog would generally have a delayed reaction in the indication because the scrub was so dense it created a scent barrier. However, the dogs were consistent at detecting a fresh scent, indicating that a wallaby had been present but had moved off as the hunter approached. The number of wallaby detections was very frequent, heavily outweighing wallaby sightings. Although, knowing that a wallaby had been there was not much use given the fact that wallaby presence was indicated throughout the entire block.

There was some correlation between concentrated dog indications surrounding hotspots areas but this was also measurable by simply observing “pad runs”, scat and vegetation type. No hunting was carried out on the Okahu block as the blackberry was too dense and wallaby numbers were deemed to be too low.



TOXIN APPLICATION

Toxins were recommended by BOPRC as a suitable method of reducing wallabies in the given environment. This was due to data collected from previous operations.

Toxins were applied in the form of Feratox encapsulated cyanide placed in strikers filled with non-toxic ferafeed paste.

+ Baits were stapled to trees, posts, stumps and wooden stakes at a minimum of 20cm off the ground.
+ Baits were applied as close to that 20cm as possible to increase the chance of a wallaby encounter.

Based on the survey data, a toxin application map was created. The map split the project into three strata: grass feed areas/hotspots, areas of high wallaby use and low priority areas which had little wallaby presence.

The toxin was applied twice. The first run was focused on hot spots and areas of high use. The second run focused on a second application to the hotspots and tracks but also filling gaps from the first application.

One issue faced using toxins was by-catch. Possums, having a dominant nature, would often interfere with strikers by consuming them, therefore removing the opportunity for wallabies to be targeted. Giving many areas two applications of toxins meant that the resident possum population took a serious hit, clearing the way for the wallabies during the second round.

HOTSPOTS

Hotspot areas were usually any areas with grass available. Typically grassy tracks, clear areas under pylons, grass public recreation areas and fresh forestry cutover. For hotspot areas, toxins were placed on stakes distributed throughout open areas. Up to 4 toxins were stapled to each stake. Due to high wallaby numbers using these areas, it was important that enough toxin was available for multiple kills.

AREAS OF HIGH USE

These areas generally consisted of scrubby habitat that wallabies were using as camps or resting areas. A significant amount of scat and runs were present in these areas. The toxin was applied at 10-metre intervals in these areas. When good trails were encountered, multiple toxins were placed to maximize the chances of toxin being available after possums or other wallabies.

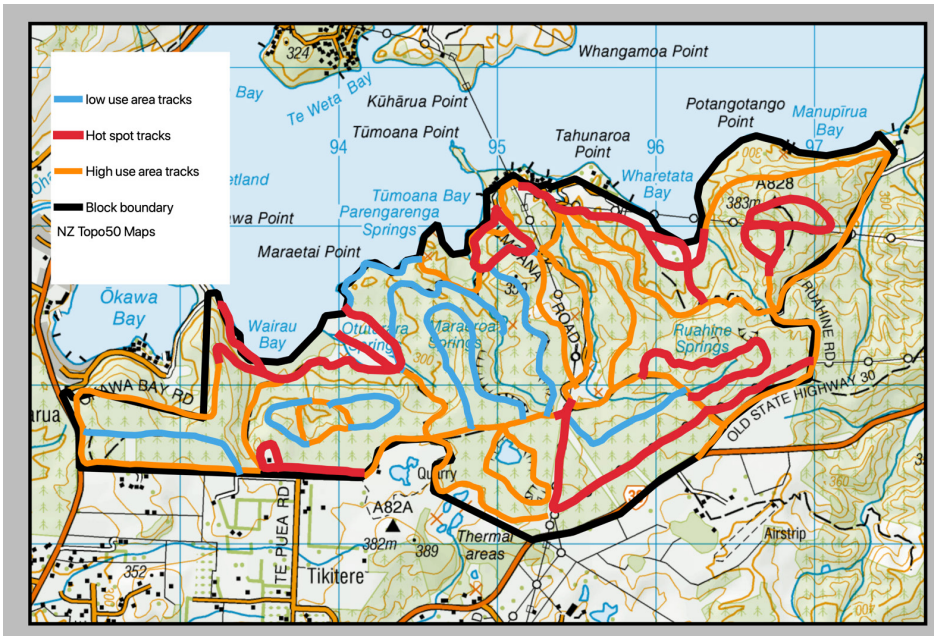
LOW PRIORITY AREAS

Low priority areas generally consisted of mature plantation with little or no undergrowth, or areas with super dense blackberry where there were no established runs or open areas. Low priority areas still had toxin applied but at a less intensive rate. Spanning anywhere between 10-20 metre intervals between toxins and lines approximately 150 – 180 metres apart.

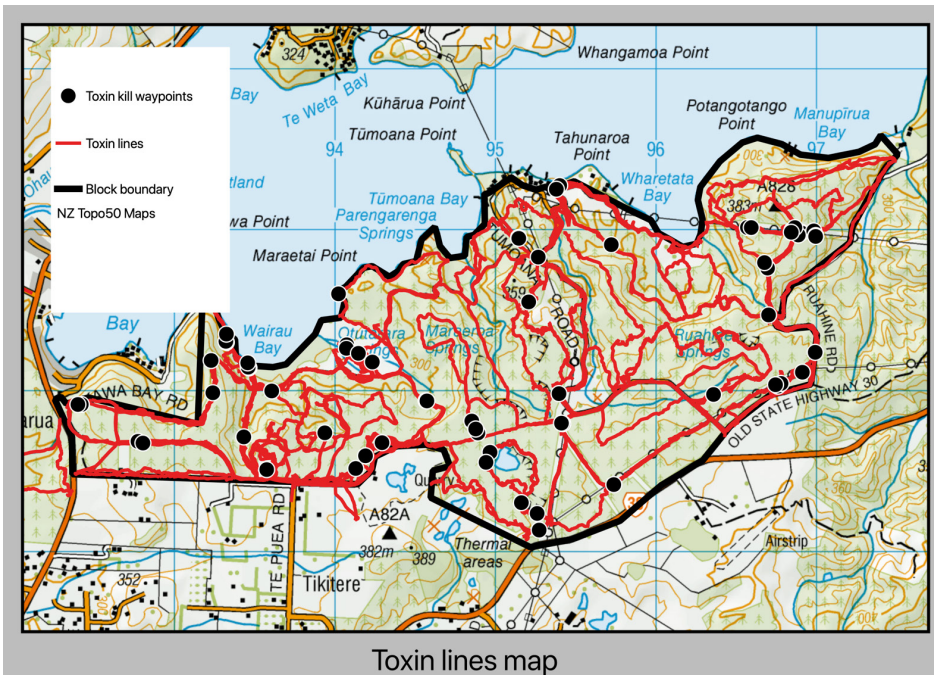
Though not shown on the map, Feratox strikers were laid along the main tracks in the Okahu Block. No dead wallabies were located during the detox in this area.

RESULTS

4500 strikers applied with 70 confirmed kills over detox of 50% of the lines.



Toxin application map



Toxin lines map

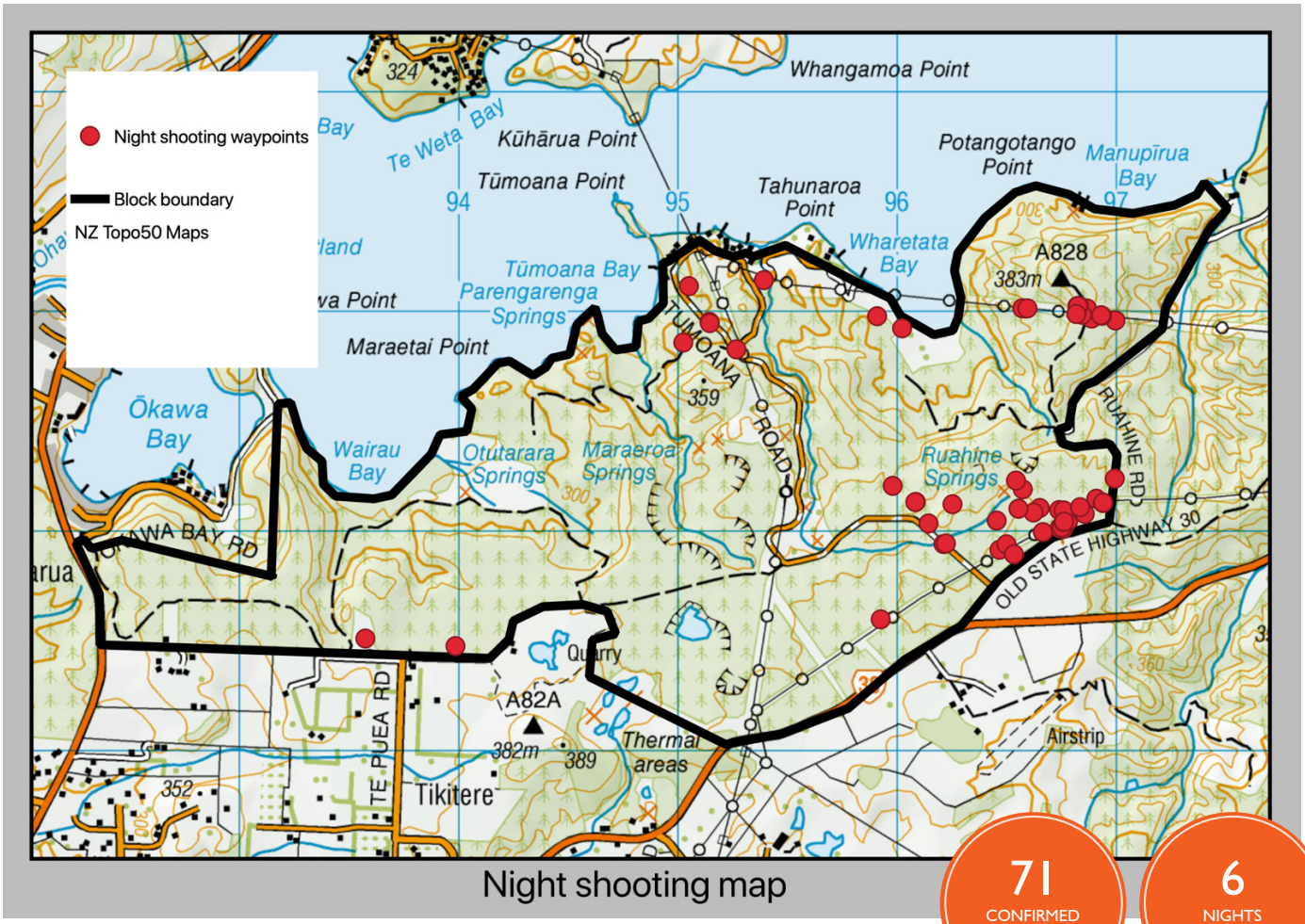
4500
STRIKERS APPLIED

70
CONFIRMED KILLS

NIGHT SHOOTING

Due to the lack of knockdown success during the hunter survey, we undertook 6 night shoots to compensate. 71 kills were confirmed.

+ Using 2 shooters and a thermal operator, the thermal operator would walk and scan for wallabies in the hotspot areas.
+ When a wallaby was sighted, the thermal operator would guide the shooters to a reasonable shooting distance, with a shooter on either side.
+ They would observe the thermal screen to gauge where and how many wallabies were ahead,
+ The thermal operator would then put the light on the wallaby and a quick response was required to shoot the wallaby before it moved off.



Night shooting map

71 CONFIRMED KILLS

6 NIGHTS SHOOTING

SET NETS

Set nets were not used as a control measure technique during this operation. Some trials around the construction of nets were undertaken. The purpose of set nets as a control technique was to explore their effectiveness as a viable option near sensitive sights (where shooting and toxins were not allowed). As the use of set nets was not deemed necessary, no data was collected.

An independent trial will need to be undertaken to accurately establish an effective net concept and application method for controlling dama wallabies.

DETOX

One key reason for detox was to remove carcasses away from areas likely to be encountered by the public.

Accurate detoxing can be difficult and time-consuming for little benefit. With the vegetation presented, attempting to walk an exact previous toxin line is tricky and many toxins and carcasses can be missed. All tracks, public areas and hotspots were detoxed.

As Feratox strikers are bio-degradable and rapidly destroyed by rodents, very little risk is posed by not detoxing the more remote and inaccessible bait lines.

POPULATIONS AND DISTRIBUTION

OBSERVATIONS

Population densities somewhat varied throughout the operational area. Common observations were heavy pad runs heading in and out of dense scrub areas then heavy sign presence on any grassy areas. Sign was found between these areas but pointed towards wallabies only using these areas as runways between bedding sites and feed areas.

While undertaking night shooting, with the thermal imaging equipment we observed groups of up to 13 wallabies in one grassy clearing.

INCONSISTENT TRENDS

We observed inconsistencies in the number of wallabies encountered in specific places between nights. For example, one night a group of 11 wallabies were encountered on a clearing of which two were shot. The following night, that clearing had one wallaby present. The alternatively some clearings where no wallabies were observed, contained large groups of wallabies the following night.

An educated guess would be that wallabies have several feed sites within their home range, that are visited sporadically. Whether these groups tend to shift from one site to the other as a large group is unclear or whether it's just coincidence that more than 10 wallabies show up to the same clearing.

OPERATIONAL DISRUPTIONS

WINTER / ADVERSE WEATHER

Hunting through the shortest days of the year provided near to 9 hours of sunlight. Negative points of working during mid-winter are it is slippery underfoot and hunting is unpleasant in these conditions. As a result we needed to postpone planned work on two occasions. Fortunately, we adopted a flexible approach to undertaking this operation, which allowed us to delay work until a decent weather window presented itself.

WALLABY BEHAVIOUR

Dama wallabies appeared to be mainly solitary but will gather together when resources are abundant such as food and cover or when populations rise. They are mainly nocturnal and they spend most of the daytime resting and usually take refuge in scrub or dense forest vegetation during the day, emerging in the late evening to feed. Due to the habitual behaviours described above such as nocturnal activity and burrowing down during the day, wallabies were highly likely to be nested deep in dense scrub during the ground hunting survey. Not only did this make for difficult detections by the dogs but also difficult for the hunter to see the wallaby both before and after it had spooked.

EDUCATED POPULATION

The wallabies in this area, in particular, were very wary. Characteristics like; spooking from foreign noise, moving off swiftly when picked up in a spotlight and large groups spooking after suppressed gunshots, indicates that these wallabies have been regularly hunted at night. While we were working, we encountered hunters spot lighting on the block, on two separate occasions. This shows how often they are hunted. We found that using supersonic rimfire rounds were too loud as groups of wallabies were spooked after one shot. Subsonic rounds provided more second chances at groups of wallabies however they did require shooting from closer distances.

TOXIN WAIT TIMES

Connovations Limited was the provider of both the striker baits and Feratox encapsulated cyanide and are the only viable supplier in New Zealand. There was some wait time for orders to be delivered. The wait times were not a major disruption but could have the potential to prolong an operation for a considerable time.

DENSE SCRUB

we anticipated some dense scrub and blackberry before starting the operation however we did not expect to find 80% of the operational area smothered in head height blackberry. It made for some testing times, and with some canvas pants and a coke waiting at the truck, we pushed through.
The ability to travel through this dense vegetation was not a real disruption to the operation but the problems it causes when it comes to finding and removing wallabies is the real issue. You can only use the indicating dogs in the good bush, you can only night shoot the open areas and you can only put out so much toxin in the blackberry when a wallaby can't see it from three feet away. The point being, dense vegetation is one of the biggest contributing factors in achieving fast, efficient wallaby control.

RESULTS

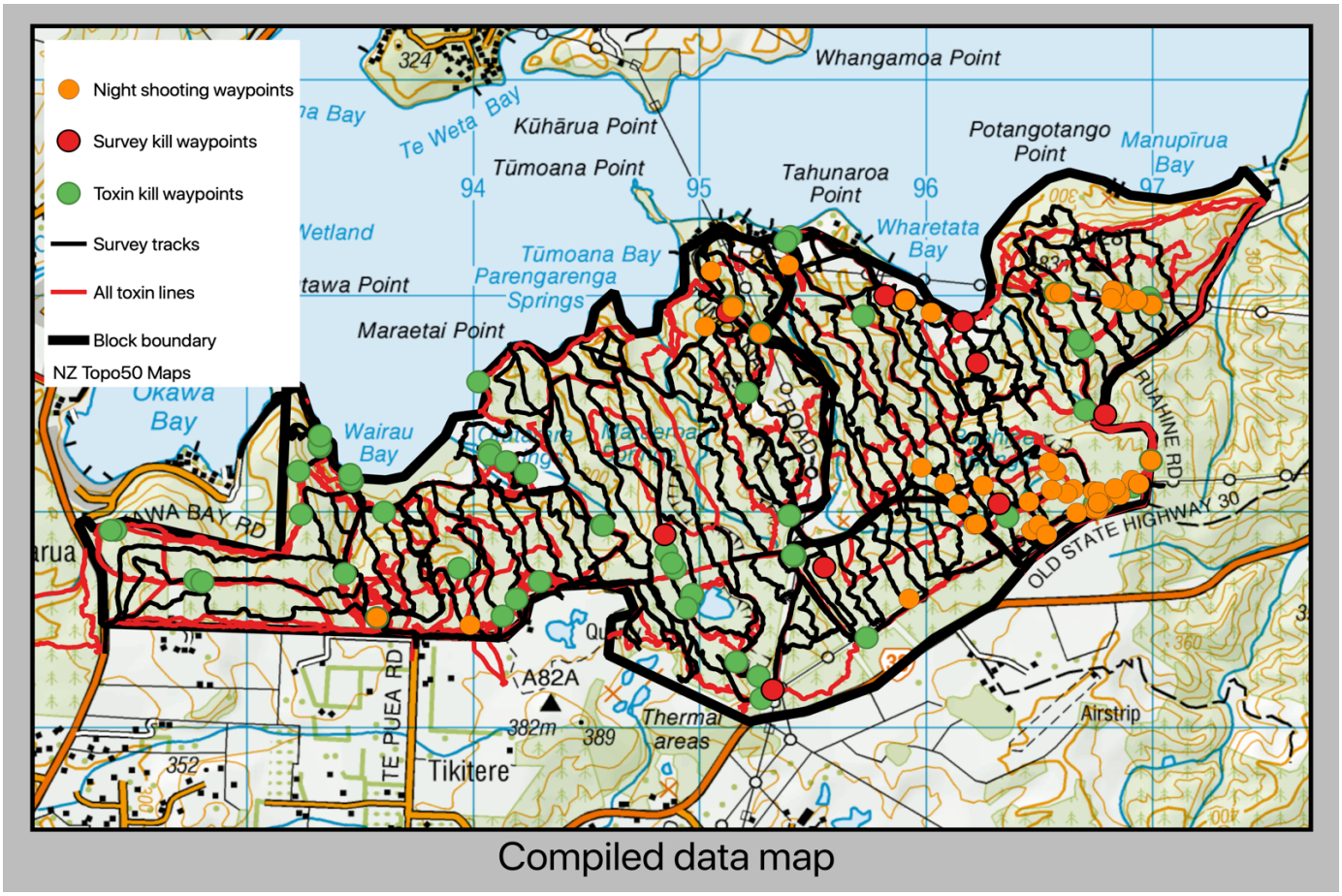
138
CONFIRMED KILLS

60+
UNCONFIRMED KILLS

ONE
WALLABY PER 4.4 - 3.1 HECTARES

614
HECTARES SURVEYED

In total, 138 wallabies were confirmed kills, with an estimated 60+ more unconfirmed on remaining toxin lines. That's one wallaby for every 4.4 – 3.1 hectares over the 614-hectare area.



Compiled data map

MOVING FORWARD

IS GROUND HUNTING AN EFFECTIVE TOOL FOR WALLABY CONTROL?

We have established that indicating dogs are not an effective control tool, even with an intensive approach like our ground survey. This application could be used in vast areas of the open forest however the tenancy for dama wallaby to seek cover in dense vegetation is still likely to remain an issue.

WHAT HAVE WE LEARNED?

We have learned that ground surveys have supplied reliable information on wallaby habitat use and population hotspots. A less intensive ground survey could be applied to highlight these areas that need special attention or close inspection through satellite imagery could also play this role.

WHAT WOULD WE DO DIFFERENTLY?

With indicating dogs out of the equation, we would likely use the same volume of effort night shooting and possibly running a couple of possum trap lines.

HAVE WE ACHIEVED EFFECTIVE CONTROL?

We are concerned about the overall reduction of wallabies as an effect of our control operation. Our aims was to make a 90% plus reduction in wallaby numbers. However, we do not think that was achieved. After shooting 70+ wallabies during the night shoots, the numbers of wallabies observed on the first night were similar to the numbers seen on the last night. Following this, we expected to encounter more dead wallabies as a result of the toxins. One night we watched a wallaby feeding within meters of some toxins, however we never found a dead wallaby in that area. Indicating that toxins may only be taken opportunistically when preferred food is available.

If we had to put a number on it, we would guess we made a 65% -75% reduction in the population. We are eager to receive the data from the camera monitoring to see what reduction is measured.

CONCLUSION

It has been a pleasure to work alongside Dale Williams from BOPRC. His passion for the Wallaby issues we face is sure to guide the programme in a successful direction. We are hopeful to return and further refine wallaby removal techniques based on our findings.

We only wish the best for the future of the containment project and hope to play a key role in its success.

Kind Regards,

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Appendix 5:
Monitoring report for Paehinahina-Mourea wallaby control contract blocks 2 and 3

Philip Commins, November 2019.

MONITORING REPORT FOR PAEHINAHINA – MOUREA WALLABY CONTROL CONTRACT BLOCKS 2 AND 3

Background

Wallaby control contracts were let through a tendering process with Trap and Trigger Limited winning the contracts for blocks 1 (67ha), 2 (337ha) and 3 (277ha). A range of control methods were proposed including shooting over dogs, night shooting, feratox strikers and nets. For details on how these methods were applied and wallabies killed please refer to Trap and Trigger Limited's post operational report. The contractor treated blocks 2 and 3 as one area. Initial control in this area was carried out over three periods from 6th June to 26th July with all methods except nets employed. A second round of control using feratox strikers was carried out from 27th August to 30th August.

Monitoring Method

Recoynx camera-traps were used to provide and activity index pre-control and post each of the two rounds of control.

Cameras sites were chosen using the intersect points on a randomised grid with a spacing of 400 meters. Sites were rejected if they fell within 200 meters of the control boundary. This resulted in 15 random points in block 2 and 12 in block 3 (see map). As per the wallaby monitoring protocol the best site within 20 meters of the random point was selected for mounting the camera. Data from 21 nights was used to provide an activity index pre and post control.

Pre-control monitoring in Block 2 was carried out between 9th April and 1st May and block 3 monitoring between 23rd April and 15th May. Post-control cameras were deployed from 25th July and left in place until 24th October.

It was not possible to reliably measure population change in block 1 due to the small area involved. Pre-control monitoring with three camera-trap sites indicated a low population. No further monitoring was undertaken.

Results

Results are from 22 camera-trap sites. Camera interference and one malfunction resulting in the loss of data from 5 sites.

Kill post initial control – 43% +/- 33.5% (approx. 95% CI)

Final kill (post second round) – 71% +/- 15% (approx. 95% CI)

As the cameras were in place until 24th October kill was re-calculated for the last 21 nights: Final kill 65% +/- 22% (approx. 95% CI)

Site to site variation was high with some camera-traps recording a 90 to 100% drop in events while 3 camera-traps recorded an increase in events. This is likely due to changes in movement patterns and a possible increased use of security cover.

Discussion

The kill post initial control was poorer than expected. One possible explanation is the wide gaps, up to 400 meters, between toxic bait lines. Past control operations have achieved good results with line spacing of 150 meters. Overlaying the bait lines with the camera locations (see map) and comparing the results from cameras more than and less than 75 meters from bait lines shows no difference in results. Wallaby are known to have home ranges averaging around 25ha so distance may not be the issue but rather insufficient bait. A moderate possum population plus rats results in rapid bait consumption such that within a few nights little bait would still be available. Wallaby with home ranges centred well away from the bait lines but with ranges overlapping the lines may never have been exposed to any bait. Optimum spacing of bait lines for wallaby control is an area that requires formal research.

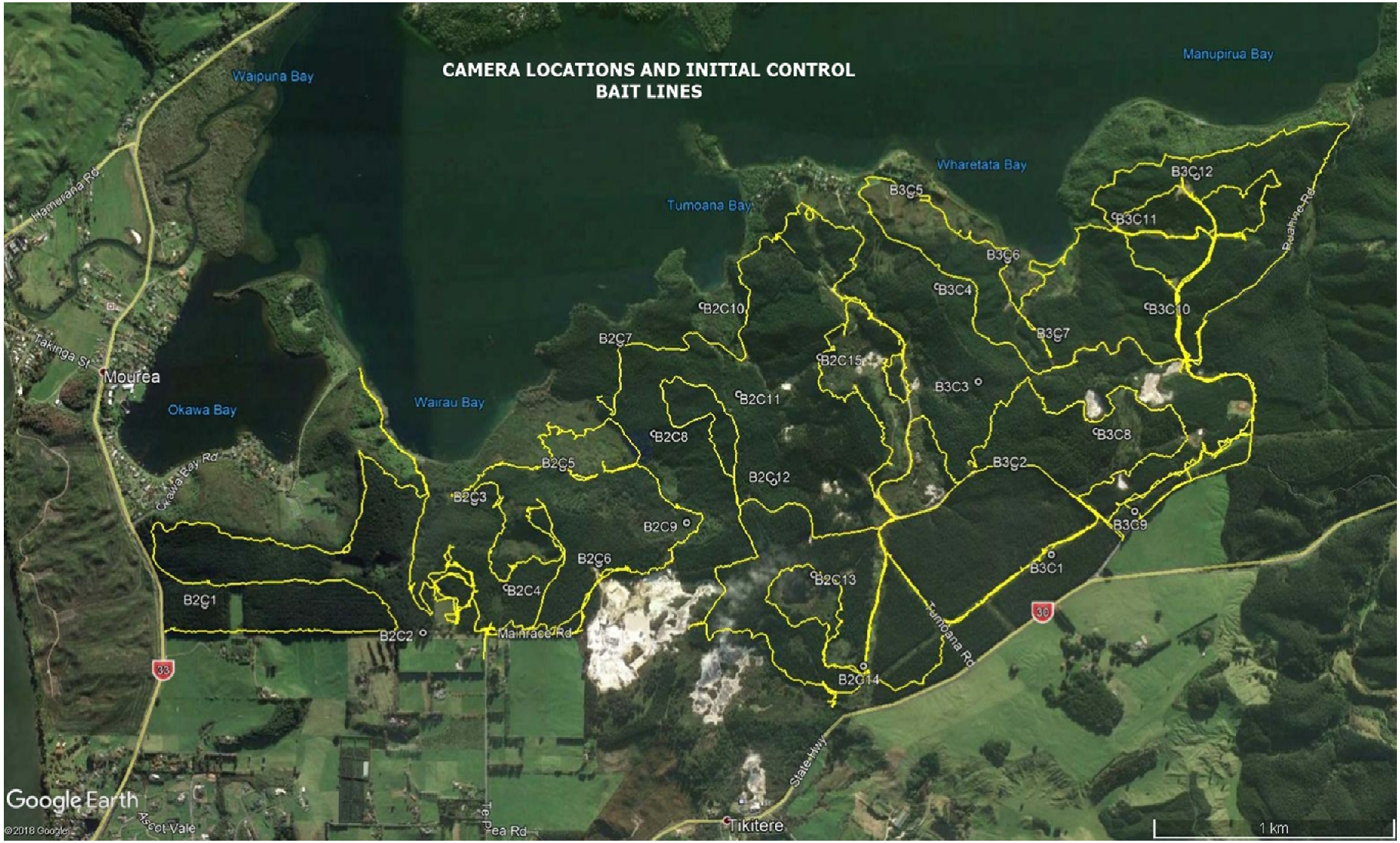
A second possible explanation is heightened neophobia. Wallaby are by nature very cautious animals and they are also gregarious and social. Initial control used shooting over dogs during daylight and night shooting. This is likely to have increase the levels of stress in surviving animals, disrupting their normal movement patterns and social groupings. This in turn is likely to have increased their level of caution when presented with a novel food. Trap and Trigger noted light shyness and saw two spotlighters but this disturbance would be minimal compared to the initial control work.

The second round of toxic baiting brought the kill up to the levels that have been obtained in other control operations using feratox strikers. This round of baiting filled in the gaps left in the initial baiting and targeted areas considered “hotspots”. A month had passed since the first round of toxic baiting possible giving wallaby the time to settle down, re-establish social groupings and resume normal movement patterns. It is therefore not possible to know which of the two explanations for the initial poor result is valid. It seems likely that both contributed. Little is known about wallaby behaviour, movement patterns, habitat selection, and this lack of knowledge makes it difficult to interpret results. It’s a fertile area for research that would contribute significantly to management objectives. What is clear from this control operation is that the initial dogging and night shooting has not resulted in a higher kill than can be achieved with toxic baiting alone. Reversing the order, using dogging and night shooting following toxic baiting, is likely to provide a different result however the cost effectiveness will need to be evaluated.

Work coming out of Landcare Research has suggested that possum monitoring immediately after control overestimates kill. It seems there is a period immediately after control when possums are more cautious, move less, or when survivors that normally would spend a significant period of time in the canopy start spending more time on the ground. The second calculation of final kill was carried out to see if this effect held true for wallaby. No significant difference was detected but statistical power was low. A higher level of kill and larger sample size would be required to test this idea.

Philip Commins

November 2019


CAMERA LOCATIONS AND INITIAL CONTROL
BAIT LINES
Waipuna Bay
Manupirua Bay
Wharetata Bay
Tumoana Bay
Wairau Bay
Okawa Bay
Mourea
Hamurana Rd
Takinga St
Okawa Bay Rd
Maintrace Rd
Tumoana Rd
State Hwy
Te Puna Rd
Ascot Vale
Tikitere
B2C1
B2C2
B2C3
B2C4
B2C5
B2C6
B2C7
B2C8
B2C9
B2C10
B2C11
B2C12
B2C13
B2C14
B2C15
B3C1
B3C2
B3C3
B3C4
B3C5
B3C6
B3C7
B3C8
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B3C12
33
30
Google Earth
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1 km