

Pest animal control guidelines for the Auckland region

Simple techniques for maximum success





This document has been based in part on the Northland Pest Control Guidelines 2016, developed by NZ Landcare Trust

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Foreword

Auckland's natural environment is an essential part of our identity, economic prosperity, health and wellbeing. We have a great diversity of native species and ecosystems, but unfortunately many are under threat.

Pest animals have a major impact on many of our treasured species and places. Between species like possums browsing on our native plants, stoats and cats eating our native birds and lizards, goats, deer and pigs damaging the understory and rats impacting on pretty much everything, our native biodiversity is in for a very hard time. Pest animals can also impact heavily on primary productivity – for example six or seven possums can eat as much grass in a night as a sheep!

Luckily in many cases it's in our power to manage these pests down to low levels in many places, especially if we band together to bring consistent control across larger areas.

Council has produced this guide to give you the information you need to protect our special places, be they the local bush, around your house or your local community. We've tried to strike a balance between keeping the information simple and providing enough information for you to be successful. We hope you find it useful.

Phil Brown

Biosecurity Manager, Auckland Council

Guiding principles for pest animal control

1. Know the home range of the target animal

The home range of the target animal will help determine the distance between tools (your traps and bait stations). Usually you would put a minimum of two tools within an animal's home range, so it has more opportunity to encounter them.

Knowing the home range will also help determine the distance an animal would have to travel to reinvade an area, so will help you define the shape and size of a control area. Long thin areas are less viable than rounder areas as pest animals can more easily reinvade.

2. Use favoured habitat to choose tool placement

Placing control tools in areas that are favoured habitat of the target animal will increase the chance of that animal encountering the tool, leading to a better likelihood of successful control.

If a control area does not have suitable favoured habitat for the target animal, there may be no need to place tools there.

3. Frequency of breeding guides the frequency of control

This helps guide how often the tools need to be activated to keep up with additions to the target animal population – matching the rate of control with the target animal rate of breeding. Control is best carried out before a pest animal breeds and during fledging time to reduce the rate of population increase and benefit biodiversity.

4. Time your control to be as cost effective as possible

Good levels of control effort need to be applied over both winter and spring and there are two aspects to this timing:

- Pest animal control is often most effective in the winter months, when there is less natural food available in the environment and target animals have higher energy requirements to keep warm, making bait more attractive.
- Having pest animal numbers low in spring will be of greater benefit to the population you are trying to protect. This is because spring is when bird species are breeding, and are therefore more vulnerable.

5. Use the animal's behaviour traits against them

When controlling pest animals, it is important to remember that one reason why they are successful predators is their ability to quickly adapt to new situations and features in their environment.

To maintain effective control, project managers should ensure a variety of tools are used when targeting pest animals. This can involve not only activating and deactivating existing deployed tools in pulses, but also using different tools, such as alternative bait or traps.

Doing so will help counter the adaptability behaviour of pest animals, and in combination with implementing the other key principles of pest animal control, will help deliver lasting effective pest animal control to a project.

6. Do it safely

- Follow the product label, Safety Data Sheet and manufacturer's instructions. If you are unsure of how to safely use the toxin, ask the supplier or contact Auckland Council's Biosecurity on (09) 3010101.
- Always use personal protective equipment.
- In more populated areas, consider using traps in place of toxins, to reduce the amount of toxins being used in the environment.
- All traps and toxins should be contained within lockable stations to reduce risks of non-target poisoning.
- Where toxins are required, pulse their use

For the full explanation of these principles email biosecurity@aucklandcouncil.govt.nz

Planning considerations

Before starting a pest control programme, it is useful to consider:

- Which native plants and animals and pest species are present
- The levels pests should be reduced to (and for how long) to make a difference
- What monitoring needs to be done, to determine if the pest control is working
- Ripple effects or side effects that might occur and how to minimise these
- The management of kauri dieback disease
- What other control is being done nearby
- Do we need landowner permission or to make the neighbours aware of what we're doing?
- What funding is available?
- Do we have capacity to do everything?

What are the beneficial and the harmful species in your area?

If you need help identifying the native flora and fauna in your area, and you don't have access to an expert to come and look at it for you, there are several online tools to help.



Naturewatch – upload photos of plants, animals, insects and more, then have them identified. You can learn in more depth about a species and look at other projects around New Zealand <http://naturewatch.org.nz>

Landcare Research – find results of research and more extensive descriptions of plants, animals and fungi in New Zealand.

<http://www.landcareresearch.co.nz/science/plants-animals-fungi>



They also have a search tool called "What is this bug?". The presence and change in density of certain types of ground invertebrates such as ground weta and ground beetles can be another sign of pest animal control efforts.

<http://www.landcareresearch.co.nz/resources/identification/animals/bug-id/what-is-this-bug>

Pest Detective – to help determine which pests you may have at your place check out www.pestdetective.org.nz

It contains information on the regular culprits, the damage they cause and the clues they leave behind.



Minimising side effects and ripple effects

Consideration should be given to what these effects may be, and minimising them.

- Side-effects include direct impacts, e.g. the accumulation of toxins in the environment and the trapping of non-target species.
- Ripple effects are undesirable biological responses to pest control such as the increase of rats once stoats are controlled, which in turn could lead to increased predation of insects and seeds.

Where possible, try to implement an integrated pest management programme targeting all serious biodiversity pests and potential problem species.

Kauri dieback disease

Kauri dieback disease (a new *Phytophthora* species, *Phytophthora agathadicida*) has been identified as a serious threat to kauri and kauri ecosystems throughout New Zealand. Kauri dieback has been associated with kauri death and decline throughout parts of the Auckland and Northland regions and parts of the Coromandel.



Kauri dieback has been identified in various sites throughout the Auckland region (including Great Barrier Island, the Waitākere Ranges and surrounds), but there are still many discrete areas (e.g. Hunua Ranges and Waiheke Island) and localised sites that remain free of kauri dieback disease at this stage.

Kauri dieback is a microscopic soil-borne disease that can spread through movement of infected soil or water. Consequently, containment and hygiene measures to reduce the spread are essential to preserving Kauri for future generations. Any movement of soil (on footwear, vehicles, machinery, equipment and tools) has the potential to spread kauri dieback disease. The risk of spreading the disease both within an area and introducing it into healthy areas of kauri should be addressed by anyone using/visiting areas with kauri present.

There are currently no approved tools for the treatment of Kauri dieback. Cleaning footwear, vehicles, tools, equipment and machinery is the single most important management action available apart from avoiding infected areas.

Hygiene protocols must be followed to limit the human-assisted spread of kauri dieback. The hygiene procedures for kauri dieback, shown here, must be followed at all times. A phytosanitary kit (including a spray bottle of Sterigene and a brush) needs to be carried by the group at all times during the work.

Prior to starting your day, ensure that all footwear is soil free. As an added precaution spray Sterigene on all footwear before entering the areas where kauri are present.

Footwear and equipment must be cleaned:

- At the start and end of each day.
- At all fixed phytosanitary stations along the track network.
- Every time the surveyor exits or enters the track network.
- Before entering and after exiting a kauri area (defined as a continual stand of kauri or within 30m of individual kauri).



Cleaning of footwear and equipment is carried out by removal of all soil and debris using the brush and then applying Sterigene. It is important that as much soil as possible is removed prior to applying Sterigene as it cannot penetrate caked on soil.

Writing your pest animal management plan

A project plan can be anything from a simple one-pager to a detailed restoration plan. For most projects, a simple plan should be enough. However it's essential to have one so that you know what you want to achieve, how you're getting there, and how successful your actions are along the way.

Spending time considering the impacts of your actions in the initial phase of your project can save huge amounts of time and effort once the project commences. It can even make the difference between success and failure.

Points to include in your plan

- **Site details and features**
 - Where it is, what activity currently happens there, are there any covenants involved?
 - How big is the project area? What is the terrain and access like?
 - What types of ecosystem or native species are present? Are any of them threatened?
 - What permissions or approvals do I need from landowners?
- **What are your priorities?**
 - What pest species do you want to control, which are your top priority, and why?
 - What control method do you plan to use for each species? (tool types, timing etc)
- **Key locations and maps**
 - The area(s) you are working in, and the locations within those areas in which you are going to be controlling pest animals.
- **Your goal and vision**
 - The values you are trying to protect at your project site and any future goals you would like to achieve for it.
- **Measuring success**
 - What monitoring will you carry out?
- **Budget, timeline and capacity**
 - What do you want to do, by when, and how much will it cost?
 - Do you have enough volunteers, and the range of skills required?

You should know where the funding is coming from for each phase (.i.e grants, direct council support, fundraising, volunteers' own donations) so the project can keep momentum.

Familiarise yourself with the timing of your local board's funding rounds, and any other funds available in the region – some applications require a lot of information, so you should leave plenty of time to complete them. The local board and regional grant information is available on the Auckland Council website.

We can help with a template for writing your plan whether your project is large or small; just contact us on 09 301 0101 or biosecurity@aucklandcouncil.govt.nz

Controlling pest animals

The following sections contain advice specific to several pest animal species – signs of their presence, impacts on the environment and best practice advice on controlling them with methods such as traps and toxins.

The animals featured in this guide are:

Possums

Mustelids

(stoats, weasels and ferrets)

Rats

Mice

Feral cats

Hedgehogs

Rabbits and hares

Goats

Deer

Feral pigs

Wasps

Pest birds (e.g. magpies, mynas)



Some control methods are not suitable for every type of site; we will indicate (using the symbols below) which method is best suited to the location you are working in.



Suitable



Varies



Not suitable

1 Possums

Possum facts

Possums can devastate forests and their fauna. They alter the composition of the forest by heavily browsing their favoured food trees and can disrupt vital ecological processes, such as flowering, fruiting, seed dispersal and germination.

To our indigenous fauna the possum is both a food competitor and a predator. 'Nest cam' video has confirmed that possums eat eggs, chicks and adult birds; autopsies have revealed that they also eat a wide range of invertebrates.

Possums:

- Feed at night and sleep during the day
- Are good communicators and are known to make 22 different calls/sounds
- Live in trees but also move across open country and graze on pasture
- Often follow the same track, forming flattened paths about 20 cm wide
- Have an average home range of 200m in forest, but will travel 15 times this length for seasonal food resources and have multiple nest sites
- Have favourite trees that are visited regularly, often recognised by extensive scratch marks in the bark and heavy browsing of leaves and fruit
- Are very curious and will investigate new objects in their territory. You can use this to your advantage



Their dislike of water and wet weather (although they can swim if they have to) makes possum control much more successful in periods of fine, cooler weather.

Possums have seasonal preferences and are opportunistic feeders. Traps or bait stations can be moved to target seasonal food supplies such as:

- Pine pollen in July-August
- Willow-poplar budding in October-December
- Supplejack, taraire, hinau, tawa fruiting in May-August
- Late summer podocarp fruit such as totara
- Various orchard trees when in fruit throughout the year



Targeting fresh possum sign can also be effective. Presence of possum trails, extensive browse and fruit damage, scratch marks on trees, faeces etc can indicate where possums are present.



Left: a possum trail

Right: possum droppings (pellets are between 1 – 2cm long)

Above right: Possum claw marks on tree bark



Possum control using toxins

Which toxin is best for your programme?

There are multiple toxins registered for possums control in New Zealand including cyanide paste and encapsulated cyanide, cholecalciferol, 1080, brodifacoum, and pindone.

In urban areas, toxins for community group possum control are only recommended for private property in the Auckland region. This is because there are no lockable bait stations available for possums so the use of baits in non-lockable bait stations is not appropriate for highly publicly accessible areas.

So long as they are contained within bait stations, brodifacoum, cholecalciferol and pindone are the only possum baits that do not need a Controlled Substance Licence (CSL). There are other toxins such as cyanide which do require a CSL.

For large areas (in excess of 50ha) when possum density is moderate to high, or they need to be controlled to very low levels for long periods (e.g. during kereru or kokako nesting), Feratox is a useful tool.

Feratox (encapsulated cyanide) is often used for an initial 'knockdown', and then possums can be controlled to maintain low levels with trapping or other toxins, depending on preference. It is important to note that rats need to be controlled to moderate to low levels to enable the use of Feratox for possum control. The use of Feratox is best delivered by a contractor.

Further information about the multiple toxins available for possum control is available from the Auckland Council Biosecurity team.

When should you use toxin?

For the maximum benefit to birdlife, possum poisoning is best concentrated just before and during the bird breeding season, which for most species runs from August to about January. Because they eat almost anything, possums are attracted by a variety of baits.

But they learn quickly, so sub-lethal poisoning (often the result of low quality or degraded poison baits, or continual baiting year-round by not pulsing) may result in them becoming bait-shy.

What is pulsing?

Pulsing of baiting and trapping means using traps and bait (in bait stations) for strategic specified periods of time throughout the year, as opposed to all year round. There are several reasons for doing this:

- It reduces the labour component required to achieve effective control of the target species.
- Targets pest animal species at times when they are most accessible for control.
- Targets pest animal species at key times of the year when native species are breeding and are more vulnerable.
- Keeps the control tools new, and interesting and as a result more effective than if kept set/baited all the time.
- Reduces the amount of toxin in the environment over the course of the year.

Deciding what toxin to use

Single feed pulsing example: *Brodifacoum*

For a second generation toxin such as brodifacoum (which is a single feed anti-coagulant toxin) you only need to pulse it four times a year (August, November, January and April).

- In this pulse, you fill the bait station on day one, and refill on days five and day 14. Remove the bait at the end of week four to end the pulse (as below).
- When ending the pulse make sure you remove all bait in stations and dispose of it correctly. Degraded bait can make animals bait-shy as it is not as effective.
- As it is a single feed toxin, it has a higher chance of a lethal dose being consumed as whatever it eats it will die.
- The antidote is vitamin K1.

Avoid prolonged use of brodifacoum (Talon and Pestoff) which is persistent in the environment and has secondary poisoning effects which can be detrimental to many species in the food chain. Use such poisons only when absolutely necessary, but be aware that over time these toxins can build up in birds such as moreporks and kiwi to lethal levels.

Small parks & reserves: ❌

Private property and larger parks and reserves: ✅

Brodifacoum baiting programme for possums

Month	August				September				October				November				December				January				February				March				April							
Week	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4				
Bait fill Days 1 and 5	Blue												Blue								Blue																Blue			
Bait refill day 14			Grey												Grey								Grey												Grey					
Remove bait day 30				Orange												Orange								Orange												Orange				

Multi-feed pulsing example: Pindone

For a first generation toxin such as pindone (a multi-feed anticoagulant toxin) you only need to pulse it four times a year (August, November, January and April).

- In this pulse you fill the bait station on days one, three and five, then refill on day 14. If less than half the bait from the previous fill is present on the day 14 fill, consider filling again on day 17.
- Remove bait at the end of week four.
- As is it a multi-feed poison it is very important that it is available for five nights (by filling three times) for the possum to be able to consume a lethal dose. If bait is not available for this length of time, control will not be effective, and may result in possums receiving a sub-lethal dose and becoming bait-shy.
- The antidote is vitamin K1.

Small parks and reserves: ✘

Private property and larger parks and reserves: ✔

Pindone baiting programme for possums

Month	August				September				October				November				December				January				February				March				April			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Bait fill Days 1 & 5																																				
Bait Refill 14, (17), 19																																				
Remove bait day 30																																				

For more information on toxin pulsing contact Auckland Council Biosecurity for private property, or Community Park Rangers for parks and reserves.

Further toxin considerations

- Unless working under a CSL, all bait must be housed in bait stations when targeting pest animals. There is a legal requirement that bait is distributed in bait stations, not spread on the ground.
- Ensure appropriate signage is displayed and the information is correct.
- Always read a toxin's label and Safety Data Sheet before distributing
- Ensure stock and domestic animal precautions are followed. Grazing stock should not have access to bait, even if spilled from a bait station.
- Ensure you know the antidote and if you suspect poisoning in non-target animals or yourself, contact your vet or doctor asap.

For more information on toxins available for your project see the toxin matrix in appendix five.

What bait stations should I be using?

Philproof bait stations are recommended when using toxin for possum control. They are mounted to a tree with a top and bottom nail, and have a removable bottom plate for refilling the toxin during each pulse.

The recommended height to install Philproof stations is 30 cm off the ground. If weka are present put them 1m above ground and mount side on to the tree. Bait stations should be placed off track edges, or where they are not easily seen by passers-by.



A Philproof bait station

How many bait stations do I need?

You should aim to have one bait station per hectare for effective possum control. This can be achieved by having bait station lines 100m apart, and a bait station 100m down each line.

Trapping or shooting

Trapping or night shooting using a spotlight is most effective when possum numbers have been reduced to low levels by poisoning, or an area is small in size (under 50 hectares) and control is aimed at minimising reinvasion.

When can I use shooting for possum control?

Shooting for possum control should only be undertaken on private property and is not permitted on public parks and reserves.

Night shooting with spotlights can sometimes be effective in more open terrain, around the margins of small forest blocks and in isolated trees. Regular night shooting is a useful gauge on the number of possums in an area, but is never likely to control possums down to very low levels across a whole bush block.

When using firearms, all users must have a firearms licence. The seven rules of firearm use must be observed at all times. These rules can be viewed at: <http://www.police.govt.nz/advice/firearms-and-safety/arms-code/seven-firearms-safety-rules>

Parks & reserves: **xx**

Private property: **✓**

When should I use trapping for possum control?

Trapping is a viable option for possum control if you are looking to reduce the amount of toxins used in the programme, have a small area you are controlling, or want to continue control between pulses (year-round).

Trapping should also be pulsed to target control prior and over the bird breeding season.

For possum control on smaller parks and reserves trapping is the preferred method.

For further information contact your local Community Park Ranger on (09) 301 0101.

Should I do pulsing with traps?

- Trapping should be pulsed four times a year, with each pulse being two weeks consecutive.
- Traps should be checked twice in the first week & once in the second week as a minimum.
- An exception for a pulse (especially the April one) to be longer than 2 weeks can be made if area is relatively small (<10 hectares) and is surrounded by some possum habitat. Due to the small nature of such areas, reinvasion is high compared to the population of possums within the control area. As a result, catches may continue for longer than expected for small reserves surrounded by good possum habitat.
- Traps should be secured so that when sprung will remain in position.
- Possum specific lure should be used e.g. apple with cinnamon, icing sugar and flour. No meat or fish should be used due to risks for non-target animals.
- Traps can be elevated on a wooden stand to reduce risks to non-target species and harm to children.

Trap Pulsing Programme for Possums																								
Month	August				September/October				November				January				February/March				April			
Week	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Check 2x	■								■				■								■			
Check 1x		■								■				■								■		

What traps are available?

The most commonly used traps in Auckland are the single kill Timms traps or Trapinators. There are other traps available on the market. Contact Auckland Council Biosecurity for further information.

Using Timms traps

As with all traps, they need to be stable and not move around too much and if necessary, secured to the ground, a tree or a wooden platform.

Timms traps are best baited with a piece of fruit, e.g. apple (sprinkled with cinnamon), some lemon or orange peel, etc. If using citrus fruit, be sure to remove any fruit flesh, and only use the actual peel, so that the bait pins in traps do not corrode from the acids in the fruit.

Use medium sized pieces of fruit (e.g. one eighth of an apple) to encourage possums to reach into the trap with their mouths instead of hands. Do not be tempted to use large pieces of fruit, as this can affect the trigger mechanism and make it harder for the possum to set the trap off.



A Timms trap

You should only place bait in a Timms trap while it is unset, to prevent accidental triggering of it and potential injury as a result.

Traps should be kept clear of debris to allow correct function and not discourage pests from entering the trap. A test triggering of your trap after re-baiting also allows you to check it is functional.

The sensitivity of Timms traps can be altered by bending the bar backwards or forwards. If using Timms traps in kiwi areas, mount them on the end of a 6 x 1 piece of timber, screw this into the tree and use as a ramp. Cut a small channel at the bottom of the keyhole-shaped trap entrance to allow the bait spike to be pulled outside the trap. This will allow re-baiting while the trap is attached to the platform.

To attract possums to the trap, make up some 'blaze' and throw a handful of this outside the trap. Blaze can be made from mixing white flour with a good dash of spice such as cinnamon. This will help to attract animals by sight, smell and taste. This is best used during dry weather.

Tips and tricks

- Well cared for Timms traps can last for over 10 years. To prolong their life, do not set them off empty unless absolutely necessary, as the force of this can crack the top.
- Use a cube of polystyrene smeared with peanut or plum jam as a long-life lure.
- If your trap has stopped catching, change its shape by placing a rock or branch on top, or move it a few meters. This may cause a curious possum to investigate this 'new' object. Or pulse the setting and baiting of the trap.
- Place traps out of view if possible in parks; this will reduce the risk of tampering
- If you are worried about children or pets around Timms traps you can place the traps on a platform at least 2 meters off the ground.



The ideal location for a Timms trap – on a platform at least 2m up a tree

Parks & Reserves: ✓

Private Property: ✓



A Trapinator

Trapinator

Trapinator possum traps have been proven to be very easy to set, and great for projects where volunteers assist with trapping. As they are tree mounted, they are also automatically out of harm's way for kiwi and inquisitive weka, as long as they are installed 1m off the ground. Trapinators are simple to use with a side lever that is pushed forward to arm the trap. A bait bar inside the trap is commonly smeared with peanut butter to lure in possums.

Detailed setting instructions can be found at www.cmisprings.com/trapinator_instruction.html

Parks and reserves: ✓

Private property: ✓

Leg-hold and cage traps

Live capture traps such as leg-holds and cage traps can be effective, for those who are comfortable humanely killing live animals and are able to check the trap daily (as is legally required).

Victor #1s are the preferred and legally compliant leg hold trap. Remember that all leg-hold traps need to be raised 700mm in kiwi or weka zones as kiwi have died after being caught and injured in these traps.

These traps require consent from the property owner if they are to be placed within 150m of a dwelling. These are strictly for private property use only.

Parks and reserves: **✘ ✘**

Private property: **✓**



Self-resetting possum trap

The Goodnature self-resetting possum trap is another tree-mounted kill trap. The trap is powered by a CO2 cylinder which can 'fire' up to 12 times.

A long-life lure comes with this trap. Traps need to be checked approximately once a month to replace the lure. An additional trap counter can be purchased with this trap. It is strongly recommended you buy this counter also. Without the counter you will not know how many strikes the trap has left from its gas cylinder, or how many kills the trap has made, as many kills get scavenged by other pest animals.

The Goodnature A12 trap

At this stage of the trap's development, we only recommend these traps for small urban areas where only a few traps are required. Larger projects should consider using another method such as bait in bait stations. See www.goodnature.co.nz for more details.

General tips for possum traps:

- Good lures for possums are fruit, citrus peel, vegemite and carrots. Placing a "blaze" of flour above the trap on a tree and in front of the trap entrance will make the trap more effective.
- For large area projects, set possum traps near feral cat or mustelid traps to reduce labour. These predators will be attracted to any dead animals caught in the possum trap and can then also be caught in the other trap nearby.
- Kiwi and weka have occasionally been caught by their bills in Timms traps so it is vital in weka and kiwi areas to firmly mount them well off the ground (700mm).
- Leave freshly killed possums next to the trap, as this will attract further possums and predators. Possums are very curious – this is why the Timms trap is yellow.
- When using spices on fruit or in blaze, cinnamon is considered to be the scent that travels farthest in the forest. Other spices or scents proven to work include aniseed, curry and raspberry.
- Use galvanized nails when mounting traps on trees – they last a lot longer.
- Use Sentinel bait clips (which can be bought separately) in Timms traps and hook them above the S bend. These lures will last a lot longer than fresh fruit.
- Possums prefer to travel along fallen logs rather than over ground. Take advantage of this by securing traps on logs.

FAQs:

- **How many traps will I need?**

The home range for possums is 2ha, which helps determine distances between control tools. The general rule is one trap per hectare for effective possum control. So, for example if you have 20ha of possum habitat in your programme you should use 20 traps.

Keeping with the one trap per hectare rule, spacing of control tools should be 100m x 100m.

- **Where should the traps be located?**

Traps should be located in possum habitat areas: ridges, tracks, road edges and near prominent trees especially kohekohe, totara, pine, pōhutukawa and macrocarpa. Targeting fresh possum sign can also be effective. Presence of run pads, extensive browse and fruit damage, scratching on territorial and play trees, faeces etc can indicate where possums are present.

For further examples of possum damage signs, go to the Pest Detective website

<http://www.pestdetective.org.nz/culprits/possum/>

- **What if I want to use toxin and traps together?**

You can combine the use of toxins with trapping. This is a great way to supplement your toxin programme in between pulses, especially if you have reinvasion from surrounding habitat as discussed above. Trapping following a pulse with toxins should ideally start three weeks after the final fill in the pulse. This is to allow the possums which have consumed the toxin time to die before you start the trapping programme, otherwise you may be wasting resources trapping an already dead possum.

When one technique stops working it is worth changing to something new. Cycling between different toxins in different years, using a range of traps and baits, and adding in an occasional night shoot (on private property) will increase your success. This will also help to remove the cunning or shy animals (usually the older breeders) that have learnt to avoid a certain trap, toxin or technique.

- **What are the target levels for possums?**

You should aim to achieve possum control to below 5 per cent relative abundance, with 10 per cent as a threshold for initiating another knock-down.

Relative abundance is a measure obtained by monitoring possum numbers in an area. Accurate measures of relative abundance can only be obtained from areas of 100ha or over, as there is not enough room to place enough monitoring tools in smaller areas.

There are three tools used to determine relative abundance in possums. – wax tags, leg hold traps and chew cards. The one we recommend is the use of plain wax tags placed in lines of 10, with each tag being 20m apart. No line should be within 200m of each other, or 100m from the edge of your control area.

- **Should I do any monitoring?**

To gauge the success of your possum control, you should carry out regular monitoring. This way you can determine if you need to change any of your control activities.

Please refer to the monitoring section of this guide on page 46 for more detailed information, and the decision matrix in Appendix One.

2 Mustelids

Mustelids include weasels, stoats and ferrets. They are now some of the top predators in New Zealand ecosystems.

Flexible and opportunistic in their diet, a change in abundance of their normal prey can cause a rapid shift to alternative food sources. This prey switching has implications on pest control operations; for example, removing a key food such as rats or rabbits may cause mustelids to prey more on native birds.



A stoat with a chick

All mustelids are good swimmers and can prey on animals up to three times their own body weight. They can breed rapidly in response to the availability of food – rats, rabbits and mice are staples but, birds, bird eggs, lizards and invertebrates are also targeted.

Mustelids have fast metabolisms and need to eat one-third of their body weight every day. They cannot store fat in their bodies.

In general mustelids are difficult to trap, and only trapping to a high standard will bring about increased survival rates of birds.

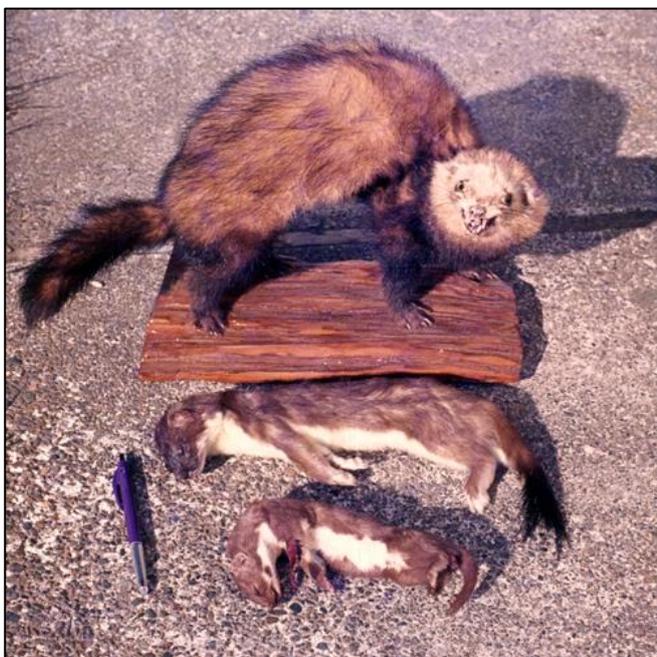
Input from an experienced mustelid trapper can be very helpful when setting up your programme.

Keep a watchful eye out for them and their tracks and droppings.

Identification

Telling these three species apart can be difficult. Ferrets are large mustelids (up to 1.5kg), usually with a dark facial mask and creamy-coloured body, with dark guard hairs giving an overall darker appearance from a distance.

Stoats and weasels are cinnamon-coloured with a white underbelly, with stoats being larger and with a black-tipped tail. The line between the brown and white on stoats is straight, but on



weasels is wavy and not even. Young stoats can look a lot like weasels. Ferrets are strictly nocturnal, but stoats and weasels often also hunt during the day.

Ferret (back), stoat (centre) and weasel (front).

Points to note:

- the ferret's much larger size
- the black tail tip of the stoat
- the difference between stoats and weasels in the line between brown top coat and white belly fur.

*Image by John Innes, Landcare Research
sourced from pestdetective.co.nz*

Stoat facts:

- Stoats kill 95 per cent of kiwi chicks
- Stoats have a home range of up to 200ha (1.4 km)
- Stoats are active night and day killing several times a day
- In colder climates where they originate, they stash their prey in the snow and come back for it later. This does not work in the warmer climates of northern New Zealand, so they just continue killing.
- The calling card of a stoat is a bite to the back of the neck.
- Stoats are good climbers and swimmers
- When food is abundant stoats produce eight-nine young during September-October with male stoats impregnating all juvenile females before they leave the den
- They are more abundant in the summer months as young stoats disperse many kilometres from their birth site, beginning in early summer
- A key adaptation of stoats is that, once impregnated, they can hold off the onset of pregnancy for up to one year until conditions are right (food for example)
- Average life span is one year in the wild.

*Stoats swimming across a stream***Ferret facts:**

- They are more common in open country
- Great variety in coat colours
- Smaller litter than stoats, but may live longer
- Largest mustelid in New Zealand
- Can carry and spread bovine tuberculosis

*A family of ferrets crossing a road***Weasel facts:**

- Smallest mustelids
- Seem to be the rarest therefore seldom a threat to significant wildlife.
- Once ferrets and stoats come under control, weasels become more prevalent as they are out competed by the former.

*A juvenile weasel***Control using toxin**

The poison registered for stoats is called PAPP (Para-aminopropiophenone). A CSL is required to use this toxin. Currently in order to use this toxin it is a legal requirement that all landowners within 3km of bait stations must be notified.

For further information on this toxin please contact the Auckland Council Biosecurity team.

Small parks and reserves: ✘

Private property and large parks: ✔

Control using traps

On Auckland Council parks and reserves trapping for mustelids is the preferred method, as no toxins are available for mustelid control in small urban public spaces. To find out more contact your Community Park Ranger.

Traps for catching mustelids include the DOC 200, DOC 250 and Goodnature A24. However, DOC 200s are designed specifically to catch weasels and stoats, with the larger DOC 250 needed to trap a ferret.

A trap is only useful if it is well serviced, has oiled working parts, and the metal parts are wire-brushed and filed. Good oils to use are Innox and WD40. WD40 is not as sticky as CRC and has a slight fish odour, which may be attractive to mustelids. Traps need to be regularly tested to ensure that they will be set off by the weight of a mustelid. Pathways to traps need to be kept open for mustelids e.g. in pastoral landscape, to ensure the trap-site is found.

What trap should I use?

DOC 200 trap in a wooden tunnel

- The entrance hole should be no larger than 60mm otherwise ferrets can enter the tunnel and pull out of the trap using their large facial muscles
- Tilt your tunnel so that salty liquid from the bait runs out of the tunnel and not around the trap in order to avoid corrosion
- Check DOC 200s are working with a bundle of rags/old socks. Using a soft bundle, rather than setting empty traps off prolongs their life
- DOC 200s should be triggered at 80g. Check this by weighing your soft bundle of rags/ socks.

Small parks and reserves: ✓

Private property and large parks: ✓

DOC 250 trap in a wooden tunnel

The DOC 250 trap is one-third bigger than a DOC 200. It is specifically designed kill trap for ferrets, who have large facial muscles and are able to pull themselves out of a DOC 200. DOC 250 traps should be used where ferrets may be present.

While there appear to be relatively low numbers of ferrets in Auckland compared to the South Island, ferrets kill adult kiwi and can quickly eradicate a local population.

Small parks and reserves: ✓

Private property and large parks: ✓



A DOC200 trap with an egg as a lure.

Trap site selection

Select sites where predators are likely to hunt i.e.:

- Stream edges
- Bushland edge
- Ridges
- Valley Floors
- Fence lines
- Animal runs
- Crossings over water courses
- Fallen trees
- Track/road edges even in open pasture

The best sites are where there are converging features like a stream crossing a track at the edge of bush. A change in features is also a good site – e.g. a pasture / bush interface.



Placing a DOC200 at the pasture / bush boundary

Select sites that are beneath a tree canopy cover where possible. Mustelids are likely to be less concerned about overhead predators under trees and therefore more likely to enter a trap.

At the trap site dig the ground over and keep the access open by providing a run, e.g. log over grass to trap site, or weed/spray around the site.

It may take a few months to catch a mustelid. Don't be disillusioned by this, and ensure your traps are primed to catch at all times. If a trap is in a good place (as per details above) – only consider moving it if it hasn't caught for two years. If a trap catches regularly, consider adding another trap nearby.

How many traps do I need?

Trap layout

For control, one trap per 20 hectares is recommended. For zero density in your project area use one trap per 8-10 hectares.

Trap Setting

Mustelid traps are best used in single or double sets in a tunnel-like cover or box. The cover has three functions:

- 1) To orientate the animal so that it enters the trap correctly
- 2) To disguise and protect the trap
- 3) To keep out non-target animals



Checking a trap and training other volunteers. Good health and safety practices are vital

Special tips for using mustelid traps:

- Always wear gloves when handling trapped animals (many target species carry leptospirosis and other diseases).
- Take every trap check seriously.
- Keep to a strict routine of what is done to minimise mistakes like leaving safety catches on or obstructions to traps closing.
- Clean out tunnels – keep free of cobwebs/ obstructions etc – make it look like the tunnel is being used by animals.

- Use your boot to clear a path from the tunnel entrance back about half a metre – to look like an animal track.
- Free and oil the treadle.
- Don't put bait under the plate.
- Single trap sets - keep fine (sensitive) setting and place bait not too close to the blocked off end with mesh.
- Record captures and bait removal attempts.
- If you catch a mustelid in good condition, rub it all over the trap box. This will increase the efficacy of your trap in the future.

What bait should I use in the traps?

Refinements in preferred baits are ongoing. Useful baits include fresh rabbit, salted rabbit, freeze-dried rabbit, freeze-dried rat, pilchards and eggs.

Stoat bait trials have been carried out by the Department of Conservation in Northland. During one of these trials fresh rabbit, replaced every three-four days, was compared to salted rabbit replaced fortnightly. Fresh rabbit captured only slightly more stoats.

In a separate trial, fresh hens' eggs were compared with salted rabbit and both baits were replaced fortnightly. In this trial, salted rabbit was found to be significantly more attractive than eggs.¹

Ferret urine has recently been shown to be four times more effective than fresh rabbit meat.

A useful strategy is to pulse with fresh baits and change bait types, particularly if it is suspected that there are trap-wise or bait-shy animals present. Some projects use fresh or salted rabbit over summer, and eggs over winter.

Always use gloves when handling fresh rabbit as they can carry leptospirosis in their urine.

Frequency of trap checking

- Varies seasonally, and depending on what you are trying to protect
- Fortnightly trap checks from October to April, and monthly checks from May-September appears to be sufficient for kiwi protection.
- Where trapping is to protect pakeke more frequent trap checks may be necessary.
- Beware of autumn stoats which will be strong and intelligent and account for a lot of bird kills at this time of year, especially pakeke and late kiwi chicks.
- If there are high capture rates of rats, consideration could be given to more frequent checks, primarily to remove rats from traps, especially in single-set regimes.
- Changing the entry of your DOC 200 from front entry to side entry will decrease rat catch by 50 per cent and not affect stoat catch, leaving traps more available for stoats.



Erayz freeze-dried rabbit meat from Connovation Ltd. This 40-piece sheet can be broken up and frozen.

¹ (For the full report see www.doc.govt.nz/upload/documents/scienceand-technical/drds262.pdf)

Maintenance and Preparation of Newly Purchased Traps

If not anodised, each trap should be dipped in Innox oil solution to prolonging the life of traps (Innox oil is available from boating or fishing shops) before being set in the field.

- At each check you should ensure the treadle plate drops freely. Apply a few drops of cooking oil around the dog hinge, and/or tweak the treadle from side to side to free it.
- Bring traps in every 1-2 years and clean. Water blast them and use a wire brush to remove any scale rust. Once dry, dip them into engine oil or a mix of 4ltrs petrol to 8ltrs of vegetable oil. (Petrol is available from paint shops)

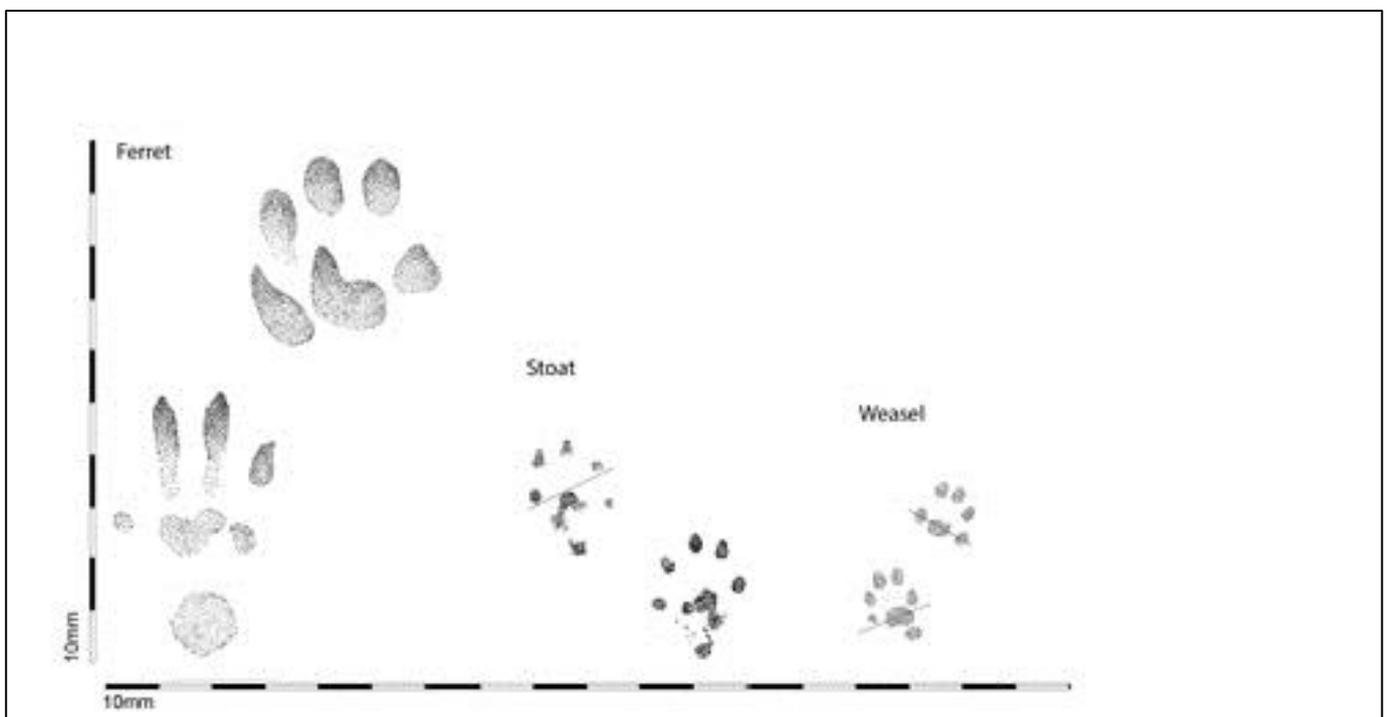
Monitoring/Recording Data

Monitoring for mustelids can be difficult due to large home ranges but can be done by:

- Placement of trail cameras in likely stoat areas or where stoats are seen, to gauge stoat visit frequency
- Use of monitoring tools to detect mustelid presence is through tracking tunnels baited with Erayz Rabbit Paste (refer to the monitoring matrix in appendix one).
- After successfully trapping a stoat, measure and record its length from snout to vent (nose to bum). Feel for a crest on top of its head – an older animal will have developed a bony crest.

The above records will help you determine the age dynamics of your stoat population. Changes in this over time will give some idea of the success of your trapping programme.

Doing regular bird counts will also help to determine if bird populations are recovering.



*A scale comparison of ferret, stoat and weasel footprints.
(image from pestdetective.co.nz)*

3 Rats

Rat species

There are two main species of rat on the New Zealand mainland - the ship rat, able to climb trees and the Norway rat, usually found near water. Both species are rapid breeders. A typical rat will be 15 to 20cm long with a further 20cm of tail

Ship rats are usually the most common rat species in Auckland forests. They come in several colours, usually black to light brown in colour with a lighter underside. In comparison to the Norway rat they are poorer swimmers, but more agile and better climbers.



The lighter belly of a ship rat

Ships rats tend to be more nocturnal and Norway rats more diurnal.

Both species are omnivorous, with a preference for grains. In a suitable environment rats will breed throughout the year, with a female producing three to six litters of up to 10 young. Ship rats live for two to three years. Social groups of up to 60 can be formed.

In New Zealand, ship rats have an unusual distribution, in that they are found everywhere through native forests, scrub, and urban parklands. Ship rats are the most frequent predator of small forest birds, seeds, invertebrates, and perhaps lizards, in New Zealand forests, and are key ecosystem changers due to this predation.

How to tell the difference:

Ship rat (*Rattus rattus*)

- Very long tail - in adult this is longer than the head and body length combined.
- Very long thin ears - when you pull the ears forward they will generally cover the eyes of the rat.
- Smaller of the two rats, weighing around 150g.

Norway rat (*Rattus norvegicus*)

- Thick tail usually shorter than head and body length.
- Small ears that can't be pulled forward over the eyes.
- Large, robust rat, weighing up to 500g.

Why is the species of rat important?

The type of rat present has implications for pest control projects. For example, having more ship rats around has implications for most tree-nesting birds including kereru and small birds. This is because they are more agile and better climbers.

Norway rats on the other hand are large and ground-dwelling, with potential impacts on ground nesting species. They also prefer wetland and other water habitats (sometimes called Water Rat). Norway rats have larger home ranges than ship rats (500m vs 150m average), which will dictate your layout of control tools if just targeting one species in your project area.

In addition to their impacts on birds, rats also have impacts on invertebrates and lizards and can also limit seedling germination, by eating fruit, seeds and young plants. Rats have a relatively small

home range (about 1ha for ship rats) and this combined with their rapid breeding means that reinvasion of rats in a controlled area is generally very rapid.

All rats eat a wide range of foods, are quick to find bait stations and communicate their location to other rats. They are capable of detecting some poisons, especially cyanide and cholecalciferol, if not used appropriately. A dominant rat will protect a large food supply such as a station of baits, and if baits are not fixed in stations, rats may stockpile the baits in or on the ground, which means only a few rats will be taking most of your bait.

Control using toxin

Which toxin is best for your programme?

Toxins are an effective way to knock down and control rat populations. There are two main toxin types covered in this guide, *first generation* multi-feed and *second generation* single-feed. Deciding which toxin to use is determined by site characteristics and risk to non-target species. These two toxins are anticoagulants and work by stopping the blood from clotting, leading to haemorrhage. Both have antidotes (vitamin k1), which not all other toxins have.

Other toxins work in different ways. Cholecalciferol works by calcifying the blood and reducing the animal's ability to filter it, leading to cardiac arrest. 1080 works by preventing cells from producing energy, resulting in either cardiac arrest, or respiratory failure.

Toxins come in both block and pellet forms. The form you use will determine which bait stations should be used (more on bait stations below).



Pelletised toxin typically looks like this and is blue / green

Bromadilone and Diphacinone are the only toxins recommended for community group use on smaller Auckland Council Parks and Reserves. Community groups should get in contact with their Community Park Ranger.

For information on other toxins please contact the Auckland Council Biosecurity team.

When should you use the toxin?

For the maximum benefit to birdlife, rat control is best concentrated just before and during the bird breeding season, which for most species runs from August to about January. Rats are attracted to a range of food sources eating almost anything, but have the ability to become bait shy from a sub-lethal dose, degraded poison or continual baiting year-round by not pulsing.

What is pulsing?

To reduce the risk of rats becoming bait-shy or over-eating bait when the lethal dose has already been consumed; pulsing is the most efficient way for toxin use in pest animal control. Pulsing is important because whatever has eaten the bait in the first fill will have died by the second fill date of the pulse so control will be more effective. Rats can consume many times the lethal dose of anticoagulants in bait before death, wasting toxin.

Rodent single feed toxin example: Bromadiolone

For a second generation (single-feed) anti-coagulant toxin such as bromadiolone you only need to pulse it four times a year (August, November, January and April).

- In this pulse you fill the bait station on day one, and refill on day five and day 14. Remove bait at the end of week four.
- When ending the pulse make sure you remove all bait in stations and dispose of it correctly, degraded bait can make animals bait shy as it is not as attractive.
- As it is a single-feed toxin, a lethal dose will be consumed during a single feed event.
- The antidote is vitamin k1.
- While bromadiolone is an effective toxin and is less labour intensive, it has a higher risk (than diphacinone) for accumulation of the toxin in the environment, and possible secondary poisoning, but less risk than brodifacoum.

Small parks and reserves: ✓

Private property and large parks: ✓

Bromadiolone bait pulsing programme for rats																																								
Month	August				September				October				November				December				January				February				March				April							
Week	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4				
Bait fill days 1 and 5	█												█												█												█			
Bait refill day 14			█												█																								█	
Remove bait				█												█																				█				

Rodent multi- feed toxin example: *Diphacinone*

- For a first generation toxin like diphacinone (which is a multi-feed anticoagulant toxin), you only need to pulse it four times a year (August, November, January and April).
- In this pulse you fill the bait station on days one, three and five then refill on day 14. If less than half the bait from the previous fill is present on the day 14 fill, consider filling again on day 17. Remove bait at the end of week four.
- When ending the pulse make sure you remove all bait in stations and dispose of it correctly. Degraded bait can make animals bait-shy as it is not as attractive.
- As it is a multi-feed toxin it is very important that it is available for five consecutive nights for the rat to be able to consume a lethal dose.
- This toxin is really only suitable to maintain low rat populations following a knockdown, and while it is more labour intensive, it has lower risks for accumulation in the soil and secondary poisoning than brodifacoum & bromadiolone.
- The antidote is vitamin k1

Small parks and reserves: ✓

Private property and large parks: ✓

Diphacinone baiting programme for rats																																								
Month	August				September				October				November				December				January				February				March				April							
Week	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4				
Bait fill on days 1, 3 & 5																																								
Bait refill day 14 & 17																																								
Remove																																								

Further toxin considerations:

- There is a legal requirement that toxin is distributed in bait stations and not spread on the ground. Some toxins and methods of application other than in stations require a CSL, and approval from the local Medical Officer of Health.
- Ensure appropriate signage is displayed at every normal entry point for the required period of time, and information correct (for parks and reserves contact your Community Park Ranger).
- Always read a toxin's label and Safety Data Sheet before distributing
- Ensure stock (withholding for slaughter) and domestic animal precautions are followed. Grazing stock should not have access to bait.
- Ensure you know the antidote and if you suspect poisoning in non-target animals or yourself contact your vet or doctor immediately.

What bait stations should I be using?

Bait stations provide protection to bait from rain and moisture, protect non-target species from accessing the bait and present the bait in a way that is attractive and effective for the target animal.

Bait station recommendations are determined by site, risk to non-target species and whether they are on private or public property.

Small public parks and reserves

- Lockable bait stations are the only stations permitted to ensure risks are managed to non-target species such as park users.
- Access is only with a key and they are tamper-resistant for kids and dogs.
- The bait is in block form, which is secured in the station via pins. This ensures the bait can only be consumed in the station and not removed and stored.
- Bait in the form of Contrac (bromadiolone) and Ditrac (diphacinone) are recommended for use in these stations.



Above: A Protecta Ambush bait station

Below: Typical block baits – also usually blue or green



Private property and large parks

- Depending on risks with non-target species both lockable and open-faced bait stations (as shown below) are recommended.
- Bait in open faced stations is usually in pellet form, with the option in some stations for a pin fixture (Philproof bait stations). Bait fixed on pins means that the animal needs to eat the bait to remove it, ensuring control. Non-fixed baits may be stored instead of eaten (by rats in particular).

Tips for baiting stations:

- Always wear gloves
- Remove any degraded or old toxin before refilling the station
- Ensure there is no toxin spilled on the ground outside the station
- Pelleted bait should be in weighed plastic bags (150g, 200g, 300g etc depending on station capacity and your programme's planned toxin use)
- Ensure the bait station remains secured to its tree / platform (or pinned to the ground).

How many bait stations do I need?

With your bait station placing you should aim to have two per hectare for rats, to achieve effective control. Using the area under management as a guide you can work out the stations needed for effective control in your area, for example 20ha x two stations per hectare = 40 bait stations. See the guide to laying out bait stations below – note trap layout and location is site specific.

Bait station and trap layout

Ideally, trap lines should be 100m apart. Along these trap lines, traps or bait stations should be 50m apart where habitat allows (see examples below with red dots). Perimeter traps or bait stations should be 25m apart. This will create a network of traps or bait stations.



Urban golf course, limited habitat.



Scenic reserve, abundant habitat in area.

It is important to consider the ease of checking and maintaining the equipment. Use existing tracks where possible.

When setting up bait stations or traps, look for evidence of rats being present i.e. fresh droppings, rub marks, gnawing, or feeding activity. Pick trap sites that are naturally attractive, such as near good food sources. Rats often nibble on seeds and fruits of native trees including nikau, karaka, taraire and kohekohe. Look out for fallen berries with the outer layer chewed away on the forest floor. Rats prefer areas with water and good food sources. Auckland forests with the large number of different types of fruiting native trees and numerous stream systems are ideal for rats.

Your bait station set-up will vary. Depending on the project goals, time and resources, a grid may not be an option. Use existing tracks in an area as a guide especially in parks and reserves.

Consider placing extra rat traps or bait stations where:

- There is a particularly heavily fruiting tree that attracts rats, i.e. lots of rat gnawed berries nearby
- You have observed nesting or breeding behaviour in a species you are trying to protect
- There is a tree favoured by native birds, i.e. a taraire tree in which you often see kereru
- There is a confluence where two streams intersect. Be sure to position traps and bait stations so that they are not easily accessible by children or stock, and that they are above high flood water marks. (Bait stations and traps should not be placed in water).

There should be at least one trap or bait station within each rat's home range. Home ranges are generally reported by length. Ship rats have an average range length of 100-200m during the breeding season. Non-breeding ship rats have larger home ranges. Norway rat home ranges are between 218-916m in length.

At high rat densities, trap or bait station spacing may have to be reduced further to maximise control. If you have a large quantity of traps or bait stations, it can help to number each one. This can help to reduce the risk of missing one during checking and allows capture data to be related to each site.

Trapping

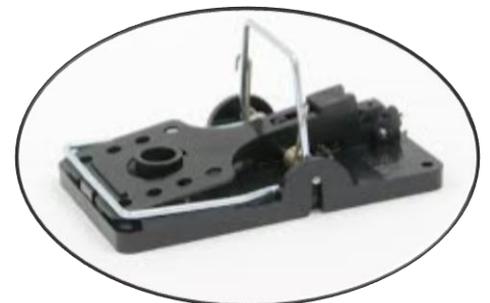
In areas with high rat numbers, trapping may be time consuming, expensive and ineffective in actually reducing the rat population, despite plenty of rats being caught in traps. A toxin may have to be used first to reduce rat numbers. Trapping can then be used to keep rat numbers low.

Commonly used rat traps include the Snap-E and Victor snapback. Kill traps must be set in a tunnel or under a cover.

Trapping should also be pulsed to target control prior & over the bird breeding season.



*Above: The T-rex rat trap
Below: The Snap-E rat trap*



Rat trapping tips:

- Traps need to be cleared regularly – a trap with a dead rat in it is not available to catch others.
- Regular maintenance of traps is essential, including checking for worn pivots, weakened springs and broken trigger mechanisms.
- Victor snapback traps require periodic retreating with preserving agent.
- When checking Victor snapback traps the trapper should carry spare traps, treadles and pegs. Treadles may be lost when the traps are sprung.
- Traps should be cleaned regularly with a wire brush – remove fur and remains of dead animals.
- Rats are nervous creatures. Ensure rat tunnels have good clearance above the trap
- There should be a 200mm gap between the end of the rat tunnel and the trap treadle to avoid catching kiwi.
- Ensure traps are stable and do not rock around as this will deter rats.

Traps can be deployed in lockable bait stations or tunnels. The tunnel has three functions:

1. orientate the animal relative to the trap,
2. disguise and protect the trap, and
3. keep out non-target species, such as kiwi.

Tunnels or covers should:

- Be at least 500mm long if accessible from both ends to prevent non-target animals accessing the trap
- Have an entry hole of no more than 45mm x 45mm to exclude non-target animals
- Allow easy access for checking traps
- Be able to be secured to the ground with wire to prevent traps being disturbed and removed by pigs and possums
- Fully enclose the trap and be stable, so the trap cannot be dragged out of the cover
- Keep the traps off the surface of the ground to keep the trap dryer, and extend the life of the trap.



A wooden tunnel box suitable for placing rat traps in.

Initially traps should be checked every one-two days. Once catch rate drops (after about 5-10 checks), traps only need to be checked once every two-three weeks. When rat numbers increase, the frequency at which traps are checked will also need to increase.

Goodnature A24self-resetting rat trap

The Goodnature A24 rat (and stoat) trap is powered by a CO₂ gas canister and can reset itself up to 24 times. Long-life lures have been developed to accompany the trap and ensure rats remain attracted to the trap.

For more information visit: <http://www.goodnature.co.nz/products/rat-stoat>



A Goodnature A24 trap

Baits and lures

To attract rats into your traps, use highly palatable lures such as chunky peanut butter, peanut butter mixed with rolled oats and white chocolate. These lures have been proven to be very attractive to rats and are easy to use and cheap. Baits or lures may need to be altered over the duration of a control programme in order to attract rats with different preferences.

Always wear gloves when handling rats and rat traps as their urine carries the disease leptospirosis.

Limitations

- Constant re-invasion and rapid breeding means effective long term control must be ongoing. Rat numbers are likely to return to pre-control densities within months after control stops.
- Pig and possum interference with covers can be a problem.
- Mouse numbers may increase after rat control.

Pulsing with traps

- Trapping is through snap traps (T-Rex or similar) in lockable bait boxes on parks & reserves.
- Trapping will be pulsed four times per year, with each pulse being six weeks long.
- Traps should be checked every one-three days.

Small parks and reserves: ✓

Private property and large parks: ✓

Annual trapping programme for rats																																												
Month	August				September				October				November				December				January				February				March				April				May							
Week	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4				

Timing of rat control operations

Timing is critical and depends on what is being protected. For species protection, timing is dependent on when the species being protected is most vulnerable. For example, to protect native birds such as kereru or tomtits during the breeding season, rat numbers must be low while the birds are on the nest until the chicks fledged. This is usually from early spring to late summer, but the timing will differ between different species and different localities. To protect invertebrates and lizards, rats should be controlled year-round. Control should be pulsed.

Monitoring

To gauge the success of your rat control, use ‘tracking tunnels’ before and after the control program.

Record the number trapped or the amount of bait taken.

Observations of rat browse on native fruits such as kohekohe, karaka, taraire and tawa will help to determine if your native forest is recovering.

Regular bird counts can help to monitor bird populations over time (See www.formak.co.nz for more information on monitoring methods).

4 Mice

The impacts of mice on native plants and animals are not as well known, but are potentially serious on small invertebrates (e.g. weevils) and some lizards, and plant germination rates.

Where there is effective predator and rat control, one potential ripple effect is for mice to increase in numbers, so consideration of impacts, monitoring and management is needed.

Control methods for mice are however not perfected and any attempts to control mice should be carefully designed and monitored.

Potential control methods include:

- Anticoagulant poisoning, on grids of e.g. 25m x 25m,
- Trapping using covered mouse traps baited with something like peanut butter on grids of e.g. 25m x 25m. This may need to be supplemented with poisoning, e.g. when reinvading numbers build up in late summer-autumn.

Trapping can be used as a monitoring tool. If trapping is also the main control method an alternative trap line should be used to monitor mice.

Due to the increased labour required to control mice, you may consider increased control in particular parts of the project area instead of across the entire area.



A typical house mouse

5 Cats

Why are they a pest?

All cats, whether feral or domestic, kill the same groups of native wildlife, including insects, eels, kōura (native crayfish), fish, lizards, birds (including kiwi chicks) as well as rabbits and rodents.



They can also carry tuberculosis, toxoplasmosis and parasites harmful to humans and marine life.

Cats are active hunters during the day and night, and can cover long distances quickly. Feral cats breed well in Auckland forests. They tend to be in higher densities in areas adjacent to forests but they also thrive deep within native forests. Cats are often present in far greater numbers than is obvious as they are extremely alert and quick to hide. Keep a watch out for their droppings which are used to mark territories.

They have large overlapping home ranges with males known to roam up to 20km, although females with kittens seldom move more than 500m from their den. Feral cats are easiest to catch in mid-winter when food sources are low.

Are all cats the same?

No, there are some important differences between companion and unowned cats.

Companion cat:

A domestic cat (including a kitten unless otherwise stated) that lives with humans as a companion, and is dependent on humans for its welfare.

Unowned cat:

Unowned cats may be classed as stray or feral. A stray is a domestic cat which is lost or abandoned and which is living as an individual or in a group (colony). Stray cats have many of their needs indirectly supplied by humans, and live around centres of human habitation. Stray cats are likely to interbreed with the unneutered companion cat population. Some stray cats, especially kittens, may have a temperament which makes them suitable for re-homing, whereas others will not.

A feral cat is a cat which is not a stray cat, and which has none of its needs provided by humans. Feral cats generally do not live around centres of human habitation. Feral cat population size fluctuates largely independently of humans, is self-sustaining and is not dependant on input from the companion cat population. They have home ranges between 30 and 80ha. Feral cats are unlikely to be suitable for re-homing.

How can I control cats?

Options available for cat control differ between private property and public parks and reserves.

Shooting

Shooting for cat control should only be undertaken on private property and large parks and is not permitted on small public parks and reserves. Night shooting with spotlights can sometimes be effective in more open terrain, around the margins of small forest blocks and in isolated trees.

Shooting does not allow cats to be checked for micro-chips or other ownership identification, therefore is not generally appropriate where there is a high risk of domestic cats being present. There are legal obligations to humanely dispose of a live animal, please refer to the section on disposing of live animals on page 45.

Private property and large parks ✓ Small parks and reserves ✗

Kill traps

Kill traps are a useful tool on private property when the owner knows the cat is feral and/or cannot check the trap every day.

Kill traps for cats must be approved by the National Animal Welfare Advisory Committee. This committee assesses all kill traps that come onto the market to ensure that they consistently kill animals within a specified time, and do not have escapes.

The Timms trap is recommended for cat control, along with the Steve Allen Mk2 (SA2) Kat trap. Care must be taken to ensure non- target animals are not caught i.e. dogs or birds.

Private property and large parks ✓ Small parks and reserves ✗

Live capture cage traps

Cage traps have the legal requirement that they must be checked within 12 hours of sunrise each day that they are in position and set.

When setting the cage trap attach it to the ground or tree, and bait with fresh meat (fish or rabbit). Traps should be rebaited fortnightly or more often if necessary in warmer months.



Feral cats can be difficult to trap as they are naturally cautious and a previous bad experience will make a cat trap shy. To reduce this risk, wire the door of the trap open for five nights to give the cat time to become familiar before setting it. After this run the trap set for a minimum of 10 consecutive nights if possible.

There is the potential risk of attracting non-target animals, including birds. To reduce this risk, and to care for trapped animals, cover the trap top to prevent birds seeing the bait from above. This cover will also protect any trapped animal from sun and rain.

Traps should be at densities of about one to 15ha in fringe areas, and one to 20ha in the core forest areas. Roads and tracks and sites where there are other traps are the best places to locate these traps. Fresh bait is essential as it is easy to create trap-wise cats if unpalatable bait is tasted and then the cat escapes. Cat biscuits in peanut butter is commonly used.

Small parks and reserves: ✓ Private property and large parks: ✓

What if the cat is domestic?

If you are undertaking cat control for your property we suggest using live capture traps if you are in close proximity to other dwellings, or are concerned domestic cats may come into contact with the control tool. We recommend that you first notify neighbours you are undertaking cat control on your property.

If a domestic cat is caught on private property we advise:

- If the cat is clearly domestic and the owner can be found, return it to the owner.
- If not take it to the SPCA for rehoming (which will involve it being de-sexed and microchipped).

If the cat caught is feral we advise:

- If it needs to be killed, this must be done in a humane way that causes the cat the least amount of suffering possible (see killing of live animals in section five)
- Taking it to the vet or SPCA to euthanise the animal

Control of cats using toxin

Only two toxins are registered for the control of cats in New Zealand. Both require Medical Officer of Health approval, must be administered by a CSL holder, and require neighbour notifications. For these reasons, cat control using toxins should be restricted to large-scale projects of high biodiversity value, and in rural or remote areas. If you require more information on this please contact Auckland Council Biosecurity.

6 Hedgehogs

Why are hedgehogs a threat?

Hedgehogs eat large numbers of invertebrates from many habitats, including forest remnants and they prey on the eggs of dotterels and other ground-nesting birds.

How do I know if hedgehogs are present?

Hedgehogs have a home range of 1.4km and prefer dry hillsides, sandy soils, coastal areas, under wood piles. Presence can be confirmed through sightings, scat, and monitoring with tracking tunnels.

How can I control them?

There is no specific control method for hedgehogs, but many are trapped in DOC 200 and cage traps (baited for cats) They are also susceptible to brodifacoum in cereal baits. Effective control of hedgehogs requires high density trapping, such as traps at 25m spacing.

Always wear gloves to avoid leptospirosis and other diseases.



(Image from Forest & Bird NZ)

7 Rabbits and hares



Rabbits and hares have the potential to impact on sensitive plants such as orchids and dune plants, and can potentially increase during dry seasons, particularly if mammalian predators are being controlled.

Controlling rabbits and hares

There are several forms of control, some better suited to being carried out by a professional pest control contractor, and some that could be undertaken by a land owner. Rabbits are rarely controlled with only one of these control methods, and several are usually required to be implemented for success to be achieved.

Control needs to be sustained and progress monitored, to assess options for complementary control methods if required.

Monitoring can include transect counts (replicated), scoring rabbit sign (extent and density of droppings and dung heaps) and measuring levels of fresh browse on sensitive plants., and night spotlight counts

The methods described in the following pages are for both rabbits and hares.

What if the area I want to control is a park or reserve?

The control option for rabbits suitable for parks and reserves are outlined on the following page, however before any control takes place you need to get in contact with your local community park ranger in the Community Services department to discuss.

Please note NO SHOOTING on parks and reserves may be carried out by volunteers.

What if my area I want to control is too large/ small?

It is important to take into account that rabbits have a home range of about 10ha. This is about 300m from one side of their home range to the other. Depending on how big your property is, control may need to be undertaken on neighbouring land that has suitable rabbit habitat for control to be effective on your land.

Larger properties will benefit from more effective rabbit control, while smaller properties can band together to increase the control area size. If you have a small area (<10ha), talk to your neighbour and see if they want to join in as this will result in more sustainable rabbit control long term.

Control methods

Listed below is information on each control method, timings and material and contractor suppliers that may be able to help.

Rabbit control using toxin

Pindone pellets

Pindone pellets are an anticoagulant cereal bait that needs to be housed in a bait station. Bait stations should be spaced at about 150m intervals in good habitat areas.

Two key factors greatly help with success on this control method. Firstly, the bait must be available for five consecutive nights at a time for the rabbit to feed on in order that be effective. If it is less than this effective control will not occur.

Secondly these pellets must be more attractive to rabbits than mown or grazed pasture (or other naturally occurring food). For this reason, these pellets are best used in winter when less natural food is available, making them more attractive for rabbits.

You do not have to bait all year around with these pindone pellets. Pulsing is the most effective way for using toxin in rabbit control. This means filling of these bait stations for about 10 days at a time (remembering to keep some bait in there for at least five consecutive nights).

As rabbits can take up to two weeks to show signs of control with this method, it is important not to implement other control until after two weeks following baiting (or else you may be spending time and money controlling rabbits that are effectively dead). This work can be carried out by a land owner.

A good place to buy both the bait and the bait stations is Philproof <https://www.philproof.co.nz/> or Key Industries <http://keyindustries.co.nz/Pest-Control>

These places are much cheaper than standard retail stores, and are specialist pest control industry suppliers.

Parks and reserves: ✓ (Best done by contractor – contact 09 301 0101 to discuss)

Private property: ✓ (appropriate by landowner – must be in bait stations)



A Philproof rabbit bait station

Liquid pindone

This product can only be used by a person who has a CSL, and you will need a pest control contractor for this work who holds such a licence.

Stock need to be excluded from where this product is used and any remaining bait should be picked up and disposed of as per the label conditions of the product before stock are allowed back in paddocks where it was used.

The advantages of liquid pindone over pindone pellets, is that it can be applied to more palatable and attractive rabbit food such as cut carrots. It also allows the rabbit to feed in a much more natural manner (they do not like to have their vision blocked when feeding and this can occur with a bait station sometimes). As a result of these two factors, liquid pindone is much more effective than pindone pellets. Again, winter is a better time to use this method, but less so than it is for pellets.

Small Parks and reserves: ✘

Private property and larger parks: ✔ (appropriate by landowner if they have a CSL, or use a contractor).

Note: pindone pellets are less effective for hares, but liquid pindone is effective.

Night shooting

Usually best carried out by a professional pest control contractor. A silenced low calibre fire arm (such as a .22 rifle, or air gun) with a spotlight attached is the best tool. Any time of year is good for this method, but at least 70 per cent of the land area must be hunted for it to be effective. Shooting, particularly spotlight shooting, needs to be sustained and is better for lower density populations.

The fire arms safety rules need to be adhered to at all times. You can get more information at: <http://www.police.govt.nz/about-us/publication/arms-code/what-you-must-know-about-firearms>

Parks and reserves: ✔
(in some parks appropriate by contractor
– contact 09 301 0101 to discuss).

Private property: ✔
(appropriate by landowner with firearms licence, or contractor).



Rabbit eye-shine makes them easy to spot with a lamp at night

Burrow fumigation

This is a below-ground method that complements the above ground methods of baiting and shooting.

The product is called Magtox, and is in the form of a small pill that when placed in the burrow reacts with soil moisture and releases a poisonous gas.

The entrance to the burrow needs to be blocked to prevent the gas escaping. Often female rabbits will be nursing young in burrows, and these adults, along with their young, will not be exposed to baiting or shooting. Young rabbits will emerge from the burrow about 28 days after birth, so the use of this method is best done within 28 days of a night shoot.

Rabbits breed for most of the year, but between June and August breeding slows down significantly. As a result, fumigation is less effective during these colder months.

Depending on the amount of this product used at the site, a certification such as an Approved Handler test certificate or CSL may be needed. It is best to use a pest control contractor for this work.

Parks and reserves: ✓

Private property: ✓ (appropriate by landowner – however we recommend using a contractor).

Exclusion

You may be able to fence off some areas of your property to prevent rabbits getting into it. This is a non-lethal method that can be effective if some parts of the property are very sensitive to rabbit browse (such as vegetable gardens).

Fences should be mesh, be at least 700mm high, and should ideally have a “skirt” that is buried below the surface on the outside of the fence, extending out about 300-400mm to prevent the rabbits digging down under it.

Parks and reserves: ✓

Private property: ✓

Habitat modification

Rabbits love nothing more than mown or grazed grass as this is a source of fresh growth grass and an open area where predators can be seen coming from a distance enabling an effective escape.

If grass can be kept longer, rabbits do not like this, and will move out of the area. This technique can be used to concentrate rabbits in one area to make them more prone to control such as baiting or shooting.

A very good document on rabbit control is produced by the National Pest Control Agencies and outlines these methods in much more detail. You can find it here:

<http://www.npca.org.nz/images/stories/NPCA/PDF/a5%20rabbits%202012-11.pdf>

Parks and reserves: ✓

Private property: ✓ (appropriate by landowner)

8 Goats

Feral goats can have devastating impacts on local biodiversity, particularly the understory of regenerating forest. Over time they can change the composition of native forests by their selective browsing of preferred plants.

For example, larger leaved coprosmas are a favourite food of goats, and are rarely found in forest patches regularly browsed by goats.

Methods for controlling or eradicating goats include:

- Pre-feeding with e.g. calf pellets in a secluded area where animals are finally shot or poisoned, the latter by licensed operator
- Sustained shooting, particularly if it can be coordinated amongst local landowners can be very effective in eradicating small herds
- Rounding up herds by using farm dogs and sending to freezing works (the ultimate in cost-recovery)

Monitoring should include watching levels of browsing on palatable plants such as coprosma.

Control of goats on parkland and small blocks of private land should be undertaken by professional contractors. On large blocks of private land goat control (including by shooting) can be carried out by private individuals.

The fire arms safety rules need to be adhered to at all times with this method

<http://www.police.govt.nz/about-us/publication/arms-code/what-you-must-know-about-firearms>



9 Deer

Feral deer heavily threaten our forests ability to regenerate by browsing on seedlings, which changes the composition of the forest through reduction of biodiversity, and destabilisation of soils.

Feral deer have home ranges between 8km (Fallow) and 15 km (Red) so the larger the control area for deer the better.

Control methods vary depending on the size of the project area, the density of deer and resources available.

The main method of control is shooting. This is best undertaken in the early evening when deer are more active, but deer can also be shot during the day. A large calibre firearm is essential to obtain a humane kill.

Tools such as infrared night scopes and specifically trained pointing dogs can increase the effectiveness of hunting.



A fallow deer

Live capture traps may be an option for smaller properties. These must be checked daily when set.

In public reserves and parks and smaller private properties, any deer control should be carried out by a professional contractor.

On larger remote private land, control may be carried out by private land owners.

The fire arms safety rules need to be adhered to at all times with deer shooting.

<http://www.police.govt.nz/about-us/publication/arms-code/what-you-must-know-about-firearms>

10 Feral pigs

Pigs have a serious impact on forest understorey and some threatened species. Kauri snails are particularly sought after by pigs and kiwi have also been recorded as prey.

Control methods are generally uncoordinated but potential methods include:



A wild boar

- Hunting using trained dogs that are regularly exposed to kiwi aversion training if relevant to the area
- Pre-baiting pigs into an area in which they can subsequently be shot or poisoned. However, pigs are very taste-sensitive and control advice should be sought from Councils and DOC
- Pre-baiting koru-shaped steel-netting traps. Monitoring should include determining extent of recent characteristic grubbing. These need to be checked daily when set.

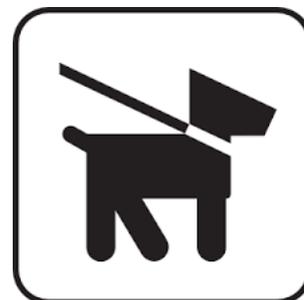
Hunting can only be carried out on private property, and not on any parks and reserves in the Auckland region except under permit in the Hunua Ranges Regional Park.

11 Dogs

All dogs, whether they are family pets, hunting, working or wild, retain an inherent drive to track, chase, hunt, grab and kill other animals. Managing dogs is an important part of biodiversity enhancement and protection projects.

Some of the wildlife currently at risk of being killed or having nests disturbed by dogs are:

- Kiwi, and other ground dwelling birds, in bush, scrub, long grasses
- Shorebirds nesting or feeding on beaches or dune areas
- Seabirds, especially penguins, nesting along the Northland coast
- Wetland birds, like the bittern, nesting or living in swamps and long vegetation



New Zealand Dog Control legislation covers the need for people to control their dogs so they do not attack or harm threatened wildlife.

For information on dogs in parks and reserve visit the Auckland Council website

<http://www.aucklandcouncil.govt.nz>

12 Wasps

There are two main types of introduced wasps– paper wasps (narrow bodied) and the plumper common and German wasps.

They are a problem because they have no natural predators, our winters are mild and there is plenty of food. They are voracious eaters of honeydew, which is an important food for native birds, bats, insects and lizards.

Wasps also prey on insects and have been observed killing newly-hatched birds.

Wasps will strongly defend their nests if humans or animals get too close. Paper wasps build umbrella-shaped nests which hang by a single stalk from the branches of trees or eaves of houses. German and common wasps most often live in underground nests with one or more entrance holes, although their nests may also be found in trees.

Successfully controlling wasps over large areas is now much more likely with the registration of the insecticide Fipronel as a wasp toxin under the trade name of Vespex. Vespex is designed to target both the common wasp and German wasp, but not the paper wasp.

Specific rules regulate the use of this control method.

For more information on using Vespex go to <https://www.merchento.com/vespex.html>



Paper wasps on their nest

13 Pest birds

Magpies and Mynas

Although much less destructive than other pests, Indian mynas and Australian magpies are both aggressive birds known to raid the nests of native birds, destroy eggs and tip out fledglings. This is a result of competition for territory and food.

Mynas are also known to predate on native skinks, geckos and insects such as weta.

Australian magpies and Indian mynas are highly intelligent birds. Shooting is not a long term effective method as the birds quickly become 'gun shy'.

Control using toxin

Alpha-chloralose

This is a humane poison that produces a hypnotic effect by interfering with the bird's body temperature control mechanism – can work well but only when you get good frosts. It does not work well in Northland's warm climate.

Alpha-chloralose does not discriminate and nontarget birds may take the bait and die as well. This method should only be carried out by an experienced contractor.

Control using traps

Larsen Magpie Trap

'Larsen' single-capture, split-perch trap: The trap consists of two compartments, one holding the 'decoy' bird, one armed with a sprung-loaded mesh panel held open by two pieces of dowelling. When a bird drops into the trap to land on the perch, the dowelling gives way and the trap door springs closed. A limitation however is that after catching the bird, it must be removed and the trap reset.

Pee Gee Myna Trap

The 'Pee Gee' trap consists of a 'trapping' compartment and a 'holding' compartment. A minimum of two 'decoy' mynas are kept in the holding compartment to call in further birds. There are two 'tunnel' entrances into the 'trapping' compartment and one 'chute' entrance from the 'trapping' compartment into the 'holding' compartment. Attracted by the food in the trap, the bird enters the 'trapping' compartment through one of the one-way 'tunnels', feeds for a while and then looks for a way to escape. The only exit from the 'trapping' compartment is up the 'chute' into the 'holding' compartment which can hold at least ten mynas.

An advantage of the 'Pee Gee' trap is that it can trap multiple birds. Traps are usually supplied with a mynah to put in the 'holding' compartment to get you started.

Larsen and Pee Gee traps are available from Adrian Gilbert (adriangilbert@xtra.co.nz) with all profits going to conservation charities.



The common mynah



The Australian magpie

Disposing of live pest animals

Why would we need to destroy a live animal?

If a control tool fails and the animal is caught but not dead then that animal needs to be destroyed humanely.

If using live capture traps, these need to be checked 12 hours after sunrise and any animals that have been caught must be dealt with.

If you are not confident in destroying live animals humanely then we recommend you either do not use live capture traps as a control tool, or arrange for the animal to be destroyed by your local vet.

But why? Are they not just a pest?

Destroying animals must be done humanely. The standard that must be met is that any animal must be killed in a way that the animal is:

1. Rendered insensible (this in effect means it must be unconscious), usually through stunning, and;
2. Death immediately follows (heat and brain function being the usual tests)

For example, shooting an animal in the head achieves both outcomes simultaneously. Stunning an animal and then cutting its throat also achieves these tests. Death through the injection of pentobarbital by a vet also achieves this outcome.

You will occasionally hear of people that will bash in the skull of an animal, which might be effective, but there is a risk that an animal will 'wake up.'

We advocate that the throat is cut or some other technique applied to ensure that doesn't happen.

Most vets will euthanise a possum and pest destruction companies will also arrange this – of course that may incur a fee. For further information on vets in your area look online or in the phone book.

Monitoring

Monitoring your target pest animals over time will help you understand if you are making the difference you intend to, and can help guide your control work.

Some fundamentals of monitoring

- *Use the same method of monitoring for each monitoring round, in the same locations.*
This will allow you to compare monitoring results over time. As many things need to be kept constant between monitoring rounds as possible (method, location, time of year, number of nights monitored) so that the main variable is the pest animal numbers you are monitoring.
- *Ensure that you monitor a representative proportion of your control area.*
For example, if your control area is one third wetland, one third bush and one third pasture, place one third of your monitoring tools in each habitat.
- *With most monitoring you are measuring relative abundance.*
This is not all the pests in your control area, but a representative sample.
- *Try and avoid biases in the placement of your monitoring tools.*
Do not locate them right next to trap or bait lines, or only along one form of landscape feature.
- *The spacing of monitoring tools and lines is important.*
This is to ensure the tools are placed within the target animals home range, and that lines do not double count animals. Placing of monitoring lines too close to your project edge will not reflect the work inside your project area.
- *For possums and rats, areas under 300ha are difficult to monitor with accuracy.*
This is because it is difficult to fit enough monitoring lines in to gain an accurate overall site average relative abundance. For such sites, presence/absence monitors compared over time are best, with less emphasis on fluctuations.



Monitoring tools for target species

Rats:

Tracking tunnels with inked tracking cards placed in them, left out for one fine night. Each tracking tunnel line is 450m long, with 10 tunnels located every 50m along the line. Each line must be a minimum of 200m apart.

Chew cards can also be used at the same spacings

Stoats:

Tracking tunnels with inked tracking cards placed in them, left out for three fine nights. Each tracking tunnel line is 400m long, with five tunnels located every 100m along the line. Each line must be a minimum of 1000m apart.

For further information on rats and stoat monitoring see

<http://www.doc.govt.nz/Documents/science-and-technical/inventory-monitoring/im-toolbox-animal-pests-using-tracking-tunnels-to-monitor-rodents-and-mustelids.pdf>

Possums:

Plain wax tags, left out for three fine nights. Each monitoring line is 180m long, with 10 wax tags placed every 20m along the line.

For further information on possum monitoring see

http://www.npca.org.nz/images/stories/NPCA/PDF/a1_possum%20monitoring_2015-nov_lr.pdf

Rabbits:

Night spotlight counts, or systematic survey of sign using the Modified McLean Scale

For further information on rabbit monitoring see

<http://www.npca.org.nz/images/stories/NPCA/PDF/a5%20rabbits%202012-11.pdf>

Goats, deer and pigs:

Use of train cameras. Survey of sign (droppings, browse, trails, rubbings on trees) at designated monitoring locations.

For further information on feral pig monitoring see

http://www.npca.org.nz/images/stories/NPCA/PDF/a10_feral%20pigs_2015-nov_lr.pdf

Monitoring the bait take and trap catches is also a great method to measure the effectiveness of your project. Doing so is less labour intensive because it is just recording what you are doing anyway. In doing so it shows the fluctuations in toxin use or trap catch so your how to plan for the next year. Templates for these can be found in Appendix Four.

For a comprehensive guide to monitoring, whether it is for biosecurity or biodiversity related projects, please refer to the *Auckland Ecological Monitoring Guide* (available 2018).

Community pest control pathway

Five steps to community pest animal control success

Getting started

Well done! Sometimes the transition from talking about it to actually getting started is the hardest part of a pest control project.

Understanding the steps needed along the way is key to keeping the project on track and making it easier to determine what actually needs to be done.

1. Define your goal and vision

- What are you trying to protect? (habitat and key species)
- What is the scope of the project and its area size?
- What are your target pest animal species?

2. Write your pest control plan

Using your answers to the above questions, and our planning template, the plan should include:

- Target species and their home ranges
- Methodology being used
- Pest control hardware layout and map
- Hardware needed for set up
- Monitoring methodology and timeline

3. How are you going to measure success?

Monitoring (refer to Appendix One below)

4. Where will you go for assistance?

- Advice (For private property go to the Auckland Council Biosecurity team, for work on local parks go to the Auckland Council Community Park Rangers)
- Funding
- Further training and upskilling
- Joining a wider volunteer restoration network group

5. Getting set up on the ground

- Signage
- Lines
- Hardware
- Toxins or traps set
- Monitoring

7. Pest control programme live!

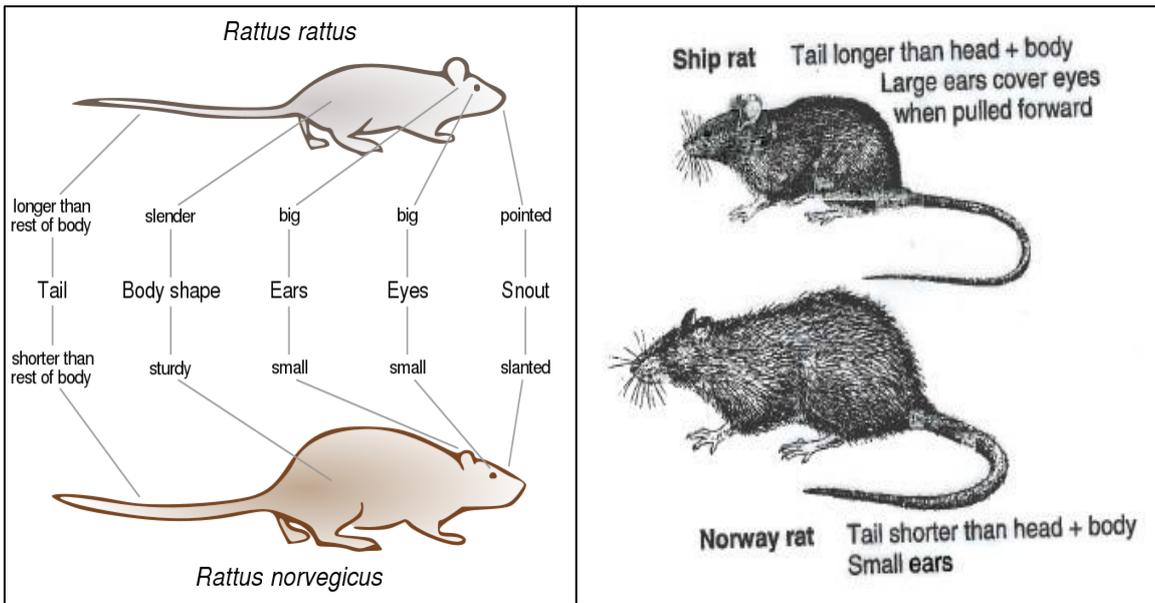
- Do you need to recruit more volunteers?
- Is there further training needed?
- Follow the pest control plan to keep the project as effective as possible
- If unsure of actual effectiveness, ask for further advice
- Review the programme after the first season

Appendices

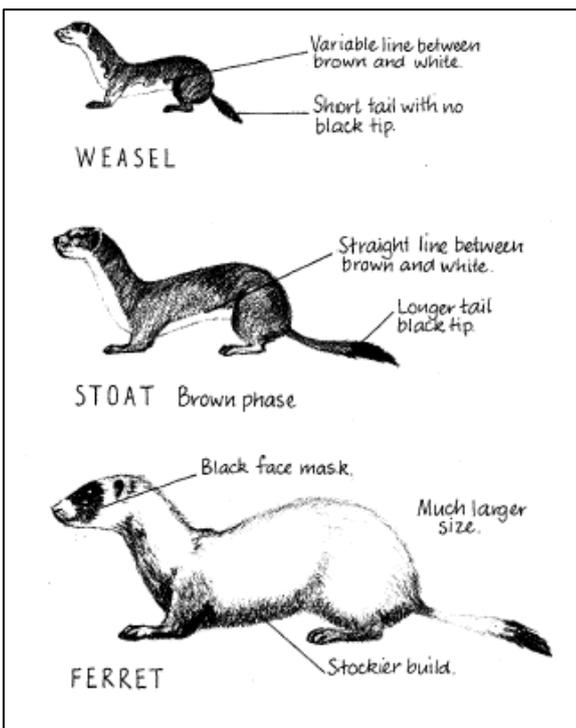
1. Monitoring matrix

Target Pest Species	Home Range (m)	Monitoring Tool	Transect spacing (m)	Tool along transect	x tools	duration	Times per year	Locations
Possum	120 Female 140 Male	1) Corflute Chew Cards Or/ 2) Plain Wax Monitoring Tags	200m	20m	x 10 (200m long)	3 fine nights	2	Ridges - especially prominent trees (kohekohe, totara, pine, pōhutukawa, macroarpa, exotic trees especially fruit, orchards, sheds, track end road edges.
Rat	150 (ship) 500-700 (Norway)	1) Tracking Tunnel with 4-6 cm of peanut butter for the lure. Or/ 2) Peanut Butter Wax Tag	200m	50m	x 10 (500 m long)	3 fine nights	4	Ridges, stream/ coast edges, track edges, always close to vegetation cover, not open pasture.
Mouse	30	1) Tracking Tunnel with peanut butter bait 4-5 cm blob or/ 2) Peanut Butter Wax Tag	100m	50m	x 10 (500 m long)	3 fine nights	4	Ridges, stream/ coast edges, track edges, always close to vegetation cover, not open pasture.
Stoat	1300	1) Tracking Tunnel with Erazz Rabbit Paste	1000m (max)	100m	x 5 (500m long)	3 fine nights	4	Ridges, valley floor, track edges even in open pasture.
Weasel	400	1) Tracking Tunnel with Erazz Rabbit Paste	200	50	x 10 (500 m long)	3 fine nights	4	Ridges, valley floor, track edges even in open pasture.
Hedgehog	1400	1) Tracking Tunnel with peanut butter bait	1000m (max)	100m	x 5 (500m long)	3 fine nights	4	Dry hillsides, sandy soils, coastal areas, under wood piles.
Rabbit	250	1) McLean scale, or/ 2) Night spotlighting	N/A	N/A	N/A	fine night	3	North facing dry slopes with easy digging and low rainfall and Sand dune systems, short pasture.
Goat	2300	1) Trail Camera, 2) Faecal plots, 3) vegetation browse plots	N/A	N/A	N/A	N/A	2	Ridges, stream, pasture pockets with shelter.
Deer	7-15km	1) Trail Camera, 2) Faecal plots, 3) vegetation browse plots	N/A	N/A	N/A	N/A	2	Ridges, stream, pasture pockets with shelter, river valleys, crops, farmland.
Pig	1400	1) Trail Camera, 2) Disturbance plots	N/A	N/A	N/A	N/A	4	God cover but close to pasture (gorse, bracken, scrub). Exotic forests with access to water. Seasonal food sources such as olives and feijoas

2. Rat and mustelid identification



Above and left: the difference between ship and Norway rats in tail length and body size



3. Glossary

Word(s)	Meaning
First Generation toxin	One of the first group of vertebrate toxins developed – multiple feeds required over several consecutive nights to be effective
Second Generation toxin	One of the second group of toxins developed, and generally of higher toxicity – only one feed is required by the target animal to be effective
Browsing	Grazing by pest herbivores e.g. goats or deer

4. Bait take and trap catch recording templates

The below are some suggestions of the basic info you should record each time a trap and / or station is checked.

Bait Take Record					
Location					
Person					
Date		Time			
Bait name					
Safety issues identified					
		record bait in 1/4 blocks, eg 1 1/4, 1 1/2, etc			
Line #	Station ID #	Estimate how much bait is still in station? (blocks)	How much bait did you remove? (blocks)	How much bait did you put in? (whole blocks)	Other comments eg. birds seen/heard, lizards seen, slug/snail damage, bait station condition

Trap catch record					
Location					
Person					
Date		Time			
Safety issues identified					
Line #	Trap ID #	Has the trap caught anything? (Y/N)	Species caught	How much bait did you put in? (whole blocks)	Other comments eg. Nothing caught but lure gone; notes of trap / station damage etc

5. Toxin matrix

Toxin recommendations for community pest control										
Toxin	Target Animal	Advantages	Disadvantages	Local Parks & Reserves Community Groups	Private Property	Pulsing	Secondary poisoning	Recommended Bait Form	Methods approved without CSL	Antidote
Diphacinone	Rat	Generally effective at controlling rats to keep numbers low. Option for urban environments where residues or non-target effects may be a factor when using higher potency second generation anti-coagulants.	Multifeed. Cannot effectively deal with sudden population surges. Not a knockdown tool. Overtime needs to be rotated with other toxins to avoid populations becoming bait shy or building up resistance. Larger amounts of toxin need to be consumed to obtain a lethal dose. May not be suitable for mice due to low toxicity	Rats: Suitable for parks and reserves. Use in bait block form (DITRAC) lockable bait boxes. Pulse.	Rodents: Private property can use in pellet form in bait stations. Pulse.	Pulsed 4 times a year (August, November, January and April). In this pulse you fill the bait station on; day 1, day 3 & day 5. Then refill day 14. If less than half the bait from the previous fill is present on the day 14 fill, consider filling again on day 17. Remove bait end of week 4 and dispose of it correctly, degraded bait can make animals bait shy as it is not as effective. The reason for the topping up is as multi feed poison it is very important that it is supplied for 5 nights for the rat to be able to consume a lethal dose.	Low Risk	Block, Cereal Pellet, striker	Bait Stations	Vitamin K1
Pindone	Rabbits, Rats, Possums	Generally effective at controlling rats to keep numbers low. Option for urban environments where residues or non-target effects may be a factor when using higher potency second generation anti-coagulants.	Multifeed. Cannot effectively deal with sudden population surges. Not a knockdown tool. Overtime needs to be rotated with other toxins to avoid populations becoming bait shy or resistant. Larger amounts of toxin need to be consumed to obtain a lethal dose. May not be suitable for mice due to low toxicity. Possums need 1-2kg and it can take up to 2-3 weeks to achieve control, so needs to be pulsed to ensure toxin is not being eaten by effectively dead possums.	Rats: suitable for parks and reserves. Use in bait block form lockable bait boxes. Pulse. Rabbits: Can be used in pellet form for rabbit control by contractor. Possums: In bait stations, pulse.	Possums: suitable for private property, can use in pellet form in bait stations. Needs to be pulsed. Rabbits: Needs to be in bait stations (turf spits require Controlled Substance Licence).	Rats: Pulsed 4 times a year (August, November, January and April). In this pulse you fill the bait station on; day 1, day 3 & day 5. Then refill day 14. If less than half the bait from the previous fill is present on the day 14 fill, consider filling again on day 17. Remove bait end of week 4 and dispose of it correctly, degraded bait can make animals bait shy as it is not as effective. The reason for the topping up is as multi feed poison it is very important that it is supplied for 5 nights for the rat to be able to consume a lethal dose. Possums: used in baiting regime with first pulse being brodifacoum & remaining 3 pindone.	Low Risk	Cereal Pellet	Bait Stations,	Vitamin K2
Bromadilone	Mouse, Rats	Single feed. Very effective for knockdowns, has a higher chance of a lethal dose being consumed in one feeding. Effective in controlling rats to low numbers.	Bioaccumulates in the tissues of poisoned animals and slowly breaks down in soil.	Rats/ Mice: suitable for parks and reserves, use in bait block form (Contra) inside lockable bait boxes. Pulse	suitable, needs to be pulsed.	Pulsed 4 times a year (August, November, January and April). In this pulse you fill the bait station; Day 1, refill Day 5, & Day 14. Remove bait end of week 4. When ending the pulse make sure you remove all bait in stations and dispose of it correctly, degraded bait can make animals bait shy as it is not as effective.	Medium - High risk	Block	Bait Stations	Vitamin K3
Brodifacoum	Possums, Rats, Mice	Effective as a knockdown tool.	It is slow to break down in the environment and it bioaccumulates in tissues for prolonged periods in living animals. Risk of secondary poisoning is high.	Rats/mice: Only as a knockdown tool during high numbers as first pulse. Move to another toxin (Pindone/ Diphacinone) for next 3 pulses so environmental persistence is minimised. Caution in urban area. Possums: Cannot be used stations are not lockable.	Possums: suitable for private property, can use in pellet form in bait stations. Needs to be pulsed. Keep stations elevated if risk to pets/ children. Livestock need to be excluded from area. Minimum height of bait stations 300mm off ground, or 1.8m off ground to minimise effect on non - target animals.	Pulsed 4 times a year (August, November, January and April). In this pulse you fill the bait station; Day 1, refill Day 5, & Day 14. Remove bait end of week 4. When ending the pulse make sure you remove all bait in stations and dispose of it correctly, degraded bait can make animals bait shy as it is not as effective	High Risk	Block, Cereal bait	Bait Stations	Vitamin K1
Sodium monofluoroacetate 1080	Possums, Rats, Deer, Goat, Mouse, Feral Cat, Rabbit, Wallaby	Breaks down quickly in the environment. Effective for multiple species pest control.	Requires CSL. Dogs are very susceptible. No antidote	Not for use	Controlled Substance Licence required. Stock need to be excluded form area. Watch dogs/ use muzzle.	Pulsed 4 times a year (August, November, January and April). In this pulse you fill the bait station; Day 1, refill Day 5, & Day 14. Remove bait end of week 4. When ending the pulse make sure you remove all bait in stations and dispose of it correctly, degraded bait can make animals bait shy as it is not as effective.	Dogs especially susceptible. Timeframe for secondary poisoning much less than other toxins.	Cereal Pellet	Bait Stations	none
Para-aminopropiophenone (PAPPP)	Stoats, Cats	Designed to kill stoats humanely. The risk of by-kill is likely to be low since it does not leave residues in the environment	Does not control other species.	not for use	Controlled Substance Licence required	Ask Biosecurity for more information	Low Risk	Paste (inside meat ball)		methylene blue
Cholecalciferol	Possums, Rats (not stoats)	Will reduce populations of possums and rats but not stoats as it does not bioaccumulate in animals. It breaks down readily in the environment, the risk of secondary poisoning is considered to be low. Lower toxicity to birds than mammals reduces primary poisoning risks to birds.	No Antidote. Less effective than other toxins.	not for use	Yes	Ask Biosecurity for more information	Low Risk/ but risk to dogs	Cereal pellet & striker	Bait Stations, Bait Bags	no
Sodium Nitrate	Pig	It does not leave residues in the environment. Minimal secondary poisoning risk.	CSL required, pre-feeding required, specifically designed bait stations.	Not for use	Yes, large properties	Ask Biosecurity for more information	Low Risk	Liquid, in bait balls		Supplemented oxygen and methylene blue
Cyanide	Possum, Wallaby	Kills quickly & humanely. Cyanide breaks down quickly and does not leave residues in the environment.	Effectiveness varies due to bait shyness. Requires CSL and approval from local medical officer of health (MOH)	Not for use	Controlled Substance Licence required & MOH approval	Ask Biosecurity for more information	Low Risk	Encapsulated pellet,		Amyl nitrite capsules. Hydroxocobalamin and kelocyanor

NOTES



Find out more: **phone 09 301 0101**
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