



PEST CONTROL GUIDELINES

NORTHLAND 2009

New Zealand's wildlife is particularly vulnerable to pest animals. This is because New Zealand plants and animals evolved for millions of years in the absence of terrestrial mammals. Pest animals can be defined as all species introduced to New Zealand that have a negative impact on native plants and animals and/or production areas.

The major threats to our terrestrial plants and animals come from:

- possums, which destroy forests and birds' nests
- rats, which prey on seeds, seedlings, invertebrates, lizards, birds' eggs and chicks
- mustelids (ferret, stoat, weasel) which prey on lizards, invertebrates and birds
- cats, which prey on lizards, invertebrates, birds, bird eggs and chicks
- dogs which kill kiwi, penguins and shorebirds.

Other threats include pigs, goats, escaped deer, livestock, hares, rabbits, hedgehogs, mice, wasps, Argentine and other exotic ants.

Widespread eradication of most pest species on the mainland is impractical in most cases, therefore control needs to be a long-term commitment as most pest populations can recover quickly.

Remember some pests are intelligent enough to learn from bad experiences and will quickly discover how to avoid poisons, traps and spot lights if your first attempts to kill them are not successful.

1.0 Planning considerations

Before starting a pest control program it is useful to consider:

- what native plants and animals are present
- what pests are present
- the levels to which pests have to be reduced to (and for how long) to make a difference
- sustainability questions
- what monitoring needs to be done in order to determine if the pest control is working and the desired results are being achieved
- ripple effects or side effects that might occur and how to minimise these.

The timing of and duration of pest control also needs to be considered. For example, if the goal is the recovery of small forest birds, then rat control to levels of 5% residual trap catch/tracking during the breeding season is normally adequate, whereas if the recovery of seedlings, lizards and invertebrates are an objective, some level of rat control will be needed throughout the year.

Table 1 provides a general guide to the impacts of animal pests on Northland native wildlife:

Table 1: KEY ANIMAL PREDATORS OF NORTHLAND BIOTA

Y = Yes, high impact; y = yes, but possibly low/lesser impact

	Possum	Mustelid	Cat	Dog	Rat	H'hog	Pig
Kiwi	y	Y	Y	Y			y
Pateke	y?	Y	Y	Y	y		y
Bittern	Y	Y	y/Y	Y			y
Blue penguin	y/Y	Y	Y	Y	?		y
Kukupa	Y	Y	y/Y		Y		
Kokako	Y	Y	y/Y		Y		
Kaka	Y	Y	Y	y?	y/Y		
Kakariki		Y	y		Y		
Robin/tit	y	y/Y	y		Y		
Bellbird	y	y	y		Y		
Rifleman		y/Y			Y		
Lizards		y/Y	y/Y		Y		
Saddleback	?	Y	Y		Y		
Stitchbird	?	Y	Y		Y		
Tuatara	Y?	Y	Y	?	Y		
Shorebirds	Y	Y	Y	Y	Y	Y	y
Kauri/Flax snail etc	Y	Y	y		Y+ mice	y/Y	Y
Fernbird		Y?			Y?		
Crakes/rails		Y?			y?		
Bats	?	?			?		
Frogs	?	?			Y		Y+ grazers
Germination and seedlings	Y				Y		+ browsers weeds
Flowering/fruiting	Y				y		
Threatened plants	Y/y				?		+ browsers weeds

(Ray Pierce)

Consideration should also be given to minimising side effects and ripple effects. 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.

2.0 Controlling animal pests

2.1. Possums

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

For native wildlife the possum is both a food competitor and a predator. "Nest cam" video has confirmed that possums eat eggs and chicks, and autopsies have revealed that they munch through a wide range of invertebrates.

While it may currently be impossible to eradicate possums in New Zealand, coordinated control can reduce local populations to much less damaging levels.



Possums:

- feed at night and sleep during the day
- 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 favourite trees that are visited regularly, often recognised by extensive scratchmarks in their bark and heavy browsing of leaves, and fruit.

Their dislike of wet weather – although they can swim – makes possum control much more successful in periods of fine weather. Colder temperatures are better as well.

Poisoning

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 not putting out enough at each site - may result in them becoming bait shy.

Poisons can be divided into two main groups: slow-acting ones that can be used by the public without special training and licensing, such as Talon, Pestoff, Campaign and Feracol, and those that require special licenses and/or permits, including, Cyanide in either a paste or encapsulated pellet form.

Avoid prolonged use of brodifacoum (talon and pest-off) which can be detrimental to many species in the food chain. Use such poisons when absolutely necessary, but be aware that over time these toxins can build up in birds such as moreporks and kiwi to lethal levels.

When possum density is moderate to high or they need to be controlled to very low levels for long periods (e.g. during kukupa, or kokako nesting), cyanide paste or Feratox are useful tools. Cyanide is often used for an initial

knock-down, and then possums can be controlled to maintain low levels with trapping or other toxins, depending on preference. Define the areas and sensitive periods of the year and contract a licensed operator to lay the poison. It is most effective to collaborate with neighbours to minimise reinvasion. Generally aim for achieving possum control to below 5% Residual Trap Catch (RTC) with 10% as a threshold for initiating another knock-down. However, where particularly sensitive species (e.g. kokako, recolonising kukupa, etc) are present, the more intensive the possum (and rat) control is, the greater the chance of success. Monitoring should be either possum bait take, trap catch and/or monitoring of sensitive trees.

If using bait stations, they are best spaced 50 - 100 metres apart along well-defined bush/pasture margins or along tracks through larger areas of forest.

Trapping or shooting

Trapping or night shooting using spotlight is most effective when possum numbers have been reduced to low levels by poisoning and control is aimed at minimising reinvasion or recruitment.

The most commonly used traps in Northland are the Steve Allan Possum Trap or Timms trap.

Tips for Possum Traps:

- Timms traps are best baited with a piece of fruit, eg. apple sprinkled with cinnamon, lemon or orange peel, etc.
- Possums love sugar! Sprinkle some sugar on the fruit and place a piece both in the Timms Trap, and also leave a piece outside the trap to attract the possum.
- Steve Allan Possum Traps can be baited with a mixture of 50% flour and 50% icing sugar. Shops like Surplus Direct or Binn Inn sell cheap cake and biscuit mix which can be very effective. Anything will work as long as it is sweet and powdery.
- Set possum traps in pairs with mustelid traps to reduce labour. Also, mustelids will be attracted to any dead animals caught in the possum trap and can then be caught in the mustelid trap.
- Kiwi and weka have occasionally been caught by their beaks in Timms traps so it is necessary in kiwi areas to firmly mount them well off the ground (70 cm).
- Steve Allan Possum traps are also good at catching rats.

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.

Monitoring

To gauge the success of your possum control operation, use wax 'chew' tags and record the number trapped or shot. Annual observations of possum browse or photopoints of trees favoured by possums such as kohekohe, mahoe, puriri, rata, pohutukawa and tree fuchsia will help to determine if your native forest is recovering. Regular birdcounts can help to monitor bird populations over time (See www.formak.co.nz or more information on monitoring methods).

2.2 Mustelids

Mustelids include weasels, stoats and ferrets. Table 2 shows their defining features:

Table 2: The Difference between ferrets, stoats, and weasels

	Colour	Average Length	Average weight	Comments
Ferret	Generally creamy with black tips	52cm	M 1200 g F 600 g	Size of a small cat, active at night; take mainly rabbits and rodents but can kill kiwi up to 2.5 kg in weight.
Stoat	Brown back, pale belly	37cm	M 325 g F 205 g	Bushy tail with black tip; active day and night; take mainly rodents, but also most kiwi chicks are killed by stoats. Peak dispersal of young is December-March.
Weasel	Deep brown to light tan	22cm	M 125 g F 60 g	Short tail – no black tip; active day and night; prey on small animals only.

All mustelids are good swimmers and can prey on animals up to 3 times their own body weight. Mustelids 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.

In general mustelids are difficult to trap, and only trapping to a high standard will bring about increased survival rates of birds. Keep a watchful eye out for them and their tracks and droppings. Input from an experienced mustelid trapper can be very helpful when setting up your programme.

The trap types and baiting methods for mustelids are continually being improved so mustelid controllers will need to keep up to speed with national and local developments.

Poison baits are currently being developed for mustelids, and should be available in the near future.

Traps

Fenn traps have been the standard trap for mustelid control for many years. In areas where ferrets are present alongside smaller mustelids, Mark 6 Fenns can be used either as double or single sets covered by a plastic or wooden tunnel. Single sets have netting covering one end to facilitate the wider dispersal of bait smell. Other traps include DOC 200 and DOC 250 traps.

A trap is only useful if it is well serviced, has oiled working parts, wire-brushed, filed, etc. Traps need to be regularly tested to ensure that they will be set off by a mustelid. Pathways for mustelids need to be kept open, e.g. in pastoral landscape, to ensure the trap-site is found, and the trap preferably hazed to orientate the animal.



Ferret

Trap layout and site selection

Trap configuration and spacing varies with the species being protected. Trapping densities typically have been 1 trap to 10 ha for mustelids, but this can vary according to the terrain. For example traps could be spaced at a lower density (1/15 -1/20 ha) in areas with large areas of grassland, or at higher densities in areas with continuous forest or a mosaic habitat where there are many contours that mustelids could be active along.

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

- stream edges (good for mustelids),
- bushland edge,
- fencelines,
- animal runs,
- crossings over water courses,
- fallen trees,
- along tracks/roads

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 – eg pasture:bush interface. 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.

If a trap is in a good place (as per details above) – only consider moving it if it hasn't caught for **2 years!!!**

If a trap catches regularly, consider adding another trap nearby.

Trap Setting

Keep all kill and leghold traps 70 cm off the ground or in a tunnel in areas where kiwi or other birds are present.

Special tips for using mustelid traps:

- Wear gloves when handling trapped animals (many target species carry leptospirosis among other things!)
- 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 Fenn bars 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 plate
- Single sets - keep fine setting and place bait not too close to blocked off end with mesh.
- 'Hazing' of trap is important to direct animal over treadle.
- Record captures and bait etc

Fenn traps

- Ensure that the treadle plate is level or angled slightly up – and moves freely
- There is value in having a variation in trap type – ie mixture of Fenn and DOC 200
- Fenn Mk IV are easier to set for community members with weaker hands – but won't catch or kill most ferrets!
- Where funding allows – double fenns are preferable to singles (stoats prefer tunnels they can access at both ends).
- Often a rat in one trap will lure a stoat into the other.

DOC 200 single trap in a wooden tunnel

- Note that large ferrets may get out of a DOC 200 so DOC 250 should be used where these may be present.
- Big treadle and fine set
- Baffles were made from 20 mm mesh and the entrance hole size was 60 mm square
- The entrance hole should be no larger than 60mm otherwise cats can enter the tunnel and pull out of the trap as it doesn't kill them. A larger entrance hole may produce trap shy cats (unless using a DOC 250.)
- A hole larger than 60mm will also allow possums in which will reduce stoat catch.
- DOC 200s are not approved for cats.
- Wooden tunnels with larger mesh ends are likely to allow more air movement through them therefore increasing the volume of scent for predators to be able to find traps
- 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

Bait type and frequency of checking

Refinements in preferred baits are ongoing. Useful baits include fresh rabbit, salted rabbit, freeze-dried rabbit, freeze-dried rat, pilchards and eggs. There are clearly regional differences in the appeal of different baits to stoats, with rabbit meat being the preferred bait in Northland and possibly elsewhere (Pierce et al. 2005). Useful strategies include pulsing with fresh baits and changing bait types, particularly if it is suspected that there are trap-shy or bait-shy animals present.

The frequency of trap checking varies seasonally and for different protected fauna species. Many Landcare groups check mustelid traps and replace baits fortnightly in summer and monthly in winter.

Other points to note:

- Bait needs to be attractive at all times. Rotten bait won't catch.
- Keeping baits off the ground on wires will delay it going rotten
- With hanging baits (eg in a wooden tunnel) watch bait doesn't interfere with Fenn trap when it is sprung
- Look to maximise air flow through the tunnel to spread the scent as much as possible.
- Placement of bait under the trap is not recommended, as the predator may not cross the trap cleanly which will result in miss catches. Bait also degrades faster on the ground.
- Alternate baits occasionally, e.g. during period of low/nil captures can use eggs to attract the occasional bait shy animals.
- Salted bait is not palatable so it is important to remove old salted baits completely (carry out or bury) so target animals do not get the chance to taste it and be deterred.
- Rabbit bait pastes and blocks have been developed by Connovations
- Eggs are the least preferred bait.

Frequency of trap checking

- Varies seasonally, and depending on what you are trying to protect
- Kiwi require protection from stoats/cats for their first 6-8 months – but in Northland year round trapping is required because of their very long breeding season, and the presence of ferrets which can kill adult kiwi.
- Fortnightly/Three weekly trap checks from November to April, and monthly checks from May - Oct appears to be sufficient for kiwi protection.
- Pateke may require more frequent trap checks.
- Beware of autumn stoats which will be strong and intelligent and account for a lot of birds at this time of year especially patake 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.

Maintenance and Preparation of Newly Purchased Traps

There is currently no simple solution to prolonging the life of traps.

- Anodising helps prolong the life of the trap (but not if in a tunnel made from tanilised wood). Contact Metal Protection Ltd, Auckland.
- If not anodised, each trap should be dipped in engine/vegetable oil mix before being set in the field (catch rates don't seem to be affected by the use of engine oil).
- At each check the trap should be checked to ensure the treadle plate drops freely. Apply a few drops of engine 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 penetrol to 8ltrs of vegetable oil. (Penetrol is available from paint shops)

Monitoring

Monitoring can include sightings of live animals and annual trap catch data, including geographic locations of captures. Taking part in the annual kiwi census or doing regular birdcounts will also help to determine if bird populations are recovering (See www.formak.co.nz or more information on monitoring methods).

2.3 Cats

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

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. They have large overlapping home ranges with males known to roam up to 20 km, although females with kittens seldom move more than 500 m from their den.

Control methods for cats include (most effective methods first):

- SA trap – formerly the conibear trap elevated 70 cm on narrow ramp, e.g. fence post stay, sloping ponga trunk, and baited with minced rabbit (not salted). These are effective in controlling cat numbers, but take a reasonable amount of strength and skill to set.
- Victor traps, also elevated and baited with minced rabbit meat, but unlike SA traps require daily checks.
- Timms traps – the opening needs to be widened slightly to accommodate the largest cat head. In kiwi areas these also need elevating; bait with fish.
- Cage traps – treadle spring is better than hook spring, but both work. Bait with fish or rabbit. Must be checked every 24 hrs.
- Shooting.

Some secondary kill of cats can occur following targeting of large rodent and possum populations with 1080 or brodifacoum and a cat poison is currently being developed.

Tips on using cat traps and baits

- Fresh meat is required – never use salted or preserved bait in traps in which the animal must actually fire the trap by coming into contact with the bait (eg SA Cat trap).
- Minced rabbit best for Conibears/SA Cat Traps
- A mixture of cat biscuits and peanut butter is a good longer lasting alternative (although the peanut butter will increase the possum bycatch/interference.)
- Salted bait (e.g. pilchards) is good for legholds and treadle operated cage traps but alternating with rabbit is recommended Canned fish is OK for conibears,
- Alternate baits
- Cage traps – cages need to be stable; also block off rear end of cage to stop pawing, Treadle operated traps are best.
- Timms traps – fish heads are good.
- Remove old baits from the trap site, but it is OK to use fresh bait as enticement.

Cat Traps - SA Cat Traps / ConiBear Traps

These are very effective traps when set correctly – but near enough is not good enough. If not set correctly they won't catch or worse, will produce trap shy animals! The trap **must** be set at least 700mm off the ground. Spraying the trap with black enamel paint can improve the catch rate.

Ramp:

- Angle of the ramp should not exceed 35 degrees.
- Ramp should not be more than 100 mm wide (wider ramp gives more room for rats and target species to go around the side of the ramp and remove the bait without being caught.) Fence battens make good ramps.
- Make sure it is wide enough for a large cat to get up

Mounting plate:

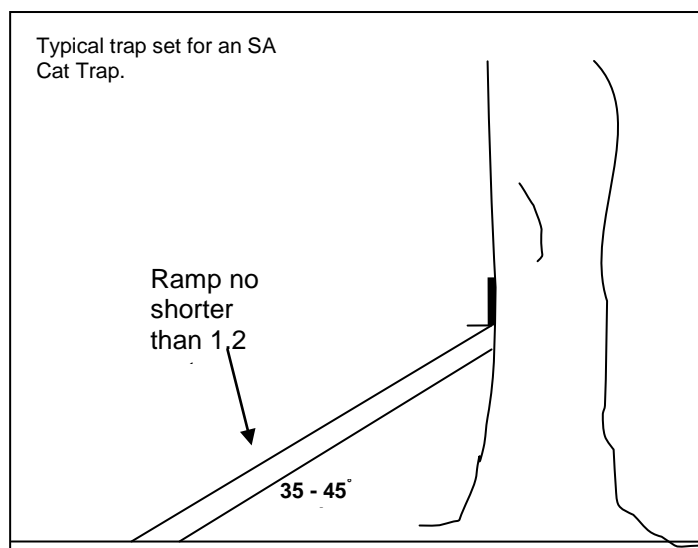
- Secure the trap plate firmly to the tree using screws.
- Choose a straight tree that will let the trap sit as close to the trunk as possible.
- Nail the chain higher up than the trap so that caught animals will hang down.
- The holding plate for the trap should be hard against the top of the ramp – not above it. Push the trap firmly into the plate so it sits at the back and doesn't wobble.
- Ensure the lip of the plate faces upwards slightly– just press down and pull up on the two bottom lips on the plates to realign them.

Trap set:

- Have the trigger wires splayed so they section the trap into thirds.
- The trigger pins should be level with or slightly forward of the front of the trap. The spring should be on a 45 degree angle down once set.
- Oil the trigger system (drop of engine oil) at each check – especially if a possum or rat has been caught in the trap.
- Sometimes need to use a chainsaw file in the groove if they become too sensitive - but don't over file! Don't file the back of the washer as it is critical to making the trap go off.
- If the trap will not set try setting the trap with the dog set outside the washer. If the dog is the problem then the trap will keep going off set this way. If the washer is the problem then the trap will stay set.

Bait placement:

- The bait should be placed on the plate and going up the tree above the plate. Bait can also be spread on the ramp as a lure. The bait must be behind the trigger mechanism.



2.4 Rats

There are two main species of rat on the New Zealand mainland - the ship rat or black rat which is able to climb trees and the Norway rat, usually found near water. Both species are rapid breeders, with ship rats being able to breed at 2-4 months of age and have 3 litters per year, each with about 5 young. They can live for 1-2 years. Ship rats are usually the most common rat species in Northland forests.

The ship or black rat comes in several colours (despite it's ame) and in comparison to the Norway rat it is a poorer swimmer, but more agile and a better climber, tending even to flee upwards. It is usually black to light brown in colour with a lighter underside. A typical rat will be 15 to 20 cm long with a further 20 cm of tail. It is nocturnal and omnivorous, with a preference for grains. In a suitable environment it will breed throughout the year, with a female producing three to six litters of up to ten young. Ship rats live for about 2-3 years. Social groups of up to sixty can be formed.

In New Zealand, ship rats have an unusual distribution and importance, in that they are utterly pervasive through native forests, scrublands, and urban parklands. This is typical only of oceanic islands which lack native mammals, especially rodents. 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.

How to tell the difference:

Ship rat

1. Variable coat colour with slate grey or white belly.
2. **Very long tail** - in adult this is longer than the head and body length combined.
3. **Very long thin ears** - when you pull the ears forward they will generally cover the eyes of the rat.
4. Female usually has 10 nipples

Norway rat

1. Coarse shaggy coat, greyish brown flanks, and grey belly.
2. **Thick tail usually shorter than head and body length**
3. **Small ears that can't be pulled forward over the eyes**
4. Female usually has 12 nipples.
5. Large, robust rat.

The type of rat present has implications to control projects. For example having more ship rats around has implications for most tree-nesting birds including kukupa and small birds. Norway rats on the other hand are large and ground-dwelling, with potential impacts on ground-nesting species like kaka, shorebirds, seabirds, ducks, as well as lizards, etc. 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 (~ 1 ha 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, and 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 stockpile the baits in or on the ground, which means only a few rats will be taking most of your bait.

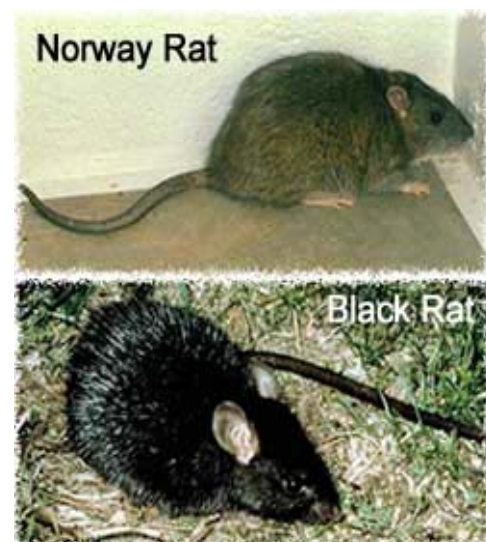


Table 3: Some examples of rat control objectives and requirements

Objective for rat control	Requirements for control	Other comments
Kukupu and other small bird recovery, including potentially spotless crakes, fernbirds, tomtits, kakariki and bellbirds, and future translocations, e.g. robins	Intensive rat control from late winter/end summer. Traps or toxin should be available to rats continuously over this period.	Hard to sustain on a large scale. Key areas should generally be identified. Begin control at onset of kukupu display flights and ensure possums also controlled to low levels. Need to monitor toxin take and condition of baits frequently.
Increased seedling germination	Year round control	Need to be on your toes in late-summer-autumn
Kauri snail, weta and lizard recovery	Year round rat control required.	Major implications to costs and methods chosen.

Timing of rat control operations

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

Bait station and trap layout

Ideally, 'triplines' about be 100m apart. Along triplines, traps or bait stations should be 50m apart. (Perimeter traps or bait stations, 25m apart). This will create a network of traps or bait stations. 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 ie. fresh droppings, rub marks, gnawing, or feeding activity. 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. Northland forests, with the large number of different types of fruiting native trees and numerous stream systems are ideal for rats! Consider placing extra rat traps or bait stations where:

- There is a particularly heavily fruiting tree that attracts rats, ie 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, ie a taraire tree in which you often see kukupu; and/or
- Two streams meet.

Be sure to position traps and bait stations so that they are not easily accessible by children or stock. 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.

Rat Poison - Ratabate

Ratabate uses the first generation anticoagulant diphacinone. Diphacinone breaks down quickly in the food chain and is far less persistent than brodifacoum. First generation anticoagulants are a multiple feed toxin. Rats must feed on the poison for at least five days and bait stations must not be allowed to become empty during this period to ensure rats ingest sufficient poison to kill them. Overseas, rodents have become resistant to first generation anticoagulants after poor baiting strategies.

It takes about 5 -8 days for the rats to die. Assuming rat numbers are high during the initial control; bait consumption will be high and gradually reduce as rat numbers decline. At the end of the operation uneaten bait must be collected and removed from operational area. This reduces the chance of rats being exposed to poor quality or old bait and the time toxin is in the environment.

Only fresh bait should be used. Bait that has previously been in the field must not be reused. This ensures high bait palatability, which has a direct influence on success. Old baits are likely to have mould growth and be less palatable.

Ratabate is attractive to possums but does not usually kill them. Possum control should be continued to keep possum numbers low while using Ratabate.

Bait stations

Bait stations can be made of Draincoil or PVC pipe. These bait stations:

- allow rats easy access but limits access by non-targets, eg possums or kiwi
- protect bait from the elements,
- limit bait spillage,
- doesn't get blockages,
- easy to fill (and transport when establishing the network),and
- is long lasting.

Using 65mm diameter draincoil or the 40mm drainpipe lessens the amount of interference from possums, but does not deter all! Possums can easily access Ratabate in 110mm draincoil, reducing the amount of poison available for rats. To prevent non-target animals such as possums or native birds accessing the bait, use at least 500mm long lengths of draincoil. Secure the draincoil to the ground at each end, using wire pins. This will help to prevent animals such as pigs or possums removing the bait station, as well as present an obstacle to long billed birds such as kiwi (or inquisitive weka!).

How to use draincoil bait stations and Ratabate

- 1) New stations should be set up prior to toxin being placed to allow the stations to 'weather' and to allow rodents to become accustomed to their presence. Rats are 'neo-phobic' and will avoid new objects in their territory for about 2 weeks
- 2) 'Prefeed' the bait stations with a teaspoonful of peanut butter halfway up the drain coil so that rats get to know that the bait stations contain food and get used to feeding from them.

- 3) *Initial knockdown*: Put gloves on. Place 70-80g of Ratabate paste in the center of each bait station. Check and refill as often as possible for the first five days. THIS IS CRUCIAL!
- 4) Leave bait stations for 10 days, then refill bait stations. Check after 2-3 days. If not much bait has been taken leave for a month. If most of the bait is gone, rebait and keep filled for the next 5 days, then leave for 10 days. Repeat this step as often as necessary till the bait is no longer being eaten by rats in large amounts. Additional bait stations may need to be used if bait take does not reduce.
- 5) *Maintenance*: Check, remove old bait and refill bait stations every 6 weeks until beginning of February.
- 6) *Operation completed*: Remove all old bait – leave bait station coil in place if still in good condition.

Limitations

- The method is labour intensive and relatively expensive in the first year because of initial setup of lines and bait stations
- Labour costs increase in difficult terrain.
- Rat populations bounce back within months once control is stopped
- Mouse numbers may increase after rat control.
- There is a small risk to native birds if they feed from the bait stations or if baits are spilt

Trapping

In areas with high rat numbers trapping may be time consuming and expensive, so a toxin may have to be used first to reduce rat numbers. Trapping can then be used to keep rat numbers low.

Kill traps must be set in a tunnel or under a cover. The tunnel has three functions:

- i) orientate the animal relative to the trap,
- ii) disguise and protect the trap, and
- iii) keep out non-target species, such as kiwi.

Tunnels or covers should:

- Be at least 500mm long 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.

Initially traps should be checked every 1-2 days. Once catch rate drops (after about 5-10 checks), traps only need to be checked once every 2-3 weeks. When rat numbers increase, the frequency at which traps are checked will also need to increase.

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 re-treating 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.

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, last well, are easy to use and cheap.

Baits or lures may need to be alternated over the duration of control programme in order to attract rats with different preferences!

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 weeks or months after control stops.*
- Pig and possum interference with covers can be a problem.
- Mouse numbers may increase after rat control.

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

2.5 Mice

The impacts of mice on native plants and animals are poorly known, but they appear to be able to have serious impacts on small invertebrates, e.g. weevils, as well as 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 are 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. 25 x 25 m, although this might provide only temporary control because mice have a high LD50 to some anticoagulants and they may also develop aversions to toxin use.
- Trapping using covered mouse traps baited with e.g. peanut butter on grids of e.g. 25 m x 25 m. 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 trapline should be used to monitor mice.

2.6 Hedgehogs

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. There is no specific control method for hedgehogs, but many are trapped in Fenn traps, Timms and cage traps (baited for cats) and Victor traps and they are also susceptible to brodifacoum in cereal baits.

Fenn traps can be split in half to remove hedgehogs. Wear gloves to avoid **leptospirosis** and other diseases. Effective control of hedgehogs requires high density trapping, such as Fenn traps at 25m spacing.

2.7 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. Dog control 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

The safest way to avoid your dog harming wildlife is to ensure it does not go into areas where wildlife live. If you must take it into a wildlife area have it on a short lead. Avoid using dogs for pest control unless you are sure there are no vulnerable wildlife in the area; that the dog is specifically trained for targeting only the pest and has undergone aversion training for native birds.

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

2.8 Goats

Goats can have devastating impacts on local biota, particularly regenerating forest understorey. Over time they can change the composition of native forests by their selective browsing of preferred plants. For example, larger leaved *Coprosma's* 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 browse on palatable plants such as *Coprosma*.

2.9 Pigs

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

Control methods are generally uncoordinated but potential methods include:

- 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.

2.10 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.

Control methods include:

- Poisoning with pindone placed in bait stations or furrows
- Shooting, particularly spotlighting shooting, but this needs to be sustained
- Carefully planned release of the calici virus, which may provide temporary benefit.

Control needs to be sustained and monitored with options to provide 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.

2.11 Wasps

There are two main types of introduced wasps in Northland – paper wasps (narrow bodied) and the plumper Common and German wasps. They are a problem because they have no natural predators in Northland, 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 even been seen 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.

Control methods for wasps have not yet been perfected on a large scale and even efficient destruction of colonies may not greatly reduce local wasp densities. However, control methods that can provide some relief include:

- Night-time application of carbaryl powder in ground or tree hole nests of *Vespula* wasps (refer NRC Animal Pests Fact Sheet).
- Night time spraying of paper wasp nests with insecticide.
- In all cases operators need to wear sting-proof clothing.

4.0 Recording results

Results recorded from pest control programmes can provide a useful source of information on predator populations, maintain the enthusiasm of Landcare group members not actively involved in trapping and be crucial for obtaining and maintaining funding. Standard recording sheets are available from the NZ Landcare Trust, or see the examples below.

Each time traps are checked, the results should be recorded. A monthly summary of trapping records can then be compiled for the main pest species from the trapping data sheets. Annual totals can also be calculated. This will give you a good idea of pest numbers, how they fluctuate during the year and if your pest control methods are working!

Similarly, records should be kept of any toxins used, the number of bait stations, how much bait is taken by pests and how much is removed at the end of the operation. The amount of bait or toxin taken by pests from bait stations in regular pulsing operations can be used to give a broad index of relative population levels. For example, declining levels of bait take suggest falling pest population levels.

Look for seasonal or locational trends in the data, and use this information to refine trapping programmes. For example you may choose to check traps more frequently during times of the year when you know pest numbers are at their peak.

The location of bait stations and traps should be marked on a topographical map of the area, and ideally recorded using a GPS. As well as helping to ensure the correct density of traps and bait stations this is also essential information for health and safety reasons.

5.0 Health And Safety

- Tell someone where you are going and when you expect to return!
- Leptospirosis, campylobacter and numerous other nasties are out there and can take the fun out of living (leptospirosis is carried by both rats and hedgehogs)
- Wear disposable gloves for all handling of traps
- Use water-proof bandaids over cuts and wash your hands before eating or smoking (note the latter is also a hazard!).
- Alcohol based anti-bacterial wipes in sachets are a good way to sterilize your hands before eating in the field.
- Follow instructions on labels.

References:

This document was produced by compiling information from the following sources:

Biodiversity Technical Guidelines
Restoring the Balance: Northland Biodiversity Self-Help Kit
Landcare Trust Trapper Training Workshops 2006, 2007, 2008

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Supplier	Toxin	Traps	<i>Other</i>	Contact details
Animal Control Products	*	*	Bait stations	Private Bag 3018, Wanganui. Ph: 06 344 5302 Web: www.pestoff.co.nz Fax: 06 344 2260 Email: info@pestoff.co.nz
Connovation	*	*	Bait stations, repellents, monitoring equipment	PO Box 58613, Greenmount, Auckland Ph: 09 273 4333 Web: www.connovation.co.nz Fax: 09 273 4334 Email: info@connovation.co.nz
Geosystems			Flagging (coloured) marking tape, survey equipment	PO Box 33-970, Takapuna, Auckland 1332 Ph: 09 915 6760 Web: www.geosystems.co.nz Fax: 09 915 6769 Email: sales@geosystems.co.nz
M. S. Woodcraft		*		128 Marine Parade, Mt. Maunganui Ph. 07 575 5920 Email: mwoodcraft@mwoodcraft@mail.com Fax: 07 574 8910
Pest Management Services	*	*	Repellents, bait stations	P O Box 121, Waikanae, Kapiti. Ph: 0800 11 466 Web: www.nopests.co.nz Fax: 04 293 1456 Email: general@nopests.co.nz
Philproof	*	*	Bait stations, trap covers, monitoring equipment	P.O. Box 4385, Hamilton. Ph/Fax: 07 859 2943 Email: philproof.feeders@clear.net.nz Cell: 021 270 5896
Trapper Cyanide	*	*	Bait stations	251 Styx Mill Rd, Christchurch 5. Ph: 03 359 4150 Fax: 03 359 4156
Metal Protection Ltd			Anodising for fenn traps	P O Box 58 520, Greenmount 14 Ross Reid Place, East Tamaki Auckland Ph (09)274 4308, fax (09)274 4309

Many animal pest control products are also available from some farm and rural supply retail centres. Some Regional Councils will also supply a wide range of products, including ammunition to the public at cost price.

