



## Winter 2017 Pest Removal Fact Sheets

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## Operational Information

The Brook Waimarama Sanctuary Trust's (the Trust) vision is to be New Zealand's richest conservation environment for visitors, education, and research. Our mission is to be a community-led organisation creating a pest-free ecosystem in mature native forest.

The Sanctuary is in the process of substantial ecological restoration. A 14.4 km predator exclusion fence has been constructed to allow the removal of all introduced mammalian pests from within the fence. Once the pests are gone, we will facilitate the restoration of native plant and animal species already present in the site, and reintroduce rare or endangered species via translocations from other sites. In winter 2017, the sanctuary will close for several months while pests are removed from inside the fenced area using brodifacoum laced baits delivered aerially with ground-baiting of a 10m zone around the inside the fence perimeter. After this critical milestone is completed, the fun work will commence when we begin breeding and reintroducing native wildlife to the Sanctuary.

The information that follows provides some background to answer questions about the pest removal process.

### Snapshot of the pest removal process from 2007 to today;

- Since trapping began in 2007, the Trust's volunteer teams have removed over 30,000 pests from the sanctuary site, thanks to weekly trap line checks by hundreds of volunteers combined with ungulate culling.
- For years the Trust conducted a successful trapping programme to reduce pest numbers in the lead up to full pest removal, but trapping alone cannot achieve removal of 100% of the pests in such a large and rugged area. Even a small number of stoats, possums or rats can decimate a local population of some of our most sensitive native species that evolved in the absence of such predators.
- From the early days of the Trust, its leaders have realised that in the absence of any other effective method to remove the remaining introduced pests, they would have to use a bait process. They understood this was necessary before New Zealand's globally unique wildlife could be reintroduced and then thrive within the predator-free sanctuary.
- Mustelids (stoats and weasels), hedgehogs, possum, and rats were controlled by intensive trapping in about a quarter of the Sanctuary's area, with traps spaced at approximately 50 m intervals on lines 100 m apart. Trapping has been used in conjunction with hunting; trapping is useful to catch smaller pests while hunting is used to cull larger species like goats, pigs, or deer. Permitted hunters have been culling feral pigs, deer and goats in the Sanctuary, and have achieved the removal of goat and reduced deer and pigs down to very low numbers. Stoats, possums, rats and other rodents have never been eradicated from a large, rugged montane island or fenced sanctuary site using only trapping methods. The very high number of traps required to target rodents in a 691ha area (the size of the fenced area of the Sanctuary) is unfeasible, since a population of mice and rats can breed faster than they can be trapped and a small number of individuals are usually wary of trap devices.
- Complete pest removal will only be achieved by using an aerial application of brodifacoum, a poison that has been used effectively at all other large public fenced sanctuaries, and is the

active ingredient in widely-used rodent control products available for purchase at most NZ supermarkets and home improvement stores.

- The Trust is following a pest removal process identical to those followed by other mainland fenced sanctuaries in New Zealand where removing pests has led to a long-term recovery of indigenous wildlife populations and ecosystems.
- The Trust is taking every precaution to ensure a well-managed, safe pest removal process for neighbouring residents, Trust personnel and contractors performing the bait application. The Trust has communicated its plans to neighbours and affected properties over several years.
- The Trust is following all regulations for this operation provided by the New Zealand Food Safety Authority, the Hazardous Substance and New Organisms Act, and the Code of Practice for brodifacoum.
- The aerial application of brodifacoum is a permitted activity within a pest-proof fence under regulations administered by the Ministry for Environment.
- Once the pests are removed from the Sanctuary, threatened species that are currently absent will be reintroduced, likely starting with kaka, kiwi (rowi) and tuatara.

## Questions and answers

### Did the Trust consult on this proposed aerial application?

The Trust has been engaging with its neighbours and the wider community for years regarding our planned pest removal operation. During the process of applying to Nelson City Council (NCC) for resource consent to conduct an aerial operation, the Trust sought comment from potentially affected parties as specified by NCC including neighbouring landowners, the Department of Conservation, Fish and Game New Zealand, Royal Forest and Bird Protection Society, and local iwi.

Following approval of the consent application, the Trust continued to stay in touch with these parties to keep them updated as the pest removal planning process progressed. Communication with the various stakeholders and the wider community will continue as the pest removal operation begins, including the Brook Valley community.

Beginning in 2017 the aerial application of brodifacoum inside a pest-proof fence, such as the Brook Sanctuary's, is a permitted activity under new regulations from the Ministry for the Environment, requiring no consent from district, regional or unitary authorities. These new regulations are intended to make regulatory oversight of such operations uniform across New Zealand, since previously different regional authorities took widely varying approaches, which in some cases required resource consents and in others, such as Orokonui Ecosanctuary in Otago, no consents were required. Accordingly the Brook Sanctuary's operation will be conducted under the new national regulations, in line with other similar projects.

### Why are helicopters necessary?

Aerial applications are required because the physical location of the Sanctuary ranges in elevation from 90m to 873m above sea level and is steep (average slope of 35°) rugged and forested terrain. Aerial disbursement is the only method to achieve uniform distribution of the bait across the site, which is important to ensure all populations of pest mammals are exposed to the bait and the operation is successful.

There will be three aerial applications over the period of July to October 2017, spaced two-four weeks apart. Each application will take one day and there will not be any pre-drops. The operation is weather dependent and will only proceed when the long-range forecast indicates a weather pattern of less than 15 knots wind speed and four fine days without significant rainfall (less than 6 mm) for each day when the aerial application would occur.

Noise from helicopters is permitted in rural areas and does not require resource consent. The Trust will proactively notify the community about the aerial operations before they commence.

### What precautions are being taken for the aerial operation?

The pest removal bait is being applied according to the Brodifacoum Code of Practice for Pestoff Rodent Bait 20R as required by the New Zealand Food Safety Authority and the regulations administered by the Ministry for the Environment.

The bait is approved to be used on an area enclosed by an effective pest-proof fence for the purposes of a wildlife sanctuary. The fence is designed and constructed to a standard that is tested and proven to be fully effective in preventing access to the sanctuary by all farm livestock and targeted pest species currently present within its boundaries. The fence is being inspected and certified prior to bait application by an independent expert. It is also checked on a weekly basis by Sanctuary personnel who check the perimeter to identify any issues such as tree fall across the fence; anything that arises is repaired promptly.

As a precaution, neighbouring landowners, including those with paddocks adjacent to the operational area who may choose to destock them, will be notified at least 48 hours prior to the first application.

Bait will be applied within the area of the Sanctuary enclosed by the fence that keeps the site secure from people and domestic animals. To avoid bait going over the fence, bait will not be aerially applied within a 10m buffer on the inside of the fence around the perimeter of the sanctuary. This will be achieved through the use of GPS systems for navigation, highly experienced pilots, and a directional bucket (a bucket fitted with a deflector to send baits inwards) to sow baits close to the buffer. In the highly unlikely event of an accidental overfly and bait dropping outside the fence, Trust personnel, who will be closely monitoring the operation, would remove the bait and if indicated under the regulations the New Zealand Food Safety Authority would be consulted.

Within the set-back area along the inside of the fence line, bait will be hand sown around the interior perimeter. Teams of Trust personnel will be stationed around the perimeter fence track checking for bait. In the highly unlikely event bait is dropped outside the fence, they would pick it up and place it inside the fenced Sanctuary. A spill team will also be on hand at the loading zone in case any bait is accidentally spilled there. At the end of each operational day the spill team will clean up the loading site following the guidelines in the brodifacoum Code of Practice.

### Will the poison get into the streams and river?

The Sanctuary has several permanent watercourses that flow into the Brook Stream and the Brook Stream itself flows out of the sanctuary; all these streams are secured from pests with proven pest exclusion structures. The exit of the Brook Stream from the fenced site will also be covered by a mesh screen to capture any bait pellets that may land in the water courses during the bait application so they can be removed.

Regardless, brodifacoum has extremely low water solubility, and therefore will not poison the stream. To prevent the possibility of pellets exiting the sanctuary, Trust personnel will be stationed along the fence's crossing of the Brook Stream and will inspect the Stream at the notch in the old concrete dam where it flows out of the Sanctuary, removing any pellets.

### What about poisoning animals: dogs, cats, etc.?

The Sanctuary will be closed to the public and their animals prior to the start of the pest removal operation, and for the required period afterwards which is anticipated to be several months. Pest removal targets are rodents, mustelids, possums, feral cats, hedgehogs, and any remaining deer and pigs from within the fenced area. Bait is only being applied within the fenced area, so animals outside the fenced area are not expected to ingest any bait.

In the unlikely event brodifacoum is swallowed or poisoning is suspected in a domestic animal, seek out a veterinarian. Vitamin K1 is an effective antidote against accidental poisoning of domestic animals. Veterinarians are familiar with the information on Vitamin K1 therapy and should be consulted. The Halifax Veterinary Centre is on standby with vitamin K1 in stock, and can be reached on 03 548 3871 or 0800 030 927.

Secondary poisoning (an animal eating a poisoned carcass) is a potential outcome but is highly unlikely due to the Sanctuary's fence, which will prevent animals entering the site, and due to the quantity of poison required to be ingested to achieve a lethal dose compared with the small amount of poison carried by a rodent carcass.

Given the targeted aerial flight paths, no feral deer, goats, and pigs outside the Sanctuary should not be exposed to aerial brodifacoum due to the barrier created by the pest-proof fence and, therefore, would still be available for hunting.

### What are the risks to people?

There have been no cases of accidental human poisoning from brodifacoum during over 40 years of use in New Zealand. Risks to human health are very low in a well-planned and delivered poison operation. There is unlikely to be any risk to human health associated with this operation. People directly involved in the operation will follow a detailed safety plan that will ensure their personal safety, and members of the public will be excluded from the operational area until it is deemed safe for them to enter.

If you suspect human poisoning: Call 111 if the situation is urgent. If the situation is not urgent contact the National Poison Centre on 0800 764 766 or Nelson Public Hospital on 03 546 1800 (both are answered 24 hours).

### What is the effect on the tracks around the Brook Sanctuary?

Tracks in the immediate vicinity of the sanctuary will be closed during each day of the operation as a precaution for public safety. The closures will be one-day only on each of the aerial application dates. These tracks include:

- Dun Mountain Trail (lower section)
- The Classic Track
- Coleman's Link Track
- Jenkins Hill Track to Third House

# Brodifacoum Information

## What is brodifacoum?

Brodifacoum is an anticoagulant poison that is the primary active ingredient in widely-used rodent control products available for purchase at most New Zealand supermarkets and home improvement stores. In New Zealand brodifacoum is used principally to control brushtail possums and rats.

Application of brodifacoum is a technique that has been used successfully on islands around the world and at fenced sanctuaries across New Zealand to remove pest mammals. In New Zealand and around the world brodifacoum has been used successfully in rodent eradication programmes on over 250 offshore islands including: New Zealand's Kapiti Island (Kapiti Coast), Maud Island (Marlborough Sounds), Codfish Island/Whenua Hou (Southland), Rotoroa Island (Hauraki Gulf), and Campbell Island (Sub-Antarctics); as well as Hermite Island (Western Australia), South Georgia Island (South Atlantic), and Anacapa Island (California USA). In New Zealand it has also been successfully used at all large public fenced mainland sites, including: Zealandia (Karori) Sanctuary (Wellington, which includes an urban water catchment), Tawharanui and Shakespear Regional Parks in Auckland, Kaipupu Point (Picton), Orokonui Ecosanctuary (Otago), Rotokare Scenic Reserve (Taranaki), and Sanctuary Mountain /Maungatautari Ecological Island (Waikato).

## How it works

Brodifacoum works by inhibiting vitamin-K dependent blood clotting factors in the liver, leading to death from internal haemorrhaging. Consequently vitamin-K1 is an effective antidote to brodifacoum.

## How it will be used at the Brook Sanctuary

We plan to use aerially disperse approximately 26.5 tonnes of bait to deliver approximately 500 grams of total brodifacoum at the Brook Waimarama Sanctuary because it is the only proven method to ensure all pest mammals are removed from the sanctuary. It's been demonstrated time and again in New Zealand that even a small number of rats or stoats can decimate a local population of some of our rarest native species, such as yellowheads (mohua) and saddlebacks (tieke). The *only* way to ensure all pest mammals are removed from the sanctuary is by dispersing brodifacoum aerially to ensure uniform coverage.

## Is brodifacoum like 1080 poison?

Brodifacoum is not 1080, though both are used for pest control in New Zealand. 1080 is used in New Zealand to *control* pest populations, whereas brodifacoum is suitable for *eradicating* pest populations. 1080 is not effective to eradicate pest populations because it is an acute (fast acting) toxin with a high risk of bait shyness if a pest does not consume a lethal dose. Pests that ingest a sub-lethal dose are likely to avoid eating baits in the future and therefore survive the poison attempt. 1080 has never been used to successfully eradicate a mammal population from an island or predator-proof fenced area.

The only method capable of successfully removing all target species at the Brook Sanctuary is an aerial application of brodifacoum.

In New Zealand, brodifacoum is used principally to control brushtail possums and rats. It is contained in widely-used rodent control products available for purchase at most New Zealand supermarkets and home improvement stores.

Brodifacoum works by inhibiting vitamin-K dependent blood clotting factors in the liver, leading to death from internal haemorrhaging. Consequently vitamin-K1 is an effective antidote to brodifacoum poisoning.

### Does brodifacoum pose a risk to human health?

Risks to human health are very low in a well-planned and delivered brodifacoum operation. Vitamin-K1 is an antidote. Brodifacoum is a slight skin irritant and a mild eye irritant. It is classified as non-mutagenic. Individual baits contain 0.02g/kg brodifacoum. An adult human would have to eat about 375 pellets in one sitting to receive a lethal dose and a child would require about 94. There have been no cases of accidental human poisoning from brodifacoum during over 40 years of use in New Zealand.

### What happens to brodifacoum in water?

Brodifacoum has extremely low water solubility, so leaching from soil into water is unlikely. Only the erosion of soil itself would result in brodifacoum reaching water. If soil containing brodifacoum reached a waterway, the brodifacoum is likely to remain bound to organic material and then settle in sediments. Brodifacoum degrades slowly over weeks to months in natural water. The presence and type of sediment layers in a waterway will affect the degradation of brodifacoum in aquatic environments. Brodifacoum levels in water have been tested following three major eradication operations (Maungatautari Ecological Island in Waikato, Little Barrier Island/Hauturu near Northland, and Motutapu Island in the Hauraki Gulf) and no brodifacoum was detected in over 200 samples.

### What happens to brodifacoum in soil and plants?

Baits containing brodifacoum can remain toxic for anywhere from a few weeks to several months, with the rate of decay depending on the amount of rainfall. As baits disintegrate, brodifacoum is absorbed into the soil, where it is slowly degraded over weeks to months by soil bacteria. Soil type, temperature, and the abundance of soil micro-organisms capable of degrading brodifacoum all influence the degradation time. The extremely low solubility of brodifacoum in water means that plant uptake is unlikely.

### How domestic animals are affected?

Domestic animals are susceptible to poisoning from brodifacoum, and Vitamin-K1 is an effective antidote. However, domestic animals are now unable to get into the fenced sanctuary area, and a mesh screen designed by a qualified engineer will be in place in the Brook Stream to prevent any baits leaving the site, thus making any risk to domestic animals extremely low.

A highly experienced helicopter contractor will use best practice methods based on GPS technology to accurately deliver the baits within the fenced area of the sanctuary. If in the highly unlikely event bait is accidentally dropped outside the fence a clean-up team will be on hand to respond immediately. Reasonable precautions should be taken by owners of domestic animals to keep them clear of the Brook Waimarama Sanctuary during the aerial operation. The Trust will provide notice of the aerial operation so adjacent landowners can manage livestock locations as a further precaution prior to the drops.

### What happens to brodifacoum in poisoned animals?

The Trust is undertaking a one-off aerial brodifacoum operation, which means the poison that is dropped within the fence during the operation will eventually break down and not be detectable in

the ecosystem. The Sanctuary will be closed to the public for several months following the operation to allow this process to be completed.

Brodifacoum is an anticoagulant, which is contained in widely-used rodent control products available for purchase at most New Zealand supermarkets. Brodifacoum works by inhibiting vitamin-K dependent blood clotting factors in the liver, leading to death from internal haemorrhaging. Consequently vitamin-K1 is an effective antidote to Brodifacoum poisoning.

### Effects on non-target species

The objective of the brodifacoum operation at the Brook Waimarama Sanctuary is to eliminate all introduced pest mammal species that prey on native flora and fauna. The pest removal process is similar to those followed by other sanctuary sites across New Zealand and on islands around the world where removing pests has consistently led to a longer term recovery of indigenous wildlife populations and ecosystems.

Most native bird species ignore the pellets as they do not appear to be a food source. There have been no recorded deaths of reptile species from brodifacoum in New Zealand. Most native fish species hunt by detecting movement and therefore ignore the pellets. And invertebrates have different metabolisms that are not affected by brodifacoum.

Non-target wildlife mortality has been reported in some native species after the use of brodifacoum. Populations of three indigenous New Zealand bird species fernbird, pukeko, and weka, have been reduced at some sites where brodifacoum baits were broadcast. However, in all cases, short-term losses were quickly offset by increased reproductive success and survival once predators had been removed. Of these three species only weka are present at the Brook Sanctuary. Short term non-target mortality in native species from the brodifacoum operation need to be viewed in the context of the ongoing impact of predation of native species by introduced mammals, estimated by the Department of Conservation to be 25 million baby native birds per year.

The native bird species present at the Brook Waimarama Sanctuary most likely to be impacted by the brodifacoum operation is weka. The Trust is working closely with the Department of Conservation to transfer some weka from inside the fence to outside locations prior to the operation. The remaining weka population will be reduced due to by-kill from direct consumption of baits, but the anticipated population growth following the operation is expected to quickly offset the initial population reduction. Other native bird species that could be impacted by brodifacoum in the sanctuary include morepork (present in low numbers in the Sanctuary) and Australian harrier (rarely present in the Sanctuary). Both of these species are capable of self-reintroduction to the sanctuary following the brodifacoum operation. New Zealand falcon largely feed by catching live birds and have not been affected by similar operations.

### Chemical information

The chemical formula is C<sub>31</sub>H<sub>23</sub>BrO<sub>3</sub> and the official chemical name is 3-[3-[4-(4-Bromophenyl)phenyl]-1,2,3,4-tetrahydronaphthalen-1-yl]-2-hydroxychromen-4-one.

For more information, please get in contact with us.

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