2016

The science behind the Department of Conservation's predator control response

Battle for our BIRDS
Tiakina Nga Manu

New Zealand Government

Department of Conservation
Te Papa Atawhai

Department of Conservation (DOC) scientist Graeme Elliott discusses the current beech mast, an event that will mean high numbers of predators putting pressure on our vulnerable native birds. Here are the facts about the Battle for our Birds – DOC's predator control response.

Graeme has been involved in research on protecting forest birds from predators for most of his career. His PhD on mohua in Fiordland's Eglinton valley during the 1980s confirmed fears they were taking a hammering from stoats every time there was a beech mast.

Similar results for yellow-crowned parakeets and kea have prompted his advisory role to a number of pest response and recovery programmes. He is currently focused on trying to control rats, stoats and possums on large scales in order to protect a range of native forest birds in the backcountry.

What is **A MAST?**

Masting or very heavy fruiting of beech trees is triggered by a summer that is warmer than the previous one. By tracking seasonal temperatures we can predict when this will occur.

The prediction modelling tells us that warm summers may occur more frequently with climate change and we can expect that widespread heavy fruiting will be more common as well.

Why is a natural event like a mast, a problem?

Occurring particularly in beech forests of the South Island, abundant seed produced in a mast provides a larder of food for rats and mice, which are, in turn, the main prey for stoats.

During a mast year rats, mice and stoats breed prolifically. The increased number of rats and stoats then prey on native birds such as mohua, kākā, kea, whio and kiwi, along with other species at risk such as bats and land snails.

Where no pest control is carried out, many native species will suffer declines over the next year.

Red beech

Mountain beech

Black beech

Silver beech

Hard beech

Cover photo: Female kea. *Herb Christophers*

Species **AT RISK**

*The irruption (rapid expansion) of rat populations is disastrous for small forest birds, like **mohua**.*

In the years when stoats and rats are abundant, mohua breeding is unsuccessful, and if it's a really big rat plague their populations take a huge hit – probably 80–90% of birds are killed.

Photo: James Reardon

Mohua

***Short-tailed bats** roost and raise their young in tree cavities where rats, stoats, possums and cats prey on them.*

Research shows beech seed-fuelled rat plagues are a key cause of bat population decline. We can't move bats to pest-free sites, so without pest control they are likely to become extinct.

Photo: H. Edmonds

Short-tailed bats

*Hole- or ground-nesting larger birds like kiwi, kākā, **kea** and whio are highly susceptible to stoat predation.*

In an exceptional mast year when rats and stoats are at plague proportions, these birds are often caught on the nest by stoats and if the adults are not killed, the eggs or chicks are easy prey.

Photo: A. Marrington

Kea

***Whio** live in fast-flowing steams in forested upland areas. They are one of only a few waterfowl species worldwide that live year round in this environment.*

Whio nest on riverbanks and are at high risk of attack by stoats and rats.

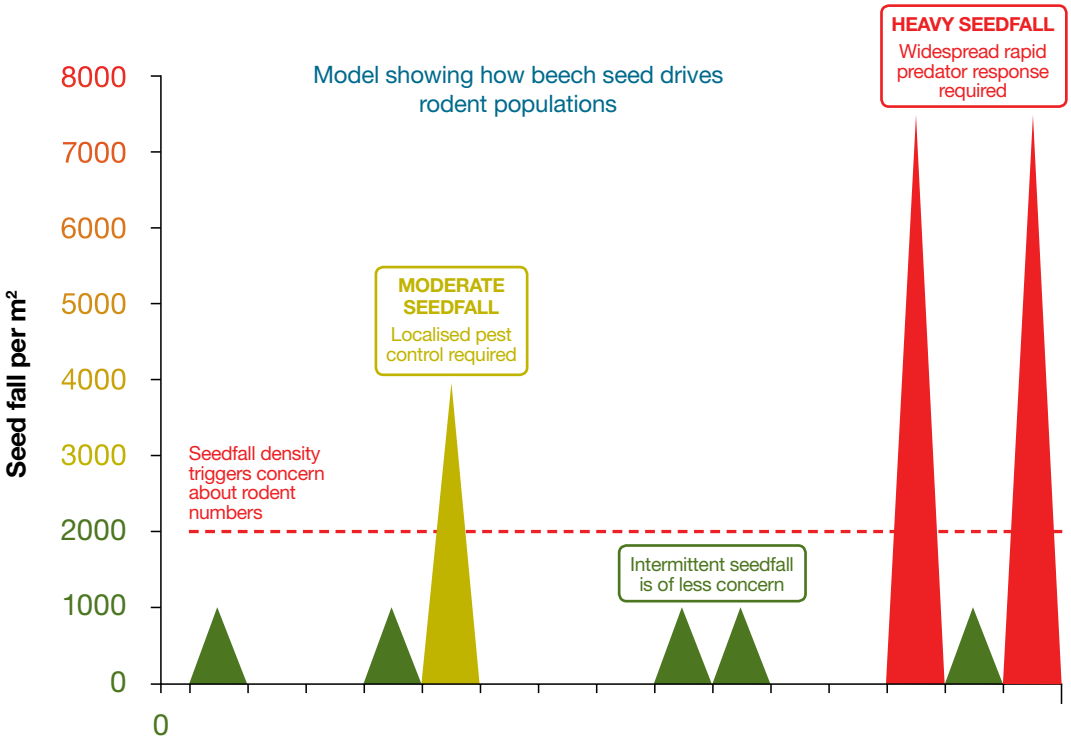
Whio

Natural event hijacked by **INTRODUCED PESTS**

In beech forests in years when there is no mast, many native birds can tolerate the low levels of rats and stoats present and little or no pest control is necessary.

During years when mast events occur at just a few sites, localised pest control will do the trick.

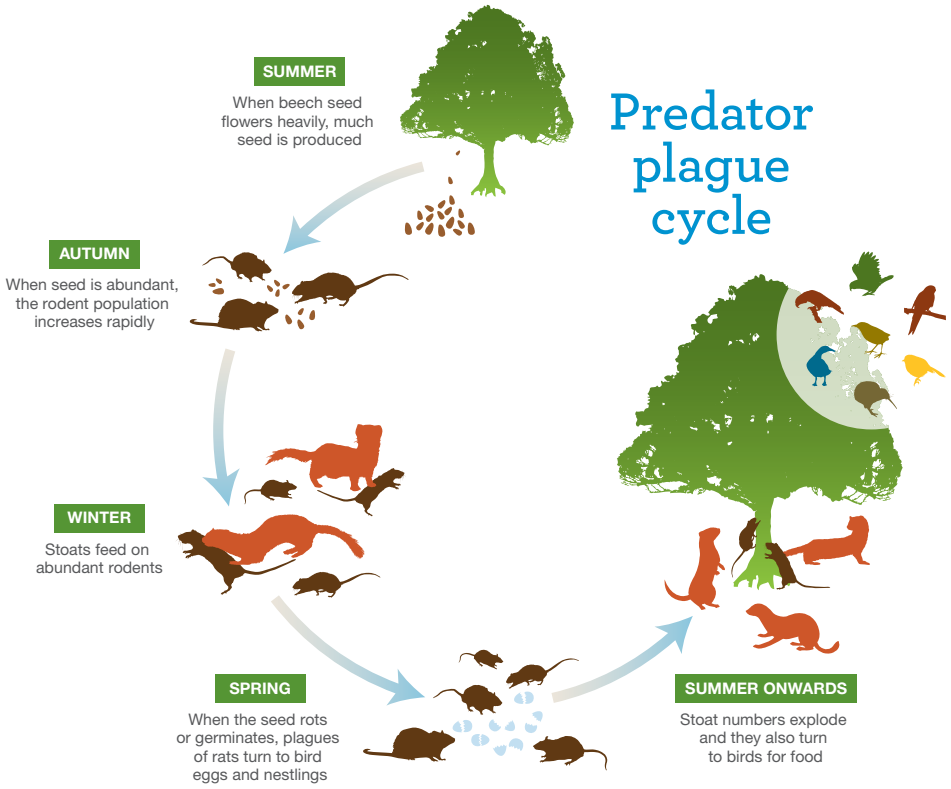
When there is a large beech mast with heavy seedfall, as there is this year, it tends to be widespread, so that rats and stoats have to be controlled over very large areas.



Heavy seeding in our native forests this year will again drive higher than usual rodent and stoat numbers that will prey on endangered birds.

Doing nothing is not an option.

'Battle for our Birds' is a predator control response to protect our native wildlife from predators.



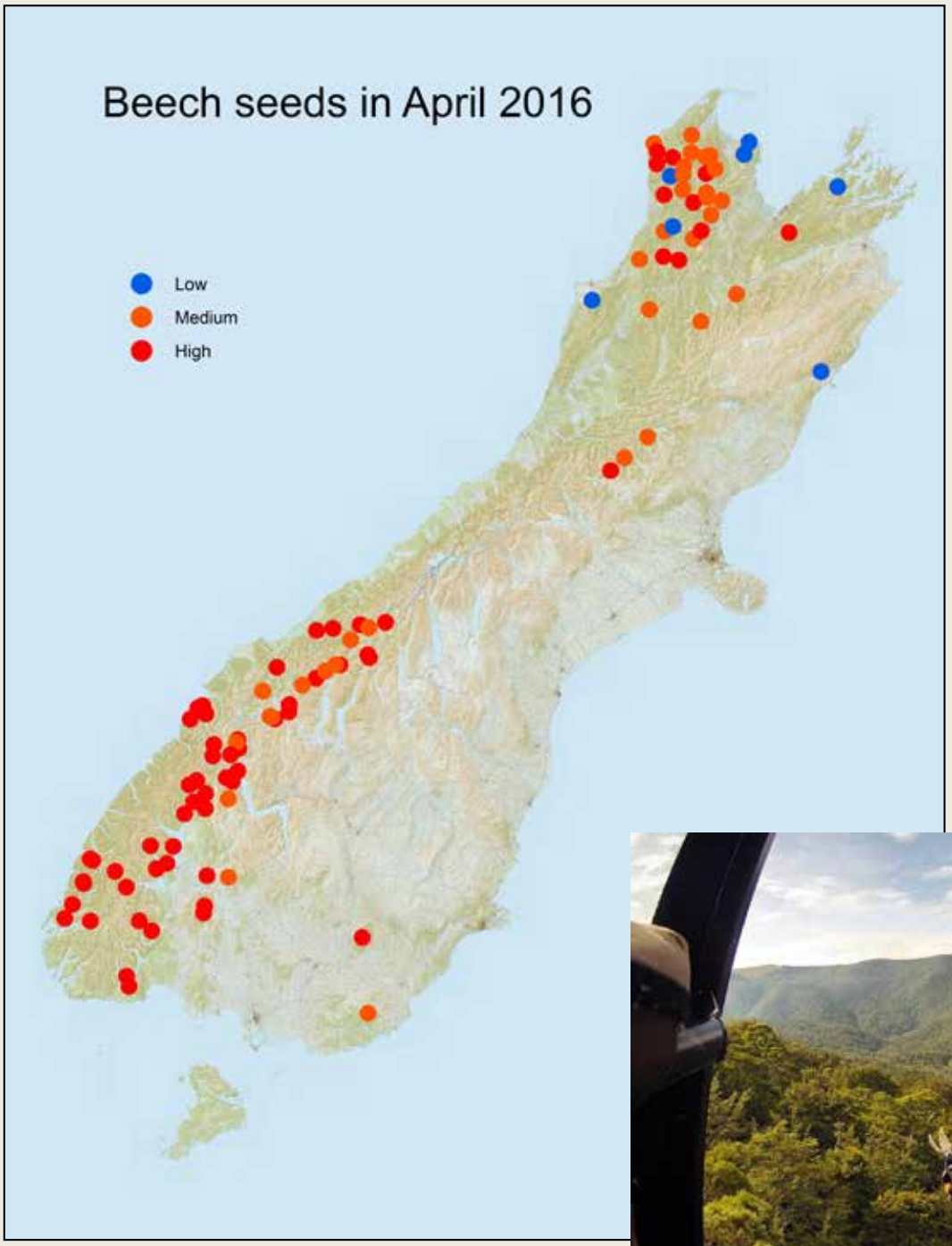
Assessing the **LEVEL OF THREAT**

Counting seed

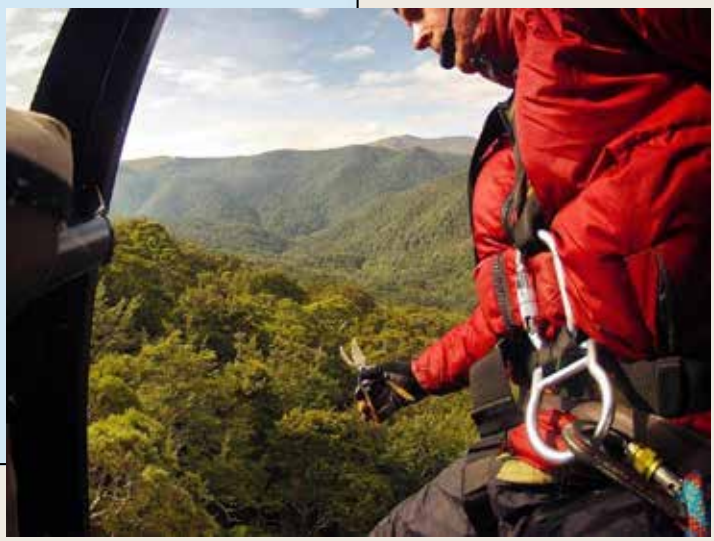
During February and March this year the amount of seed present on beech trees at 102 sites around the South Island was assessed either by shooting branches off trees using a shotgun, or by using secateurs to cut branches while hanging out the door of a hovering helicopter.

The number of seeds in each sample was counted and combined with others to produce a seedfall measure for a site.

Seedfall at each site is classified as either high, medium or low. Sites classed as low are unlikely to have significant rodent plagues, sites classed as medium will probably have a rodent plague, and sites classed as high will almost certainly have a rodent plague. The relationship between the abundance of seed and the severity of rodent plagues is not an exact science and is being refined. The method worked well during the 2014 mast event as a reasonable predictor of threat status.



Seedfall shooting and snipping



Snipping beech seed.

Measuring **PREDATOR NUMBERS**

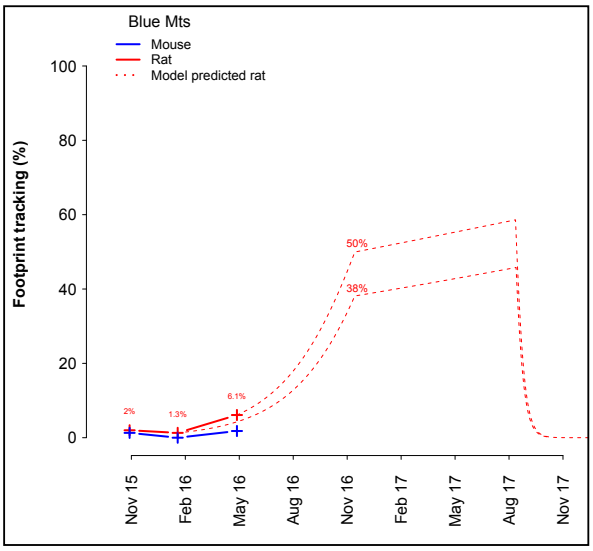
By late May 2016, rodent numbers were measured through our extensive tracking lines.

Predictive modelling based on rat and seed numbers allows us to track the likely status of pest populations in the spring and the possible threat to nesting native species.

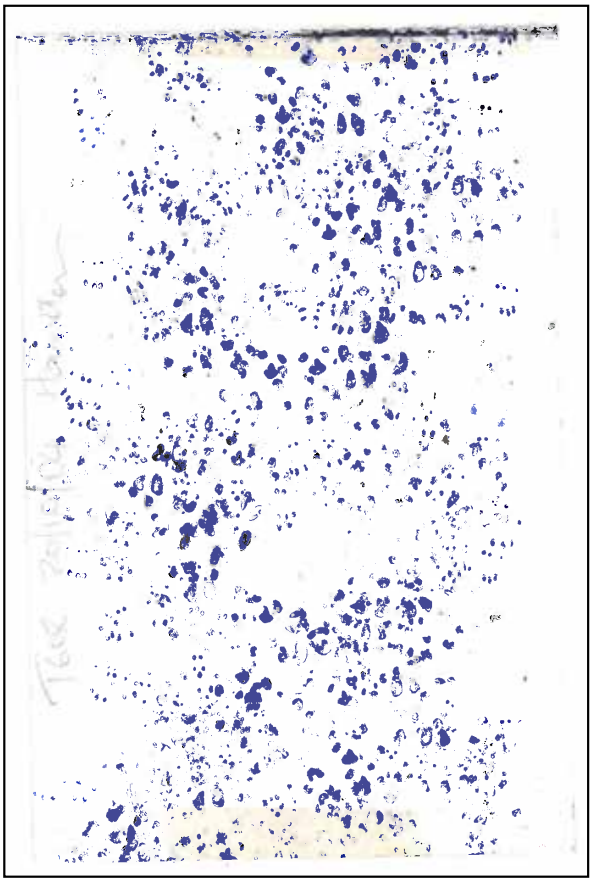
Plan of action

DOC has prioritised areas where species are most threatened and where there will likely be a mast event. This covers about 1.2 million ha.

Once the level of threat has been fully assessed, the specific areas for pest control will be decided. That area is approximately 800,000 ha.



Rodents, Blue Mountains



Rodent prints from tracking tunnel survey, Blue Mountains

Benefits of the use of **AERIAL 1080**

Rapid knockdown of rats and stoats over large areas

Before 2005 DOC had not used 1080 to control rats and stoats during plagues. That's because scientists had only recently found out that aerially applied 1080 killed stoats – stoats don't eat the 1080 pellets, but they do eat the dead rodents that have eaten the pellets, which then kills the stoats.

That makes aerial 1080 an ideal tool to protect hole nesting birds in the spring when rat numbers begin to climb.

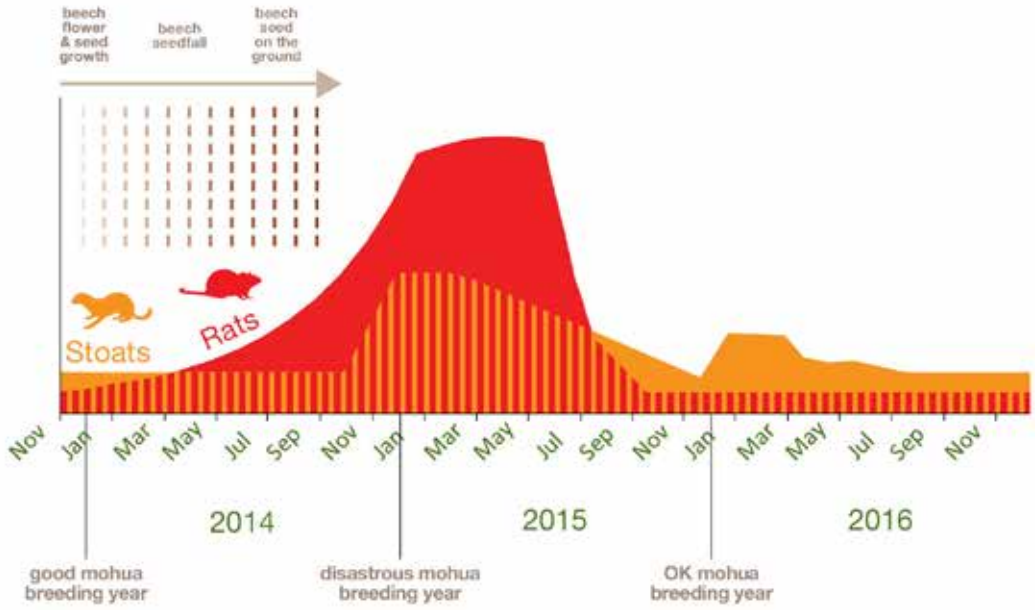
Outsmarting a rat

But rats are cunning – when they come across a new food they have a nibble, wait a while and come back and have some more. 1080 is a fast-acting poison so after they've eaten a little bit, they feel sick and won't eat the pellets again.

If you **pre-feed with non-toxic baits** they have a nibble – find it's OK and then start hoeing into the baits. When a week or two later they come across toxic baits they eat them without hesitation, take in a lethal dose and die.

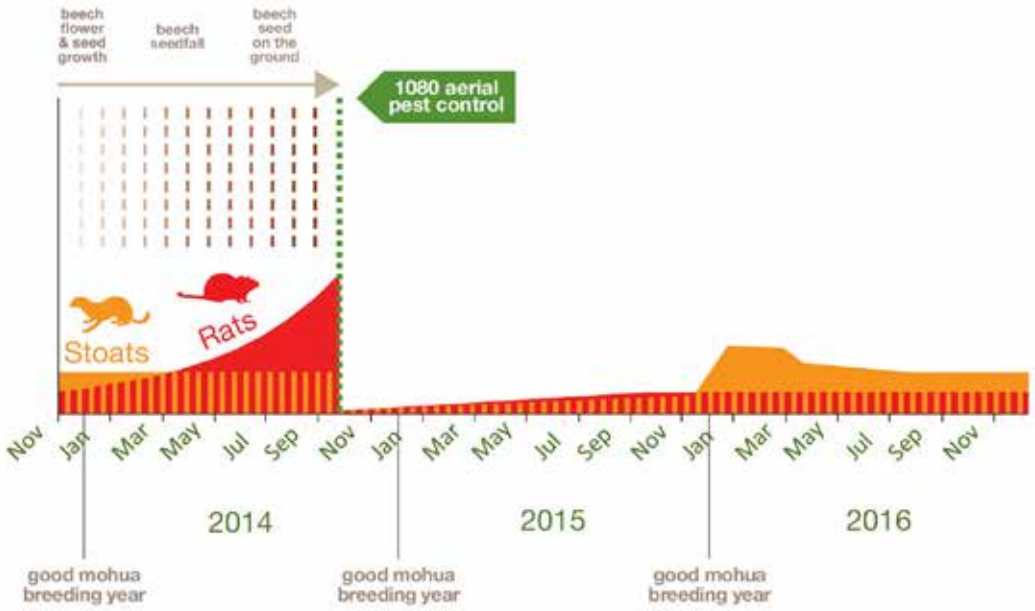
Without pest control:

Rodent numbers build up during winter and expand rapidly with the abundant food source. Stoats, feeding on mice and rats, peak each summer. Native birds take a hammering.



With intervention:

By monitoring rat numbers after prolific beech seeding, we can predict where the rodent and stoat populations will impact on native birds. Timely pest control allows birds to nest and fledge successfully.

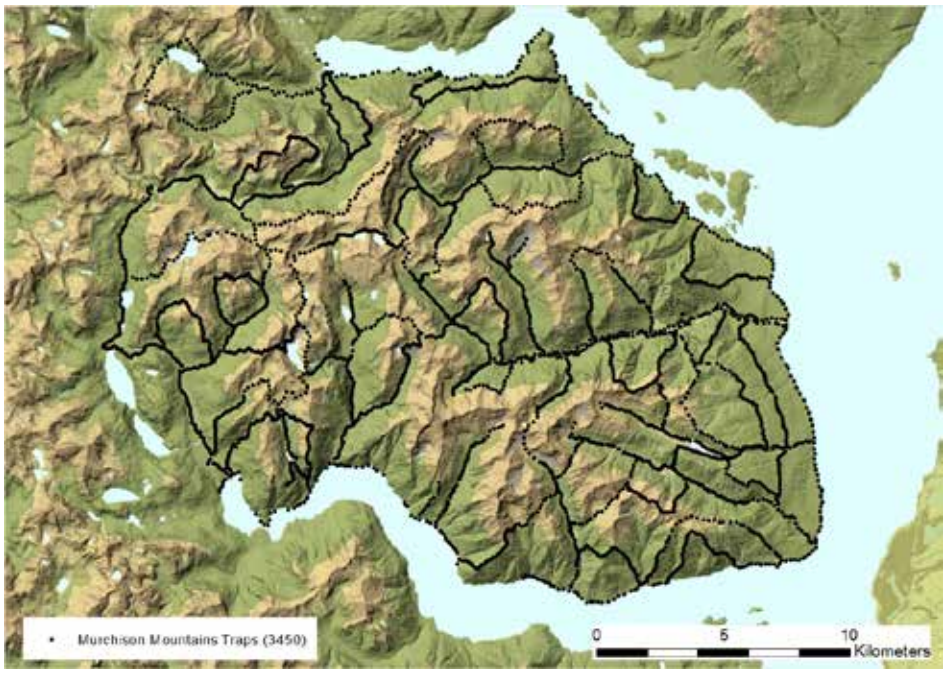


Benefits of **GROUND CONTROL**

Reliable networks

The DOC 150 traps are the backbone of stoat and rat control. Where possible, ground control is used and a trapping network is put in place to suppress pest populations.

This is not possible at all places at landscape scale but in some areas like the Murchison Mountains, a ground control network for stoat trapping is the norm. Here the resident takahē are protected from stoats by 3,450 traps at 100 metre intervals in the valleys and ridgelines across 50,000 ha.

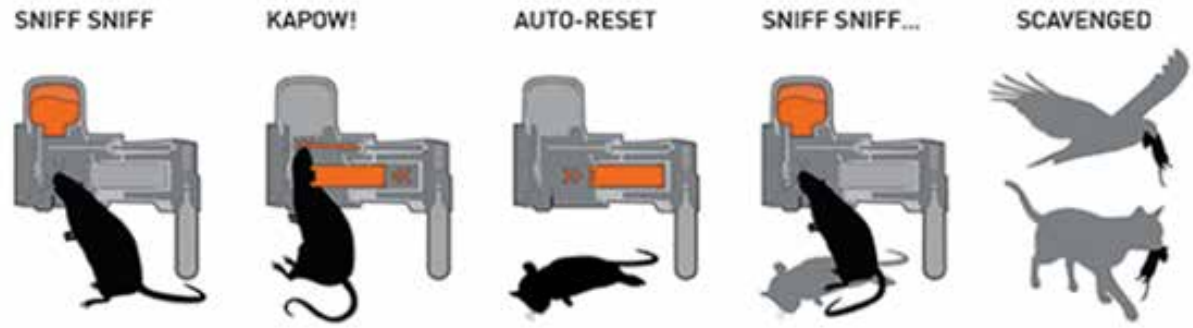


Stoat in DOC150 trap.

Innovation and experience combined

DOC is bringing the Goodnature A24 self-resetting trap into the front line to add ground-based control to the Haast Range site and to bolster the existing DOC 150 trap network at the Hawdon valley site. After the aerial 1080 has knocked down the pest populations, the Goodnature traps will be deployed to provide constant, labour-efficient control to hold pest populations down and maintain protection for critically threatened species in those areas.

A24 self resetting trap



Rock wren

Rock wren nest on the ground in the alpine zone so are easy prey for stoats and other predators.

DOC monitored rock wren in the Grange Range and Lake Aorere areas of Kahurangi National Park, with researchers tracking nesting in areas with 1080 control and areas without.

After 1080 treatment in Kahurangi, rock wren raised three times more chicks than without aerial control.

DOC is trialling traps in some places, but without more widespread pest control, rock wren are at risk of dying out.

The birds inside the 1080 area raised three times more chicks than birds in the comparison area.

The benefits continued when the birds bred again a year later. That season rock wren produced five times more offspring than the birds in the area without 1080 control.

More chicks offsets lost birds

The extra chicks more than made up for the 22 rock wren that went missing. These birds disappeared after unseasonable heavy snow and pest control in spring 2014.

At the monitored 1080 sites, rock wren numbers doubled over the first summer.

At the site without 1080 treatment, one-third of adult females went missing, and were likely killed by stoats.

Further research is planned in alpine areas to determine the risks and benefits of 1080 to rock wren in the 2016 Battle for our Birds operations.

Kea

Kea nesting improves in the second summer after 1080 treatment.

Predators, often stoats, attack up to 60% of kea nests. This climbs to about 99% in stoat plague years after beech seeding. Without pest control, kea will continue to decline.

Overall, kea are better off after 1080 treatment

DOC tracked kea through pest control operations in South Westland and at Arthur's Pass, Kahurangi and Lake Rotoiti. Four out of 49 kea died from 1080 poisoning.

Researchers monitored kea nesting over two breeding seasons. Results for the 2014 breeding season were inconclusive. Several pest control operations ran late in the breeding season, offering limited protection and many monitored birds also showed no signs of nesting.

Nesting for the 2015 breeding season was more positive. In the 1080 treatment areas in Kahurangi National Park, 27% of nests were successful. And all radio-tagged kea survived.

DOC monitored kea nesting in areas of Kahurangi without pest control between 2009 and 2014. Only 2% of nests over this period were successful.

DOC scientists have determined that kea populations are better off after 1080 treatment, taking into account the deaths caused by 1080. Without 1080 treatment high stoat levels wipe out most nests and also kill adult birds.

Summary

The massive beech mast event causing the current pest irruptions requires quick action to save populations of threatened species from further depletion. We can interrupt this cycle, but we want to look further ahead to species recovery. The most logical way is to increase the amount and frequency of pest control.

In the long run we have to seek ways to eliminate threats to native species. We are beginning to understand what drives heavy seeding events and we can now anticipate with more certainty where and when these events might occur. Controlling pests that thrive during those heavy seeding years can be better planned.

As control methods are refined and new ones developed, the effectiveness of pest control will increase, and with help from our conservation partners, the Department of Conservation can control pests in even larger areas.

The Battle for Our Birds will not just sustain populations of our native birds but it will lead to increases in their abundance and improvements in their habitat.

FOR MORE INFORMATION

Visit www.doc.govt.nz/battleforourbirds

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Rock wren. ***Photo: Craig Mckenzie***