

# National Predator Control Programme Annual Report

2023



Department of  
Conservation  
*Te Papa Atawhai*



Te Kāwanatanga  
o Aotearoa  
New Zealand Government

# National Predator Control Programme

Aotearoa New Zealand is facing a biodiversity crisis. Each year, an estimated 25 million native birds are killed by rats, stoats, possums and other predators. Without predator control, forest health will decline further and many more native animal populations will become extinct in less than two human generations.

**We face a choice: unchecked pests and silent, bare forests, or predator control and the survival of our native species.**

Predator Free 2050 seeks to solve this problem for Aotearoa New Zealand, with an ambitious goal to eradicate rats, stoats and possums by 2050. We don't yet have the tools and technology to completely eradicate predators, so a number of organisations are investing in research to develop them.

In the meantime, the National Predator Control Programme (NPCP) run by the Department of Conservation Te Papa Atawhai (DOC), is holding the line by using existing tools to prevent the loss of our most vulnerable threatened species.

**Alongside our partners, we use aerial 1080, large-scale trapping and other methods to control predators across large forest areas at important conservation sites.**

Currently, we control predators on a sustained, rotational basis over about 1.8 million hectares or 20% of public conservation land (see map on page 2). Sites are nationally prioritised for inclusion in the programme. The frequency and timing of predator control operations depend on the needs of the species being protected and the characteristics of the ecosystems at each site.

This timing forms the basis of our programme planning, along with other factors, such as forest seed and fruit production, and opportunities to coordinate work with our partners like OSPRI, regional councils and community groups. We monitor predator numbers carefully throughout the year to make sure that our operations only take place where and when they are most needed.

## Our 2023 work programme

The 2023 year was a real test of our ability to adapt the programme to accommodate a larger-than-forecast beech mast. Mast response operations are critical for protecting vulnerable species from high rodent numbers, and urgent changes were needed when monitoring showed more beech seed and rats were present than expected in the South Island.

To address this, we slowed down less urgent work and were allocated additional funding to boost our 2023 beech mast response campaign. Most of this work is to protect Kahurangi National Park, Fiordland National Park, and Westland. The beech mast response campaign began in 2023 and will continue into early 2024.

A highlight in 2023 was to see the tide begin to turn for kiwi in Fiordland. The June Wet Jacket operation was the second round of aerial predator control at this remote site, which is part of a study to find out how to best protect tokoeka kiwi chicks from stoat predation. The good news is the local population is now increasing, after years of steady decline (read more on page 5).

We also completed research into a potential kea repellent bait additive to reduce risk for kea, and we began trials into the effects of deer repellent on bait attractiveness to kea. See page 7 for more details.



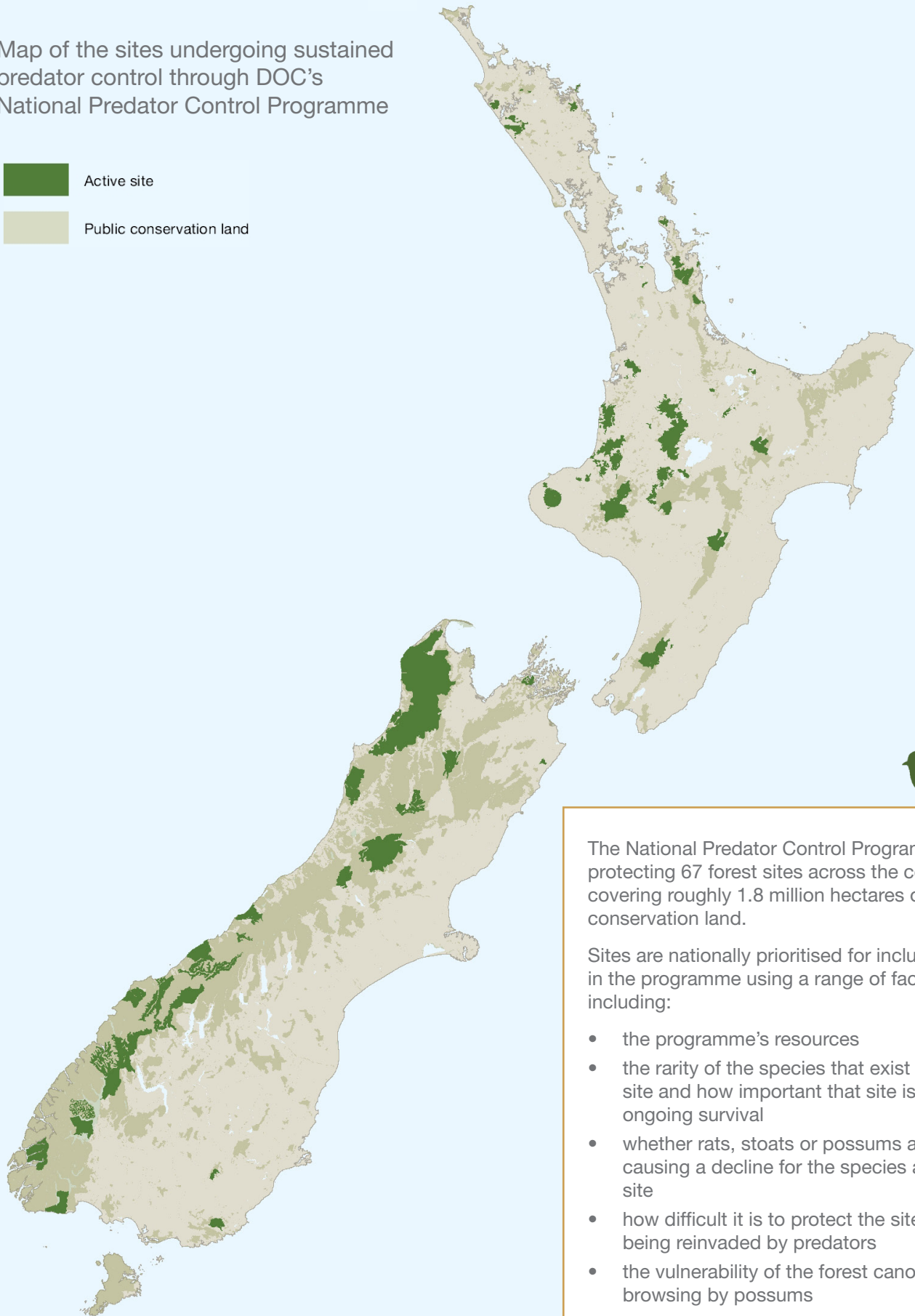
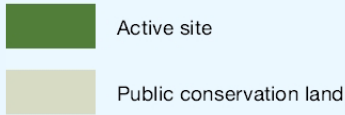
A beech forest 'mast' is a mass flowering and seeding event that occurs every 2-to-6 years. Podocarps, such as rimu and tussocks, also mast. This increase in food leads to increases in predator populations, which has a devastating impact on native species if left uncontrolled.

In 2023, we continued to roll out hundreds of acoustic recorders and cameras across our tracking tunnel network (see page 11 for an explanation of tracking tunnels). This additional monitoring is improving our ability to accurately measure the health of the sites we are protecting. Over time, this will provide valuable trend data for predator abundance and birdlife at each NPCP site and some non-treatment areas.

We finished the year having safely delivered roughly 580,000 hectares of predator control (see map on page 3), with an even bigger effort ready to be delivered in 2024. A huge thank you goes to our iwi and hapū partners, community conservation groups and other stakeholders, including landowners, and our contractors for helping to achieve this crucial protection for Aotearoa New Zealand's native species.

# National Predator Control Programme

Map of the sites undergoing sustained predator control through DOC's National Predator Control Programme



The National Predator Control Programme is protecting 67 forest sites across the country, covering roughly 1.8 million hectares of public conservation land.

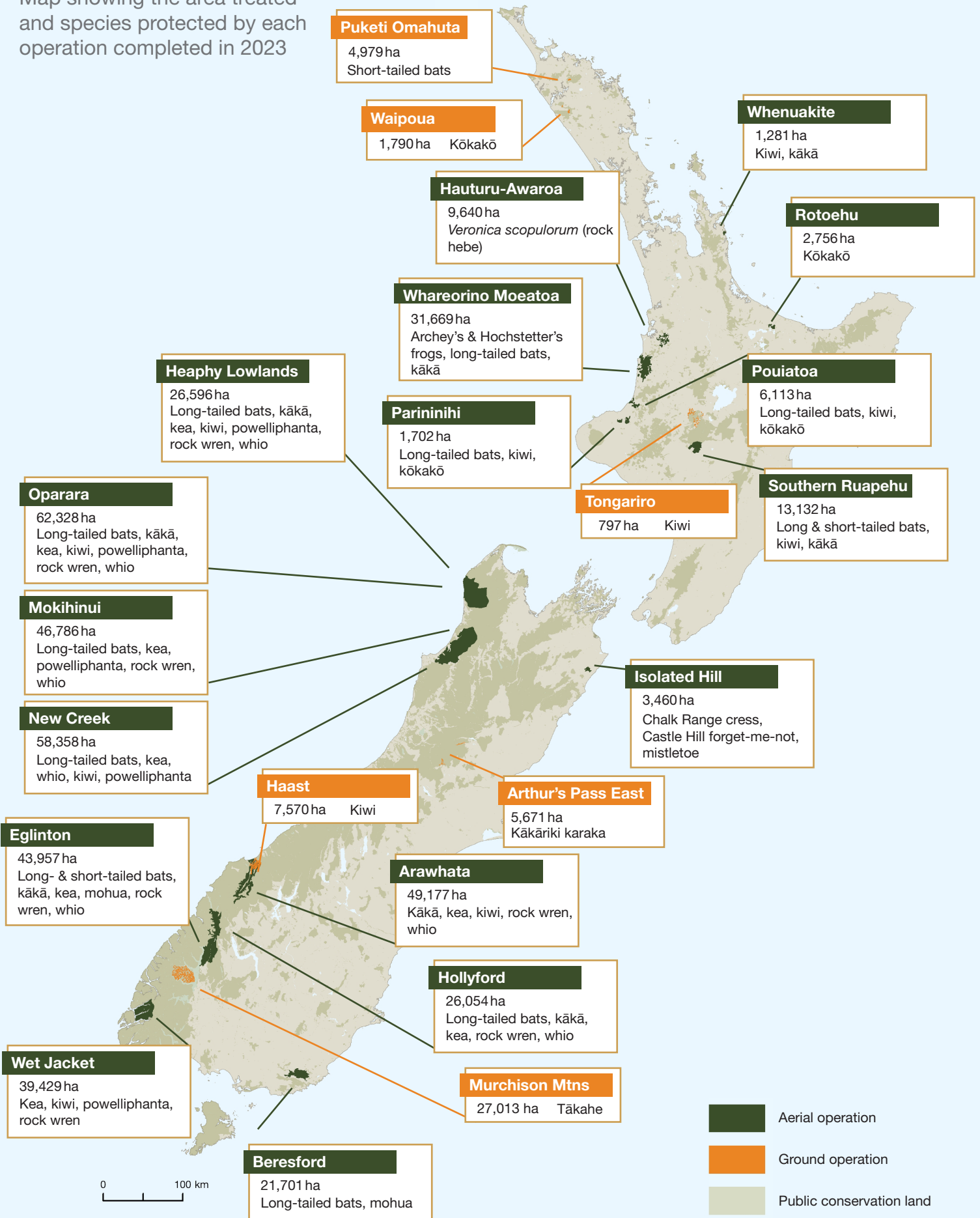
Sites are nationally prioritised for inclusion in the programme using a range of factors including:

- the programme's resources
- the rarity of the species that exist at each site and how important that site is for their ongoing survival
- whether rats, stoats or possums are causing a decline for the species at each site
- how difficult it is to protect the site from being reinvaded by predators
- the vulnerability of the forest canopy to browsing by possums
- how much protection the forest has had over time, including predator and wild animal (deer and goat) control.

0 100 km

# Operations completed in 2023

Map showing the area treated and species protected by each operation completed in 2023



# Threatened species protected

The NPCP provides crucial protection for New Zealand's threatened native species that are most at risk from introduced predators at a select number of sites.

The following pages outline the main species we are protecting. These are species with populations that will not survive in the wild in the long term without protection from rats, stoats and possums, and that live in places where predators can be controlled to low enough numbers to provide benefit.

Many other native species also benefit from predator control in these areas, but our programme is focussed on the most vulnerable species featured throughout this report.

The monitoring insights provided on the following pages comprise a mixture of NPCP-funded monitoring, other DOC monitoring and published research.



Whio. Photo: Anthony Behrens



Rock wren. Photo: Kerry Weston



Rock wren. Photo: Liz Whitwell

## Whio / blue duck

### Whio / blue duck sites protected in 2023

-  **Arawhata**
-  **Eglinton**
-  **Heaphy Lowlands**
-  **Hollyford**
-  **Mokihinui**
-  **New Creek**
-  **Oparara**

Whio is a threatened species of native duck found only in Aotearoa New Zealand's clean, fast-flowing waters. With an estimated population of less than 3,000 birds, whio are rarer than kiwi.

Whio are vulnerable to stoat predation, especially during nesting time and when females are in moult and cannot fly.

DOC started two whio security sites in Kahurangi National Park in the early 2000s, to protect whio through stoat trapping and large areas of aerial 1080 predator control. A 1998–2000 survey counted 191 adult whio with 58 breeding pairs. Results from the latest survey (2020–2023) counted 846 adult whio with 335 breeding pairs. Whio densities were generally highest on rivers where both aerial 1080 and trapping were used.

## Tuke / pīwauwau / rock wren

Rock wrens live year-round in the harsh alpine environment, and are thought to semi-hibernate for periods in the winter. They are weak flyers and nest on the ground, making them easy prey for rats and stoats.

Each January for the past four years DOC has surveyed rock wren at 24 sites across the South Island to gauge how they are faring in areas with and without predator control.

The results show rock wren numbers are increasing at the 12 sites where predators are regularly suppressed by aerial 1080 and/or trapping but are gradually declining at the 10 sites where there is no predator control.

### Rock wren sites protected in 2023

-  **Arawhata**
-  **Heaphy Lowlands**
-  **Hollyford**
-  **Eglinton**
-  **Mokihinui**
-  **Oparara**
-  **Wet Jacket**

In fact, the sites with predator control are doing so well it has been decided that biannual surveys will now be sufficient to measure long-term trends.

# Kiwi

## Kiwi sites protected in 2023

-  **Arawhata**
-  **Heaphy**
-  **New Creek**
-  **Oparara**
-  **Parininihi**
-  **Pouiatoa**
-  **Southern Ruapehu**
-  **Wet Jacket**
-  **Whenuakite**

The biggest threat to kiwi chicks is stoats. In areas without predator control, kiwi are declining by 2% every year.

Aotearoa has five species of kiwi, our national icon. Brown kiwi live in the North Island and roroa / great spotted kiwi in the top half of the South Island. Kiwi pukupuku / little spotted kiwi are extinct on the mainland and are now found only on predator free islands and in sanctuaries. Only one natural population of rowi remains, near Ōkārito in South Westland. Lastly, the tokoeka has three distinct forms, named after the areas in which they are found, Haast, Fiordland and Rakiura.

## 1080 reversing tokoeka decline at Shy Lake

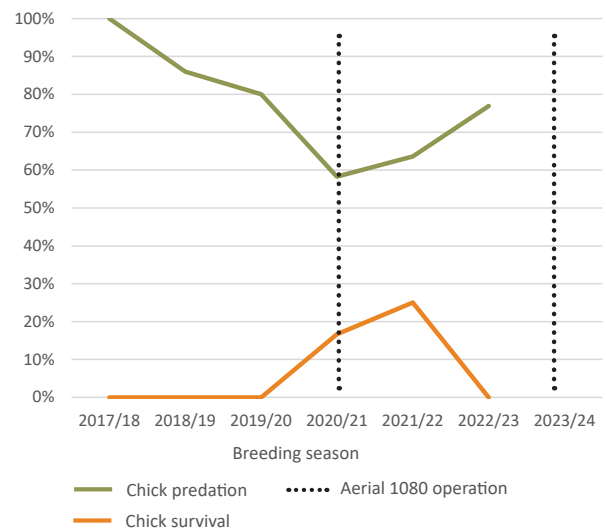
A population of southern Fiordland tokoeka is being monitored at Shy Lake in western Fiordland, to find out whether aerial 1080 alone can control stoats to a level where tokoeka populations can significantly grow, and what the timing of the operations should be.

The main cause of population decline for Fiordland tokoeka is stoat predation of chicks weighing under 1,000g. Chicks reach the 'stoat-safe' weight at about a year old.

Monitoring at Shy Lake began in 2017, three years before the first 1080 operation. In the absence of stoat control, chick survival was zero for each of those three years. With no chicks to replace the natural death of aging adults, the population was declining by 2% per year.

The first Wet Jacket NPCP aerial operation took place at the site in June 2020. Following the operation, a clear improvement in the number of chicks making it to stoat-safe weight could be seen.

### Chick predation and survival rates each breeding season



**Chick survival increased to 20% in the first two years after the operation.**

**Thanks to aerial 1080 predator control, the Fiordland tokoeka population at Shy Lake is now increasing by around 2% per year.**

However, after two years, as stoat numbers began to increase again, the survival rate of kiwi began to fall.

A second Wet Jacket aerial operation took place on 14 and 15 June 2023 and monitoring again showed that stoat numbers were successfully reduced to low levels.

We now know that aerially applied 1080 bait is an effective method for protecting tokoeka. Kiwi are long-lived and do not need to successfully breed every year to have an increasing population. To ensure the gains seen at Shy Lake continue, 1080 only needs to be used every 2-to-3 years to control stoat numbers and ensure kiwi chick survival.



Fiordland tokoeka prints.  
Photo: Bridget Railton



Fiordland tokoeka.  
Photo: Crystal Brindle



Kiwi rangers in Fiordland. Photo: Tim Raemaekers



Fiordland tokoeka. Photo: Andrew Digby

# Archey's and Hochstetter's frogs

The terrestrial Archey's frog is a modern-day dinosaur: the species is almost unchanged from its 150-million-year-old fossilised relatives. These little amphibians are critically endangered, with only three remaining populations in Whareorino and Pureora forests in Waikato and on the Coromandel Peninsula.

Hochstetter's frog is semi-aquatic, with partially webbed feet. It is wartier and more widespread than Archey's frog. Hochstetter's frog has been sighted at Waipu in the upper North Island, on Great Barrier Island, and in Coromandel, Waikato, the central North Island and Raukumara Range.

## Frog sites protected in 2023

 **Whareorino Moeatoa**

The NPCP protects Archey's and Hochstetter's frog populations with aerial and ground predator control across a range of North Island sites.

The dynamic between predators and Aotearoa New Zealand's native amphibians is complex, and we are continuing to learn how to provide the best protection.

# Kākā

## Kākā sites protected in 2023

- |  |  |
|--|--|
|  <b>Arawhata</b>          |  <b>Southern Ruapehu</b>    |
|  <b>Eglinton</b>         |  <b>Whareorino Moeatoa</b> |
|  <b>Heaphy Lowlands</b> |  <b>Whenuakite</b>        |
|  <b>Hollyford</b>       |  |
|  <b>Oparara</b>         |  |

Kākā were the standout of the last Landsborough valley annual bird count in 2023, which has occurred each summer for the past 25 years. Results showed kākā numbers doubled from the previous year. The birds were likely drawn to the masses of flowering mistletoe in the valley, which is in healthy numbers and showing little evidence of possum browse.

The long-running bird monitoring programme shows that populations of most native bird species have increased or remained stable. The area has received seven aerial 1080 treatments since 1998 and is now in exceptional condition.



Hochstetter's frog. Photo: Gregory H Sherley



Kākā. Photo: Ross Henderson





Mohua. Photo: Leon Berard

# Mohua

In the 1800s, the small, yellow, insect-eating mohua was one of Aotearoa New Zealand's most abundant forest birds. But since the introduction of predators to our country, mohua have declined and now only a few isolated populations remain in the South Island and on predator free offshore islands.

From a low of seven individual mohua in 2007 in the Hurunui South Branch (Lake Sumner Forest Park), numbers were boosted through predator control and translocations in 2008 and 2009. The latest monitoring shows mohua numbers are continuing to trend upwards in the South Branch, with individual birds increasing at an average rate of 10% per year.

## Mohua sites protected in 2023

 **Eglinton**       **Beresford**

Unfortunately, mohua are still declining at some other sites, despite our predator control efforts. It is critical that we continue to use the predator control tools we have available, while also investigating how we can improve their effectiveness for protecting mohua.








# Kea

Clever kea are well-known for their antics with road cones, cars and camping equipment. But this iconic parrot is nationally endangered, due to introduced predators and human activity. Their numbers are in greatest decline in eastern areas of the South Island. Aerial 1080 is the only effective predator control option in the vast, remote and rugged terrain they inhabit, and it can significantly improve kea survival and breeding success.

DOC's Code of Practice for aerial 1080 use in kea habitat contains operational standards to protect kea. It is based on the best available research to date, including a dataset of 253 kea monitored across 24 operations.

Despite the benefits to kea from the use of aerial 1080 at a population level, unfortunately the toxin can pose a risk to individual kea. Kea are curious and tend to explore new objects and foods, behaviours that can lead them to interact with 1080 bait. Research has shown that the risk of 1080 to kea is likely increased close to places where kea scrounge food from humans.

## Kea sites protected in 2023

- |  |   |
|--|---|
|  <b>Arawhata</b>        |  <b>Mokihinui</b>  |
|  <b>Eglinton</b>        |  <b>New Creek</b>  |
|  <b>Heaphy Lowlands</b> |  <b>Oparara</b>    |
|  <b>Hollyford</b>       |  <b>Wet Jacket</b> |

## The kea challenge

We are continually working to better understand and reduce the risks to kea from the use of 1080 and improve the benefits from predator control. Joint research between DOC and OSPRI was undertaken in Arthur's Pass in 2022, to test the effectiveness of two bird repellents to deter kea from eating baits.

The first trial looked at whether kea, attracted by audio lures and exposed to the repellent anthraquinone in non-toxic baits, became averse to the baits and less likely to eat them. Anthraquinone is a 'secondary' repellent, because it makes the birds feel sick after they consume it. Analysis of the results was completed in November 2023 and unfortunately showed the repellent baits did not create the hoped-for aversion.

About 90 kea were monitored using radio transmitters and cameras during the trial. Significant numbers of kea were attracted to the 25 repellent bait sites by recorded kea calls but few adverse reactions were recorded, and kea continued to visit and interact with the repellent baits undeterred.

Overall, kea ate little of the repellent bait, likely not enough to make them feel sick and create a lasting aversion.

While the result was disappointing, it was important to further investigate anthraquinone because it had previously shown promise when tested with kea in captivity.

In the other trial, a different repellent, d-pulegone, was added to non-toxic baits to see if the birds would be deterred by this peppermint-flavoured additive. Results are still being analysed and are expected to be available from mid-2024.

In 2023 we began research (also in the Arthur's Pass area) to test whether the newly available deer repellent bait, Prodeer, is more attractive to wild kea than standard cereal baits normally used in predator control operations.

DOC takes great care to ensure any changes made to 1080 baits used for predator control do not accidentally increase the risk to the native wildlife being protected. In this case, the aim is to avoid increased risk to kea during 1080 operations where deer repellent is being used.

Social science is also being used to inform how best to encourage people not to feed kea or allow scrounging. Newly designed 'do not feed kea' signs are being installed at visitor and kea sites.

DOC and the Kea Recovery Group are reviewing what we learnt in 2023 and will continue this research in 2024, to better protect kea and grow the population.



Kea. Photo: Andrew Walmsey



Kea. Photo: Andrew Walmsey



Kea. Photo: Andrew Walmsey



Kea. Photo: Laura Young



# North Island Kōkako

In the early 1900s, kōkako were common in forests throughout New Zealand. Sadly, the South Island kōkako is now presumed extinct. By the 1990s, North Island kōkako declined to a low of less than 400, but through management, predator control and huge efforts by community groups, the number of kōkako pairs passed 2,000 in 2020.

## Kōkako sites protected in 2023



Rotoehu



Pouiatoa



Paraninihi



Waipoua ground

## Kōkako on the rise at Rotoehu

Thanks to ongoing aerial 1080 and ground-based predator control, and a cooperative effort, Rotoehu Forest in Bay of Plenty is now home to New Zealand's second-largest mainland kōkako population.

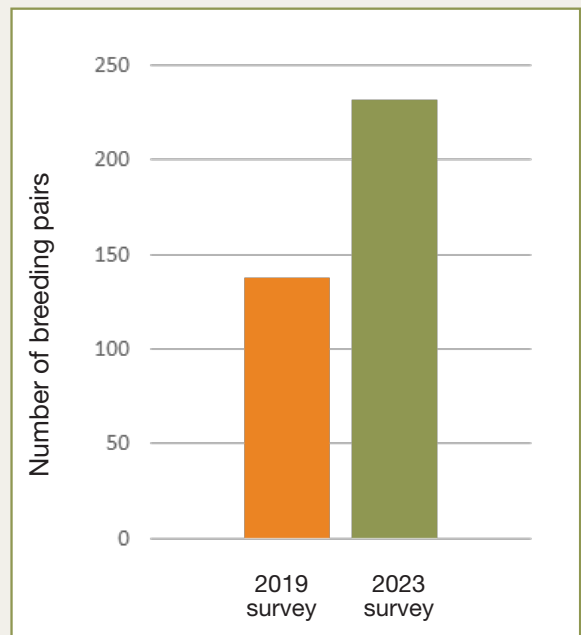
A survey undertaken in April 2023 counted 232 breeding pairs in the area – a 68% increase on the 138 pairs counted in the previous survey in 2019.

The 2023 survey found that the density of kōkako varies across the forest, with the highest densities in the areas where predators have been managed the longest.

Kōkako are protected at Rotoehu through a partnership between Ngāti Mākinō, DOC and the Rotoehu Ecological Trust. The Trust's hard-working team of volunteers and advocates has managed a bait station network in the forest since 2013. In 2019 they increased the 650-hectare network to 996 hectares, and then expanded it again to 1,367 hectares in 2022.

Rotoehu Forest is undergoing sustained aerial predator control across 3,000 hectares as part of the NPCP. Operations took place in 2017, 2020 and most recently in 2023.

**Within the 1,367 hectares receiving both ground and aerial predator control, the average kōkako density is now 5.9 pairs per hectare, the greatest average density of any mainland site in Aotearoa New Zealand.**



**Rotoehu kōkako survey results: number of breeding pairs**

Survey results now estimate the kōkako population as 543 adults within the broader Rotoehu Forest, which means it has passed the target of 500 birds needed for the population to be considered genetically robust. With the continuation of ongoing predator control, the population now has a high chance of persisting.



Kōkako. Photo: Janice McKenna

Kōkako. Photo: Janice McKenna

Kōkako. Photo: Leon Berard

# Kākāriki karaka / orange fronted parakeets

With less than 400 mature adults in the wild, the kākāriki karaka is Aotearoa New Zealand's rarest mainland forest bird. Kākāriki karaka are currently found in the wild in Hurunui South Branch in Lake Sumner Forest Park and the Hawdon valley in Arthur's Pass National Park.

A boom-and-bust species, kākāriki karaka numbers can naturally increase rapidly when environmental conditions are good but can also decline rapidly when they are not.

In 2021 and 2022, the Hawdon valley population had declined due to predation to the point where monitoring was unable to detect any birds.

Kākāriki karaka were reintroduced to the valley in late 2022 and early 2023, after predator control efforts – including the NPCP 2022 Arthur's Pass East and Arthur's Pass West operations – made this viable. In March 2023, a field team was excited to spot kākāriki karaka chicks in a nest for the first time in the Hawdon valley since 2015.

## Kākāriki karaka sites protected in 2023



Hawdon / South Branch ground control



Powelliphanta. Photo: Kathrun & Stefan Marks



Kākāriki karaka. Photo: Coralee Thouzeu-Fonseca



Kākāriki karaka. Photo: Sabine Bernert

# Powelliphanta snails

The carnivorous powelliphanta are among the largest snails in the world, but they are in danger of extinction. The latest threat classification report on Aotearoa New Zealand's carnivorous land snails shows that, of the 109 species assessed, 48 have declined in status while only six have improved.

The report highlighted the urgent need for action to control exotic browsers and predators, protect habitat and address climate change, if many of our giant land snails are to survive.

Powelliphanta are vulnerable to predation not only by rats and possums but also pigs, thrushes, hedgehogs, and even our native weka.

## Powelliphanta sites protected in 2023



Heaphy Lowlands



Oparara



Mokihinui



Wet Jacket



New Creek

For this reason, it is likely that possum and rat control alone will not be enough to fully protect them. Powelliphanta ecology is complex and we are still working to understand the impacts our predator control operations have on these species.

# Pekapeka / bats

## Bat sites protected in 2023



Beresford



Mokihinui



Pouiatoa



Eglinton



New Creek



Puketi Omahuta



Heaphy



Oparara



Southern Ruapehu



Hollyford



Parininihi



Whareorino

Aotearoa New Zealand has two species of bat, and both are vulnerable to predation.

Long-tailed bats have the highest threat ranking of Nationally Critical. They are distributed throughout Aotearoa New Zealand.

Short-tailed bats are less threatened but also less widespread, found only in scattered forest sites in the North Island, Fiordland and on Codfish Island.

# Protecting pekapeka in the Eglinton valley

DOC has been monitoring the annual survival of pekapeka / long-tailed bats in two social groups in the Eglinton Valley for over 20 years. The site is prone to spikes in predator numbers driven by periodic mast seeding of beech trees. Stoat trapping has been undertaken since the 1990s, bait station ground control began in 2006, and since 2014, the valley has received aerial 1080 treatment to provide additional protection following beech masts.

Long-tailed bat numbers have increased since the 1990s, but the rate of increase has slowed in recent years.

Predator control can make a difference to pekapeka survival. Before 2009, beech mast seeding was associated with low pekapeka survival, but in the 2009,

2011 and 2014 masts, predator control effectively reduced the impact of an explosion in rat numbers.

However, despite aerial 1080 operations through the 2016 and 2019 beech masts, rat populations were not reduced enough, or recovered too quickly, and pekapeka numbers did not increase.

In response to this, we have changed the timing and frequency of operations to provide better protection in beech masts. Ahead of an expected beech mast in the Eglinton valley in late 2023, a successful aerial 1080 operation was carried out earlier than usual, on 2 February 2023. To ensure protection is maintained throughout 2024, a second operation took place in early 2024.



Short-tailed bat. Photo: Sabine Bernert



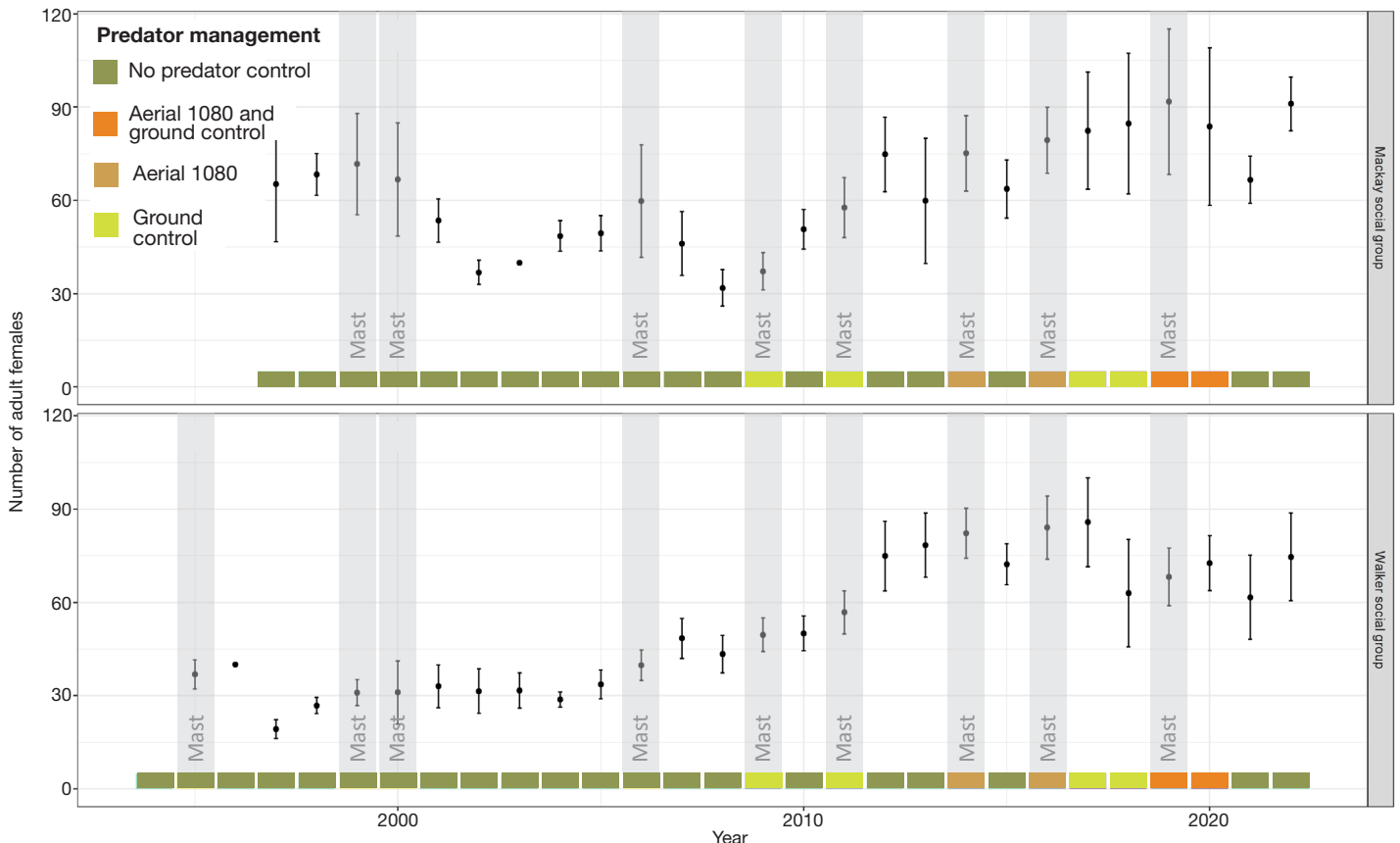
Long-tailed bat. Photo: Colin O'Donnell



Long-tailed bat. Photo: Colin O'Donnell

## Number of adult female long-tailed bats in the Eglinton valley 'Walker Creek' and 'MacKay Creek' groups

The minimum number alive was estimated using recapture rates from marked bats. Grey columns indicate beech masts and coloured bars indicate predator management. Values are means  $\pm$  95% confidence intervals.



# 2023 result monitoring

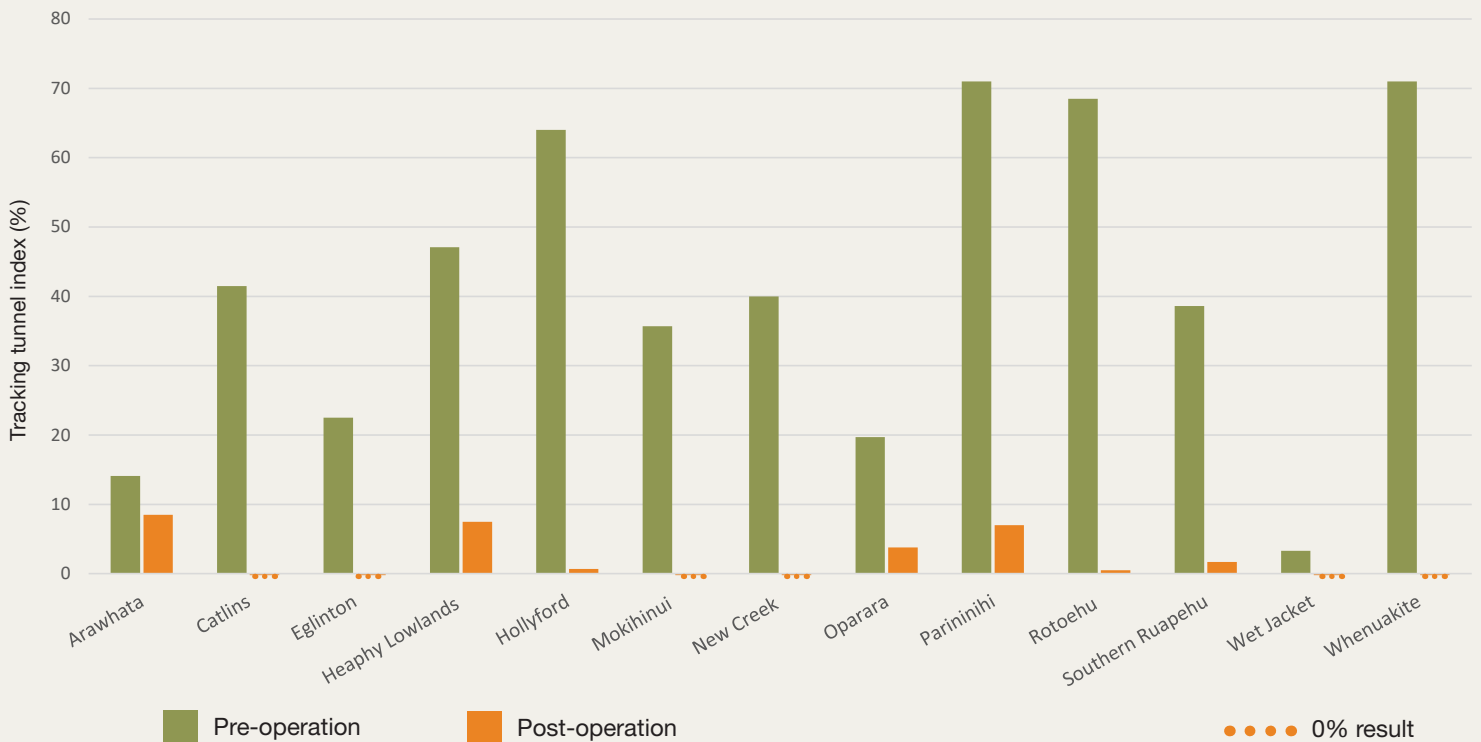
As well as monitoring native species, we also monitor predator numbers before and after control operations to measure their effectiveness. Most commonly we measure rat populations, because their numbers are the single-biggest driver for the NPCP.

DOC monitors rat numbers using tracking tunnels that contain ink pads. The tracking tunnel index is the percentage of tracking tunnels containing rat prints.

In 2023, NPCP operations often achieved a post-operational rat monitoring result of 0% (indicated by a dotted line on the graph below). This means the predator control successfully reduced rats to undetectable or very low levels.

The 2023 rat monitoring results were very encouraging. Ultimately, however, the success of an operation is measured by long-term monitoring of the species we are aiming to protect.

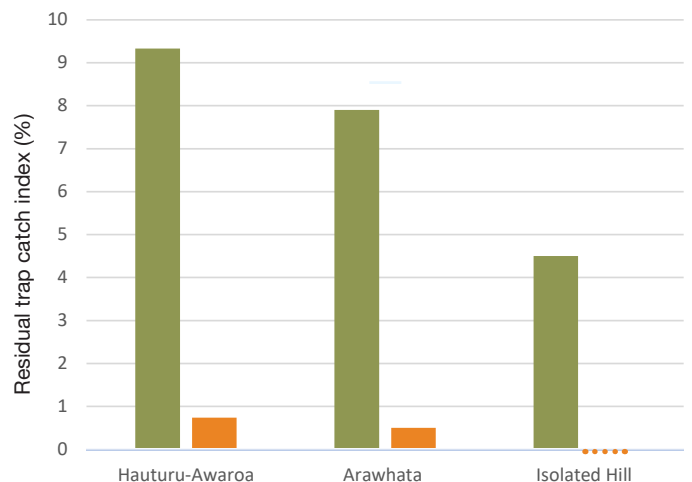
## Pre- and post-operation rat monitoring results, 2023



## Pre- and post- operation possum monitoring results

We monitor possum numbers at some NPCP sites. Possums breed at a much slower rate than rats, so it is not necessary to monitor them as frequently.

There is more than one way of monitoring possums, but for consistency, the results shown here have been converted to the residual trap catch index, which is the percentage of nights in which a possum was captured across a number of trap lines.



Pre-operation Post-operation 0% result

# Operations planned for 2024

Map showing NPCP operations planned for 2024. Operations are subject to change based on mast forecasting and other factors.

