

A photograph of a yellow and grey bird, likely a New Zealand Yellowthroat, perched on a tree branch. The bird is facing left, looking slightly upwards. The background is a soft-focus forest scene with various tree branches and green foliage.

National Predator Control Programme Annual Report

2022

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Department of
Conservation
Te Papa Atawhai

INTRODUCTION

National Predator Control Programme

There is a biodiversity crisis in Aotearoa New Zealand, with more than 4000 of our country's native plants, animals and fungi threatened or at risk of extinction. Each year, it is estimated that 25 million native birds are killed by rats, stoats, possums and other predators.

Without active predator control, some of New Zealand's unique wildlife will be lost forever.

The Department of Conservation Te Papa Atawhai (DOC) has learnt that where predators are regularly suppressed or eradicated, the ecology begins to heal, allowing native wildlife to recover. This is the vision of Predator Free 2050.

The tools needed to eradicate rats, stoats and possums from New Zealand by 2050 are not yet available, but we have the ability to develop them through research and innovation over the next 10 to 20 years.

While new tools are developed, our National Predator Control Programme (NPCP) is holding the line, by using existing tools to prevent the loss of our most vulnerable threatened species at selected sites on public conservation land across the country.

Alongside our partners, we use biodegradable 1080, large-scale trapping and other methods to control predators across large forest areas that are still rich in native wildlife (see map on page 3).

Sites are nationally prioritised for inclusion in the NPCP based on the predator-sensitive threatened species that are present (see page 5), the history of predator control in the area, and the type, size and condition of the forest.

How often predator control operations occur at each site depends on the needs of the species being protected and the characteristics of the ecosystem. This informs the annual planning for the NPCP, along with other factors such as mast forecasts and opportunities to complement work being done by our partners, including OSPRI and regional councils.



A 'mast' is a season of heavy flowering and seeding of beech or rimu forests, or tussock grasslands, occurring roughly every 2-6 years. This increase in food leads to predator population explosions, which has a devastating impact on native species if left uncontrolled.

Our 2022 work programme

Landscape-scale predator control is by nature a movable feast, requiring agility and flexibility – and 2022 was no different. We began the 2022 calendar year with a significant mast being forecast for parts of the North and South Islands, and with a number of 2021 operations having been postponed to 2022 due to Covid-19, so we planned to treat over 800,000 hectares if necessary.

Fortunately, only a patchy mast eventuated, so rat numbers at some sites in Fiordland, the southern South Island and the central North Island did not increase as feared. This meant that we could defer some operations until rodent numbers warrant it. The lighter-than-expected mast also allowed us to speed up the **Hope Cascade** operation in Westland, where possum numbers had already reached damaging levels.

All the Covid-delayed operations (**Arthur's Pass East, Rangitoto, Tongariro, Moehau** and **Matemateonga**) were successfully completed as planned in 2022, protecting precious populations of **kōkako, kākāriki karaka / orange-fronted parakeet, kiwi, whio / blue duck, Archey's frog** and other vulnerable species.

A highlight in 2022 was delivering the **Waipoua** operation, as this was the first time this important Northland kauri forest had received extensive predator control since 2014. The work was completed in October – just in time for the **kōkako** breeding season.

Unfortunately, we were unable to complete the **Arawhata** operation in South Westland. The prefeed was applied in June, but bad weather made it impossible to fly the toxic part of the operation for many weeks. There was a risk that such a large time delay between the prefeed and toxic bait application would affect the operation's success, so we decided against proceeding with the toxic operation, deferring **Arawhata** to 2023.

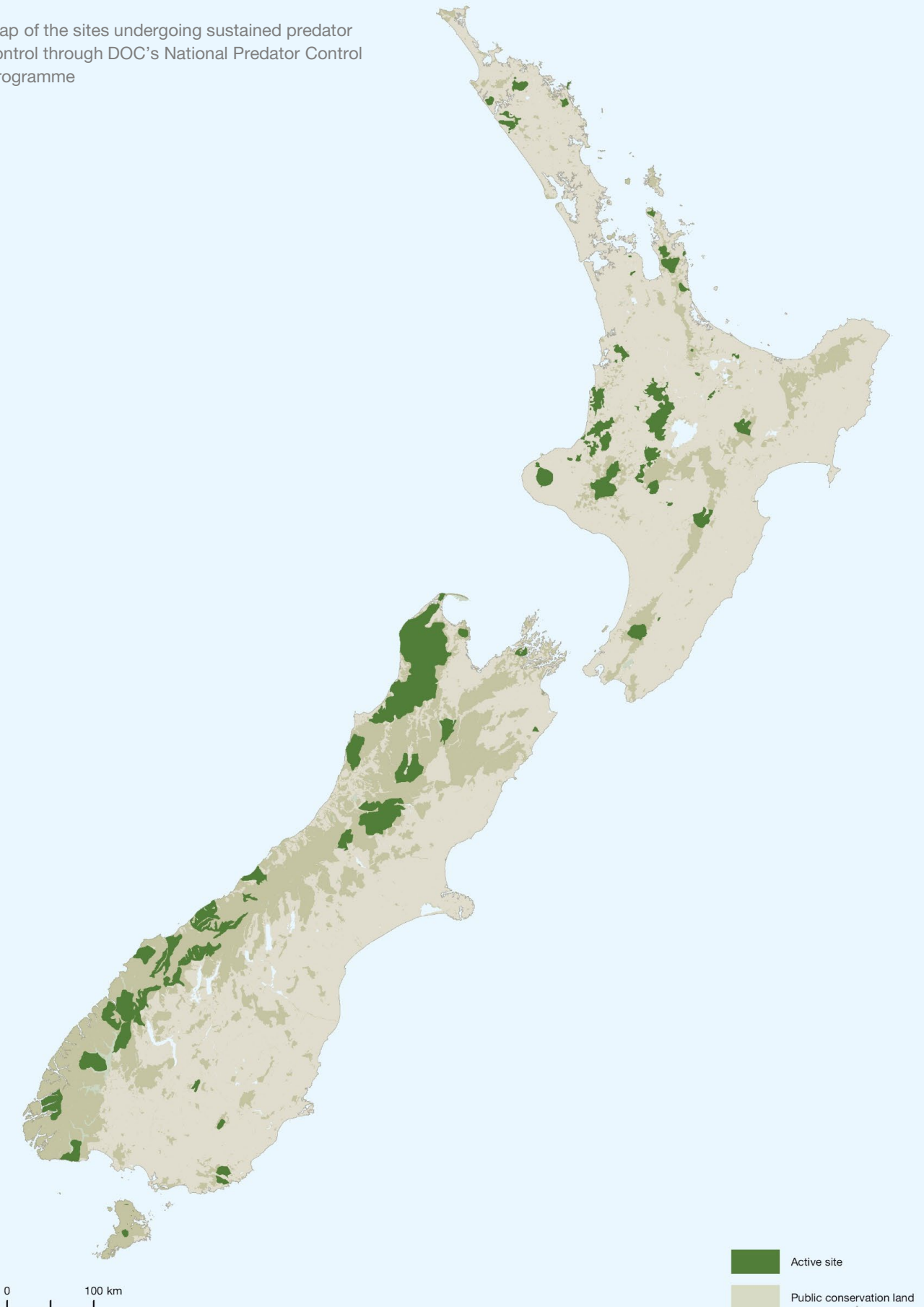
Another significant challenge for the NPCP is preventing **kea** from eating 1080 baits. Research has shown that on balance **kea** populations benefit from stoat control through well-timed aerial 1080 operations, but some birds will eat the baits and be poisoned. We are working with a coalition of partners to reduce this risk through a major research programme that is described in more detail on page 7.

The final operation for the year was **Dart Caples** in Fiordland, where the **mohua/yellowhead** population is at serious risk of local extinction from rat and stoat predation. Following consultation with hunters, we used deer repellent bait over 20,000 hectares of the 46,000-hectare site to mitigate the impacts of the operation on a highly-valued white-tailed deer herd.

We finished the year having safely undertaken 516,297 hectares of predator control (see map on page 4). A huge thank you to our iwi and hapū partners, stakeholders, landowners and our contractors for helping to achieve this crucial protection for New Zealand's native species.

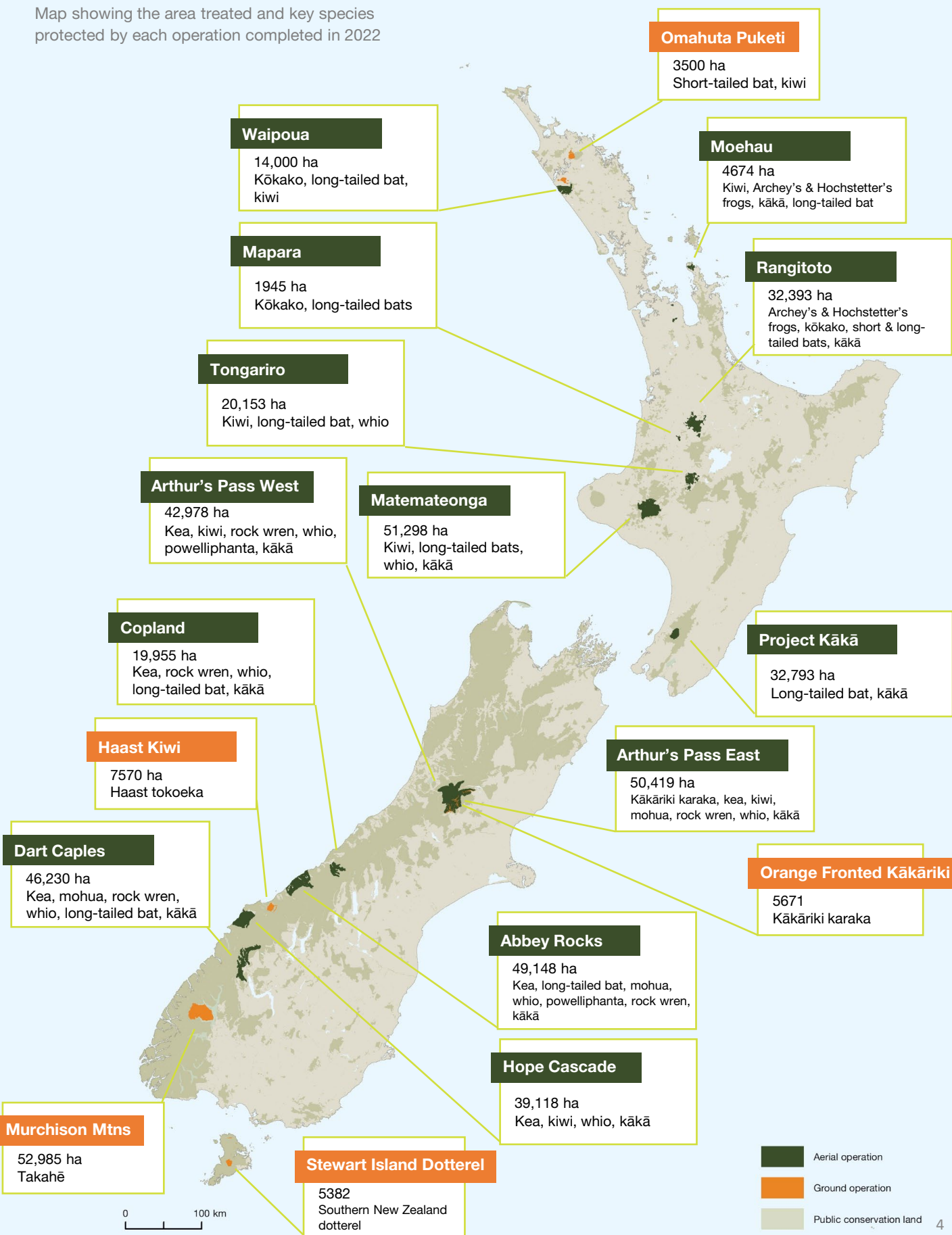
National Predator Control Programme

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



Operations completed in 2022

Map showing the area treated and key species protected by each operation completed in 2022



Threatened species protected

The NPCP provides crucial protection for New Zealand's threatened species that are most at risk from introduced predators.

The following pages outline the key 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 species also benefit from predator control in these areas, but our programme is focussed on the most vulnerable species featured throughout this report.

DOC measures the effectiveness of its predator control work through long-term monitoring of the species we are protecting and the predators being controlled. This includes monitoring population trends at a representative selection of sites, as well as more focussed monitoring of specific threatened species populations.

We also monitor rat, stoat or possum numbers at the sites we are protecting. In addition, DOC undertakes research, often in collaboration with other partners, with the aim of improving predator control methods.

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



Photo: David Cook



Photo: Sabine Bernert, <https://sabinebernt.fr>



Photo: David Cook

Whio / blue duck

Whio / blue duck sites protected in 2022

- | | |
|---|--|
|  Abbey Rocks |  Dart Caples |
|  Arthur's Pass East |  Hope Cascade |
|  Arthur's Pass West |  Matemateonga |
|  Copland |  Tongariro |

Whio live in clean, fast-flowing rivers in parts of the North and South islands, and are a key indicator of healthy rivers and streams. Unfortunately, whio have low reproductive success as they nest on river banks, where they are vulnerable to stoat predation and flooding.

Predator control is the best way to ensure that whio thrive, and using a combination of aerial 1080 and stoat trapping is most effective. A 3-year study at the Wangapeka/Fyfe whio 'security sites' in Kahurangi National Park showed that whio raise more young in the year following aerial 1080 predator control than in years when stoats are controlled through trapping alone.

North Island Kōkako

North Island kōkako now only survive in small, isolated populations in some native forests. Female kōkako are particularly vulnerable to predation while nesting, which can lead to populations that are predominantly male. In these situations, males sometimes pair up with each other, and can even build nests.

In 2021, the national kōkako population reached 2000 breeding pairs, up from 330 pairs when recovery efforts began in the late 1990s. Intensive predator control (including aerial 1080 and trapping) over many years in kōkako habitat has been vital to achieving this milestone.

Kōkako sites protected in 2022

- | | | |
|--|---|---|
|  Mapara |  Rangitoto |  Waipoua |
|--|---|---|

At sites with effective ongoing predator control, kōkako populations have increased by up to 50% each year. DOC's predator control efforts at sites such as Rangitoto, Mapara, and Northland's Mataraua and Waipapa forests have significantly boosted kōkako numbers.

Kiwi

Kiwi sites protected in 2022

-  Arthur's Pass East
-  Arthur's Pass West
-  Haast Kiwi
-  Hope Cascade
-  Matemateonga
-  Moehau
-  Tongariro
-  Waipoua

Kiwi populations are declining by 2% per year in areas without predator control, with stoats being responsible for the deaths of approximately half of all kiwi chicks on the mainland. Young kiwi chicks are vulnerable until they reach about 1 kg in weight, after which they can generally defend themselves.

DOC's goal is to turn around the decline of kiwi populations and achieve a 2% increase.

The NPCP protects key populations of all five kiwi species at key sites across the country. Aerial 1080 operations are timed to protect kiwi chicks from stoats through the breeding season.



Tokoeka
Photo: Jonathan Astin



Shy Lake, Fiordland
Photo: Bridget Railton



North Island brown kiwi
Photo: andrewwalmsleyphotography.com

Haast tokoeka one step closer to recovery

The Haast tokoeka (which means 'weka with a walking stick') is one of New Zealand's rarest kiwi, found only in a small area of South Westland. Most of this species' habitat is covered by the Haast Kiwi Sanctuary, where these birds have been actively managed over the last 20 years.

Between 2007 and 2018, the sanctuary was part of the Operation Nest Egg (ONE) programme, through which eggs were collected from the wild and hatched in captivity, and chicks were grown to a 'stoat-safe' weight and then released back into the wild.

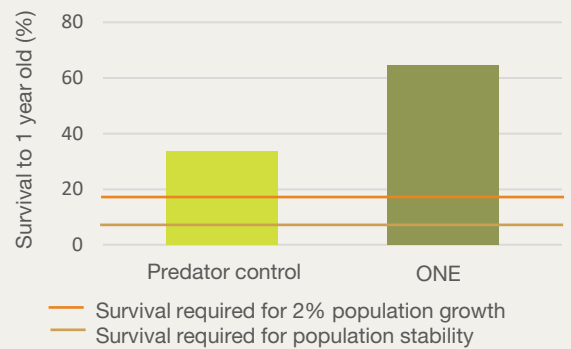
By 2018, populations were well established, so the focus at the sanctuary switched back to managing the birds through a 12,000-hectare stoat trapping programme and periodic aerial 1080 predator control.

In 2021 the Haast tokoeka population surpassed 250 adults and its threat level was downgraded from Nationally Critical to Nationally Vulnerable.

A recent study looked at the survival and growth rates of the Haast Kiwi Sanctuary chicks under the ONE programme and the *in situ* predator control programme, the results of which will be soon be published in a paper.

The study found that the ONE programme achieved 64.7% chick survival to 1 year old (the 'stoat-safe' age), with a modelled population growth of 8.5% per year, while the predator control programme achieved an average of 33.5% chick survival to 1 year old, leading to a population growth rate of 4.1% per year.

Haast tokoeka chick survival







Thanks to the dedicated effort to control stoats and monitor outcomes, these results are comfortably over the 2% per year growth goal of the Kiwi Recovery Plan. The tokoeka within the Haast Kiwi Sanctuary have an extraordinary 98.4% per year adult survival rate, which gives an average life expectancy of 61.4 years.

The 2022 Hope Cascade operation also helped protect a satellite Haast tokoeka population near Junction Hill. The next round of aerial 1080 over the main sanctuary (Arawhata) was postponed from 2022 and will now take place in 2023.

Kea

The kea is one of the most intelligent birds in the world – these cheeky parrots have been known to turn on water taps, lock trampers in toilets and use tools to set off stoat traps to get the eggs.

Kea sites protected in 2022

- | | |
|---|--|
|  Abbey Rocks |  Copland |
|  Arthur's Pass East |  Dart Caples |
|  Arthur's Pass West |  Hope Cascade |

Kea nest and forage on the ground, making them highly vulnerable to introduced predators, particularly stoats and feral cats, and aerial 1080 is the only effective predator control option in the vast, remote and rugged terrain they inhabit.

A study published in 2018 compared kea nest survival through a rimu mast year between an area that underwent aerial 1080 treatment (Ōkārito) and an area without predator control (Fox-Paringa). During the two breeding seasons, only 1 of 15 nesting attempts failed at the 1080-treated Ōkārito site, compared with 10 out of 13 nests at the untreated Fox-Paringa site.

These findings show that large-scale aerial 1080 operations can significantly improve kea breeding success by reducing the numbers of predators, particularly stoats.

Reducing risks to kea

Despite the benefits of predator control to kea at a population level, some individual kea can be poisoned from 1080 operations. Kea will explore novel objects and scavenge for human food, and these behaviours can lead them to interact with 1080 bait. The risk to kea appears to be greater in areas near human settlements or activity.

DOC and its partners are continually working to understand and mitigate the risks to kea from 1080.

The goal is for kea populations to recover and thrive by effectively managing introduced predators without the loss of any kea.

The Kea 1080 Risk Mitigation Technical Advisory Group, which includes representatives from DOC, Te Rūnanga o Ngāi Tahu, OSPRI, Zero Invasive Predators (ZIP) and the Kea Conservation Trust, has developed a list of research priorities for kea and 1080. DOC and OSPRI predator control operations in Arthur's Pass National Park were chosen as sites to focus on for research in 2022.

The 2022 research tested two bird repellents, which we hope will stop kea from eating 1080 baits. In one trial, kea were exposed to anthraquinone, which makes birds feel temporarily sick, to see if they could be 'taught' to avoid toxic bait pellets – a method that had previously shown promise in operations as part of Predator Free South Westland.

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

Research has shown that the risk of 1080 to kea is likely influenced by the proximity of the treatment area to human scrounge sites, the history of the site to 1080 treatment and the birds' blood lead levels.

In the other trial, d-pulegone was added to non-toxic baits to see if the birds would dislike the peppermint-flavoured additive. This method is also being tested with rats and possums to ensure that they will still eat the bait.

To monitor the outcomes of the trials, 100 kea were fitted with radio transmitters. This is the largest group of kea ever studied in this way and provides an opportunity not only to test these repellents but also to gather valuable information on the movement, survival and breeding success of kea.

Results from these trials are due in 2023 and will inform our ongoing research on ways to mitigate risk and improve outcomes for kea.



Photo: Tahu Taylor-Koolen

Photo: Thomas Hamill

Photo: Jane Gosden

Archey's and Hochstetter's frogs

The terrestrial Archey's frog is critically endangered, with only three remaining populations in Whareorino and Pureora forests in the Waikato and on the Coromandel Peninsula.

Frog sites protected in 2022



Moehau



Rangitoto

The semi-aquatic Hochstetter's frog is more widespread, with isolated populations being found in the top half of the North Island.

A 12-year study in Whareorino Forest showed that the Archey's frog population there was stable or increasing in areas where ongoing predator control was in place but had declined where predator control was absent.

There is still much to learn about the complex dynamic between predators and New Zealand's native frogs and the effects of predator control on these vulnerable amphibians.

Pekapeka/bats

The critically endangered long-tailed bat is found throughout New Zealand, whereas short-tailed bats are only found at a few scattered sites in the North Island, in Fiordland and on Codfish Island / Whenua Hou.

Both of New Zealand's bat species are vulnerable to predation. Unfortunately, neither species has ever been successfully translocated to predator-free islands, so it is particularly important that we protect existing populations from predators.

Long-tailed and short-tailed bats are present in the Eglinton valley in Fiordland National Park, where ground-based predator control has been used since the 1990s and aerial 1080 has been applied since 2014.

Bat sites protected in 2022



Abbey Rocks



Project Kākā



Copland



Rangitoto



Dart Caples



Tongariro



Mapara



Waipoua



Matemateonga



Moehau

Monitoring has shown that in the last 25 years, the long-tailed bat population has gone from decreasing by 5% per year to increasing by 4%, and the short-tailed bat population has also responded well, with the population increasing by 8% per year on average.

Mohua/yellowhead

Mohua are small, yellow, insect-eating birds that are found in isolated populations in beech forest in the South Island and on Stewart Island/Rakiura. They nest in trees and are very sensitive to predator plagues caused by beech masts.

Mohua sites protected in 2022



Abbey Rocks



Arthur's Pass East

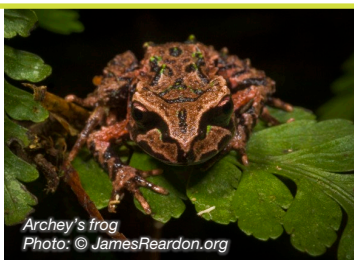


Dart Caples

In one of DOC's longest-running studies, beginning in 1998, 5-minute bird counts have been undertaken annually in the Landsborough valley in South Westland to measure the response of all forest bird species to regular aerial 1080 operations and ongoing trapping.

The results have shown that mohua numbers have increased from just 14 birds in 1998 to 517 in the last count in November 2021, so that mohua are now the most abundant native birds in the valley.

Unfortunately though, mohua are still in decline at some sites, even with sustained predator control. Based on the latest scientific advice, we have recently changed the timing of our aerial 1080 operations in beech mast years and anticipate that this will improve rat control during mast years to give mohua populations a better chance to grow.



Archey's frog
Photo: © JamesReardon.org



Hochstetter's frog
Photo: Sabine Bernert, <https://sabinebernert.fr>








Long-tailed bat
Photo: Collin O'Donnell



Photo: Leon Berard - leonberardphotography.co.nz

Tuke / rock wren

Rock wren sites protected in 2022

-  Abbey Rocks
-  Copland
-  Arthur's Pass East
-  Dart Caples
-  Arthur's Pass West

The rock wren is New Zealand's only true alpine bird species, living and breeding solely above the tree line. As ground nesters and poor flyers, rock wrens are highly vulnerable to predation, particularly by stoats.

Rock wrens live in fragmented populations throughout the South Island and are generally doing better in southern areas and west of the Main Divide, where there is less pressure from predators than in the east.

Tuke trending upwards with 1080

An NPCP monitoring programme that is now in its third year is tracking rock wren populations to study the effects of predator control techniques and environmental factors.

The programme uses a simple, low-cost transect method to survey this wee alpine bird across 22 sites, including sites that are undergoing sustained aerial 1080 control, sites where both 1080 and trapping are used, unmanaged 'control' sites, and the currently unmanaged 'beech gap' sites, which are not affected by beech masts and have fewer predators.

Overall, there are three times more rock wren in predator control areas compared to unmanaged sites

Results to date show that rock wren numbers are increasing at the 12 sites where predators are regularly suppressed but are gradually declining where they are left uncontrolled.

Modelled rock wren trend by management type

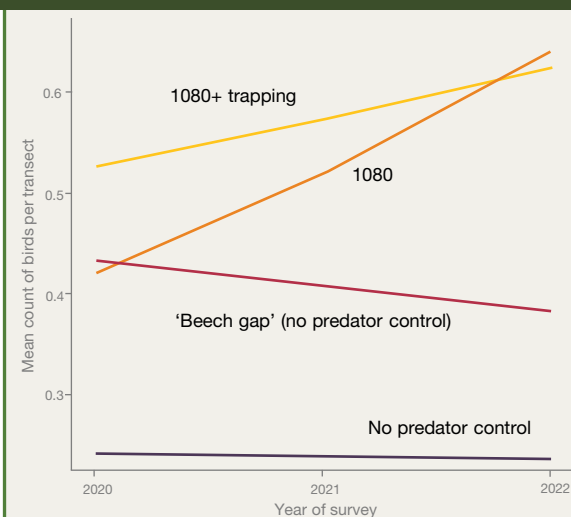



Photo: Sabine Bernert, <https://sabinebernert.fr>

Kākāriki karaka / orange fronted parakeet

The kākāriki karaka is New Zealand's rarest mainland bird species, with only about 360 birds remaining in the wild in the Hawdon and Poulter valleys in Arthur's Pass National Park and on the Hurunui River South Branch in Lake Sumner Forest Park.

Kākāriki karaka sites protected in 2022





-  Arthur's Pass East
(the last remaining mainland populations)

It is touch and go for kākāriki karaka. They nest in holes, making them an easy target for predators, and are especially at risk from rat and stoat plagues caused by beech masts – a rat plague in 2001 reduced the South Branch population by 85%.

The Arthur's Pass East operation that was completed in February 2022 was the latest of a regular cycle of aerial 1080 predator control operations at the site. Combined with an intensive programme of trapping and bait stations, these aerial operations are critical to protecting the remaining kākāriki karaka populations on the mainland.

Kākā

Kākā sites protected in 2022

- | | |
|---|--|
|  Abbey Rocks |  Hope Cascade |
|  Arthur's Pass East |  Matemateonga |
|  Arthur's Pass West |  Moehau |
|  Copland |  Project Kākā |
|  Dart Caples |  Rangitoto |

Although still reasonably common in some areas, kākā need large areas of forest to survive, and they nest in hollow trees, where they are easily cornered by predators.

Rather than breeding annually, kākā breed every few years during beech and podocarp masts, when the trees produce larger than usual amounts of seed. Unfortunately, however, these mast events also lead to large numbers of predators.

Kākā monitoring in Pureora Forest Park in the Waikato found that kākā density increased at an average rate of 6.9% per year between 2000 and 2008. It also showed that sustained large-scale predator control will lead to episodic increases in kākā populations when forest trees mast.



Photo: Ross Henderson



Photo: Leon Berard - leonberardphotography.co.nz



Photo: Leon Berard - leonberardphotography.co.nz

Powelliphanta snails

There are at least 16 species of carnivorous powelliphanta snails, each confined to its own small habitat.

Powelliphanta are some of our most threatened invertebrates. They are vulnerable to predation by rats and possums, and their populations are also affected by pig predation, habitat loss and other factors. This makes it complex to understand the impacts our predator control operations are having on these snails, and we are still building our knowledge.

For example, recent snail monitoring at Mackay Downs in Kahurangi National Park suggests that powelliphanta are continuing to decline despite predator control.

Powelliphanta sites protected in 2022

- | | |
|---|--|
|  Abbey Rocks |  Arthur's Pass West |
|---|--|

Where snail shells previously showed signs of possum predation, most now indicate weka predation – suggesting that when possum numbers are reduced through predator control, weka start to eat the snails instead. It is also likely that an increase in rat numbers driven by the 2019 mega beech mast contributed to a decline in powelliphanta in Kahurangi.



Photo: Anthony Behrens



Photo: Alfonso Siciliano

Predator control benefitting Hope Valley bird life

The National Biodiversity Monitoring Team has been carrying out 5-minute bird counts in the Hope and Stafford valleys in South Westland since 2009. The Hope valley has been undergoing sustained predator control, including aerial 1080, since 2000, whereas the Stafford valley has been left uncontrolled. Therefore, these two valleys offer a unique opportunity to compare the bird life in protected and unprotected sites.

The latest results from spring 2021 found that six of the nine native species in the Hope valley (with predator control) showed improvement. Amongst these were the kākā and rifleman, which are known to be sensitive to predator impacts.

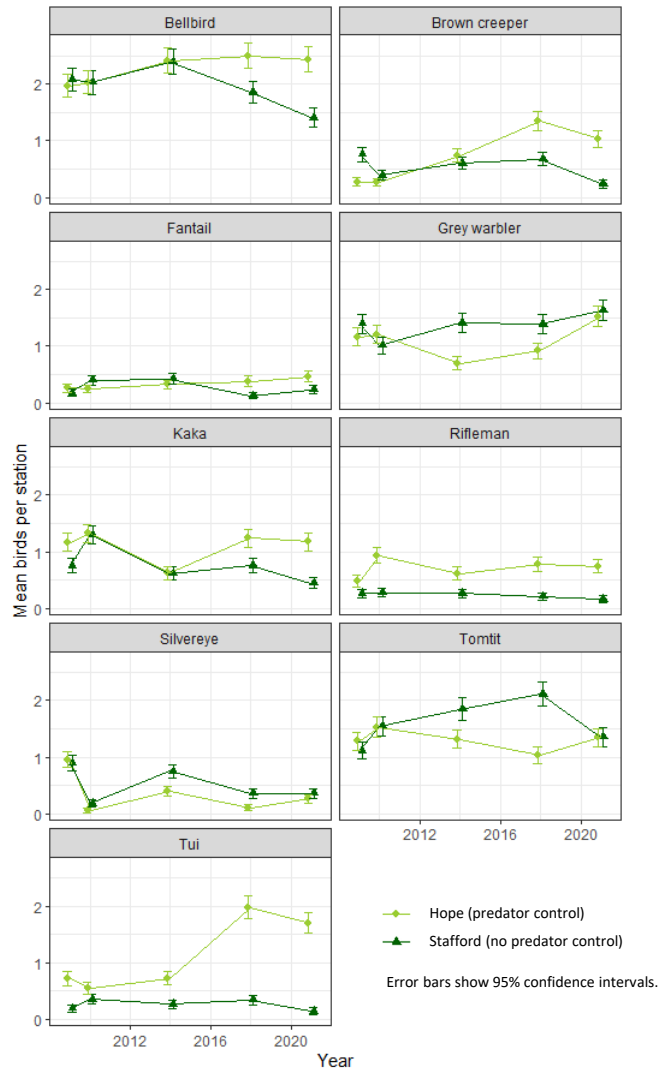
These results suggest that the predator control regime in the Hope valley is making a positive difference

Silvereyes, tomtits and grey warblers were more commonly seen in the uncontrolled Stafford valley. These species are the most widespread bird species in New Zealand and therefore likely to be less sensitive to predation than more threatened species.

The only species that showed a more positive trend in the Stafford valley than the Hope valley was the tomtit. This may have been due to tomtits benefitting from the decline of other, more predator-sensitive species.

The NPCP Hope Cascade operation, which was completed in September 2022, will provide further protection for these predator-sensitive species.

Results of 5-minute bird counts in the Hope and Stafford valleys



Bird counter in the Hope Valley



Grey warbler
Photo: Janice McKenna



Tomtit
Photo: Leon Berard - leonberardphotography.co.nz



Rifleman
Photo: andrewwalmseyphotography.com



Stafford Valley

2022 rat monitoring results

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, as their numbers are the single biggest driver for the NPCP.

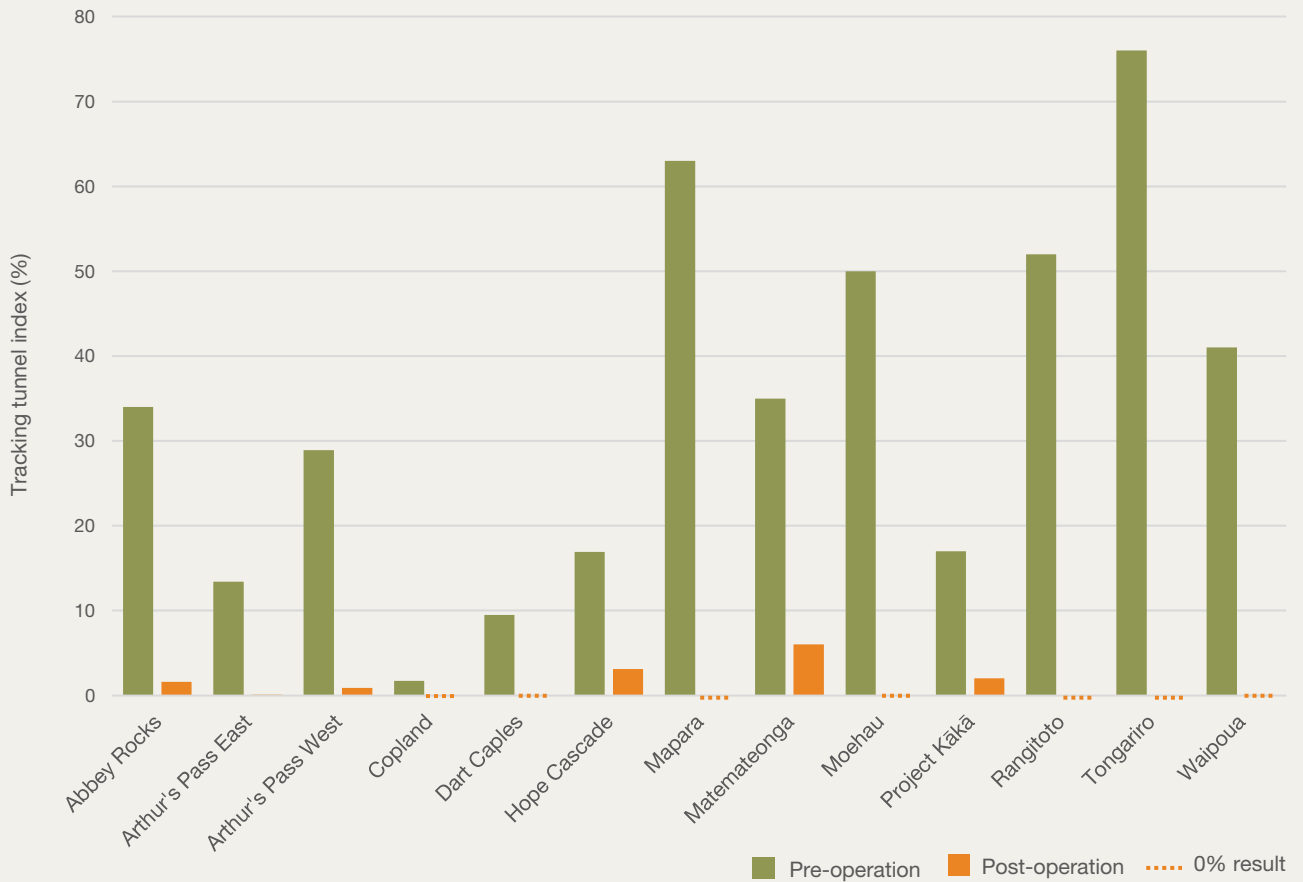
In 2022, most NPCP operations achieved a post-operational result of 0% (indicated by a dotted line on the graph below).

The 2022 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.



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

Pre- and post-operation rat monitoring results for each 2022 NPCP operation



Rat tracking tunnel



Image: Herb Christophers



Rat tracking tunnel
Image: Anthony Bihrens

Operations planned for 2023

Map showing NPCP operations planned for 2023
(as at 24 February 2023)

