



Aotearoa New Zealand's Predator Free 2050 goal

Five years on – a progress report

September 2022



An introduced brushtail possum predating juvenile endemic birds. © Rod Morris/www.rodmorris.co.nz

Overview

On 26 July 2016, the New Zealand Government announced it was adopting the goal of Aotearoa New Zealand becoming predator free by 2050.

Many of New Zealand's treasured species – native birds, bats, reptiles and invertebrates – cannot coexist with introduced carnivorous predators and are confined to off-shore or fenced sanctuaries and/or threatened with extinction.

Permanently removing predators is an opportunity to halt decades of biodiversity decline across our country.

A new charitable company, Predator Free 2050 Limited, was established by the government to support the

eradication of rats, possums, stoats and other mustelids across the country and help save the more than 4000 native plants and wildlife that are threatened or at risk of extinction.

Our company was made responsible for identifying large, high-value predator control projects and attracting co-investors from across a range of sectors, including local government, Māori communities and corporate and philanthropic organisations to boost their scale and success. Additionally, we were tasked with funding new research and development (R&D) that could lead to the scientific and technological breakthroughs needed to achieve the Predator Free 2050 goal.

The goal itself is crystal clear. However, achieving it has been described as Aotearoa New Zealand's 'Apollo Mission'. The complete eradication of predators involves a complex mix of social, technical and financial challenges. While as a nation we have been successful in eradicating pests from offshore islands, mainland eradications have proved more challenging due in part to lacking the ocean to help prevent re-incursions. It has now been a full five years since Predator Free 2050 Limited became operational. Since then, we have achieved far more towards the goal than anyone thought possible.

Our initial funding allocation was NZ\$23.2m for the period 2016-20 and funding of NZ\$5.9m per annum beyond then. The government added to this allocation in 2019 with NZ\$19.5m to advance further new projects and predator control product development. We then received an additional NZ\$76m over four years in New Zealand's Budget 2020. Overall, these government investments are leveraging at least double the resourcing from other sources.

Since our establishment, we have co-funded:

- the development of 17 large landscape projects, each targeting a significant area of land for eradication;
- 42 scientific projects and research studies advancing our understanding of predator eradication; and
- 26 new tools such as innovative traps, cameras, lures, remote communications and 4 best practice guides. Seven of these tools are already available for projects to use.

Through our work we have built up a wealth of institutional knowledge on the tools and techniques best suited to eradicating the 'big three' predators in Aotearoa New Zealand's unique environment.

Our first 5 full years of operation has already seen the estimated cost of achieving the Predator Free 2050 goal drop significantly since the original estimate of NZ\$32 billion, due to new technology and techniques developed through our work, among other factors. The new estimate is now NZ\$8 billion.



Predator Free Wellington team members. Photo by Ian Robertson.

Progress toward the Predator Free 2050 goal

The government has set a series of interim 2025 targets and our work will play an important role in achieving these.

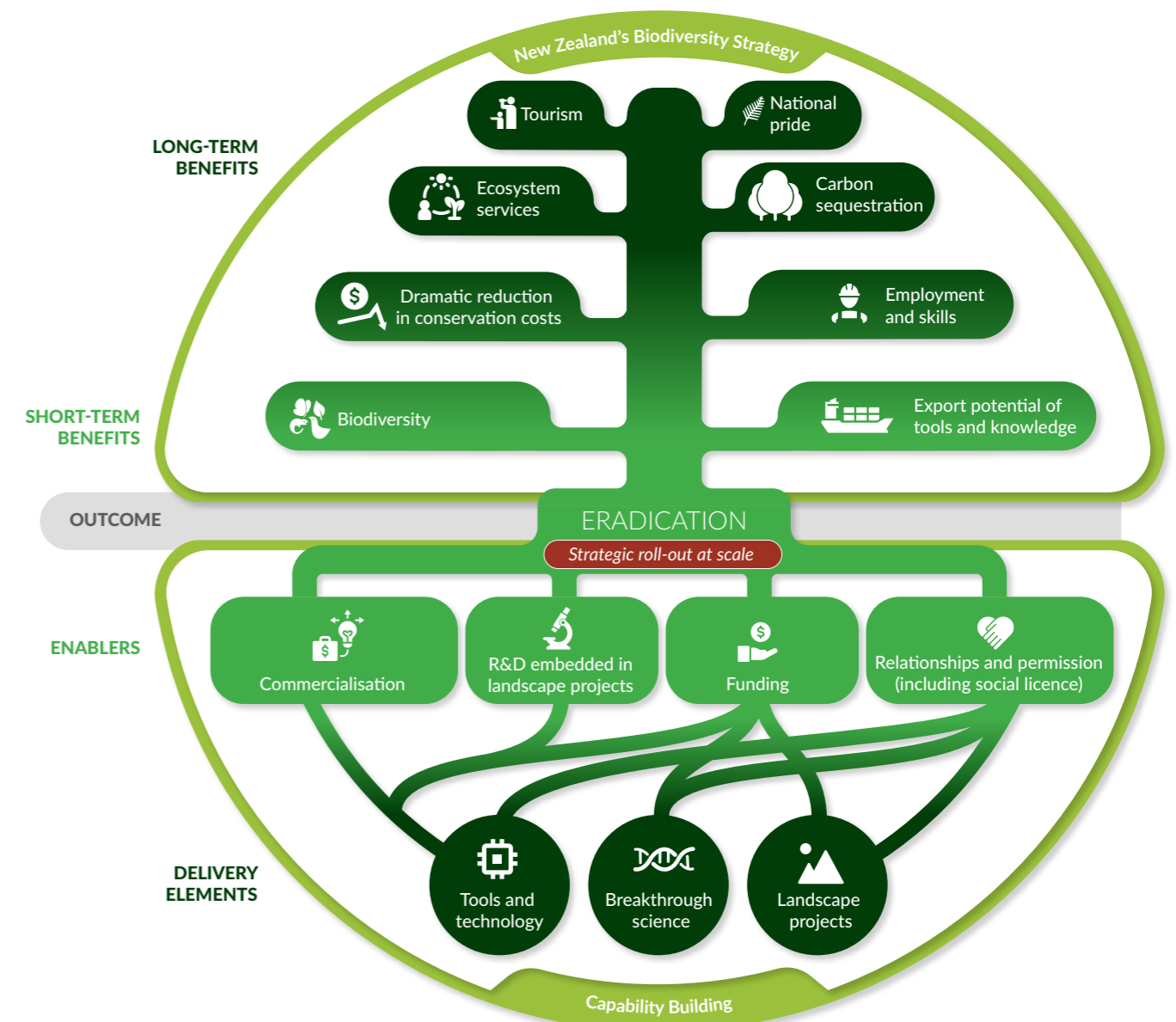
National 2025 target	Our contribution to date
One million more hectares of mainland New Zealand where predators are suppressed.	Our landscape projects are making a significant contribution to this goal, and are forecast to be managing over 756,700ha towards eradication by 30 June 2024. As at 30 June 2022, landscape projects were managing 451,000 hectares towards eradication.
Demonstrate predator eradication on at least 20,000 hectares of mainland New Zealand without the use of fences.	<p>Predator Free South Westland is managing 43,600 ha for elimination of rats, stoats and possums.</p> <p>Predator Free Hawke's Bay is on track to eliminate possums by December 2022 across the Māhia Peninsula (14,600 ha).</p>
Māori – Aotearoa New Zealand's indigenous peoples – will have identified sites of importance for predator eradication, and at least five eradication projects led by iwi and hapū (regional tribes and communities) will be underway across the country.	Three projects are currently iwi-led.
Develop a breakthrough science solution to eradicate at least one small mammal predator from the New Zealand mainland.	Our first research strategy drove the underpinning outcomes (e.g., predator genomes) needed to enable the most likely research pathways that will achieve this goal (e.g., cost-effective specific toxins, chemical reproduction suppressants, biocontrol, genetic control). Our second research strategy is building on this foundation to provide the breakthroughs needed.
Supported the eradication of possums or mustelids from at least one New Zealand city.	Wellington has eliminated stoats, weasels and Norway rats from the Miramar Peninsula, with ship rats not far behind. <p>Dunedin is on track to remove possums from Otago Peninsula by September 2023.</p>
Effective tools and knowledge will be available to achieve predator eradication on farmland.	We have funded development of seven new tools which are already available for use and a further 19 tools and 4 best practice guides are on track for completion by December 2024.

How Aotearoa New Zealand will achieve the Predator Free 2050 goal

Many different agencies and factors play a role in contributing to the Predator Free 2050 goal.

Predator Free 2050 Limited contributes to all of these enablers and delivery elements through our programme of work and we collaborate with all other parts of the system.

This diagram shows the enablers and delivery elements that will be needed to achieve predator eradication, as well as the short and long-term benefits for Aotearoa New Zealand.



Highlights to 30 Sept 2022

Landscape projects

17 landscape projects developed

3 of these are iwi-led.

2,000ha of Kaitake farmland has possums eliminated in Taranaki. One-in-five households involved in the trapping programme.

14,600ha of the Māhia Peninsula on track to eliminate possums by December 2022.

Eliminated stoats, weasels and Norway rats from the Miramar Peninsula, ship rats not far behind.

c43,600ha Or 45% of the South Westland project area is actively managed for elimination of rats, stoats and possums.

Dunedin on track to remove possums from Otago Peninsula by September 2023.

756,700ha forecast to be covered by landscape projects by June 2024, slightly more than the total land area of the Taranaki region.

Waiheke Island on track to eliminate stoats by June 2023. Rat trials started.

Science and research



Better understanding of target species through world first genome sequencing of ship rats, kiore (Polynesian rats) and stoats, with possums not far behind.

50x

increase in small predator detection sensitivity using thermal cameras.



1080 → ZERO

ZIP's new 1080 to zero approach now driving elimination over large parts of South Westland.



World first Data Standard for pest management, meaning data from all projects can be combined for analysis.

Products and innovation



7 new products developed for use by landscape projects including long life lures, high-interaction traps, thermal cameras with artificial intelligence, and remote communications.

Social licence



Co-funded the Fight for the Wild series (2021), raising the profile of the Predator Free 2050 goal.

Landscape Projects

Thanks to increased government funding, Predator Free 2050 Limited is now co-funding and managing milestone reporting for 17 large landscape projects covering 756,700 hectares.

We have deliberately chosen projects for their unique landscape characteristics to cover a wide range of terrain and settings, from backcountry to rural to urban, to generate lessons that can, in time, be applied across the whole of Aotearoa. No project is identical due to the range of environments they operate in, which enables them to try different methods and work with different technology.

These projects are led by local authorities, iwi and community entities, targeting predator eradication across urban, farmed and forest landscape types, under different ownership and socio-economic contexts. Projects work on all land tenures, including public conservation land.

Already through this mission we are seeing enhanced biodiversity and positive associated outcomes for wellbeing, jobs, regional development and Māori leadership.

Each project is ambitious in scope, and different in their methods and the technology they use. Some of the major achievements to date include:

Predator Free South Westland: 45% (43,600 ha) of the project area is now under active management to maintain elimination of rats, stoats and possums, with advanced surveillance and response capabilities deployed to intercept any re-incursion. This includes the Perth Valley and Butler-Whataroa blocks in the backcountry and the South Ōkārito block on the coast.

Predator Free Hawke's Bay: On track to eliminate possums by December 2022 across the Māhia Peninsula (14,600 ha).

Taranaki Taku Tūranga – Towards Predator-Free Taranaki: Eliminated possums from two blocks of 1,000 hectares of Kaitake farmland and is now just dealing with incursions. It has hit its goal of having one in five households involved in the trapping programme.

Te Korowai o Waiheke: Aiming to eliminate stoats by June 2023 and rat trials have started, designed to gain knowledge about a potential island-wide rat eradication.

Predator Free Wellington: Eliminated stoats, weasels and Norway rats from the Miramar Peninsula, with ship rats not far behind. Preparation for the expansion beyond Miramar is going well, with over 7,500 individual permissions for trap locations now received.

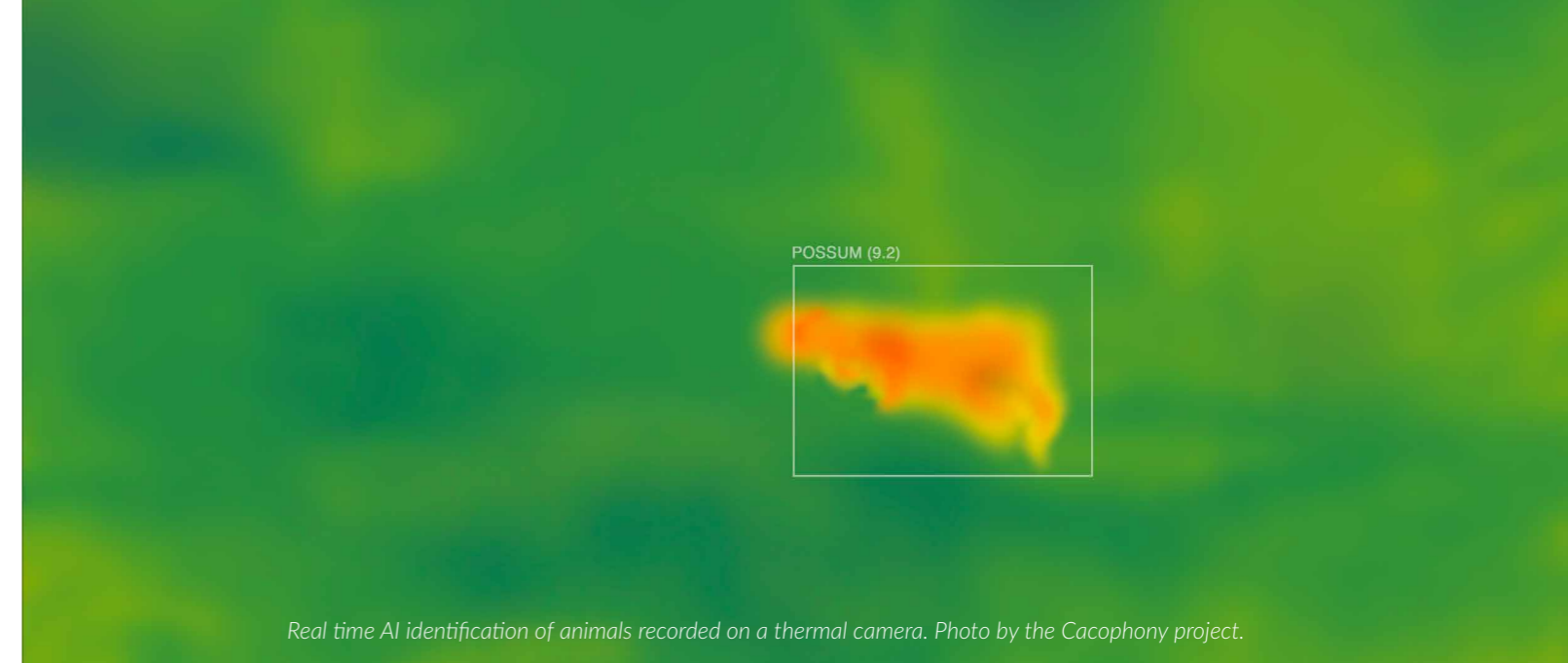
Predator Free Dunedin: On track to remove possums from Otago Peninsula with a high degree of confidence by September 2023.



Each year we bring the projects together to share information and learn about what is working well and what isn't. Some of the common lessons so far include:

- Trust and relationships are priceless. Each partner needs to enter into discussions with deep respect for mana whenua (Māori), landowners and the community.
- Open communication and respect for everyone's contribution and perspective are fundamental to success.
- Eradication and suppression are very different management goals and require different techniques. Keeping the focus on what is needed to achieve eradication is crucial. More than one tool or techniques may be needed to find the last hard to catch animals, devices may need to be closer together, and monitoring every single home range will be necessary to ensure eradication has been achieved.
- Projects should be ambitious in their scope, and communicate that ambition to their communities. We are regularly surprised at the way support can be awakened in the community with good engagement and storytelling. Often funding will be forthcoming once visible activity has begun.

While it is early days, we are confident that permanent predator freedom at scale is possible and defensible where people live, work and play, and in the absence of fences.



Science and R&D

In June 2021, we published our new research strategy for 2020–2024. It will contribute to the interim national goal of a breakthrough science solution capable of eradicating at least one of the target predators from mainland New Zealand by 2025.

This is an ambitious goal. It has never been achieved before anywhere in the world, and to succeed, we must build an environment that fosters and builds on new and emerging ideas and technologies across the full range of science disciplines.

A critical element is creating new science and research capability that is currently under-represented and under-resourced in New Zealand. This is particularly so in the non-ecology, organismal sciences that focus on the biology of our target predators and how they work for the purpose of developing new control tools and techniques.

Our strategy includes support for an environment that fosters new and emerging ideas and technologies, across the full range of science disciplines. Capability is being built through funding

for university students and early-career researchers working in under-resourced areas of relevant Predator Free 2050 science. It also supports developing Māori capability in STEM (science, technology, engineering and mathematics) research disciplines.

To date, we have disbursed or contracted \$13.8m for new science and research. Much of this investment is supported by co-funding, through collaboration with national and international research agencies, as well as philanthropy.

We stay abreast of international breakthrough science developments through engagement with the International Union for Conservation of Nature Task Force on topics such as Synthetic Biology and membership of the United Nations Convention on Biological Diversity Ad-Hoc Technical Expert Group on Synthetic Biology, assist others (such as the Chilean Ministry for Environment) with invasive species management planning, and frequently showcase our research portfolio both nationally and internationally.

New Science

As of June 2022, we have funded 42 scientific projects and research studies. These comprise:

First Research Strategy (2017-2020)

Environment and Society

- Social research on novel pest control methods (Manaaki Whenua)
- Scaling the predator free kaupapa across schools and kura (Papa Taiao Earthcare)
- Testing the efficacy of rat and stoat traps (Manaaki Whenua)
- Social and ecological outcomes from community-led research (The Catalyst Group)

Best use of existing approaches

- Landscape-scale research and development to completely remove possums (ZIP)
- Low-cost eradication of possums from native forest (Manaaki Whenua)
- Using natural barriers to predator dispersal (Te Manahuna Aoraki)
- LoraWAN Repeater Software & Hardware (Econode)
- Thermal camera & AI based predator monitoring tool (The Cacophony Project)
- Artificial Intelligence triggered trap (The Cacophony Project)
- Drones for thermal detection of possum and precise delivery of baits (OSPRI)

Exploring new approaches

- Sequencing the stoat genome (Manaaki Whenua)
- Underpinning genomic resources for invasive New Zealand rats (Otago/CSIRO)
- Modelling of gene drive strategies for rodent control (University of Cornell)
- Sequencing the stoat genome (Manaaki Whenua)
- Next-generation sensing technologies (Envico Technologies)

Modelling and data sharing

- TrapNZ collaborative (Groundtruth)
- Quantitative decision support for eradication (Manaaki Whenua)
- Biosphere Data Commons Phase One (Noos)
- Shared data standards for predator-free relevant data (Internal)

Student fieldwork grants

- Previous predator control and possum personality (Amelia Wilson)
- Wellington rat home ranges (Henry Mackenzie)
- Brushtail possum landscape genetics (Nimeshika Pattabiraman)
- Zero density possums and consequences for rats (Therese O'Malley)

Second Research Strategy (2020-2024)

Priority research

- Enabling possum fertility control (University of Otago)
- Predator monitoring using eDNA (University of Otago)
- Can we turn stoat breeding off? (Manaaki Whenua)
- Tactical genetic control of rats (Genomics Aotearoa)
- Detecting the last predators (SfTI Challenge)

Capability development

- Reproduction and survival genes in possums (Alana Alexander)
- Potential social and ethical challenges to Predator Free 2050 (Ally Palmer)
- Genomic applications for mustelid control (Florian Pichlmuller)
- Modelling multi-species genetic pest control (Anna Clark)
- Integrating control tools and attractants (Brittany Graham)
- Audio predator detection and luring (Ben McEwen)

Enabling elements

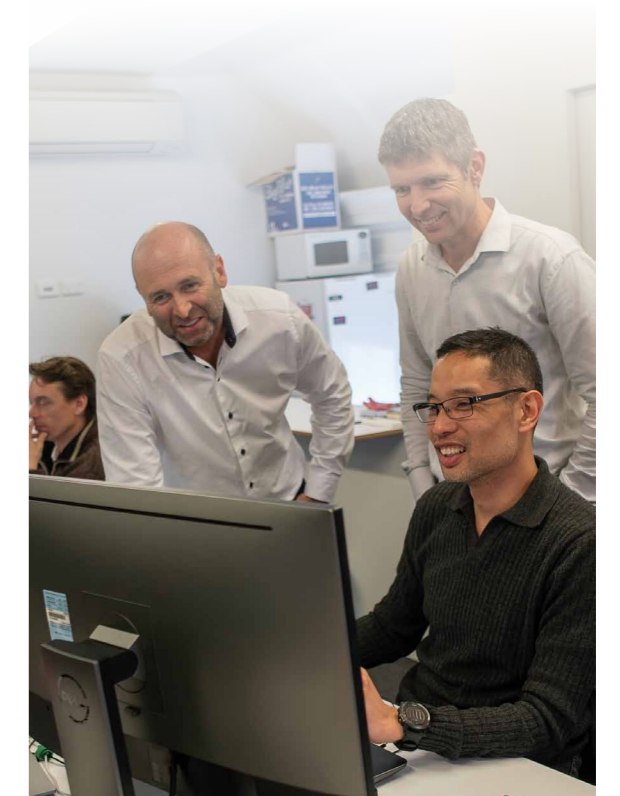
- Carbon accounting (Island Conservation)
- Conservation Activity Management System (EcoNet)
- Data Standards adoption (Internal)

Insurance research

- Eradicating the last 1% (Manaaki Whenua)
- Sterilisation of pests for conservation (University of Otago)
- Embedded R&D (ZIP)

Student grants

- Predator management strategy modelling (Zachary Carter)



New Products ready to assist Projects (Products to Projects)

The ramping up of large-scale landscape projects has created a demand for new and improved tools (eg, lures, traps, cameras and communications networks) to get the job of predator eradication done now. We estimate we have created demand for 1,500,000 of these tools from our current landscape project investments.

This initiative is exactly as it sounds. Using Provincial Growth and Jobs for Nature funding from 2020, we are investing in the development and production of the tools needed to support the work of our landscape projects, simultaneously building new regional business opportunities and creating jobs.

The first tranche of investment in 2019 went into the development of a range of products and application projects: six new traps, three long-life lures and lure dispensers, four communication and image recognition devices, and two toxin formulation and application projects. Seven of these products are already in use in the field:

Backcountry Camera: A thermal detection video camera complete with onboard image recognition AI and remote reporting.

Poa Uku ('clay lure'): A long-life ceramic lure that can attract predators to traps or other devices for over six months.

High-interaction Rate Trap: A motion-sensor triggered live trap for targeting remaining hard-to-control individuals.

OutPost: An automated reporting system to enable timely and cost-effective transfer of field data from landscape-scale projects.

MotoLure: A mechanical lure-dispenser, delivering a preset amount of lure for up to one year without manual service.

PosStop: A tried and true live capture possum trap, the PCR No 1 leg-hold, raised off the ground and with remote locking.

AT220 trap: An automatic, self-resetting trap for both possums and rats.

The second tranche of funding was made available in 2021 for the development of a further 15 new products (11 tools and 4 best practice guidelines). In total, we have now disbursed or contracted \$11.8m for new product development.

Dependent on obtaining appropriate resourcing, we are planning to extend our approach beyond breakthrough science and tools to a third critical area: best practice and embedded R&D (effectively large-scale field testing). We have recently employed a knowledge broker to better communicate the needs of our projects to our researchers and the findings of our researchers and developers to our projects.

Zero Invasive Predators Case Study: Predator Free South Westland

Overall progress is tracking well in this Predator Free 2050 Limited landscape project, with 45% (43,600 ha) of the total project area now under active management to maintain elimination of possums, rats and stoats. This includes the Perth Valley and Butler-Whataroa blocks in the backcountry and the South Ōkārito block on the coast, and is demonstrating how predator freedom can be maintained by leveraging high alps and fast-flowing rivers as natural boundaries.

Elimination was achieved with a combination of approaches, but primarily the application of the new '1080 to Zero' control model (supported by the Research Strategy) followed by the mopping-up of survivors through multiple more targeted methods.

Survivor detection for mopping-up, demonstrating elimination success, and now the detection of reinvasers for incursion control is achieved through intense surveillance which relies heavily on a remote network of (Products to Projects) thermal cameras using A.I. image recognition.



Brett Butland visiting Predator Free South Westland. Photo by Nathan McNally.



Challenges

Achieving the Predator Free 2050 goal is a hugely ambitious challenge. It will require everyone involved to work innovatively and to the same plan if we are to be successful.

The primary challenge for landscape projects in the medium term, is building capability in the sector. Specifically, we need more people who are open to the innovative approach required to deliver elimination, and have the skills and expertise to design and deliver successful elimination operations on the ground.

Covid-19 may have had some impact on the ability to recruit the staff and expertise we need to progress towards our mission, as closed borders have affected the availability of both temporary workers and overseas expertise. Covid also created supply chain issues that affected many of our Products to Projects funding recipients resulting in development delays, however we expect this to

resolve itself as the world returns to a more normal trading environment.

Generally speaking, eradication projects are spending 10% of their budget to remove 90% of their target species population, and 90% of their budget to remove the last 10% of that population. This reinforces the level of resilience, perseverance and discipline required for successful eradication projects.

A lot of resource and effort is being put into removing the last predators in an area, and how we do this more efficiently is a major focus of our R&D programme.

Partnering with Māori

We recognise the special kaitiaki (guardianship) role that Māori play in managing our natural resources, and our responsibilities under the Treaty of Waitangi. We believe the strength of our relationships is crucial to succeeding in the protection and restoration of our native species here in Aotearoa New Zealand.

At Predator Free 2050 Limited, we have begun our journey to embed Treaty of Waitangi and its principles into our organisational values, so that they become our fundamental way of operating.

We promote partnership by requiring all of our funded projects to partner with iwi or hapū, and we support iwi and hapū to develop their own predator free projects.

Through the Korehāhā Whakahau project, Predator Free 2050 Limited is supporting the aspirations of local iwi Ngāti Awa to restore the natural world and equip their people with transferable skills to support their families.

We have collaborated to develop a further two iwi-led projects, and have also funded a research project for Ngāti Awa to look at how local knowledge, coupled with the latest innovations in technology, can be applied to pest eradication.



Predator Free 2050 Limited is a Toitū carbonreduce certified organisation. We are committed to reducing our environmental impact and will be striving toward becoming a carbonzero workplace in the future.



PEOPLE—NATURE
TOGETHER WE FLOURISH
TUIA TE TAIAO



Cover and back cover: Juvenile Northland kiwi on predator free island. Photo by Shaun Lee.