



New Zealand  
Biosecurity Institute

the magazine of the NZBI Winter - 2021

# Protect

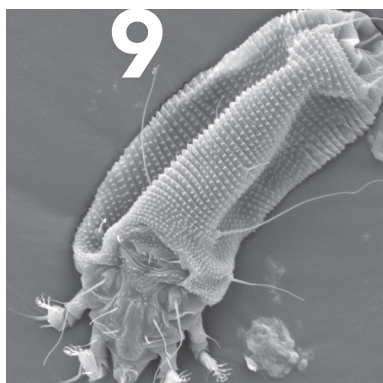
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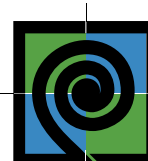
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New Zealand  
Biosecurity Institute

Working together to ensure New Zealand is protected from the adverse impacts of invasive species

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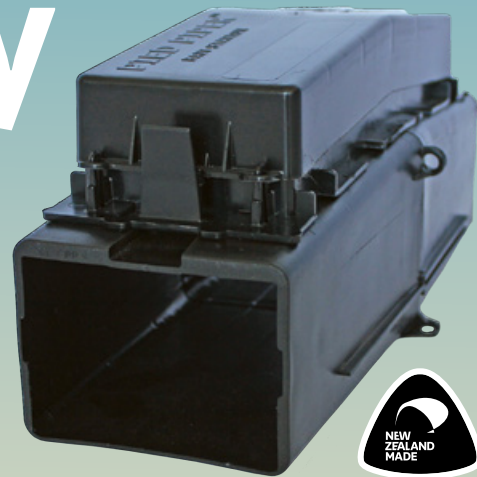
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The New Zealand Biosecurity Institute can be found on the web at [www.biosecurity.org.nz](http://www.biosecurity.org.nz)



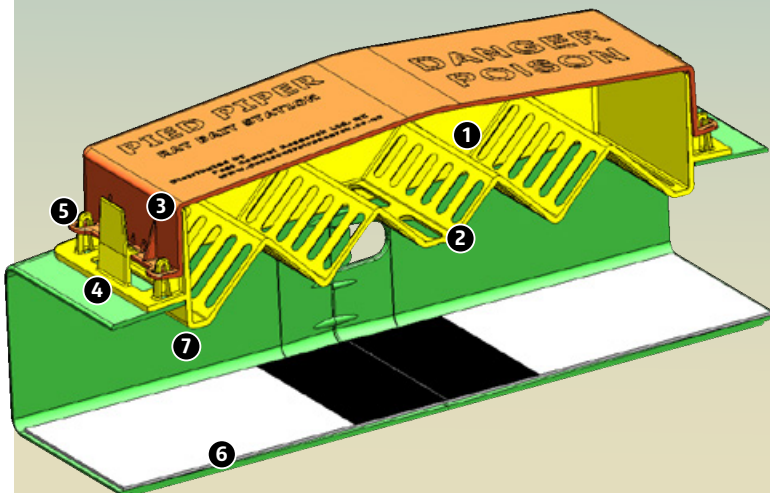
# Rat Bait Station Dine in only

The uniquely designed Pied Piper™ is a cost effective, rain fast, tamper proof and safe rat bait station which can also be doubled up as a tracking tunnel. The gnaw proof gridded basket securely holds 700g of cereal pellets, blocks or soft baits preventing caching by rats.



## KEY FEATURES

- 1 Basket holds approximately 700g of bait pellets  
Shallow design of basket to stop bridging of bait pellets  
Basket moulded in unpalatable hard plastic to resist chewing by rats
- 2 Grill at bottom of basket allows rats to feed on bait pellets
- 3 Large overlap between lid and basket to ensure bait pellets are protected from rain
- 4 Strong clips at each end of the basket hold the lid firmly in place
- 5 Loops at each corner of the basket can be used to secure the lid against tampering or unauthorised access
- 6 Tunnel design allows the additional use as a tracking tunnel
- 7 100mm clearance to basket to ensure bait pellets are kept clear of surface water



## What baits are available for use in the Pied Piper™?

Pied Piper™ has been specifically designed to use 10mm pelletised bait. We recommend **Pindone Rat Pellets** (contains Pindone) but there are some other options:

**BLOCK OR BAG OPTIONS:**

- Contrac (contains Bromadiolone)
- Ditrac (contains Diphacinone)
- Generation (contains Difethialone)
- First Strike (contains Difethialone)



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## Nothing to do with Scottish sea monsters

In this issue we hear about mowing the lawns and Swiss cheese. Both are very relevant to biosecurity as they are useful analogies for explaining very complicated concepts of pest control methods, and even more complicated matters investigated during pest control research.



This could be a helpful way of sounding informed when explaining to laypeople the importance of biosecurity.

In the spirit of the open bubble, we see what kiwi scientists have been doing to help the Cook Islands with their biosecurity.

We eavesdrop on a few webinars which are occurring with frequency these days.

We also take a look at the matter of dealing with possums who have decided to take up inner-city living.

In preparing this issue I came upon some biggish words like morphometrics and toxicokinetics. I also learned about NeSI which has nothing to do with legendary Scottish sea creatures.

I have tried to do justice, while keeping it simple, to a brief summary about the relatively new field of genome mining and how it relates to the control of pest mammals.

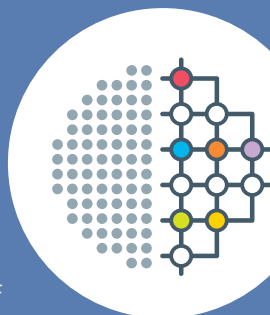
There is an item on a report which commends our past efforts in plant biosecurity but shines a light on where the country can improve further.

There's more on close shaves of the old man's beard variety, more perspectives on how to keep our kauri standing, and interesting thoughts on wildings from a fire hazard point-of-view.

There's an item on "when does nothing mean nothing?" from a pest control operation monitoring perspective. There's also a sentence containing 62 words.

Thank you all very much as usual for your continued support and for contributing your stimulating and interesting articles and profiles.

CHRIS MACANN  
PROTECT MAGAZINE EDITOR



## Keeping it nimble: Adapt Adapt Adapt

As this issue of Protect is being produced we are rapidly approaching our virtual NETS2021 and with it, Biosecurity Week.

A lot of effort has gone into preparing a comprehensive NETS2021 programme and we are looking forward to joining as many members and guests as possible on-line.

The Executive Committee has had more meetings than usual in the past 12 months to discuss the format and delivery of this year's gathering, and we have held our own micro-NETS as a practice run.

After some considered discussion on what this year's theme should be the Executive decided that **a logical theme for NETS2021 and Biosecurity Week was quite simply one word: Adapt.**

The virtual NETS2021 is an illustration of just that. As an organisation we have been able to set an example of how we can adapt and still ensure that our flagship gathering is beneficial and useful to all.

It is also key to keeping the country's biosecurity infrastructure nimble.

See you all soon.

THE NEW ZEALAND BIOSECURITY  
INSTITUTE EXECUTIVE COMMITTEE





## Bathed in beautiful Marlborough sunshine: Top of the South Branch Meeting

By KEN WRIGHT

Seventeen NZBI members attended a field day and Top of the South Branch AGM in Marlborough on Thursday 6 May. The whole day was bathed in beautiful Marlborough sunshine.

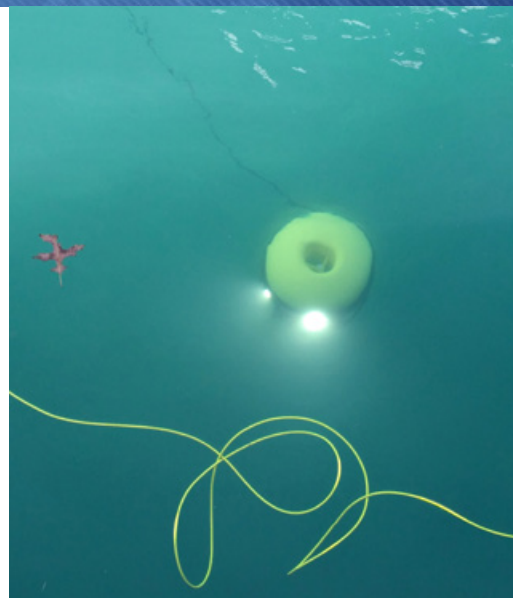
The day started with a visit to the Omaka suburb of Blenheim where we observed an urban infestation of feral rabbits near an olive orchard and residential housing. The infestation has been assisted by a dry Summer and Autumn, and control is a challenge in this urban setting. In the same location we observed a paddock with an existing Chilean needle grass infestation that is receiving ongoing inspection and control. This paddock, among others, adjoins the Omaka Aerodrome, and venue for the "Classic Fighters" air show event. During this event, the paddocks are used for parking. **Bark chip was laid on the paddock surface during the event to prevent transportation of Chilean needle grass seed** or contaminated soil, on car tyres.



*Brent Holms (red clip board) explains the successful Argentine ant eradication at Rarangi foreshore.*

We visited Rarangi foreshore to observe the area that has ongoing monitoring and control for an Argentine ant infestation discovered in residential properties in 2014. The foreshore, administered by DoC, has high conservation values, and the control has been successful with no ants observed in the last two years of monitoring. Formerly, the ants would erupt following the lifting of any jetsam on the foreshore. Congratulations on a great success.

Ocean Bay, Port Underwood was the next stop, where Chinese pennisetum and boneseed management areas were examined. The boneseed is located on a steep coastal face. Access to control the boneseed is gained in a creative way, by a ladder attached to the bow of a vessel. The vessel nestles against the rock shore and access is gained via the ladder to treat the plants. The steepest continuous faces, are accessed by abseiling, if needed.



*The submersible drone with its umbilical control cord.*

Karaka Point was the site of early Maori habitation pits, and a combined DOC/ Marlborough District Council boneseed control programme has been underway since the early 2000's. This terrain was a little easier to access, and, with time, the scrub is maturing into climax native forest.

Lunch and the Branch AGM were held in Picton. Following lunch we had a demonstration of a submersible drone in the marina. The drone is used to inspect vessel hulls.

Finally we visited a Honshu butterfly release site at Picton's Auckland Street Reserve. No live insects were observed but we did note leaves that had been browsed. A very informative day was had by all, and it was great to catch up with colleagues, seeing how they managed their pests.



*Kurt Schollum and Liam Falconer prepare their submersible drone for deployment.*



## It's all about our communities and sharing experiences:

CANTERBURY - WEST COAST BRANCH MEETING

Around 20 members met for the Annual General Meeting of the Canterbury-West Coast branch on June 15, hosted by Environment Canterbury. Some attended in person; some virtually. Project Editor and Canterbury Branch member Chris Macann provides this summary of some of the ideas touched on at the meeting.

It was pleasing to see new faces and a good representation of early-career members including those joining from the West Coast.

A key part of our discussion was how the branch could better leverage its collective strengths to help the community. We discussed whether we should be talking more about climate change and how it affects our work. **We discussed the idea of a 'Young Professionals' or 'Early Career' sub-group within the Institute.** There was a clear signal from those gathered of the wish to find opportunities to increase their networks and opportunities to meet, share and undertake professional development, and benefit from the expertise of longer-term members.

We also discussed connecting with community groups and offering help with events related to biosecurity and biodiversity whether they involve weed-busting or vertebrate pest-busting.

We noted that **caution was needed in order to not blur the lines between offering a hand, and professional responsibilities or commercial matters.**

Those gathered agreed it was important to note that if the branch was to become involved in bringing these groups together, it was important to be very clear about the piece of the puzzle members, individually or as part of the Institute, provide. The meeting considered a hui to help foster the relationships and look for opportunities to collaborate towards shared goals.

The branch will host a mini-NETS (NETS) later this year which the branch has now held successfully for a number of years thanks chiefly to significant support from Environment Canterbury. The proven format will involve a day of presentations and a second day of field trips.



Some of the Canterbury - West Coast Branch members at the branch Annual General Meeting. Clockwise: Rowan Sprague, chair and NZ Wilding Conifer Group Coordinator; Hugh Gourlay, Manaaki Whenua Landcare Research; Sarah Thwaites and Brent Barret, Boffa Miskell; Terry Charles, Paige Lawson and Lauren Piket, Environment Canterbury; Arnaud Cartier and Robyn White, MWLR; Rich Langley, secretary and ECan. On screen are Lynley Hayes, MWLR and Laurence Smith, treasurer and ECan.

## New arrival for President Alice

Congratulations President Alice McNatty on the birth of her son Finn on June 8.



New Parents NZBI president Alice McNatty and Antony Rewcastle with baby Finn.



## Lots of firsts and lots of learning

Canterbury branch chair Rowan Sprague presented this report to the Canterbury Branch Annual General Meeting about her eventful first year at the helm.



Rowan Sprague

This past year has been an exciting and eventful one for biosecurity. We've seen increases in funding for biosecurity initiatives through the Jobs for Nature fund and others, and we've also seen the general public in New Zealand become familiar with pest containment and eradication strategies through our COVID-19 response.

This has been my first year as branch chair, also my first year as branch representative on the National Executive Committee and my first year as chair of NETS 2021, now NETS 2022. Lots of firsts and lots of learning.

We started the year planning NETS 2021 in earnest, having postponed it from the originally planned NETS 2020. Early this year, **it became clear that there was a fair bit of uncertainty and risk with holding large events still**, and together with the National Executive Committee, we decided to postpone the in-person NETS conference in Christchurch until 2022. While this wasn't ideal, we wanted to make sure that everyone could attend NETS safely and that we'd keep the NZBI in a stable financial position. I'd like to thank the NETS Organising Committee for their patience and persistence during this time: Laurence Smith, Rich Langley, Samantha Brown, Laura Williamson, Ronny Groenteman, Kevin Gallagher and Keith Briden.

Our branch will now organise the NETS conference to be in Christchurch in July 2022. We'll resume planning it soon.

The NETS 2021 Conference will be online this year, and I've been involved in the small Executive organising committee for it. We're still hoping to capture the essence of a NETS conference, through sharing information and advice, but we acknowledge it isn't the same as meeting-up in person.

I realise this past year has been very quiet with our branch social activities. I'm really keen to hear what you as branch members would like to see from the NZBI. As always, if you have any suggestions for branch events or get-togethers, please let me know.

Like last year, we're holding our AGM via video conferencing, and the national NZBI AGM will be held via video as well. While it's a shame we're not all together in person as a branch, I hope that video conferencing has made this AGM more accessible.

Finally, I would like to acknowledge and thank Rich Langley and Laurence Smith for showing me the ropes as I got into this role as chair. I'd also like to thank all of you as branch members for your hard work and dedication to biosecurity in Canterbury and the West Coast.

Ngā mihi, Rowan Sprague.

## Wanting more cheese, and it's nothing to do with mice:

## Landcare's Biosecurity Bonanza 2021

SUMMARISED BY CHRIS MACANN



Manaaki Whenua Landcare Research hosted another virtual Biosecurity Bonanza in early May following the success of last year's on-line information-sharing presentations.

The presentations once again traversed all fields of MWLR biosecurity research. They also showed how failures along the road are just as helpful as successes.

Wildlife Ecologist Dave Latham covered the research needs for wallaby management, in particular the need to have confidence that no detections, means there are in fact no wallabies present, meaning control operations have succeeded.

Vertebrate Ecologist Chris Niebuhr covered research into transmission of the parasitic disease toxoplasmosis to livestock such as sheep, and natives which includes kiwis and dolphins. A specific focus was on cats as spreaders, and how their complex relationships with rats and mice further complicates research.

Wildlife Ecologist Grant Norbury presented **a not-at-all confusing session which delivered information all about misinformation**; specifically, trials on

continued



continued



methods of confusing predators by supplying them with misinformation, in order to protect their prey.

In addition to tales of weed biocontrol research, and success from the plant biological control team: Ronny Groenteman, Paul Peterson and Angela Bownes; Simon Fowler spoke on biocontrol research into Douglas fir, which has a safe but accidental biocontrol agent already in the country, but which itself also has a natural predator, meaning that it had little prospect as a biocontrol agent.

Researcher Erica Hendrikse spoke on toxin development for mammals using genome mining. This complicated subject was simplified by **the Swiss cheese model of risk mitigation**, repurposed as a model for toxin use in pest control. **"Wouldn't it be great to just add more layers of cheese to solve a research problem,"** she said. Erica's research model was inspired by human drug research. She described her research as "super cool, as it is a new research field". It was **a great effort at simplifying what could have been an overwhelmingly complex topic.**

All presenters acknowledged the many collaborators on each of the projects they were sharing updates on.

Events and marketing advisor at MWLR Tiffany Day's comments indicate **the Bonanza lived up to its name.**

"After the great success of our Covid pilot last year, we decided to keep the event virtual, with live-event uncertainties arising from time to time.

"The eight sessions have had over 1500 views combined," (attendees either watched live or viewed the recording).

"The sessions had some robust discussions during the Q&A with well thought-out and provocative questions.

**"We have found this is a great way to engage with organisations such as regional and district councils, with them representing the majority of our audiences for each session.**

"Our researchers enjoyed the experience and have found this is a great way to share research updates to a diverse audience," Tiffany said.

The sessions and presentations are available on the MWLR website as are last year's sessions.

## NeSI

The New Zealand eScience



Infrastructure enables researchers across a wide range of communities and disciplines to tackle large or highly complicated problems and to investigate scientific challenges that were previously impossible. NeSI makes approaching these problems easier for researchers through offering a specialised platform of computational and analytics software and services powered by supercomputers, and placing strong emphasis on support and training alongside the raw power of its technology platform.

NeSI is a collaboration of the University of Auckland, the University of Otago, Manaaki Whenua - Landcare Research, NIWA, and the Ministry of Business, Innovation and Employment (MBIE).

## Toxicokinetics

describes how a poison enters the body and reaches a target tissue. It can be related to how drugs are absorbed and processed in different animals.



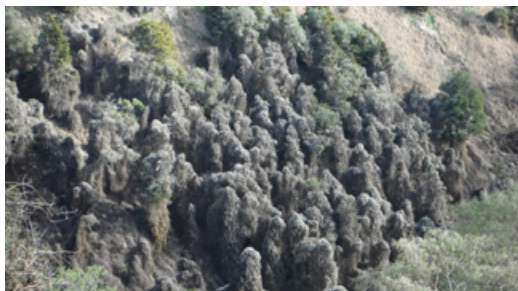


## Old man's beard must ...

Craig Davey, Environmental Coordinator at Horizons Regional Council brings this update on biological control efforts to severely trim old man's beard in the region.

Horizons Regional Council is about to spread hope in the form of *Aceria vitalbae*, the old man's beard gall-forming mite, that has the job of helping old man's disappear. A long-held dream for OMB to go, or at least naturally be held in check and become just another climber in our forests rather than a smothering blanket of death, may be a reality not far around the corner.

Due for release at two locations in early August, this first introduction of a microscopic mite from Serbia to Taihape; New Zealand's first naturalisation,



*Old man's beard, Moawhango near Taihape.*

*An infected stem on the right, showing much reduced growth. (MWLR)*

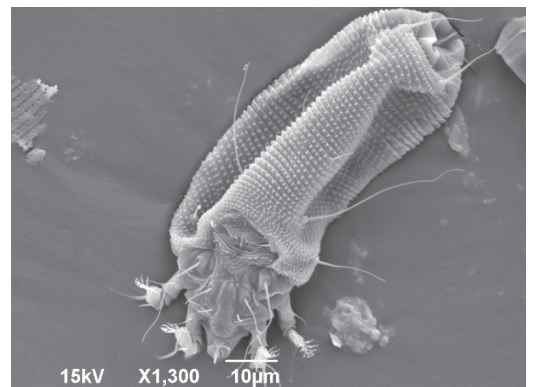


is exciting staff and the public alike. This is the fourth agent to be released against OMB and the one with the most promise. Previous introductions have not had the desired impact; the leaf miner is widespread but not effective, a fungus petered out and the sawfly is now in two South Island locations,

but still in low numbers, and one site is currently drying out from the Ashburton floods. One agent not released was the much-anticipated bark beetle. A project fraught with set-backs, bad luck and acts-of-God seemed finally about to deliver the desired result when host testing showed the beetle to have too healthy an appetite for all our native clematis. Any future options available to New Zealand are dependent on the new Manaaki Whenua Landcare Research/National Biosecurity Collective/Sustainable Farming Fund \$3m project which is funding UK and Europe OMB pathogen hunting. So, for now, our attention is on the mite.

**Introducing this agent requires staff to plant potted infected OMB plants from the MWLR Lincoln campus into the middle of old man's beard infestations.** Keeping them alive until transfer of the mites to the host plants may be difficult for trained plant killers, and all in the presence of wild deer, possum and (apparently) wallaby.

Definitely not the poster child of biological control, **the mite is so small it goes wherever the wind takes it. So, the release strategy is for mid-infestation placement to ensure locals and staff have the ability to monitor establishment down-wind.**



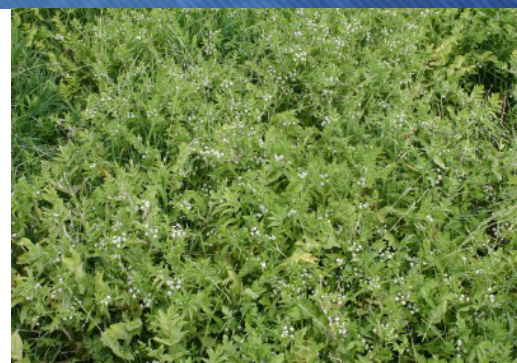
An antagonist of plant development, the mite abides in buds and turns an aggressive and verdant stem into a weaker and smaller example. If the mite is able to reduce canopy thickness and seeding potential then the spread risk reduces, and with a less dominant canopy there is hope for regeneration under and through the blanket.



## Investigating natural controls for Nelson's water celery

The prospects of developing a biocontrol programme for the plant pest water celery in New Zealand were recently assessed at the request of Nelson City Council.

Water celery (*Helosciadium nodiflorum*; synonym *Apium nodiflorum*) was recently highlighted as a problematic aquatic weed in New Zealand in a weed risk assessment conducted by Paul Champion from NIWA in 2018.



Water celery (*Helosciadium nodiflorum*; synonym *Apium nodiflorum*)

In a desk-top study carried out by Landcare Research led by Ronny Groenteman, and assisted by Peter Heenan and independent plant pathologist Jane Barton, several pathogens and insect natural enemies associated with water celery were identified.

"Nine pathogenic micro-organisms have been recorded from water celery, which is a relatively small number as far as plant pathogens go," said Jane. "However, only one of these, a white smut (*Etyloma helosciadii*), appears to be a promising candidate due to its potential to have a restricted host range," she said. Eleven arthropods were identified in the literature as associated with water celery, but, again, only one is a promising candidate agent, a stem-mining moth (*Depressaria ultimella*). The moth is common on water celery in the United Kingdom, where plants with extensive larval

mining collapse late in the growing season. The moth reportedly has a preference for water celery growing in slow-flowing water, such as roadside ditches, as opposed to streams. Nevertheless, it may be worth pursuing, since our research suggests the moth could be sufficiently host specific for New Zealand and has the potential to be very damaging.

"Any **biocontrol agents for water celery would need a fairly high degree of host specificity due to water celery's taxonomic affinities with valued food plants in the carrot family** (e.g. celery, celeriac, parsnip, carrot, parsley and coriander) and New Zealand natives in the genus *Lilaeopsis*," Ronny said. "Fortunately, after taxonomic revision, water celery is no longer classed in the same genus as celery as it once used to be. This increases the likelihood of finding natural enemies that are sufficiently host specific," she said. Based on this research, water celery appears to be a viable biocontrol target, with some natural enemies already identified, and with the possibility that additional candidate agents will be discovered during native range surveys. Also, aquatic plants tend to be good biocontrol targets, based on evidence from programmes elsewhere in the world. Since water celery is regarded as the worst among a suite of aquatic weeds being managed around Nelson and Wellington, a biocontrol programme may be timely.

This project was funded through an Envirolink Grant to Nelson City Council.

### More about water celery

Water celery is a perennial herb in the carrot family, Apiaceae. It is a sprawling, emergent aquatic plant that can grow up to one metre in height. Plants have glossy, bright green leaves and white flowers that grow close to the leaf bases. Water celery grows in shallow ponds and lakes, drains, canals, ditches, the margins of slow-flowing streams and riparian zones, in marshy areas and around springs. It can form submerged patches in slow-flowing deep water. Seedlings contribute to its spread from the edges of existing stands, and new populations establish from detached shoots that readily develop roots.

In New Zealand, water celery was first recorded as naturalised in 1947, most likely introduced as a contaminant via seed or ornamental aquatic plants. Infestations are now scattered from Northland to Wellington, and the plant is locally abundant in many regions, especially in coastal areas. It has also established in the north and west of the South Island, where its distribution is confined to a small number of streams.

**Water celery contributes to the degradation of water quality in streams, especially in combination with farm drainage entering these systems.** Infestations trap nutrients and deplete dissolved oxygen when plants decompose, and they threaten endangered native species in wetlands. In the North Island, water celery needs to be regularly managed to clear drainage networks.

If the weed is not cleared from slow-flowing streams, the build-up of plant biomass reduces water flow and can lead to flooding. Water celery is currently controlled mechanically and chemically, which only provides temporary relief, with rapid regrowth of surviving plants or recolonisation through seed germination.



## Plant biosecurity: How ready are we?

Manaaki Whenua Landcare Research released in July a review of the state of plant biosecurity readiness in New Zealand.

The review entitled *Plant Biosecurity Science in NZ* is aimed to consider and address science capability gaps in plant biosecurity.

In light of the COVID-19 outbreak, the review asks, does new Zealand have the research capability to help to avoid or deal with the next big pest or pathogen threat to productive and indigenous plant systems?

MWLR chief executive Richard Gordon acknowledged that New Zealand has an excellent biosecurity system and said that those involved had a responsibility to keep science capabilities up-to-date and focused on priority risks.

The review acknowledges that while NZ's biosecurity system has been well served by the legacy of the Department of Scientific and Industrial Research, MAF, and the Forest Service, many of the original cohort of scientists and technicians that transferred into CRIs in 1992 have since retired, or are about to.

It concludes that **there are gaps in NZ's capabilities in plant biosecurity science that create weaknesses in our overall biosecurity system.**

Among many suggestions the review particularly recommends that a compendium of existing biosecurity-relevant science skills, by discipline, be compiled for all relevant science providers. The compendium should include identification of plant-systems-level generalists.

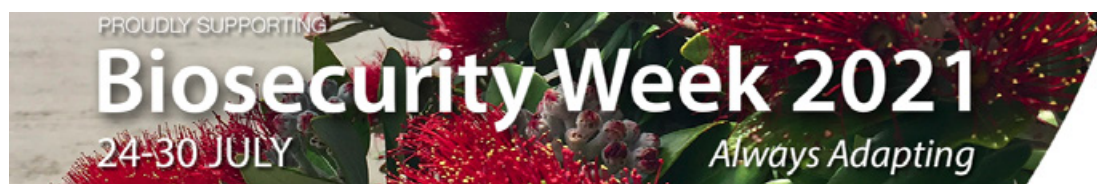
It also said **there is a need for an infrastructure database to identify current strengths and gaps** in key biosecurity science equipment and facilities.

**These two compendiums would help to better clarify the role each science organisation** would be expected to play.



The reviewers also recommend a survey of foundational teaching in general plant biology at university level, and of core subjects available for biosecurity-oriented Master's and PhD students, with a view to identifying teaching gaps and opportunities for subject expansion.

The review recognised that while that Better Border Biosecurity (B3) is an excellent model, there is a need for improved biosecurity science networks, including international collaborators, that are accessible by industry as well as by government and scientists.



## Wilding control: the key to success is strong long-term relationships

The New Zealand Wilding Conifer group hosted another in its series of webinars at the end of June. Protect editor Chris Macann eavesdropped.

The topic was the "Mid Dome Wilding Trees Charitable Trust: its role and function in wilding control since 2006".



The subject matter was a departure of sorts from the Wilding Conifer Group's usual webinars.

NZ Wilding Conifer group Coordinator

Rowan Sprague said past webinars in this series had focused on the latest science relating to wilding conifer management, this time "we're going to pause this to hear from communities leading wilding conifer control."

The Mid Dome Trust formed in 2006 to tackle the spread of wilding conifers at Mid Dome in northern Southland. Two of the members involved since its foundation, Ali Ballantine and Richard Bowman talked about what has made the Trust successful over the years and the remaining challenges it faces.

Their experience is likely shared by all groups undertaking this work nationwide.

They said a key to success was strong long-term relationships with local agencies, and partners DOC, LINZ and Environment Southland, as well as strong relationships with local landowners and local communities.

These relationships are vital to establish, as it will enable consistent control following handback of the management to landowners in time.

Community engagement is important and volunteer days twice a year are great for this, they said.

Some challenges are on-going funding after 2023 - a challenge shared with groups nationwide, and funding to manage risks in other areas of Southland.

They said there is a need for effective rules to maintain the gains and prevent "it" happening in the future.

They said there was still some public resistance to large scale wilding control and advocating always been hard.

**"You can't beat getting politicians down; local and national,"** they said.

"In the early days we were worried about what tools were and weren't performing but **we now have a good idea with evolution what works and what doesn't.**" they noted that the significant amount of chemical use has always been somewhat of a concern.



## Myrtle rust is now widespread

Biosecurity New Zealand reports that it is no longer collecting, analysing, or reporting myrtle rust data.

Myrtle rust has been found throughout most of the North Island, and across the top and on the west coast of the South Island. Given the widespread distribution of the disease, targeted surveillance and control activities have stopped. The focus now is on research to identify management options, and supporting landowners to minimise the impacts of the disease on their plants.

The ministry's advice is to observe, photograph and not touch the affected plant.

If you have a camera or mobile phone you can take a photo and submit it to the iNaturalist website. Experts can check to confirm whether your identification is correct.

Advice is available on the myrtle rust website. The Ministry is continuing to suggest visiting the iNaturalist website to confirm the rust is present.



## Casting the net more widely

### An update from Predator Free 2050 Limited

We want to share with you a few changes and some exciting developments at Predator Free 2050 Limited (PF2050 Ltd) in the last few months.

PF2050 Ltd now supports 16 landscape-scale Predator Free projects throughout the country. This includes eight new projects in the last year, with more on the way.

Thanks to Jobs for Nature funding, the total area covered by the projects has more than doubled in size since this time last year. Each project is unique, ambitious and adopts leading-edge approaches to help us accelerate the national journey towards a Predator Free Aotearoa.



Some of the initial projects are already nearing eradication of their target species, and in total they are aiming for predator eradication on nearly 300,000 hectares of mostly mainland Aotearoa. If that is not impressive enough, they contribute over 700,000 hectares towards predator suppression, which is bringing us close to the national target of one million hectares of predator suppression by 2025.

### The changing nature of predator free work

This rapid increase in projects is creating lots of opportunities and challenges. One is an increasing demand for people with knowledge and skills in predator eradication, which is a vastly different mindset and process to ongoing suppression of predators. It is also **creating a demand for eradication tools and new technology**.

The Predator Free New Zealand Trust has stepped in with an apprenticeship scheme to in-part cover some training challenges, and PF2050 Ltd and Department of Conservation have stepped in to help with the increasing demand for tools and technology with the Products to Projects programme (PF2050 Ltd), alongside the programme of Tools to Market (DOC).

### Learning from each other

To support this increase in projects, new staff have come on board PF2050 Ltd. This has not only allowed us to take a partnership and 'In service to projects' approach, it has also created more opportunities for projects and technical 'experts' to learn from each other.

One such opportunity was held recently, where **we brought all the projects working on eradicating stoats together with all the stoat technical experts from around the country** for a day.

continued



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The aim? To nut out what could be agreed about best approaches to eradicating stoats and where the gaps in knowledge are. One participant commented that **there has not been a similarly focused national session on eradicating a particular pest species for 40 years.**

A review paper will be published following the stoat workshop, which will advance our collective understanding of eradicating stoats. **Many more topic-specific workshops are being planned,** from Community Engagement or individual species, through to Information Technology needs.

We also ran a two-day learning-from-each-other workshop in May for the Landscape-scale projects we support. It was really heartening to see the projects connecting and talking openly about their projects' highs and lows, ins and outs. The main message that came out of this workshop is summed up beautifully in this whakataukī:

“ He aha te mea nui o te ao  
He tangata, he tangata,  
he tangata  
What is the most  
important thing in the  
world?  
It is the people, it is the  
people, it is the people

Some of the key themes that emerged:

- Early and sustained engagement and building solid partnerships with mana whenua is critical
- Sociocultural partnerships are inextricably linked to operational success
- We need to build more capability in the sector
- Information sharing within the sector needs to be more efficient.

We will keep you posted on new projects or initiatives and look forward to creating more opportunities for cross-pollination of ideas and resources. This will drive us, collectively and with urgency, towards a Predator Free Aotearoa by 2050.

Links to initiatives talked about in this article are available from the Predator Free 2050 website. Other information is available from the DOC website.



## The Company is: Predator Free 2050 Limited

Predator Free 2050 Limited is a Crown-owned, charitable company established to help deliver the New Zealand government's goal of eradicating possums, stoats and rats by 2050.

It provides co-funding to enable predator control and eradication projects at large landscape scale and the breakthrough science needed to underpin them.

## The programme is: The Predator Free 2050 Programme

Predator Free 2050 (PF2050) has the goal of ridding New Zealand of the most damaging introduced predators. It sits within the Department of Conservation. It brings together communities, iwi, experts, businesses, government and nongovernment organisations, and individuals who work to achieve the goal.



## No possum 'spike' in central Christchurch - they're just much easier to see

Despite increased sightings, possum numbers are not on the increase in central Christchurch.

A resident spied a possum while walking in Little Hagley Park in July, then later, saw five in quick succession.

"If there are five possums in Little Hagley Park, how many have we got in Hagley Park itself?" she said.

The resident was worried about the threat they posed, especially in light of the plan to create a habitat "corridor" to encourage native birds back into the central city.

**"I have also seen moreporks and bellbirds in the vicinity and fear for their nests this spring,"** she said.

"I don't want to see possums affecting the bird-life that we've got in this city."

The Christchurch City Council said there had been no spike in possum numbers in Hagley Park. **The pests were just easier to spot in winter.**



"[They] become more visible at this time of year due to there being no leaves on the trees."

Between 20 and 30 possums were thought to make Hagley Park their home. Controlling the numbers was something of a challenge. **Guns were out of the question. Using traps ran the risk of catching a domestic cat,** the Council said.

"We are currently trialling traps in some of our regional parks to see if they can be used safely at Hagley in the future."

The Council said staff had been deployed to pick up acorns - a food source for possums - to keep the animals off the ground, and the council's newly-introduced BigBelly bins, equipped with a small solar-powered compactor, prevented possums from feeding on rubbish.

It's not the first time pests have been seen in sizeable numbers in Hagley Park.

In 2019 walkers, runners and cyclists noticed an increase in rodents in the park during a nationwide mega mast of beech and rimu trees, and tussock.



"Just about every phone call at the moment is about rats or mice," a pest controller said at the time.

The battle was a long-running one for the city council.

In July 2016, new gas traps, which self-reset after each pest has been caught, were introduced throughout the Horseshoe Lake area.

And in November 2019 a new biodiversity ranger began patrols of Banks Peninsula in an effort to control "power line-hopping possums".

The council, Department of Conservation and lines company Orion joined forces to control the pests after **there was a 45 per cent increase in the number of "possum strikes" across its network.** Almost half of the spike came from Banks Peninsula.

EDITED FROM AN ARTICLE IN THE  
CHRISTCHURCH PRESS JULY 25, 2021

### Fine for not registering livestock

The chief executive of a large Waikato farm business was fined a total of \$3,600 in early May for four charges related to failing to register 820 animals under the National Animal Identification and Tracing (NAIT) scheme.

The offending came to light through an analysis of the NAIT database.

The person moved 820 unregistered NAIT animals from the farm to four meat processing facilities between February and early November 2019.



## Wildings as a fire hazard: what can be done immediately?

While the recent \$100M government injection into wilding conifer control will reduce the number of invasive trees over the next four years, Boffa Miskell biosecurity consultant Beth Williamson investigates what can be done in the immediate term to minimise the impact of wildfires today?

Wilding conifers infest over 1.8 million hectares of New Zealand. The spread of these self-sown trees has a dire effect on natural ecosystems and creates severe implications for fire control.



Historically, New Zealand has had low wildfire frequencies. However, due to climate change, wildfires are becoming more rampant; and last year's fires on the shores of Lake Ohau and Lake Pukaki were a sobering reminder of the devastation fire can cause.

In his book, *The Living Planet*, Sir David Attenborough explains how conifers create dry, barren areas by controlling moisture levels in the soil. This process, along with dead pine needles and limbs on the forest floor, increases the susceptibility to fire outbreak, while also causing fire to burn longer and hotter.

Unlike commercial plantations, wilding conifers grow in irregular patterns with no firebreaks and are often impenetrable and difficult to access. Based on hypothetical scenarios, the New Zealand Forest Research Institute (Scion) predicts that medium-density wilding stands hold the highest overall fire hazard across all stages of growth.

**The hazard and potential for extreme fire behaviour increases significantly several years after control due to the number of dead trees left standing.**

While the recent \$100M government injection into wilding conifer control will reduce the number of invasive trees over the next four years, what can be done to minimise the impact of wildfires today?

Green firebreaks (areas consisting of vegetation with low flammability) can assist in slowing the spread of fire, particularly in residential areas proximate to wildings. Whilst there is limited available research about plant flammability in New Zealand, a qualitative assessment derived from expert opinion at Scion Rural Fire Research stated that **native plants with**

**the lowest flammability include lancewood, five-finger, coprosma, and tree fuchsia.** These plants do not ignite easily due to their high moisture level; although these (and most plant species) will burn in the right fire conditions.

There are many other techniques to minimise fire hazard in our backyards. Highly flammable species can be replaced with lower flammability species, which will force fire to dissipate faster. Plants should be spaced 3-4 m apart to limit the speed of fire spread. Although the removal of flammable material such as long grass, dead limbs and leaves in your garden may reduce habitat availability for indigenous biodiversity, it will help to reduce the amount of fuel for fires. Reducing fuel load will reduce fire intensity and, therefore, allow easier suppression.

Whilst we can make small changes to protect our homes from wildfire, it is vital that we put our best efforts into the eradication of wilding conifers if we want to protect our biodiversity, and reduce the frequency and severity of fire disasters.



## Kauri dieback and more about clever science

It was first found in the Waitākere Ranges nearly 15 years ago, but over the past five years the rapid rate of “kauri dieback” spread has become an urgent concern.



Ecologist Kate Heaphy from Boffa Miskell explains the most recent developments in the fight to save Aotearoa’s iconic trees.

Kauri forests (*Agathis australis*) used to cover 1.2 million ha of the upper North Island. These ancient ecosystem engineers, the largest tree in New Zealand by volume, can live for over 2000 years.

However, our kauri are dying. The cause was originally misidentified as the pathogen *Phytophthora heveae*, and then was temporarily classified as the water mould *Phytophthora taxon Agathis* (PTA). In 2015, it was finally officially described as *Phytophthora agathidicida*, literally meaning kauri-killer. More commonly known as kauri dieback, there is still no known cure.

### So how do we manage such a disease?

Clean everything: boots, equipment and vehicles.

Then, we need to find out where it is – in many areas, the presence and distribution of kauri dieback is still unknown.

**We all know the importance of testing and presence/absence data from our experiences with COVID-19.** As luck and hard work would have it, a new method of

detecting *P. agathidicida* (a loop-mediated isothermal amplification assay or “LAMP” test) was published by Richard Winkworth from Massey University and colleagues from other organisations earlier in 2020\*. **This highly specific and highly sensitive test has been a leap forward in informing and improving our management practices.**

Multiple large infrastructure projects currently underway within the greater Auckland region are crucial to ensure the needs of Auckland’s growing population are supported. Many of these are occurring in areas where kauri is present or nearby, with potential to spread kauri dieback. Effective, informed management of kauri dieback during these projects is equally crucial to protect our valuable and iconic ecosystems.

Management plans typically include protocols that adopt a precautionary approach (assumed presence) for:

- Rigorous testing for the pathogen as part of pre-construction planning and risk assessment;
- Strict sediment control and overland flow management;
- Construction protocols, including for the removal and disposal of soil if required; and
- Stringent cleaning protocols, both around the project footprint and within Kauri Containment Zones (a standard distance of three times the canopy drip line of any kauri specimens).

This year, we have been working closely with the team at Biosense who have been using the LAMP method with great success to determine kauri dieback presence and distribution at one of our major project sites.

This testing provides us with valuable information, such as:

- Increasing our knowledge of the local distribution of kauri dieback pathogens, to inform soil containment and overland flow management within project sites;
- Providing baseline presence/absence data of kauri dieback, to determine in future whether the mitigation measures have been successful at preventing the spread (if detected, this will provide reassurance for all that kauri dieback was not introduced solely as a consequence of the project and also help similar projects adapt their mitigation measures in future);
- Informing the decision as to whether to include kauri in revegetation plans (if not detected, there may be opportunities to restore a historically dominant, severely reduced ecosystem type. However, if detected, there is little benefit to planting kauri trees that are almost guaranteed to become infected and eventually die, and potentially creating a further host population for the disease);

\* Winkworth, R. C., Nelson, B. C., Bellgard, S. E., Probst, C. M., McLenachan, P. A., & Lockhart, P. J. (2020). A LAMP at the end of the tunnel: A rapid, field deployable assay for the kauri dieback pathogen, *Phytophthora agathidicida*. *PLoS one*, 15(1), e0224007.



continued



- Contributing to leading research and science and help answer remaining questions such as other host species, accuracy of field observations in determining infection and potentially ongoing monitoring for treatment monitoring; and
- Identifying 'confirmed cases', after which sick trees can be treated with phosphite injections (although not a cure, phosphite injections give sick tree's immune systems a 'boost' with successful results to date around the Auckland region).

Testing at one of our project sites this year revealed that the distribution of kauri dieback can be extremely extensive within a project site and even within a catchment. Stream-baiting (a method of efficiently collecting water samples for the LAMP test) has detected kauri dieback within flowing streams, meaning that **the disease is being naturally widely spread via water. The results also show that the disease may be present in soil some distance from kauri trees.**

Although disappointing, these results bring a strong realisation. Beyond managing individual trees and their root zones, we need a holistic, catchment wide approach that acknowledges that kauri dieback management involves the water, the soil and multiple potential host species.

Kauri dieback is an active field of research with multiple facets and research directions. Some of the most talented scientists, passionate community members, arborists and industry are working together to learn about this disease and how to control it. This leap forward in detection methods provides another ray of hope.

## Cook Islands travel bubble a welcome opening for weed-busting beetles

A consignment of African tulip tree flea beetles (*Paradibolia coerulea*) has resumed their interrupted journey to Rarotonga and the beetles have started on their weed-busting work.

The beetles are a natural enemy being used for the first time in the Pacific islands to try to reduce the spread and density of the invasive African tulip tree.

After a year-long search to find a safe way to transport them from their quarantine in South Africa, the beetles arrived in New Zealand in late February just as Auckland went into a COVID lockdown that halted all flights to our Pacific neighbours. The enforced and extended stay at the Manaaki Whenua - Landcare Research (MWLR) containment facility in Auckland led to the beetles growing too old to be released.



*African Tulip tree flea beetles.*

In response to this setback **the team got to work rearing a new generation of beetles to be ready for when travel to the Cook Islands was possible.**

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"We already had African tulip tree (*Spathodea campanulata*) plants growing in our containment facility, so we were able to keep a culture going," said MWLR Research Leader Dr Quentin Paynter.

"It has taken some careful rationing of the plants to rear enough beetles for a field release and ensure that they haven't demolished all our plants. We also need to keep a back-up culture in case the first release fails."

Dr Paynter and MWLR Weed Biocontrol Technician Stephanie Morton released the beetles in the Cook Islands in mid-June.

"Our colleague at the Cook Islands Ministry of Agriculture, Dr Maja Poeschko, located a suitably isolated release site that is safe from public health staff spraying insecticides for mosquito control to combat dengue fever," said Dr Paynter.

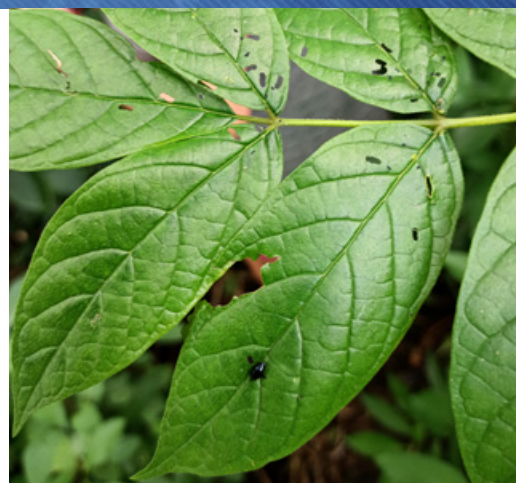
"We initially released 40 beetles in four nylon rearing sleeves, to keep them contained and ensure beetles didn't rapidly disperse so their offspring couldn't find one another. We set 26 free (just in case we hadn't chosen an ideal release site). When we returned to the site two days later, **we easily found several of the freely released beetles, indicating they did like the release site.**"

The African tulip tree is considered one of the 100 worst alien invasive species in the world and one of the top 30 terrestrial invasive plants. MWLR researchers and their collaborators at Rhodes University in South Africa have been seeking specialist natural enemies to reduce the spread and density of the invasive African tulip tree, which has been problematic in the Pacific Region for several years.

A gall mite (*Colomerus spathodeae*) which forms leaf galls that stunt new growth has already been successfully established in Rarotonga. It is expected that the combined impact of both agents will be needed to reduce the invasiveness of African tulip tree. Rigorous testing has confirmed that both the mite and the beetle are African tulip tree specialists that pose no risk to other plant species in the Pacific region.



*Quentin Paynter and Cook Islands Ministry of Agriculture's Dr Maja Poeschko releasing the African tulip tree flea beetles.*



*Damage done by tulip tree flea beetles two days after the Cook Islands release.*

The African tulip tree project is **an example of one of the many projects in the Pacific region working to enable the Pacific Island countries and territories to take stronger action against invasive species and build resilience to climate change.** This collaborative effort is funded by the Ministry of Foreign Affairs and sees MWLR join forces with the Secretariat of the Pacific Regional Environmental Programme (SPREP), and the Department of Conservation.

MWLR's Science Team Leader Lynley Hayes said the work on stopping invasive weeds is vitally important.

"Recent reports suggest children in the Pacific are suffering even more due to poor nutrition under COVID and climate change. **Weeds contribute to this problem by making it more difficult to produce food,**" Lynley said.



*Stephanie Morton packing African Tulip tree flea leaf beetles at Landcare's Auckland Quarantine facility.*

## Pest control is like lawn mowing

BY BRENT BEAVEN, PROGRAMME MANAGER PREDATOR FREE 2050

Occasionally, you may hear someone say: '1080's not working. We've been using it for 60 years, and we've still got possums'. Which might sound like a fair comment, but it fails to recognise a crucial reality: pest control and pest eradication are two very different things.

Pest control is a bit like mowing your lawn: you don't intend to remove the grass entirely – you just mow it regularly to stop it getting away on you.

Around one-eighth, or 12.5%, of the public conservation estate receives pest control in any given year, and sites are treated at intervals calculated to stop rats, possums and stoats reaching overly destructive numbers.

In forests with lots of food, which support high pest numbers, that might be every three years or even sooner. In less productive forests, that might be every five years.

Now imagine for a moment that you only mowed one-eighth of your lawn once a year, and that you mowed a different eighth each year. What would the grass on the other seven-eighths of your lawn do under such a regime?

This is why we still have possums, despite decades of 1080 use.

Sticking with the lawn analogy for a bit, we all know that **mowing is a bigger job in the spring** and autumn, when conditions are right for grass to thrive.

Similarly, conditions in the forest occasionally become ideal for pests – times when there's so much food around that they can breed up to their maximum potential. Periodically, whole forests simultaneously produce vast amounts of flower and seed, a phenomenon ecologists call a mast.

For example, when beech trees experience a cool summer followed by a warmer one, they can litter the forest floor between March and June the

following year with up to 50 million seeds to a single hectare, many times more than usual.

The magnitude of masts varies across locations and from year to year, but in 2019, beech trees masted pretty much everywhere. So did podocarps – rimu, tōtara, kahikatea, mataī, etc – and in some places, tussocks, in what ecologists called a 'megamast'.

In times of such abundance predator numbers go through the roof, and that has dire consequences, because once all that seed has either been eaten, or has germinated, plagues of hungry pests need something else to eat. They turn on native wildlife, often just when birds are trying to breed.

Mast seasons come along, on average, every four or five years.

DOC runs a national predator control programme called *Tiakina Ngā Manu* (formerly Battle for our Birds).

Predator control across large landscapes or remote and rugged terrain costs a lot of money: in 2014 when the Battle For Our Birds predator control programme was launched, it was with a budget of \$21 million over five years. Had we met the threat in all affected forests in that period, it would have cost around six times as much.

When a mast loomed in 2017, we had to seek an extra \$21m in funding from Treasury to blunt the impact of the mast in addition to the initial five year funding package.

In 2018, within the context of the recently adopted Predator Free 2050 goal, the government increased the budget for Tiakina Ngā Manu to \$81.2 million over four years, recognising an ongoing programme of predator control was needed in areas with high ecological values. The programme juggles resources when mast years occur to meet



*Predator Free 2050 Programme Manager Brent Beaven with tieke/saddleback. [Photo: Peta Carey]*

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immediate needs while continuing to protect highly threatened native species populations in key areas.

Which is all to say: possums, rats and stoats are costing the country a small fortune.

It's estimated that invasive predators do more than \$450m of damage to the crop and timber industries each year (as laid out in a 2015 BioScience paper). But arguably the biggest toll never appears in the Treasury ledger: Landcare's John Innes has estimated that every year they devour around 26 million native forest birds chicks and eggs.

Just like mowing lawns, pest control is a job for life – a never-ending game of whack-a-mole that can only ever hold a line in the sand.

Imagine instead if we could rid Aotearoa of stoats, rats and possums completely – forever.

Picture a forest where a mast season was a bonanza for native wildlife, instead of a disaster.

That's the proposition of Predator Free 2050 (PF2050), but eradicating pests is a whole other magnitude of difficulty and expense.

Back in 2008 I was working on Rakiura/Stewart Island, and did a study on the potential to eradicate invasive predators from the island. At the time, I estimated it would cost between \$35 and \$55 million to remove invasive predators from Rakiura/Stewart Island alone. That's between \$210 and \$330 a hectare, as opposed to aerial pest control, which can cost as little as \$20 a hectare.

It sounds expensive, until you factor in the perpetual price of having these predators in the country. At some point, PF2050 would start paying for itself.

### **So how much would it cost to eradicate predators from all of Aotearoa?**

Even if we apply the highest known per-hectare cost – \$993 per ha on Rangitoto and Motutapu Islands in the Hauraki Gulf – and a long-run inflation rate of 2.55%, the bill for PF2050 has been calculated at a little over \$9 billion over 50 years.

New-generation traps and detection devices are already bringing that cost down, because they reduce labour. By way of comparison, control agencies expect to spend about \$15 billion just trying to contain – not eradicate – all known agricultural pests over the same period.

When they deducted the known costs of invasive predators in New Zealand, and added the expected hike in tourism spending that being predator-free would bring, the authors of this 2015 paper found that PF2050 would deliver a net value of \$9.32 billion over 50 years, well into the profit side of the ledger.

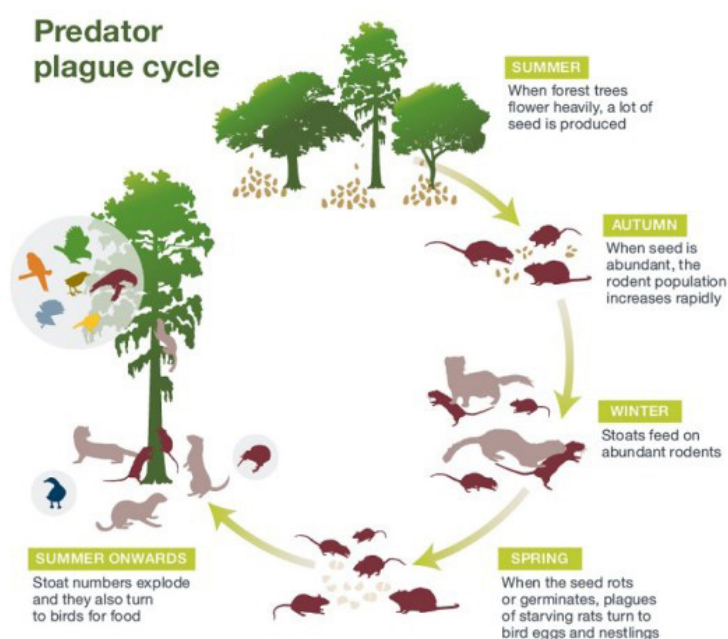
We're not yet able to say conclusively how much it will cost to achieve Predator Free 2050 – and that's mostly because we're putting a focus on developing the technology and exploring new innovations that will allow us to do the job. Once we are further down the path with this tech, we will be able to cost it.

That said, some things, though, are beyond price: the greatest value of all would come from saving our native biodiversity from extinction, having it thrive, and for our children's children to be able to experience it.

Doing nothing would be far too costly.

Ngā mihi

Brent Beaven.



Predator-plague-cycle [DOC].

## A career in fields I find interesting and challenging

BRENT BARRETT, BIOSECURITY CONSULTANT, BOFFA MISKELL, CHRISTCHURCH.

Brent is presently part of a team developing new devices for biosecurity applications. He currently consults on many biosecurity and ecology projects and trained in field-based conservation and animal biosecurity.



Following years of island-based research, he has had first-hand experience of many predator control strategies and works with his colleagues to prescribe effective plans for various reserves, parks and communities.

Brent describes one of his main strengths as his ability to understand the rigorous requirements of field work and the technical specification of device design.

As a professional ornithologist, Brent spent many years in project management of critically endangered parrot recovery programmes across large landscapes. He has field experience in highly diverse climates, among them, Galapagos and most ecosystems of Australia (deserts, outback and offshore islands). He spent a year in South America working with parrots, macaws, hummingbirds and sand lizards.

His experience in New Zealand spans over a decade with the Department of Conservation and Lincoln University. This work was conducted in all regions of the South Island including every habitat on the mainland and many offshore islands including the sub-Antarctic Auckland Island where he conducted his Masters of Science research.

Brent has developed a strategy for assessing risks to planting areas from browsing animal pests which includes planning and conducting control operations. His work with LINZ in surveying and planning pest management across the 500Ha residential red zone allowed him to demonstrate his skills in landscape scale predator control.

Protect asked him a few more questions about his work.

### How long have you been in your job?

I have been with Boffa Miskell just over three years now. This is my first role as a consultant.

### What motivates you to be involved in biosecurity?

I was originally a threatened species manager and research scientist with DoC working on Kea nesting survival during 1080 operations on the West Coast. We monitored ten nests in controlled habitats and 10 in areas that had never had 1080 operations.

Within the uncontrolled areas I filmed a stoat predating a kea nest, the camera was inside the cavity and it was a pretty brutal event. A few months later I captured footage of a possum killing kea fledglings and I became very motivated to be part of the solution to these issues rather than just recording them. That's when I moved to Lincoln University's Centre for Wildlife Management.

### What has been your career path to your current position?

I studied for an MSc in Marine Mammalogy in the Auckland Islands then Kakapo Protections Office on Whenua Hou/Codfish Island which led to a project management job with the Western



*Brent Barrett in his element.*

continued







Australian government (Western Ground Parrot) then numerous ornithology projects in NZ, South America and the Galapagos Island. **All this field work allowed me to choose subsequent career directions into fields I found interesting and challenging.**

## What makes up a normal day for you?

My days are highly varied as I have about seven active projects at any one time. It could start in the Residential Red Zone of Christchurch or onsite tracking browsing animals in planting sites, switch quickly to a client meeting in our Christchurch office and end with a public talk on back-yard trapping in the Port Hills. However, other days I could sit at my desk and finish reports with the help of coffee.

## What do you enjoy most about your job?

I like specialising, and through that constantly increasing my knowledge with new projects, I really enjoy approaching innovative technology from a field ecologist perspective and I especially enjoy being the glue between various groups in the same landscape with the same pest control aspirations.

Protect magazine is keen to introduce members, and to tell their stories. It welcomes contributions from all members. Newcomers can tell their stories and talk about what motivates them, and old-timers have an opportunity to talk about the experience they have gathered in their careers and to dispense sagely advice.

# Impressions of a newbie

KELSI HOGGARD, BIOSECURITY OFFICER- PEST PLANTS  
HORIZONS REGIONAL COUNCIL

The first piece of advice I received from my boss when starting at Horizons was that if I knew everything within six months, I wasn't telling the truth. Nearly 18 months in, I can see his point.

Only five weeks into the job we were thrown into Covid-19 lockdown, giving me a very unique introduction to the life of a Biosecurity Officer. It then went to full speed very quickly due to the discovery of alligator weed in Palmerston North. The discovery, surveillance and subsequent control programme have provided a distinct opportunity to develop my knowledge and skills over the past year. I also have a strong suspicion it is going to be the gift that keeps on giving for the foreseeable future.

Taking over the management of the Horowhenua has provided its own opportunities to extend my familiarity with the biosecurity world. The area has a colourful pest-plant history and is comprised of a number of well-established and new threats. Between woolly nightshade, old man's beard, banana passionfruit, Chilean rhubarb, evergreen buckthorn and Senegal tea, there is plenty to keep my brain going and my boots on the ground.

So far, my time at Horizons has provided countless opportunities to learn and develop my expertise. **I am fortunate enough to be surrounded by people who are willing to pass on years of knowledge and with whom I share a passion for the environment and conservation. With any luck, in the next few years I'll be able to say I know half of what I'm meant to.**



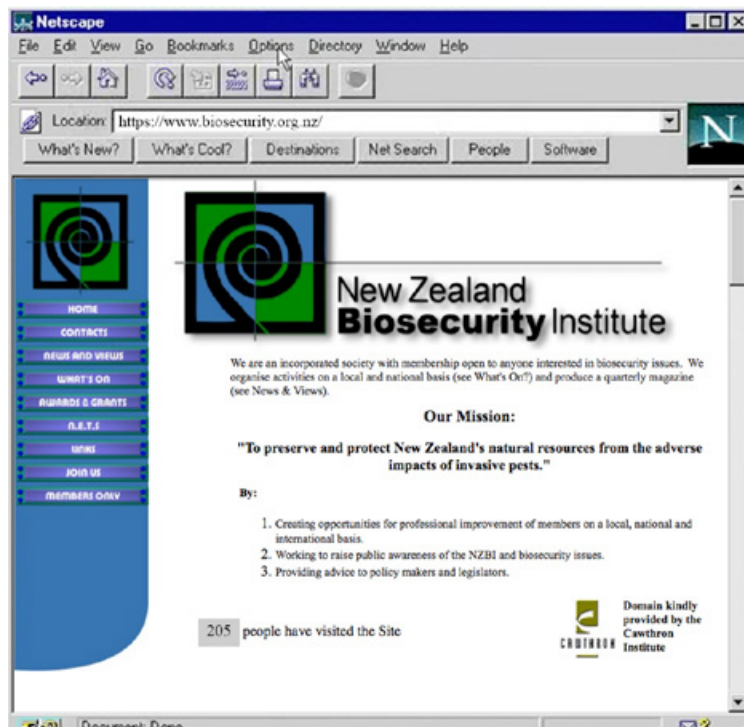
Kelsi Hoggard in the Mangaone Stream (Palmerston North) with a long stem of alligator weed.



## NZBI in cyberspace



News from the Executive Protect, Autumn 2000



The New Zealand Biosecurity Institute website in 2002

## Lead poisoning?



The *Christchurch Press* reported in early August that an increasing number of harrier hawks are dying from lead poisoning after eating dead animals shot during pest control operations.



The Oxford Bird Rescue group suggested the increase in poisonings was due to hunters thinking they are doing the right thing by leaving carcasses behind for predators to eat after pest control operations.



Find us on the web at  
[www.biosecurity.org.nz](https://www.biosecurity.org.nz)