New Zealand Biosecurity Institute

the magazine of the NZBI Summer - 2021-22

Protect

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inside

New Zealand Biosecurity Institute

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

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The New Zealand Biosecurity Institute can be found on the web at www.biosecurity.org.nz

SAFER, SMARTER RABBIT CONTROL

Rabbits have reached plague proportions in some areas and cost the country millions of dollars through lost production on farmland as well as through attempts to control them. Rabbits have a significant effect on the ecosystem and cause large areas of land to become eroded and native vegetation to change. When rabbits are seen active during the day this indicates a high population.

Pindone is a first-generation, slow-acting anticoagulant poison in a cereal-based pellet, designed for the control of rabbits in rural and urban areas. It needs to be consumed over several days to be effective, around twenty-one pellets need to be consumed by a 1.5kg rabbit before death occurs. It is important to keep the bait stations filled as death occurs 4–11 days after bait consumption. Very few rabbit carcasses will be found as rabbits return to their burrows to die.

Pindone Rabbit Bait must be used in bait stations. In cases where there is concern about bait being accessible during the daytime, the NoPests Multifeeder bait station can be closed off to stop nontarget species accessing the bait. If large areas need to be treated then consider using aerial or ground applications using a registered applicator, this will allow baits to be spread on the ground.

SMARTER THAN 1080

	PINDONE	1080
No Pre-Feed Required	✓	×
Stock Re-Entry Time	28 Days	90 Days
Dog Antidote Available	✓	×
Ground Application (CSL Required)	✓	✓
Aerial Application (CSL Required)	✓	✓
Bait Station Application Available to Public	✓	×
Pellet & Liquid Formulations Available	✓	✓
Rate per Hectare	Up to 18kg	Up to 15kg
No Clean Up Required. All Bait Consumed.	✓	×
Type of Vertebrate Toxic Agent	Multiple Feed	Single Feed

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The good work continues

Despite continuing disruption across the country from Covid 19 the good work has gone on, and this issue highlights the variety of work Institute members have been involved with.

Wallabies have had quite a high profile recently, with a number of regions asking people to keep an eye out for the unwanted jumpers over the summer break. This issue features an item from Greater Wellington about a testing operation to ensure the region remains wallaby-free.

This issue contains a brief summary of two reports from the Parliamentary Commissioner for the Environment on chemicals in the environment, and invasive plants, both will affect the biosecurity sector to varying degrees.

This issue also introduces the 2021 NZBI Scholarship winners. There are three winners this year, all working on the same biosecurity challenge. An allied item, contributed by Unitec, shows the very real career benefits of linking practical industry training with study programmes.

Flying a drone to a specific location is relatively easy but being able to hit a target on the ground with a high degree of accuracy is not so simple. This issue notes research on increasing this precision particularly for pest animal control.

Covid has seen the adoption of a few new words and abbreviations. As well as vax or anti-vax, I'm talking about WFH and WFB. There's also an explanation in this issue of other shorter versions of slightly more complicated concepts like GNSS and PNT, neither of which are research organisations or medical conditions.

If you are wondering WTH some things mean; sometimes the answers are at the very end.

Read on for more good-news stories, interesting research, and battles fought-and-won.

Chris Macann
Protect Magazine Editor

Continued disruption but plenty of good news too

This summer has seen continued disruption in all sectors throughout New Zealand due to Covid 19. Plenty has also been achieved.

The Parliamentary Commissioner for the Environment has recently released two reports affecting the biosecurity sector. The first on invasive plants, the second on chemicals in the environment. Both will be of interest to members. It's also significant **that Institute members will have had major input into the report** on invasive plants.

The NZBI executive committee has been considering ways of making oral history recordings from the Institute's ongoing Oral History project more accessible to members. A selection of clips from these recordings is now available in the members' section of the website.

Three students at Unitec, Auckland have each been awarded an NZBI Scholarship. The Institute generally awards only one NZBI Scholarship each year. It also generally awards a Wendy Mead Professional Development Award. However, as the Wendy Mead Professional Development Award has not been presented since 2019 due to Covid-19 disrupting travel, the Institute has sufficient funds to present three scholarships this year.

It is pleasing to see Landcare's weed biocontrol team receive recognition at the 2021 Science New Zealand Awards. A significant number of members of the team are Institute members.

Keep up the good work one-and-all.

The NZBI Executive Committee

Three winners of NZBI Scholarship for research into recently arrived beetle

Research on a potentially invasive beetle has won three students at Unitec, Auckland each a NZBI Scholarship.

Chryee Jones, Sarah Kate Wechsler and Maddy Gibson each have a scholarship to work on a project to research granulate ambrosia beetle (GAB) in New Zealand.

Chryee Jones, in her third year of a Bachelor of Applied Science will be the lead researcher. Sarah Kate Wechsler, and Maddy Gibson, both in their second-year of a Bachelor of Applied Science will be contributing to the granulate ambrosia beetle research by undertaking the field work to determine the beetle's distribution in the Auckland region, and in which plants it might be present.

The beetle is native to South East Asia and is now widespread in America, Europe, some Pacific Islands and recently Queensland. In 2019 it was found in New Zealand and has the potential to affect a wide range of native commercial tree and shrub species here. In addition, it could be a mechanism for the introduction of pathogenic fungi.

The aim of the research is to determine the current distribution of GAB within the Auckland area, and catalogue all plant species in which invasion is detected, and to conduct a literature search on the current knowledge of the plant associations of GAB.

On the job: Maddy, Chryee, and Sarah Kate.

The awards committee decided the GAB project is an important one, and that each of the researchers has a role to play in it, and it will assist their academic work.

Chryee said the scholarship validated her research.

"For me this scholarship just validated that I'm moving from 'just a uni student' to someone doing something that seems worthwhile to the scientific community. It adds value and a level of importance to the work I'm doing that I haven't had before.

"In a literal sense it means I can purchase the equipment I need to get the research done that I otherwise wouldn't have been able to afford as a full-time student."

The students will be supervised by Associate Professor Diane Fraser in collaboration with Andrew Pugh of Scion, Rotorua.

The New Zealand Biosecurity Institute's two financial awards

The NZBI generally awards only one NZBI Scholarship each year. It also generally awards a Wendy Mead Professional Development Award. However, as the Wendy Mead Professional Development Award has not been presented since 2019 due to Covid-19 disrupting travel, the NZBI has sufficient funds to present three scholarships this year. The purpose of the Wendy Mead Professional Development Award is to provide a member of the NZBI with funds to assist with travel expenses where that member is undertaking travel to further their knowledge in the field of biosecurity.

Clean, compost and de-sex: three habits for this summer

The Institute prepare this article to encourage people to help members do their jobs over the summer:

Clean, compost and de-sex are three simple habits a key biosecurity sector group wants Kiwis to adopt this summer to help prevent the spread of pests and diseases other than Covid 19, even though Covid 19 is front-of-mind for good reason.

The appeal comes from the NZ Biosecurity Institute - the networking organisation for all people involved in all aspects of biosecurity.

Institute President Alice McNatty said that its members have continued to work tirelessly to address wider biosecurity issues, and she wants to encourage people to remember other biosecurity threats are ever-present.

Ms McNatty said the Covid 19 response has already asked a lot of all Kiwis.

"We are just asking for their support by adopting three simple habits: clean all equipment that has been in waterways and the outdoors; compost or dispose of garden and aquarium waste at a greenwaste or landfill site; and desex pets and prevent them from roaming."

Ms McNatty said these are three simple habits people can adopt which will have a huge impact on the long-term health of the environment and also help Biosecurity Institute members do their jobs.

"Some of our worst pests come from gardens or aquariums, others are transferred on equipment and clothing. Domestic pets which are allowed to roam can also have big impacts.

"Every year Institute members spend thousands of hours controlling or managing the risks to the economy and the environment from the effects of invasive species."

"This is work which costs the country hundreds of millions of dollars each year through control, research and border control budgets. This money is coming out of all New Zealanders' pockets," Ms McNatty said.

Anyone who thinks they have seen something potentially out of place should contact Biosecurity New Zealand, which has a dedicated pest reporting website, or a regional council or the Department of Conservation.

"We encourage people to investigate before phoning immediately."

She said other helpful websites for information, or for reporting observations are: Weedbusters, iNaturalist NZ, Find-A-Pest, and BionetNZ.

Listen to this

A selection of clips from the NZ Biosecurity Institute's ongoing Oral History project is now available in the members' section of the NZBI website.

These clips are extracts from interviews carried out as part of the Institute's ongoing Oral History project. Most are stored in perpetuity with Archives New Zealand. The NZBI executive committee is considering ways of making these recordings more accessible to members.

Representative clips include:

Ray Clary, former Senior Biosecurity Officer, Pest Animals with Wellington Regional Council, based in Wairarapa, talks about manually formulating pest control bait pellets. Ray retired in 2012. He has been involved with pest animal control in the Wellington region and elsewhere for more than fifty years.

Ray Clary talks about gun dogs, fumigation, getting the last rabbit, and what rabbits like.

Walter Stahel (29.12.1942 – 19.8.2020) talks about alligator weed control and the usefulness of weed mats. Walter was a Noxious Plants Officer, at the Bay of Plenty Regional Council. He retired in 2012. He began his biosecurity career in 1974 as a Rabbiter with the Hawkdun Pest Destruction Board in Central Otago.

Jack Powell (14.6.1925 – Nov 2013) talks about money for rabbit skins, cattle for rabbit control and farmers walking off the land. Jack began rabbiting in the 1930's. At the time of his retirement in 1985, he was a Senior Field Officer with the Agricultural Pest Destruction Council, dealing with Pest Destruction Boards throughout the country.

Zoe Battersby talks about her experiences as the wife of a pest controller and attending conferences. Zoe is the wife of Les Battersby, who was Supervisor of the Kaikoura Pest Destruction Board at the time of his retirement in 1989. He began his pest control career in the mid-1950's. Zoe is mother of Kevin Battersby also a pest controller.

If you know of anyone with an interesting tale to tell, please contact Oral History Co-ordinator Chris Macann.

2021 New Zealand Biosecurity Awards Winners

New Zealand Biosecurity Supreme Award winner

Winner: Xerra Earth Observation Institute 'Starboard' tool

Vessels arriving from international waters are vectors of exotic pests, disease agents and unwanted organisms. Xerra Earth Observation Institute's Starboard tool is a maritime intelligence project which is able to detect hitchhiker pests. Starboard can assess the biosecurity risk of every ship or boat entering Aotearoa based on their vessel movements and port visits in the last 12 months, game-changing for marine biosecurity.

Starboard is a database of more than 16 billion ship positions worldwide. Vessels arriving from international waters are vectors of exotic pests, disease agents and unwanted organisms. The team realised that the risk of a vessel bringing unwanted organisms to Aotearoa is strongly related to its past journey track and characteristics of travel.

To achieve the required combination of data management, science-based analytics and usability, Xerra have built a multidisciplinary team of environmental, remote sensing and data scientists, software engineers and product designers.

By bringing together scientists, designers, engineers and end-users they are delivering a much-needed solution and improving marine biosecurity for New Zealand.

Winner: Xerra Earth Observation Institute 'Starboard' tool

This year's awards recognised the project's impact and innovativeness for biosecurity, awarding Xerra the New Zealand Biosecurity Supreme Award in addition to the GIA Industry Award and the Mondiale VGL Innovation Award.

Winner: Peter Wilkins for outstanding contribution to New Zealand biosecurity.

Minister's Biosecurity Award

Winner: Peter Wilkins, for outstanding contribution to New Zealand biosecurity

With more than 45 years dedicated to biosecurity, including responding to over 80 pest incursions, Peter Wilkins exemplifies what makes our biosecurity system strong and resilient.

His biosecurity work spans a huge range of pests and pathogens (most recently at AsureQuality), including many highly successful fruit fly responses. Peter is a passionate, calm and highly experienced leader in his field of pest eradication and response management and is a very worthy recipient of the Minister's Biosecurity Award winner for 2021.

continued ▶

BioHeritage Challenge Community Award

Winner: Eastern Whio Link

Eastern Whio Link (EWL) is a project led by hapū, hunters, fishers and farmers that is helping to bring native species back from the brink of extinction through predator control and mahinga kai (protection of natural resources).

The project was started in the Upper Waioeka Catchment on New Zealand's East Cape in 2020 by a small group of volunteers and has quickly gathered momentum. EWL has developed partnerships with seven educational organisations and there are now over 80 active volunteers.

EWL has established biosecurity for Whio and Kiwi through a large landscape trapping programme.

Winner: Eastern Whio Link

Māori Award

Winner: Te Roroa – Te Toa Whenua

Te Toa Whenua (TTW) is an initiative by Te Roroa iwi for the ecological restoration of 900 hectares of land returned to Te Roroa as part of the Treaty of Waitangi Settlement process from exotic forestry to a mosaic of sustainable land uses in the Waipoua Valley in Northland.

The project involves intensive pest plant and pest animal management and indigenous reforestation.

The project represents an opportunity for Te Roroa, partners and the community to actively exercise tangata whenuatanga.

Winner: Te Roroa – Te Toa Whenua

Kura (School) Award

Winner: Lynmore Primary School – Lynmore Hunga Tiaki

Student-led action has been at the heart of Lynmore Primary School's biosecurity activities. Their predator trapping journey started six years ago when a parent of a child offered them a DOC200 trap to catch rats in the school's native bush area.

Six years on from setting this one trap, students have built and given out over 300 traps to people in their local community; provided and helped maintain traplines on Mokoia Island bird sanctuary; and students themselves maintain two traplines in Whakarewarewa Forest and one in their school grounds.

They work closely alongside Te Arawa Lakes Trust on catfishing projects in Lake Rotorua and Lake Rotoiti and have netted and removed thousands of catfish from these lakes.

Winner: Lynmore Primary School – Lynmore Hunga Tiaki

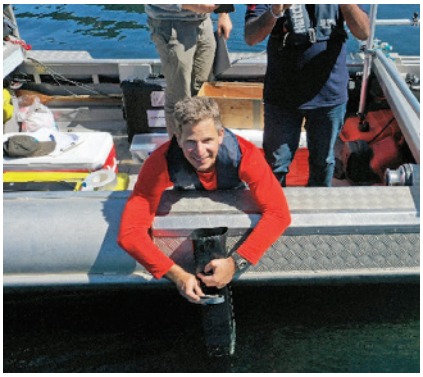
Eagle Technology Local and Central Government Award

Winner: Bay of Plenty Regional Council Marine Biosecurity team – Toi Moana

The Bay of Plenty Council Marine Biosecurity team is making a huge contribution to the surveillance and control of invasive marine pests across the upper half of the North Island.

The group delivers operational surveillance and control work for other councils and works with iwi to enable them to participate actively in marine biosecurity.

Carrying out more than 5,000 person hours of diving each year, this team have been instrumental in detecting and subsequently undertaking Mediterranean fanworm responses on behalf of Biosecurity New Zealand at five locations. They are also responsible for the detection of the new pest species *Clavelina oblonga* at Great Barrier Island.



Winner: Xerra Earth Observation Institute 'Starboard' tool

GIA Industry Award

Winner: Xerra Earth Observation Institute 'Starboard' tool

Xerra have created Starboard Maritime Intelligence to support operational and research-based marine biosecurity, a project which has not only won this category but also the Mondiale VGL Award and the coveted New Zealand Biosecurity Supreme Award for 2021.

Winner: Bay of Plenty Regional Council Marine Biosecurity team – Toi Moana

continued ▶

Bioprotection Aotearoa Science Award

Winner: Cawthron Institute Aquatic Animal Health Research Programme

Cawthron Institute's Aquatic Animal Health Research Programme has tackled major biosecurity issues facing New Zealand, with a focus on supporting the resilience of the aquaculture sector and enabling more informed and proactive farm health management.

This helps to prevent outbreaks of aquatic disease, which protects New Zealand's seafood industry, human health, and marine ecosystems.

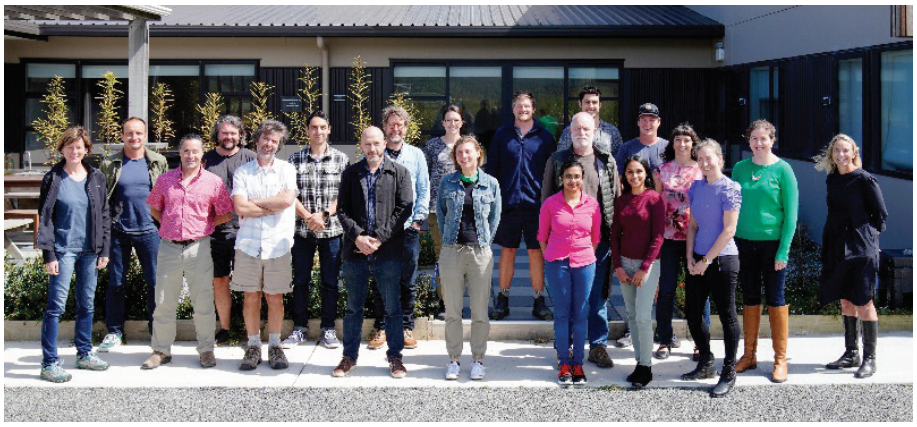
Funded through the Ministry for Business, Innovation and Employment's Endeavour Fund, the programme objectives are to develop methods for better detection, diagnosis, prediction and management of aquatic health and disease.

AsureQuality Emerging Leader Award

Winner: Patrick Cahill, Cawthron Institute

Patrick Cahill has led the Biosecurity team at the Cawthron Institute since 2019. His team are recognised internationally for pioneering contributions to biosecurity surveillance, response, and management in the marine environment.

Patrick provides leadership 'from the back', with a strong strategic mind, attention to detail, and brilliant relationship building abilities. Patrick leads by example, continuing to maintain and grow his own research speciality to develop innovative treatment tools for invasive marine pests.



Winner: Cawthron Institute Aquatic Animal Health Research Programme

Mondiale VGL Innovation Award

Winner: Xerra Earth Observation Institute 'Starboard' tool

Xerra have created Starboard Maritime Intelligence to support operational and research-based marine biosecurity, a project which has not only won this category but also the GIA industry Award and the coveted New Zealand Biosecurity Supreme Award for 2021.

Winner: Patrick Cahill, Cawthron Institute

The NZBI Legacy Awards

The New Zealand Biosecurity Institute has its own Legacy Awards, also presented Annually:

Two financial awards:

The NZBI Scholarship to provide funds to assist with an individual's research to improve knowledge in the field of biosecurity.

The Wendy Mead Professional Development Award to provide a member of the NZBI with funds to assist with travel expenses where that member is undertaking travel to further their knowledge in the field of biosecurity.

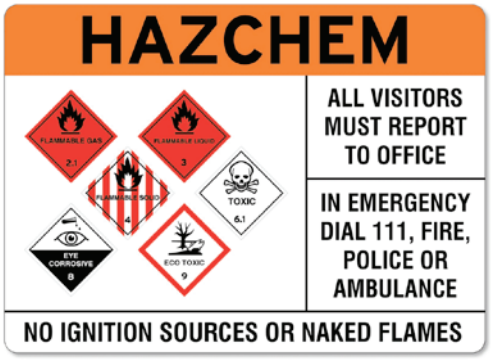
Three Awards recognising Excellence:

The Peter Nelson Memorial Trophy awarded annually to individuals or organisations, for achievement in Vertebrate Pest Management within New Zealand.

The Peter Ingram Award presented to a member of the Biosecurity Institute who has successfully undertaken or enabled others to achieve, relevant to pest plant education, control or management.

The Dave Galloway Innovation Award recognises innovation in biosecurity by an individual, group or organisation.

Knowing what's out there: Regulating the environmental fate of chemicals



The Parliamentary Commissioner for the Environment has released a report which suggests the need for a more effective way of monitoring chemicals in the environment.

The report titled "Knowing what's out there: Regulating the environmental fate of chemicals", looks at four categories of chemical pathways: wastewater and biosolids, landfill leachate, stormwater, and agrichemical applications. It specifically notes, in the section on agricultural chemicals, that "national controls and conditions do not typically require monitoring (except in a small number of cases, such as the use of 1080).

Here below is the information the Commissioner's office provided with the release of the report in early March 2022:

The Parliamentary Commissioner for the Environment, Simon Upton, is proposing changes to the way New Zealand manages chemicals to make sure their environmental impacts are not overlooked.

"On paper, there is a robust system in place to assess risks when a chemical is introduced to the country. But many chemicals that have been in use for decades have not been subject to close scrutiny. Much of the science on their environmental impact has changed," the Commissioner says in a report released today.

"The rules about how a chemical can be used shouldn't be static – we need to be able to adapt as new information comes to light.

"Restrictions should be based on the latest science and informed by New Zealand-specific data on use and impact."

The report, *Knowing what's out there: Regulating the environmental fate of chemicals*, found that there are gaps in the way we monitor chemicals in the environment and in how we interpret their impact on living things.

Of the monitoring that is undertaken, there is little feedback to the chemical management system that determines how chemicals are used.

"While not all chemicals present a high level of concern, **there is a lot we don't know about chemicals reaching our environment, including how much is used, where they are used, and the effects they are having**," the Commissioner said.

"Finding out after chemicals have caused irrevocable impacts on the environment is too late."

The Commissioner proposes that all agencies dealing with chemicals, alongside Māori, develop a common framework to better manage the environmental impacts of chemical use.

This framework should prioritise action on contaminants that pose the highest risk based on how much a chemical is being used, the potential environmental harm it could cause, and how much of it is being detected in the environment.

To gauge the scale of a chemical's use in New Zealand, the Commissioner recommends collecting and reporting data throughout a chemical's lifecycle. This would require importers, manufacturers, and sellers of chemicals to report on chemical quantities.

"If we know what is being used and the regional distribution of that use, we can then organise our environmental monitoring to match the scale of chemical use," he said.

"There are over 30,000 chemicals approved for use across the country, but only around 200 chemicals are routinely tested for.

"While we cannot test every ecosystem for every chemical in New Zealand, we can do more to target those of highest potential risk to the environment.

"We also need to do a better job of setting limits for acceptable concentrations of chemicals in the environment and monitor whether these levels are being exceeded."

To assist these goals, the Commissioner wants greater use made of environmental exposure limits and better guidance on monitoring on a regional and national scale.

Monitoring guidance should include the scope and frequency of monitoring as well as the development and implementation of Māori cultural monitoring.

"In a perfect world, if chemicals are used in the way they are approved to be used – taking into account their likely environmental fate – then what we see and find in the environment should be at acceptable levels. But theory rarely matches reality."

"If we make these adjustments to the system, we should be able to see when problems occur and amend conditions as new information arises."

The Biosecurity and Biodiversity Journey for LINZ

Land Information New Zealand Toitū Te Whenua published its Biosecurity and Biodiversity Strategy in late 2021. Here is a brief note introduction to the strategy contributed by LINZ:

This strategy aligns with the national biodiversity strategy, Te Mana o te Taiao, which was launched by the Department of Conservation in 2020.

The strategy provides a guide to our priority-setting and investment decisions, and a framework for how we will engage with partners and stakeholders to involve them in decisions and operational planning. It sets out an ambitious vision of LINZ-managed land being in the best environmental state possible, via four strategic goals that will help us progress towards this vision, including:

1) Proactive and effective land management

2) Data excellence for informed decision making

3) Empowering connection and partnership, and

4) Working with Māori as kaitiaki and as having mana whenua.

Our first two-year action plan was kicked-off this financial year and the strategy will continue to support our work programme beyond its current expansion, made possible through Jobs for Nature funding of $40 million (over four years) allocated to LINZ as part of the Government's Covid-19 recovery response in mid-2020.

This is an exciting journey for us, and we are grateful to everyone working alongside us to help enhance biosecurity and biodiversity across New Zealand. We would especially like to thank our staff and partners who offered their time and advice to review draft documents.

The strategy is available from the LINZ website.

Trying out Double Tap bait

Bruce Brewer from Greater Wellington Regional Council reports here on a trial of Double Tap bait on a mainland island in the region last year.

'Double Tap' is a recently registered pellet bait for controlling rats and possums. It contains 50ppm of diphacinone and 600ppm of cholecalciferol.

Both of the toxins in Double Tap bait (diphacinone and cholecalciferol) are non-water-soluble. Both are biodegradable, with cholecalciferol having a half-life of about 8 months, and diphacinone having a half-life of about one month. However cholecalciferol doesn't have an antidote, so that may create an increased risk to children and dogs compared to anticoagulants.

A decision was made to try out Double Tap bait in the 1200 hectare Wainuiomata Mainland Island. This area is a water supply catchment, and three important considerations seemed to make this a good location for a trial:

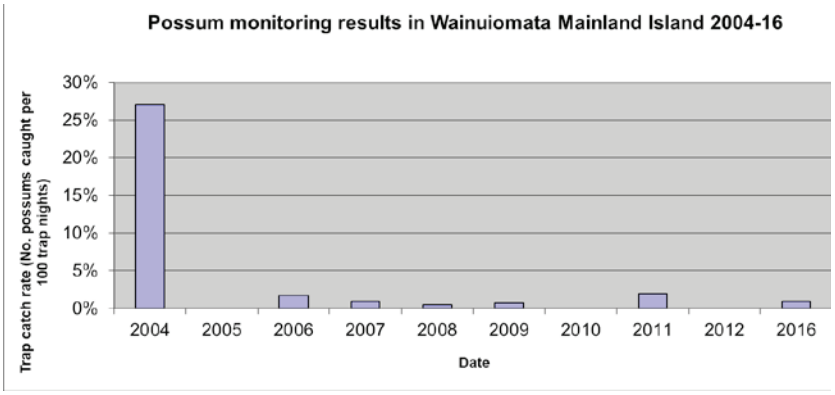
Firstly, the water supply catchment is closed to the public, so there was almost no likelihood of pet dogs or children being accidentally poisoned. However an additional precaution was taken of not using the bait within 100m of the boundary of the catchment.

Secondly, neither toxin is soluble in water, so contamination of supply water is a negligible risk.

Thirdly, both toxins are already permitted for that location, minimising the need for notifications and approvals, and consequently, the water supply is already routinely tested for the presence of these toxins.

The catchment has a network of pelifeed bait stations at 100m x 150m spacing, as well as a network of possum traps. The most recent possum RTC (Residual Trap Catch rate) that included this area was 0.4% in October 2018- a post-monitor for a 1080 operation.

Since 2005, possum RTCs in the mainland island have not exceeded 2%.



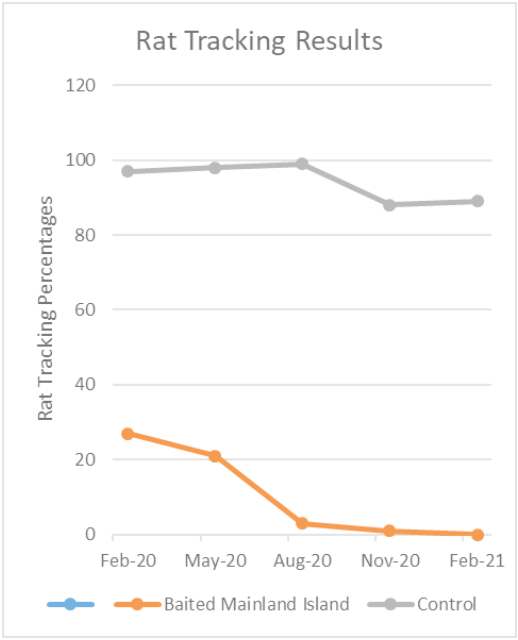
The bait stations are for rats. Traps minimise possum numbers.

The bait stations are therefore solely intended for rat control, with the traps being the primary method of possum control, but the decision was made to ensure that a potentially lethal dose of bait for possums (10 x 12g pellets) was used in each bait station.

The Double Tap bait was put into the bait stations in late October 2020, and replaced about 6 weeks later, in December 2020. That bait was then removed in early February, replaced with Ditrac blocks

In most cases, around two pellets of bait had been eaten. Remaining bait had not rolled forward to the mouth of the bait station, and the long shape of the pellets prevented this. It would seem that the 12g pelifeed bait stations and Double Tap bait are not the best combination, but the effect on the rat population was still impressive, with the subsequent monitor showing 0% rat tracking. On both occasions, the uneaten bait had gone mouldy in the bait stations within the six to eight week period that it was in the field.

As the remaining Double Tap bait was removed, it was replaced with Ditrac blocks on wires. This was scheduled for a period when contracted hunters with dogs were due in the area for pig control, followed by the roar, with balloted deer hunters.



Results:

The rat tracking percentages were already low in the treatment area, following brodifacoum treatment. A monitor just prior to the first Double Tap treatment showed rat tracking at 3%. Reassuringly, the rat tracking percentages remained low, and even dropped further, after two treatments with Double Tap, falling to 1% then 0%.

Over the same period, in an adjacent area of forest where no ongoing pest control occurs, rat tracking percentages stayed very high – high nineties to mid-eighties over the course of the year.

This seems to be a good outcome that confirms the suitability of Double Tap bait for these circumstances, although using the 6g pellet bait rather than the 12g pellets would be better in this design of bait station.

Wellington wallabies:

Getting onto them when there's not many there

Senior Biosecurity Officer at Greater Wellington Regional Council, Reuben Harland contributed this report about a challenge laid-down to staff when wallaby appear where they're not expected, and most definitely not wanted.

Dama wallaby Macropus eugenii [Waikato Regional Council]

As with many regional councils, Wallabies are included in GWRC Regional Pest Management Plan because they pose significant risk to biodiversity and the environment. When our current plan was implemented in 2019 Wellington was fortunate that no wild wallaby were known to be present, and were therefore listed as an exclusion pest.

In 2021 all that changed. From time-to-time GWRC biosecurity staff are notified of wallaby sightings or wallabies held as pets. Usually, **these sighting turn out to be a dead hare or possum on the side of the road or some "funny bugger" dumping a dead wallaby on the side of the road.** In September that's what happened, several reports came in of a dead wallaby spotted on the side of SH2 near Kaitoke Regional Park. This turned out to be a male Bennets wallaby which appeared to have been shot with a large calibre rifle. An investigation involving landowner interviews, day search of likely surrounding habitat, water eDNA sampling, camera trap network and night thermal searches was undertaken then closed after three weeks with no further sighting or evidence of wallaby presences.

Then in October, not 3km away a pig hunter reported spotting a live wallaby near the boundary of Pakuratahi Forest Park on private property covered in thick vegetation and the witness was credible as he had hunted wallabies and possums before and was adamant he got a good look at what was a wallaby. Upon inspection of the properties surrounding the wallaby sighting, wallaby scat was detected along with a partial foot print. Initially twelve camera traps were installed at locations of scat and likely habitat with a Pelifeed bait station installed 300mm off the ground containing non toxin prefeed (Sharps Multifeed nuts). A week later six of the twelve cameras contained images of a Dama wallaby, along with rats, possums, pigs, goats and deer. Only one wallaby was seen per image and no images of a wallaby were captured on different cameras at the same time. 400m separated the largest distance between camera sightings, easily within the home range of a single Dama Wallaby.

We then had to figure out how we were going to kill the wallaby and recover its carcass. **Recovering the carcass, while not essential for completing the objective of eradicating wallabies, would assist in the investigation into who or how the wallaby got there,** MPI is currently assisting in the investigation which is ongoing.

The vegetation on the site is dense mature manuka and low scrub and gorse, so not ideally suited to hunting. We also felt there was a risk that too much pressure with hunters and dogs could displace the wallaby to an unknown location. Night searching with thermal equipment of the bush edge 2-300m from the wallaby sighting locations did not detect any wallaby so shooting them on the bush edge was also ruled out. Trapping would likely be

unsuccessful and labour-intensive on a low-density populations. While both 1080 and cyanide are registered for the control of wallaby, Feratox (cyanide) was determined to be the preferred option as it would allow us to recover the carcass and likely be easier and quicker than 1080 to get Ministry of Health (MOH) and landowner approval. However in order for the feratox to be successful we needed to reduce the interference from rats and possums first.

The bait stations in front of the Camera traps were replaced with rabbit modified Philproof bait stations as these were deemed more suitable for wallaby. Sharps Multifeed nuts and Ferafeed placebo balls were dispensed from these. Six Enviromate 100 automated bait stations were also trialled alongside the Philproofs. The advantage of the Enviromate was that we could programme it to open a fresh bait well early in the morning, after possums had left to allow the wallaby access to fresh bait because the possums were dominating the bait station sites. We did not obtain evidence that this approach was successful, other than a couple of photos of a wallaby attempting to eat prefeed from the Enviromate. We presume the opening and bait well size of the Enviromate is not ideally suited to wallaby feeding habits and preferences.

To control possums, the Pelifeed bait stations were raised to 1.4m and filled with Brodifacoum and several Warrior possum kill traps installed at sites wallabies had been observed. This prefeeding and possum and rat knock down continued for two weeks while we completed the MOH application process then non-toxin Striker prefeeds were installed. A wallaby was observed on camera consuming a striker prefeed bait station and Ferafeed placebo balls from the Philproof Bait stations. It was during this time we got our first image of 2 wallabies at the same time so now knew we were dealing with more than an individual.

In conjunction with the prefeeding, the camera trap network was expanded to cover roughly 170 ha with roughly 50 cameras located in suitable wallaby habit with a prefeed bait station at the site and in shot of the trail camera.

Once the Feratox operation had MOH approval, six ferafeed strikers containing two feratox pills were stapled roughly 250mm above the ground on trees surrounding the camera trap locations where wallaby had been sighted. In addition 3-4 Ferafeed balls containing a Feratox pill were placed in each Philproof Bait station at camera sites where wallaby had been seen and strikers were stapled to trees at 15-20m intervals on lines between cameras sites.

The next day the cyanide baits were checked and four adult Dama wallaby carcasses recovered.

Wellington Zoo vets undertook post mortem exams and confirmed the two males had been castrated, and one of the two females had received an oophorectomy, while the remaining female was intact, but did not appear to have carried a joey in its life.

Manaaki Whenua – Landcare Research has agreed to age the jaws, and we are awaiting these results.

Cyanide baits remained in the field for seven days and any remaining pills recovered and disposed of. The camera network was widened further up the gully to the Remutaka Main Range and no further wallaby carcasses were recovered and no wallaby images were captured for the subsequent six weeks of monitoring.

Two further wallaby sighting locations in Featherston and Kaitoke were also investigated after the public reported sightings through the MPI Reportwallabies.nz website or directly to GWRC resulting from increased public awareness from signage and media coverage.

Seven weeks after the wallabies were poisoned, two wallaby detection dogs and handlers searched the three wallaby sighting locations. No dog detections were found at the most recent Kaitoke sighting or Featherston sites and along with several weeks of camera traps with no wallaby detected we have decided to cease further investigation here until further evidence emerges from these sites.

At the original site, fresh wallaby scat was detected by the dog team in a small discreet location between camera trap locations. A further six cameras have been installed through this area and on January 9th another wallaby was captured on camera. **Unfortunately, pigs have become habituated to the prefeed bait stations and are consuming the non-toxin prefeed preventing wallaby pre-feeding.** On January 26th two pig leg snares were installed and on January 27th a 210lb pig was captured and destroyed. If there is no further pig interference, wallaby prefeeding with non-toxin strikers and ferafeed balls will commence in early February followed by feratox application after two weeks of prefeeding.

Where's Wallaby?

In January, Biosecurity New Zealand requested information from widespread parts of the country for information on wallaby sightings.

Here is an abridged report about the request aimed at Waikato, Bay of Plenty, Canterbury, and Otago regions in particular:

Biosecurity New Zealand's director of readiness and response, John Walsh, said reports are fundamental to the success of stopping their spread.

"We have a real concerted effort underway in partnership with regional councils, the Department of Conservation, manawhenua, industry groups and landowners to try to contain existing wallaby populations, because left unchecked, they could cover a third of the country over the next 50 years.

A roadside wallaby sign in South Canterbury.

"This partnership, the National Wallaby Eradication Programme builds on existing wallaby management work, and with $27 and half million dollars funding over four years, it is also boosting regional employment opportunities while also delivering environmental and economic benefits."

"We can't afford to let wallaby populations spread further. Ultimately, we want the country to be wallaby-free. It's not a quick fix, and we need to get it right," said Mr Walsh.

" Our estimates place the environmental and economic damage caused by wallabies reaching $84 million a year in lost farm production and ecosystem services by 2025."

Without natural predators, their populations have surged wildly.

This is particularly true in South Canterbury and Rotorua Lakes, where their numbers are up in the tens of thousands.

Control efforts by local councils, landowners and organisations have been underway in these regions for decades but have been stepped up through the unified National Wallaby Eradication Programme.

Using drones to target and control pests

Flying a drone to a specific location is relatively easy, but being able to hit a target on the ground with a high degree of accuracy is more difficult and requires precision flying and an effective electronics system.

Craig Morley, Associate Professor Resource Management, Toi Ohomai Institute of Technology, Rotorua explains research into ways to increase accuracy.

In August-Oct 2021, a team of researchers from Toi Ohomai Institute of Technology (Rotorua), X-Craft (Auckland), Aerospread (Napier) and Ngāti Mākino (Bay of Plenty) used drones (unmanned aerial vehicles [UAV] or remotely piloted aircraft systems [RPAS]) to deploy 1080 to kill rats and possums. Our question was: could we target and control predators in low-density populations in hard-to-reach locations as we wanted to test whether this technology will allow us to focus on areas (or gaps) where there has been little or no pest control?

Currently, pest controllers use bait buckets/hoppers attached to aircraft to offload bait (which is either trickle-feed or broadcast), or time-consuming ground control methods. While these systems are effective over large areas with large buffer zones or in areas where ground access is easily traversable, they are not always economically viable or effective in small complex sites near streams, rivers and wetlands, buffer zones, sensitive sites (e.g. archaeological sites, wāhi tapu, urupā, pā sites, near farm boundaries, woodlots, reserves or on small islands.

Flying a drone to a specific location is relatively easy but being able to hit a target on the ground with a high degree of accuracy is extremely difficult and requires a great deal

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Yamaha Fazor R-GM drone with RPAS pilot, Greg Quinn from Aerospread Technologies.

precision flying and a complicated electronics system capable of pin-point deployment. This is done by linking the drones autopilot system with GPS positioning using GNSS-aided technology. While we used manual operations for the trial, all future communications will be uploaded onto a cloud-based platform.

By using drones, we can now target pests in specific locations or "hotspots", deploy bait over steep inaccessible sites and all while not having to cut and maintain tracks that disturb the bush/forest below as cut tracks also act as dispersal pathways for pests. As the system is unhampered by the terrain and vegetation below, it speeds up control allowing for constant suppression. Our system is environmentally friendly, economically sustainable and, scalable as we can use several drones for different operations. More importantly, we can ascertain if the bait deployed is being consumed as all baits are GPS located.

For our proof of concept trials, we used a Yamaha FAZER R-GM (one of only 3 in the world). This drone flies for an hour using a 390cc petrol-engine and has a bait payload capacity of 30-35kg. Yamaha RMAX & FAZER drones have been in operation for around 40 years and have amounted over a million flying hours. We also used a battery-powered DJI M600 drone. A key advantage of drones is that they can easily be transported and take off from virtually anywhere.

For our trials, we designed a bait dispensing unit that is fixed to the drone to gain even greater precision and accuracy, unlike that of a swath bucket. We deployed the bait in a unique bait pod (like a biodegradable aerial bait station with 240g of 1080 toxin inside). Within these pods, we could potentially place any type of permitted bait/item. **The pods were designed to break open to expose the bait to the target pests. If the pods did not break apart, the target species could easily eat through the outer shell.** We also conducted a number of trials to test the bait pod design for accuracy and on whether non-target species would interact with them. Fortunately, the non-target species generally ignored these large bait pods. While we used brightly coloured bait pods in our trials (so we could relocate them), in future the pods will be green like the bait.

We started our trials on a small 1ha marine island and then moved to a larger 6ha farmland site. Both sites were covered in native trees and bush and the small island had extremely steep cliffs. We then did a trial over a 30ha area where the Māori landowners did not want toxin dropped on their archaeological sites or within a pristine stream that flowed through the site. In 2020, an aerial 1080 operation had been undertaken by DOC in the surrounding forest but this area was not controlled. In total, we deployed 360 bait pods (at 6 bait pods per hectare) over all sites with prefeed and toxic bait pods.

As part of the trial to test and the accuracy and precision of deployment, each deployment position was marked with a GPS reference point and videoed. After the operation, we went into the field where we deployed the baits as we knew exactly where the baits had been deployed. While a few bait pods got caught in the trees, 97% of the bait pods fell through to the ground. We also revisited the same drop locations one month after the operation and found that most of the 1080 had been consumed or that the rain had neutralised the remaining bait.

We also ground-truthed the distance the deployed bait pods were from the intended target. This was done using a GNSS differential GPS. We had previously marked a sample of the drop locations so we could measure the distance where the bait pods landed on the ground. **In open areas, the bait pods landed within 80cm of the intended target, and in the tall native forest under dense vegetation, the bait pods landed within 2.3m of the intended target.** The variation between the open areas and dense forest areas was due to the pods deviating through the forest canopy on their way down to the ground.

With the POC trials completed, we are now investigating how we can enhance the precision

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A drone with the fixed bait dispensing unit underneath for greater accuracy.

and accuracy of our system. The percentage kill efficacy is still being analysed from tracking tunnels and trail cameras data but we saw physical evidence of dead possums and rats on the ground. Wallabies were also detected prior to the operation; however, none were detected after the operation was completed although the sample size was small. However, what we do know this that this system is considerably faster than if done via ground control methods and with this increased speed will come greater cost-efficiencies especially in small steep inaccessible sites. More robust trials are required to test the kill efficacy but we believe our new pod designs, better deployment systems and spatial mapping will be another useful tool to target these pests. We are currently seeking additional funding and trial sites so if anyone wants to be involved in this exciting and novel pest control system, then please contact: craig.morley@toiohomai.ac.nz.

Craig further notes that: "Drones still have to fly line-of-site but there are ways around this but with such a big drone you can see this for quite some distance. The company we are using are working with the CAA to fly beyond visual line of sight. This will come but we can still do a lot of work even under the current regulations."

The pods for the trial we're made of biodegradable wood filament but there are plans for an alternate product.

What all these letters mean: a note on terminology

GNSS (or Global Navigation Satellite System) is a broad term encompassing different types of satellite-based positioning, navigation and timing (PNT) systems used globally.

GPS (or Global Positioning System) is one such type of Global Navigation Satellite System.

Turning back a silent invasion

Parliamentary Commissioner for the Environment, Simon Upton, is calling for the Government to lift its game in protecting native ecosystems from the thousands of exotic plants spreading throughout the country. Many Institute members will have played a part in helping the Commissioner prepare this report which was released in November 2021.

Here is an abridged version of the article that accompanied the commissioners report:

The report, Space invaders: A review of how New Zealand manages weeds that threaten native ecosystems, explains that protecting our native ecosystems from being overrun by weeds not only helps our native taonga plants, but also saves crucial habitat our taonga fauna need to survive.

Māori brought about a dozen new plants with them to Aotearoa. But since European colonisation, more than 25,000 plant species have been introduced.

Over 1,800 of these exotic plants now survive in the wild without human help and are joined by about 20 new ones each year.

Most are escapees from our gardens. The risks they pose will only rise as climate change increases the area over which many of them can spread and conquer.

"We cannot rid New Zealand of every single weed. There are simply too many. But we can be smart about which ones we choose to tackle, have a clear outcome in mind and make sure we coordinate our actions.

"Weed management programmes need to be achievable and sustainable over time – potentially a very long time.

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"There is no point removing one species and creating an expensive 'weed-shaped hole' waiting to be reinvaded. Knowing what comes next is critical."

The Commissioner has made a series of recommendations to improve the way weeds threatening native ecosystems are managed here in New Zealand.

Critically, he is calling for improved national leadership to help coordinate action on which plants to manage, where and how they are to be managed and by whom.

"Our biosecurity system is very good at protecting our borders from exotic plants and looking out for farming and forestry interests. But protecting native ecosystems from plants already established here does not get the same attention."

The Commissioner also recommends better monitoring and surveillance of exotic plants to help nip new nasties in the bud. This includes establishing an emerging risks team to scan for new escapees that could harm native ecosystems. Catching a plant early gives interventions a far better chance of success and is much less costly in the long run.

Effective monitoring and surveillance require better weed information systems. A single, publicly accessible database of all exotic plants in New Zealand needs to be developed and maintained so everyone has a better idea of which plants are in the country and where they are.

Defeating weeds will not be achieved by top-down policies alone. Much of the weed control happening everyday throughout the country is being done by passionate community groups, iwi, hapū and landowners.

These weeders are an integral part of this system and are making a substantial dent in the numbers of weeds carpeting and climbing over our parts of our land. In many cases they are holding the line against what would be a rapidly worsening problem.

The recommendations made in this report are intended to back up these community-based efforts. A better focused and coordinated system would give these groups the support they need to make progress and hold onto it.

With massive land use and climatic change in the offing, that will be harder than ever to achieve.

We need to lift our game.

Landcare's weed biocontrol team nets Science New Zealand Team Award

The Manaaki Whenua Landcare Research weed biocontrol team has received special recognition from Science New Zealand - The organisation which overviews the NZ Science System. This item contributed by the weeds team celebrates that success and provides a background on what the group was rewarded for.

Manaaki Whenua Landcare Research is very proud to report that its weed biocontrol group was a recipient of a 2021 Science New Zealand Team Award.

The Science New Zealand awards are held annually to recognise the contributions and achievements of scientists and teams across New Zealand. This year's awards celebrated 24 awardees across three award categories – Early Career Researcher, Individual/Lifetime Achievement, and Team.

"It's wonderful to see the acknowledgement of our hard work over several decades," said Team Leader Lynley Hayes. "But we didn't do it alone – one of the reasons that our group has managed to be so successful is due to the steadfast support we have received from many quarters over the years."

For two decades, regional and district councils and the Department of Conservation (DOC), operating as the National Biocontrol Collective, have pooled resources for weed biocontrol funding, undertaking collaborative decision-making about weed prioritisation and assisting with releases and monitoring of agents.

In addition to these applied research programmes, fundamental, underpinning research is supported by the Ministry of Business, Innovation and Employment's Strategic Science Investment Fund. This research has resulted in significant knowledge

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breakthroughs in weed biocontrol science to make it even safer and more effective, and also more cost-effective.

This award acknowledges the weed biocontrol group's contributions to the sustainable management of invasive alien weeds in New Zealand. The group has conducted research facilitating the release of biocontrol agents to control serious intractable weeds across all regions of New Zealand, from native forests to farms throughout the North and South Islands.

This research has benefited all sectors required to effectively and more sustainably manage invasive alien weeds, including government agencies such as regional councils and DOC, farmers and forestry operators, and community groups focused on saving local bush remnants.

Weed biocontrol teamleader Lynley Hayes with the Science NZ Team Award which she received remotely on behalf of the team.

Over the past three decades the weed biocontrol group has gained permission to release 45 weed biocontrol agents against 22 target weeds, and has worked with an additional 19 agents approved for release against seven target weeds in the years before MWLR (and its predecessor) came into being. Some of these programmes have been highly successful, with substantial economic and environmental benefits. There has been a 40,000-hectare reduction in infestations of heather (Calluna vulgaris) in Tongariro National Park resulting from the introduction of the heather beetle (Lochmaea suturalis).

Economic analyses show that the Net Present Value for biocontrol of St John's wort (*Hypericum perforatum)* is between $140 million and $1.49 billion over 70 years, with benefit-tocost ratios of 10:1 and 100:1, respectively. The savings in control costs at the more conservative estimate of $140 million more than covers the costs of all weed biocontrol programmes in New Zealand to date. For ragwort (Jacobaea vulgaris), a major pasture weed, biocontrol is estimated to have saved the dairy industry approximately $44 million annually in herbicide costs alone, with a benefit-to-cost ratio of 14:1. In classical weed biocontrol, international collaboration is a crucial aspect since natural enemies are sought from all over the world, from wherever the target weeds originate. The group has been fortunate to work with researchers in Argentina, Australia, Canada, China, Chile, Colombia, Ecuador, France, Hawai'i, India, Jamaica, Japan, Papua New Guinea, South Africa, Spain, Switzerland, the UK, the USA and Uruguay. They have also collaborated with researchers at AgResearch and Scion, and with five New Zealand universities.

From 2012 the MWLR weed biocontrol group has assisted developing countries in the Pacific with sustainable solutions for invasive weed management, with highly successful results already evident in the Cook Islands. In 2019 they were invited to become a founding partner of the Pacific Regional Invasive Species Management Support Service (PRISMSS). Better weed management in the Pacific will improve the well-being and livelihoods of people living in the Pacific by improving food security and human health, assisting with climate change adaptation, and protecting unique and threatened biosecurity. Well done team and keep up the excellent work!

Current team members at MWLR: Alana Den Breeyen, Angela Bownes, Arnaud Cartier, Simon Fowler, Hugh Gourlay, Ronny Groenteman, Lynley Hayes, Richard Hill, Chris McGrannachan, Zane McGrath, Stephanie Morton, Quentin Paynter, Paul Peterson, Chantal Probst, Temo Talie, and Robyn White. Also acknowledged are former group members and others who have provided systematics, molecular, and other support.

Remembering Rusty: thanks for your great service

Rusty the velvetleaf detection dog has passed away after a significant and trailblazing contribution to biosecurity in New Zealand. Rusty, a border collie, was eleven-years-old.

Rusty won the Dave Galloway Award for Innovation in Biosecurity in 2017, along with his human companion John Taylor. Here is a reprint of the item documenting Rusty's achievements which won him the recognition:

John and Rusty have well and truly innovated in the field of pest plant surveillance and deserve this award for their work detecting velvetleaf.

When John read about the velvetleaf incursion, he thought his wonder dog trained for Search and Rescue could be put to good use for the Southland farmers who innocently received this devastating threat.

Funded by MPI to provide a proof of concept in only a few months, New Zealand now has a superior tool for crop and paddock inspection of known and potential velvetleaf infection zones.

John and Rusty work pasture and low growing crops to find velvetleaf plants. Depending on the wind and rain their abilities are well proven. With seventy-five meter swath widths, plants down to two leaves sub-canopy have been picked up. Ranging across paddocks at up to four hectares per hour the duo have found plants unfindable by previous human efforts and have proven invaluable to confirm the current number of infected paddocks in Southland, Waikato and the Horizons region.

This has proven the worth of thinking outside the box.

MPI and John have created a valuable tool for councils and others needing to find velvetleaf to enable early intervention and removal of plants before they seed.

John with Rusty. [Photo Marijn Roberts]

What do plastic toy dinosaurs have to do with biosecurity?

An example of industry working to train for the future

By Diane Fraser, Unitec

Adam Field, Biosecurity Manager at NZ Biosecurity Services Ltd introduced himself to me at the NZ Biosecurity Institute Conference (NETS) in Tauranga in 2019. Since then, a strong education relationship has been fostered between both parties. This includes the delivery of a lecture and an interactive field trip to the company facilities for second year degree students studying in the 'Ecological Risk and Mitigation' course in the Bachelor of Applied Science (BASCI) in the School of Environmental and Animal Sciences (EAS), Unitec New Zealand.

This field trip, which was first delivered in 2021 due to Covid lockdown in 2020, was an opportunity for students to experience some of the practical aspects of biosecurity. Adam set-up a mock vehicle inspection on business vehicles, for students to experience biosecurity tasks they perform. As well as finding hidden plastic dinosaurs, students also learnt how to open the bonnet of a ute, which they were not familiar with, and how to lift the cab of a truck for engine inspection.

This may seem very simple, but the students were highly engaged and thoroughly enjoyed the visit.

Not only did Adam organise an in-house vehicle inspection, he engaged the services of Kerryn Johnson, an Auckland Council Detector Dog handler, to give a mock demonstration of searching their facilities for detection of rodents. This is a requirement for accreditation of the Pest Free Warrant for Businesses, that NZ Biosecurity Services has undertaken.

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NZ Biosecurity Services Ltd is also registered with the BASCI as a work experience placement for students studying the second year 'Practicum' degree course. In this course, students have to achieve 96 hours of work-based experience in an organisation of their field of choice. In 2021, two students were placed at NZ Biosecurity Services Ltd. One of these students was Mihaela Carcianu, who arrived from Romania in 2001and is keen to follow a career in biosecurity.

Mock rat detection demonstration by Kerryn Johnson, Auckland Council, at NZ Biosecurity Services Ltd.

"My placement for my 'Practicum' course with NZ Biosecurity Services has reinforced what I want to do in the future. My goal is to do biosecurity/ restoration work for a few years and after that I would like to become an MPI Border Services Quarantine Officer. I believe that being in the field was the best place I could expand the application of my learning from my Unitec BASCI degree to the identification of plants, my knowledge about a range of invasive species and risk mitigation and ecological restoration in practice."

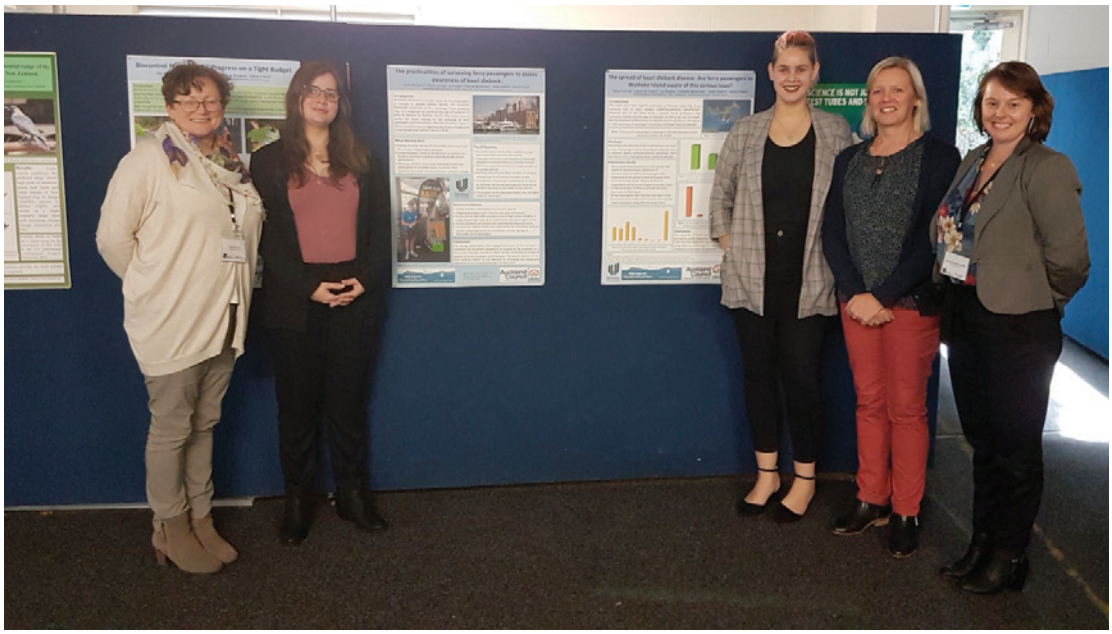
Support of students in their learning is extremely important and the staff at NZ Biosecurity Services Ltd have excelled in encouraging and teaching students during work placement.

"Everyone I came in contact with, including Adam, Danielle Hancock (Operations Manager) and Matt van Archterberg (Team Leader), was very supportive of me and took the time to show me and teach me things that I will never imagine that I will be able to do them myself."

Mihaela at work.

says Mihaela. This support has been so successful for Mihaela, that she has been offered a part-time casual contract with the company while still completing her degree.

Unitec aims to provide "work-ready" graduates for industry and the School of Environmental and Animal Sciences prides itself in providing the opportunity for students to develop the theoretical and practical skills required by stakeholders. As expected, this is vital for graduates in sub-degree vocational education in EAS, but this philosophy is also applied as a primary focus of the BASCI. NZ Biosecurity Services is an important contributor to the review of our course content, allowing the degree to maintain currency to meet the needs of industry.



Students, Laura de Castro (second from left) and Taylor Furlong (third from right) presenting their research, which they did in collaboration with Auckland Council (Liz Brooks, far left and Chelsee Neverman, far right), at NETS in Tauranga in 2019.

From the point of the educator, this industry/EAS relationship is of significant value both for our delivery of biosecurity education but, more importantly, the education and future outcomes for our students. This does seem to have also resulted in benefits for NZ Biosecurity Services Ltd, as they hired two of the BASCI graduates, Laura de Castro and Taylor Furlong, whom some of you may have seen presenting their research, which they completed in collaboration with Auckland Council, at NETS in Tauranga in 2019.

New Zealand Biosecurity Services Limited (NZBSL) is a private biosecurity service provider. It also has an education wing, the New Zealand Biosecurity Academy.

I would like to extend a personal thanks to all staff in NZ Biosecurity Services Ltd who support our students but particularly Adam Field and Matt van Archterberg, which are integral to the development of content and delivery of teaching to our students. Long may this relationship continue for the benefit of all concerned.

Diane Fraser
Unitec

Nassella Tussock: it's just bloody hard work

Here is an extract from an oral history project on Nassella Tussock, allied with the Institute's oral history project. North Canterbury farmer Harry Dalziel talks here about nassella tussock grubbing in the 1960's and 1970's on his property near Amberley.

"I wasn't very happy [when I discovered nassella on my land] because I knew what was going to happen. I was going to have to grub it.

We started grubbing it from the word go. The family were growing up a bit and my eldest children and wife came out to help me grub it, but it was very steep, you couldn't get any cultivation on it - you had to grub it by hand.

I used to go out with my horse tied up to the fence, and spend the whole day there and grub six feet at a time, and go right up, grubbing it right to the top, just like a ploughed paddock, and then walk down and get the ones I missed, and take another six feet. And away I went

… bloody hard work.…

We just grub it out by the roots and let it lie there and die… sometimes one grub, and sometimes three or four. Its hard work.

They did a good job. You do that during the winter time. It took is about three weeks to grub the nassella. If you went every day, it would take about three weeks.

I only went a day here and a day there. You just grubbed, that was all, you just grubbed.

[It was] bloody hard work."

North Canterbury farmer Harry Dalziel, 16 May 2014

Monitoring undertaken by regional councils around the country is also patchy. A few examples illustrate the point. A report concerning a range extension of pink ragwort (*Senecio glastifolius*) in the winter 2020 issue of New Zealand Biosecurity Institute magazine Protect illustrates just how serendipitous surveillance can be. Pink ragwort has been spreading widely throughout the lower North Island but was thought to be currently restricted to just a few locations in the South Island.

The report noted that a Tasman District Council biosecurity officer noticed, by chance, some flowering plants in pots as he drove past a house in Golden Bay and investigated, since he knew the plant was all but absent from the region. It turned out that pot plants, along with unwanted hitchhiking weeds, had been moved from Wellington along with the other possessions of the new occupiers of the house.

Space invaders: A review of how New Zealand manages weeds that threaten native Ecosystems.

Parliamentary Commissioner for the Environment, November 2021

New Zealand Biosecurity Institute

Find us on the web at www.biosecurity.org.nz