NETS2018

New Zealand Biosecurity Institute

Shining the Light on Innovation

25 – 27 July 2018, Nelson

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WELCOME to NETS2018...

I would like to extend a warm welcome to everyone who has joined us for our 68th annual NZBI National Education and Training Seminar (NETS) in beautiful Nelson. NETS is a fantastic opportunity to learn, connect, be encouraged, and participate in the spreading of the biosecurity knowledge at a national level, and I know that this will happen.

NETS2018 is about you, the people of biosecurity in New Zealand. This week is Biosecurity Week and these seminars will bring you a broad range of topics, a range of experts and people working at the coalface of the biosecurity system. NETS is not a holiday but is an opportunity to take a breath and show off who we are and what we do!

The theme for NETS2018 is; Shining the Light on Innovation. Our industry is constantly changing, so it is crucial that we focus on innovation, in order to continue to tackle our old pesty foes and also keep ahead of the new ones. Innovation also helps give direction to the passionate people, you and I, within the biosecurity system.

This NETS experience would not happen without a strong organising committee: Ken Wright, Jono Underwood, Dan Chisnall, Zac Milner, Richard Frizzell, Rob Simons and NETS organizer Carolyn Lewis.

Also I would like to acknowledge all our sponsors whose support enables us to charge modest registration fees to NZ's premier biosecurity event: Marlborough District Council, Ministry of Primary Industries, Key Industries, Boffa Miskell, LINZ, Nelmac, Landcare, NIWA, Element Raw Materials Ltd, Nelson City Council, Tasman District Council, Econode, Archetype Precision Systems, and Wildland Consultants.

Our NZBI Mission is –
"Working together to ensure New Zealand is protected from the adverse impacts of invasive species."

Our aims are to -

- Raise awareness of the Institute and biosecurity issues
- Encourage the development and application of best practice in biosecurity
- Connect people and organisations to share knowledge
- Create opportunities for professional development of members

For the institute and the wider biosecurity system to achieve these aims it requires people. Much of what we do needs people collaborating, people trying a new method, speaking up about a new idea… people taking a risk!

So we have a great line-up of speakers, field trips, workshops and networking opportunities. I trust you will find NETS2018 an enjoyable and valuable experience.

Darion Embling
NZBI National President

Day 1 Wednesday 25 July 2018

9.00 Conference opening - powhiri, official welcomes

9.30 Nelson Nature - Bringing the Wild into our Life (*L. Marshall, Nelson City Council*)

9.50 Janszoon Project – Together Restoring the Abel Tasman (*D. McLean, Project Janszoon*)

10.10 *Morning tea*

10.40 Top of the North Marine Biosecurity Partnership - an inter-regional approach to biosecurity (*S. Clark, NRC & S. Happy, Auckland Council*)

11.00 Top of the South Marine Biosecurity Partnership (*P. Lawless, Lawless Edge Ltd*)

11.20 Project De-Vine - Golden Bay (*N. Clifton*)

11.40 GEMS

12.00 *Lunch*

	TECHNOLOGY	PARTNERSHIP & COLLABORATION
1.00	Using Spatial Application tools to Manage Wallabies in the central north island *S. Allard & D. Williams, Bay of Plenty Regional Council*	Training the trainers; what we learned from delivering War on Weeds workshops around NZ *M. Urlich, Re-Native, Representing QEII and Weedbusters*
1.20	Wilding Conifer Information System: What can it do, what is it doing? *H. Payn, Land Information New Zealand*	Outsmarting Weeds by Connecting Science, Industry and Growers *S. Hona, BOPRC & A. Blayney, Boffa Miskell Ltd*
1.40	Critterpic on the lookout *B. Barrett, Boffa Miskell Ltd*	Managing wild kiwifruit in the Bay of Plenty *J. Mather, Kiwifruit Vine Health*
2.00	Macraes Flat DOC Trapping Innovation *S. Croft, Encounter Solutions*	Cooperative Management of Large Scale Aerial 1080 Operations *M. Hickson, OSPRI New Zealand Limited*
2.20	Remote monitoring of pest traps in the community *M. Way, Econode*	What's sauce for the goose is sauce for the gander *P. Russell, Better Biosecurity Solutions Ltd*
2.40	Thermal Animal Detection System (TADS) *J. Munn, Trap and Trigger Ltd*	Making our size work *J. O'Hagan, Auckland Council*

3.00 *Afternoon tea*

	BIOCONTROL	CASE STUDIES
3.30	Multi agency partnership in action - Introduction of a new rabbit biocontrol tool for New Zealand *A. McKenzie, Place Group Ltd*	Velvetleaf: Can we win the battle with improved tools and greater knowledge of the enemy? *T. James, AgResearch & H. Pene, WRC*
3.50	Chickens as a bio-control agent for plague skinks *J. MacKay & J. Wairepo, Wildland Consultants*	People, Cities & Nature: Wellington mammal monitoring 2017-18 *J. Murphy & S. Thomason, Victoria University of Wellington*
4.10	Folivory impact of the biocontrol beetle *Cassida rubiginosa* on population growth of *Cirsium arvense* *M. Cripps, AgResearch*	Who rules the roost? Trapping innovations for Banded Dotterel restoration *D. Lees, Greater Wellington Regional Council*
4.30	*Nassella trichotoma*: Modelling the costs and benefits of proposed classical biocontrol in New Zealand *S. Lamoureaux, AgResearch Limited*	Confessions of a weed manager - we all know we should monitor. Some monitoring examples from around the country, to inspire conversations. *I. Keenan, Wellington City Council*
4.50	Horehound biocontrol: a case study in public consultation *R. Groenteman, Manaaki Whenua Landcare Research*	The Curious Case of *Wilsonia backhousei* on Saxton Island *B. Myer, Kaitiaki o Ngahere*

5.10 *New Zealand Biosecurity Institute Annual General Meeting*

6.00 *Mix 'n' Mingle, The Rutherford Hotel*

Day 2 Thursday 26 July 2018

8.00 MPI's National Biosecurity Capability Network (NBCN) (*A.Sander, Ministry for Primary Industries*)

8.20 Eradication of the Great White Butterfly from New Zealand (*K. Brown, DOC*)

8.40 Fieldtrip info

9.00 Buses depart for fieldtrips

FIELDTRIPS

ABEL TASMAN NATIONAL PARK

Join us on a trip to Kaiteriteri Beach where we will board a ferry and take a cruise along the iconic golden-beached coastline of Abel Tasman National Park. Two guides representing the Janszoon Project partnership will be joining us to give a commentary during the cruise which will cover work on off-shore islands, predator control (including pesky mice!) and weed control in this area so that biodiversity can be restored to the Abel Tasman National Park. Native species already returned to the Park include South Island robin, saddleback, kakariki, South Island kaka and brown teal. We'll be stopping for a walk through a coastal section of the Park to see Project Janszoon initiatives on the ground.

Limited to 100 people and a charge applies.

NELSON HAVEN MARINA

Based at Nelson Haven Marina, Port Nelson, this fieldtrip will look at marine biosecurity threats and actions taken to address them in this significant hub for commercial and recreational vessels. Representatives of the Top of the South Marine Biosecurity Partnership (TOSMBP), Cawthron Institute, and Nelson Marina will be there to explain the work that they do, and you'll have a chance to get up close to a fouled vessel on a haul-out/travel lift, check out about the new Fabdock purchased by Top of the South Marine Biosecurity Partnership, see a demonstration of Marlborough District Council's Remote Operated Vehicle/sea drone, and find out about current Cawthron Institute research and projects. Please note: this trip will finish early afternoon.

Limited to 50 people

NELSON'S MINERAL BELT

On this fieldtrip we'll be taking a bus into the nationally significant mineral belt ecosystem of Mt Richmond Forest Park and then walking into the Hackett Creek area at the southern extent of the Dun Mountain management unit. This area is jointly managed for wilding conifers by both the Department of Conservation and Nelson City Council through their Nelson Nature programme. Here you'll find out about the challenges faced when managing wilding conifers adjacent to forestry land, and see a helicopter demonstration of the aerial basal bark technique for controlling wilding conifers.

Limited to 50 people and a charge applies

6.00 *Happy Hour*

7.00 *Conference Dinner*

Day 3 Friday 27 July 2018

	MARINE	NEW APPROACHES
9.00	Molecular tools for marine biosecurity application: prospective approach to surveillance and control measures *A. Zaiko, Cawthron Institute*	What are we protecting? Novel approaches for monitoring biodiversity to inform invasive species control decisions *P. Caldwell, Boffa Miskell*
9.20	Towards pest-free ports, marinas and urban marine environments *O. Floerl, Cawthron Institute*	The development of best practice guidelines for feral cat control with PredaSTOP *L. Shapiro, Boffa Miskell Ltd*
9.40	Creating a fire break for Undaria in Fiordland *J. Brunton, Ministry for Primary Industries*	Pest Control Hub - Your one stop shop for pest control information *C. Bunton, Northland Regional Council*

10.00 *Morning tea*

	NEW WEED SOLUTIONS	UPDATES
10.30	Recent Innovations to improving the herbicide control of weeds *P. Raal, DOC*	• Global trends in the development of rodenticides & opportunities for innovation (*C. Eason, Cawthron Institute (and Lincoln University)*) • Automated pest recognition & decision-making for species-specific control (*H. Blackie, Boffa Miskell Ltd)* • Planning Predator Free Miramar - a world first (*G. Falconer, GW Regional Council)* • Improving on Innovation: Revealing the Effectiveness of Hessian for Aquatic Weed Management (*M. Girvan, Boffa Miskell Ltd)* • Innovation & partnerships for the control of wilding conifers in NZ (*S. Smith, MPI)* • NZs national weed management decision-support system (*G. Bourdot, AgResearch)*
10.50	Saflufenacil: A new tool in the 'war' against pest plants *P. Robinson, Kiwicare Corporation Ltd*	
11.10	New solutions for control of submerged aquatic weeds *P. Champion, NIWA*	

11.30 On Farm Biosecurity: Experience and new experiments (*L. Smith, Environment Canterbury)*

11.50 Out of sight, out of mind? Ensuring the safety and security of a distributed workforce (*J. Knapp, OSPRI*)

12.10 Biosecurity 2025 - where to from here? (*A. Bell, Ministry for Primary Industries*)

12.30 Closing address and awards

12.40 *Lunch*

Day 1 Wednesday 25 July 2018

Nelson Nature - Bringing the Wild into our Life

Leigh Marshall, Nelson City Council
leigh.marshall@ncc.govt.nz

Leigh Marshall is an Environmental Programme Advisor for Nelson City Council and coordinates the Nelson Nature programme.

Nelson Nature is Nelson City Council's long term programme to protect, restore and enhance the Nelson/Whakatū native ecosystems and species. Nelson Nature is both a holistic and targeted approach to care for Nelson/Whakatū's natural environment from the mountains to the coast, boosting the conservation and ecological work carried out on both public and private land. Nelson Nature works in partnership with Department of Conservation, and closely with other agencies, community groups, businesses and private landowners to coordinate restoration efforts and enhance ecological outcomes across the region.

Leigh will give an overview of the Nelson Nature programme and how the programme is using both a targeted and holistic approach to address some common biosecurity challenges.

Top of the North Marine Biosecurity Partnership: an inter-regional approach to biosecurity

Sophia Clark, Northland Regional Council
sophiac@nrc.govt.nz

This will be a combined presentation by the Top of the North Marine Biosecurity Partnership comprised of Northland Regional Council, Auckland Council, Waikato Regional Council, Bay of Plenty Regional Council, Gisborne District Council, Hawkes Bay Regional Council, Department of Conservation and Ministry for Primary Industries.

The Top of the North Marine Biosecurity Partnership will present on their ongoing work in delivering new marine biosecurity initiatives. The group is a combined effort between multiple councils and agencies who all share an interest in building resources to combat marine invasive species. This talk will present on the key learnings and obstacles in this field of biosecurity.

Top of the South Marine Biosecurity Partnership

Peter Lawless, Lawless Edge Ltd
thelawlessedge@gmail.com

Peter is Coordinator of the TOS Marine Biosecurity Partnership and leads a shall delivers shared programmes of public awareness, intelligence, science advice, training, surveillance.

The Top of South Marine Biosecurity Partnership was established in 2009 withe completion of a joint Strategic Plan agreed by Tasman, Nelson and Marlborough Councils and the Ministry for Primary Industries. The Partnership has grown to include active participation by industry and iwi. In addition, each Council has instituted a small scale management programme for Sabella spallanzii that involves diver removal of the fanworm in Tarakohe, Nelson and Picton. To support this the joint Partnership undertakes surveillance of around 500 vessels and 500 structures each year. This has successfully prevented fanworm spread outside the three hubs. At the same time the clubbed tunicate has not been controlled in hubs and has now spread to marine farms and substrate across the region. Strengthening intelligence gathering and public awareness is reducing risk at the same time risk from other regions is growing. General lessons learnt over the last 9 years are reported together with challenges for the future.

Project De-Vine Trust: An example of community lead conservation action

Neil Clifton

Neil has an extensive career in conservation management at both operational and management levels including being the manager of Nelson / Marlborough Conservancy for a period of 17 years. He is currently actively involved in conservation governance in the voluntary sector.

Project De-Vine Trust's mission is: "CLEARING THE PEST VINES OUT OF GOLDEN BAY AND AROUND ABEL TASMAN & KAHURANGI NATIONAL PARKS".

This talk will look at how a local community-led weedbusting initiative grew into a landscape scale pest plant programme, which has tackled areas of high infestation that were in the 'too hard basket'. It has relieved a large number of landowners of an 'overwhelming' burden of trying to control the pest vines on their properties as well as the enormous numbers of seedlings that keep coming from near and far, brought in by birds, wind and mammals.

The primary objectives of the Trust initially focused on banana passion vine and old man's beard. It has since added in climbing asparagus, woolly nightshade, yellow jasmine and pampas grass to stop their spread across Golden Bay.

The Trust works extensively with the Department of Conservation and Project Janszoon to survey and control invasive plants along the periphery and 'halo' of Abel Tasman National Park.

Our model of operation is based on applying for funds to carry out our aims and contracting for work with agencies to assist control of invasive plants on their land. These contracts help us to cover some of our operating costs.

How do we go about starting control work in an area? The four steps we follow will show how we achieve good buy in from landowners and agencies alike to clear large areas of pest plants and maintain the improvement.

- The Trust has split the area of Golden Bay in to Management Units and will show the status of each with the current levels of control.
- Working with the New Zealand Transport Agency our team has cleared most of the Old man's beard alongside State Highway 60 as you come over the hill to Golden Bay. This is a key flagship to show how much work is going on, which the public can not miss.
- Some statistics of our work
- How we report to the landowners and funders.

GEMS - see back of the handbook

TECHNOLOGY

Using spatial application tools to manage wallabies in the Central North Island

Simon Allard & Dale Williams, Bay of Plenty Regional Council
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Simon is a GIS Analyst with BOPRC, based in Tauranga. Simon has a strong background in natural resource and wildlife management and over the years, he has developed a keen interest in developing innovative spatial tools using GIS technology to help support field staff. Spatial applications provide us with pathways to visualize emerging distribution patterns in real-time - which ultimately improve inter-agency collaboration and management response.

Dale is a Biosecurity Officer with BOPRC, based in Rotorua. Part of his role includes the co-ordination of surveillance, monitoring and control of dama wallabies within the Bay of Plenty Region. Receiving and responding to reported sightings of wallabies has been an ongoing issue, which he has experienced for more than 20 years, in a previous role as a Technical Support Officer with the Department of Conservation. The use of the ArcGIS apps (along with camera traps and surveillance dogs) have been the biggest advances in wallaby management he has seen during that time.

In New Zealand dama wallabies (*Macropus eugenii*) are classified as an Unwanted Organism under the Biosecurity Act 1993. The Bay of Plenty Regional Council (BOPRC) in partnership with the Waikato Regional Council (WRC) and the Department of Conservation (DOC), are responsible for controlling the spread of dama wallabies in the Central North Island. Public sighting reports are submitted to BOPRC and once collated, property access permission is obtained and field staff or contractors are deployed to collect evidence, confirm sightings, and implement control measures. Previously, data was entered manually and the process was time consuming, inefficient and interagency collaboration was difficult.

The use of ArcGIS Online and a suite of ESRI apps to plan, manage, and coordinate wallaby surveillance and control operations, in response to public sightings, allow information to be collected and viewed in multiple ways, all of which are available to the three key agencies (BOPRC, DOC and WRC). These apps increase the response rate from the public, save time and effort, improve data accuracy and enable the tracking of wallaby surveillance and control across the region.

Wilding Conifer Information System - What can it do, what is it doing?

Helen Payn, LINZ
HPayn@linz.govt.nz

Helen is a GIS intern who joined the LINZ biosecurity team last year to help map and collect data from the control of wilding conifers using, and further developing, the Wildling Conifer Information System (WCIS) which was developed by Eagle Technologies and instigated by collaboration between LINZ, DOC, and MPI. Helen's background includes a degree in geography and cultural anthropology, and internship experience working at forestry-based crown research institute Scion. Helen was a member of the 2017 New Zealand Women's U-23 underwater hockey team which won its division in the Age Group World Championship, and is still heavily involved in the sport. She also enjoys getting out into nature and 'off-grid'.

Wilding conifers are a biosecurity threat to New Zealand as they have negative impacts on ecosystems, reduce available grazing land, and limit future land uses. They reduce the productivity of primary industries and damage the environmental, social, cultural, and landscape values that New Zealand is renowned for. Wilding conifer infestations span publicly and privately-owned land, requiring numerous organisations such as trusts, regional councils, private companies and government organisations to be involved in control efforts.

The National Wilding Conifer Control Programme involves central and local government agencies collaborating to efficiently contain and eradicate wildings. The organisational set up of the programme requires intensive collaboration and sharing of information. The Wilding Conifer Information System (WCIS) was built by LINZ, Eagle Technology, and DOC, to enable effortless transfer of data from field workers through to central government to support longevity and success of the programme. WCIS is easily accessible due to utilising cloud services - users can log in from any organisation or location - which promotes collaboration. The Wilding Conifer Information System is an exemplar of how GIS can be used as platform for increasing efficiency and effectiveness of data-based communication in multi-organisational initiatives.

CritterPic on the lookout

Brent Barrett, Boffa Miskell Ltd
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Co-authors: Helen Blackie (Boffa Miskell Ltd); Kenji Irie (Red Fern Solutions); Michael Hagedorn (Red Fern Solutions); Todd Jenkinson (Pukaha Mount Bruce)

Brent Barrett is a biosecurity Consultant with Boffa Miskell Ltd. His previous work was in developing predator control tools like PAWS and Spitfire at Lincoln University. Prior to that he was a threatened species project manager with Department of Conservation and Western Australia Government.

In this era of high technological literacy, there is a greater thirst for operational control of monitoring/observation devices. One of the biggest criticisms of commercially available trail cameras is that they are a tool developed specifically for a narrow global market (hunting and anti-poaching). With our typical 'Number 8 wire' attitude, we deploy these devices in scenarios which force sub-optimal operation. These include: trying to monitor organisms too small to reliably trigger the PIR; large numbers of 'false triggers'; attempting close-proximity deployment outside of ideal focal range resulting in LED washing out; and a requirement to build specialised housing to correctly orientate the organism for identification. Ultimately, there are issues with suitability of trail cameras for widescale use in public spaces or in conjunction with education. This is because a high degree of user knowledge is required to gain meaningful images within these marginal deployment conditions.

A unique approach within Australasia is the production of customised small-run image capture devices. Recently a collaborative project between Boffa Miskell Ltd, Red Fern Solutions and Pukaha Mt Bruce has resulted in the development of a close-range enclosure-based wildlife observation device called CritterPic. This device has proven application in assisting native fauna monitoring and has been used by several industries including schools. Some key advantages include colour images illuminated from white LED's and targeted orientation of subject's due to a housing that includes a sensitive trigger and bait locker. It is very easy to operate and delivers its results to the user in real-time using a cloud server and 2G connectivity.

Device suitability, application and future development will be discussed in this presentation along with some results from field applications.

Macraes Flat DOC Trapping Innovation

Simon Croft, Director, Encounter Solutions
simon@encounter.nz

A New Zealand chartered professional engineer, Simon has over 17 years' experience in a range of dam, water resources and geotechnical engineering projects. Simon is a problem-solver with a passion for developing innovative solutions. An engineer at heart, he finds solutions that are efficient and pragmatic. Encounter Solutions came about as a result of a conversation about controlling predators in New Zealand's North Island Volcanic Plateau. The conversation ended with, "There has to be a better way!". It went without saying that the solution needed to be flexible, deliver great performance combined with minimal resource requirements, but it also had to be practical to deploy. Drawing on his engineering background and encouraged by the goal of delivering long-term biodiversity outcomes, Celium was developed. As the founding director, Simon is building a strong governance and leadership team around him to ensure that Encounter Solutions delivers on its vision.

Macraes Flat is an area in central Otago that includes both historic and modern day gold mines, and two species of endangered skink. In a trial from 2005 to 2008 four thousand hectares of intensive predator trapping and thirty hectares of fenced enclosures reversed the decline of both the grand and the Otago skink. Trapping remains at the heart of their gradual recovery.

The Department of Conservation, working out of their Macraes Flat Field Base, found that kill traps alone could not adequately suppress predator numbers, leg hold traps or cages are far more effective. The Animal Welfare Act, however, requires that these traps are checked daily, and rangers were often checking completely empty trap lines in trying conditions. There had to be a better way, and one that complied with MPI guidelines.

After researching overseas and NZ options the team leader at Macraes Flat, Patrick Liddy, engaged Encounter Solutions to trial their Celium network on a third of their live capture traps. He only wanted to check traps that were sprung and ensure the operation complied with the MPI guidelines.

What he found was that the monitoring solution reduced trap checks by 75% and once fully deployed will pay for itself in less than three years. Along with staff hours, petrol and associated vehicle costs savings, there will be reduced degradation of vehicle access tracks, the ability to extend the trapping season into the fringe winter months, and a general improvement in working conditions and animal welfare.

Remote monitoring of pest traps in the community

Matthew Way, Econode
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Co-author: Scott Sambell, Econode

Matt is an IT innovator and inventor. Scott is an environmentalist, field worker and conservation dog handler.

Matt will present an Introduction to remote monitoring of both kill traps and live capture traps, which can reduce labour needed and increase effectiveness of trapping operations. See https://predatorfreenz.org/robot-garage-assembles-econode-circuit-boards/

Thermal Animal Detection System (TADS)

Jordan Munn, Trap and Trigger Ltd
trapandtrigger@gmail.com

Jordan started his career as a possum trapper in Southland, evolving into a self-employed hunter, then becoming the director of wildlife management and conservation-based company Trap and Trigger. Jordan has been part of over 100 invasive species programmes, including two large scale overseas eradications. He has a passion for hunting and conservation, and hopes to continue progressing in the biosecurity industry.

Trap and Trigger Limited has invested in excess of $100,000 to create the largest capacity thermal detection system specifically designed for wildlife management. We strive to be innovative and to maintain a progressive mindset toward biosecurity; this great investment can support our current services but also give suppliers the capacity to undertake larger scale projects.

Our TADS was also the receiver of the WWF conservation innovation award for open category 2017 - https://www.wwf.org.nz/what_we_do/community_funding/innovation/ See also our recent coverage from predator free nz - https://predatorfreenz.org/trap-trigger-takes-innovation-award/

PARTNERSHIPS & COLLABORATION

Training the trainers - what we learned from delivering 'War on Weeds' workshops around NZ

Michael Urlich, Re-Native, Representing QEII and Weedbusters
mikeurlichnz@gmail.com

Mike started his career as a pest plant officer with GWRC in 2001. He was instrumental in the development of the pest plant response within Greater Wellington's Key Native Ecosystem Programme and was also part of the TAG team for MPI's National Interest Pest Response programme. In 2010 he was moved into GWRC's newly formed Biodiversity Department within the implementation team. This role involved the planning and management of biodiversity at 15 KNE's across the Porirua/Kapiti districts. In 2016 Mike left GWRC to start his own restoration business, Re-Native. He is currently engaged as the programme manager for the QEII Community Weedbusting Project, and he also gets his hands dirty controlling ecological weeds and doing restoration plantings.

There are huge gaps in training needs for individuals and agencies wishing to control weeds in order to protect NZ's biodiversity. As a nation we spend multi millions on spreading toxins in and onto unwanted plants in sensitive natural ecosystems but most of us are given little guidance on how to do so.

As part of a successful combined QEII National Trust and Weedbusters bid to the then DOC Community Conservation Fund in 2015, a training workshop was developed in line with the Department of Conservation's 'War on Weeds' directive set under their Biodiversity Action Plan of 2016.

The workshop has synthesised known methodologies, techniques and tools available within ecological weed control practice in NZ. The scope and breadth of the workshops were wide, covering the entire weed industry, from landscape level weed thinking, to selecting the right tool for the job on the ground.

Participants were council staff, QEII reps, DOC operatives and selected community group members and contractors. The level of teaching was set at 'Train the Trainers' level so that participants could disseminate their best practice learnings out to QEII covenantors and members of the wider community.

So what did we learn from our participants? What are the gaps and where do we go to from here in our mission to have trained troops doing quality weed control work? Before we start weed works a clearly defined set of principles are key...

Outsmarting Weeds by Connecting Science, Industry and Growers to Increase the Probability of Success

Shane Hona, Bay of Plenty Regional Council
shane.hona@boprc.govt.nz
Andrew Blayney, Boffa Miskell Limited
andrew.blayney@boffamiskell.co.nz

Shane currently works as a Biosecurity Officer for the Bay of Plenty Regional Council, focussing on pest plants in both the Western and Rotorua Lakes areas of the Bay of Plenty. In the past he has worked in varied roles in the environmental field, including the Biological Control of Weeds team at Landcare Research, forestry industry and research in USA and NZ, contract work for the Environmental Protection Authority, and has managed a safari company in Botswana.

What do you do when you are losing the battle against a pest plant, and the usual management and control methods are not working?

This presentation outlines the innovative process that we developed, involving partnerships, research, and new fieldwork and control methods, which has greatly improved the success of our management of an eradication

pest plant. We developed a holistic approach taking into account all aspects of both the weed's life cycle and its mechanisms of spread, along with the entire land use system and all activities taking place at this site, in order to outsmart the weed and gain the upper hand in the battle to manage it.

Operational staff should find this framework useful for thinking 'outside-the-box' to develop methods to better manage difficult-to-control weeds. We have already shared this process with another regional council and they have found it useful in the management of pest plants they have been struggling with.

Managing wild kiwifruit in the Bay of Plenty - an example of successful collaboration between Regional Council and Industry

John Mather, Kiwifruit Vine Health
john.mather@kvh.org.nz

Co-author: Wendy Mead (Bay of Plenty Regional Council)
wendy.mead@boprc.govt.nz

John has been a pest plant coordinator for the Bay of Plenty Regional Council for many years, has worked in the Pacific with the Pacific Invasives Initiative and has for the last five years worked within the biosecurity team for Kiwifruit Vine Health. KVH manages risk around biosecurity threat organisms to the kiwifruit industry. John also undertakes compliance activity as required by the National Psa-V Pest Management Plan and works with Regional Councils and landowners to destroy wild kiwifruit throughout New Zealand.

Bay of Plenty Regional Council (BOPRC) and the kiwifruit industry have been working collaboratively to manage wild kiwifruit in the Bay of Plenty region for 20 years. The kiwifruit industry has a dedicated agency - Kiwifruit Vine Health (KVH) - responsible for ensuring all biosecurity risks are actively managed.

Wild kiwifruit (*Actinidia* spp.) is a fast-growing vines which threatens indigenous biodiversity and exotic forest values and has potential to host other biosecurity threat organisms such as Psa. Kiwifruit is also a very valuable commercial crop. Eighty percent of New Zealand's kiwifruit is grown in the Bay of Plenty, where the environment provides ideal conditions for it to thrive within orchards or in the wild.

Wild kiwifruit is classed as a containment pest under the BOPRC Regional Pest Management Plan (RPMP) and landowners are responsible for its control. To assist landowners, BOPRC and KVH contribute toward the cost of control if approved contractors are used, subsidising the landowner to the tune of 75% of control costs.

Reject fruit fed to stock and unpicked fruit at harvest (unpicked due to human error) have been identified as providing a seed source for wild kiwifruit infestations. Seed is spread by birds such as silvereyes (Zosterops lateralis). KVH has developed best practice which ensures no fruit are left on vines after 1 July yearly and farmers cover feedlots to prevent mass-feeding of fruit by birds.

The collaborative programme has been in operation since 2001 with over 160,000 vines destroyed and larger (therefore older) wild vines nearly eradicated in the Bay of Plenty. Last year 7,500 vines across 90 properties were controlled.

Containing wild kiwifruit in the Bay of Plenty will continue to be a challenge as the area in kiwifruit orchards continues to expand and provide a potential source of wild kiwifruit seed. A continued collaborative approach between industry and BOPRC should ensure on-going success in managing wild kiwifruit.

Cooperative Management of Large Scale Aerial 1080 Operations

Matthew Hickson, OSPRI New Zealand Limited
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Matthew has worked in various parts of animal pest control for the last 20 years from field possum control through to his current role as Senior Advisor (Operations) for OSPRI New Zealand. This has included stints in South Canterbury for Environment Canterbury managing possum and ferret control for TB management and with the Department of Conservation as a Technical Support Officer and Programme Manager Biodiversity. Before moving into his current role Matthew was the TBfree New Zealand Programme Manager for the Northern South Island.

As the two largest users of aerially laid 1080 for the purpose of animal pest control, OSPRI and the Department of Conservation have co-operated on joint operations for a number of years on a case by case basis.

The Battle for our Birds 2016 rodent control operations required the treatment of huge areas to counter the effects of a large beech MAST on a number of threatened species. Due the volume of work required to be completed in a short space of time, OSPRI was approached around coordination of our own operations with the wider programme and our ability to undertake work to remove some pressure on particular teams and offices. This was in recognition that key staff within these offices still had a number of other conservation projects to deliver despite the MAST event.

OSPRI and DOC had the same passion for good quality operations, so despite initially having quite different procurement and management methodologies, they were able to work together very well. Their methodologies were successfully combined by having a clear direction of required operational outcomes, and by very high levels of communication at all stages of the process.

Early on in the relationship, an overarching steering committee and multiple technical advisory groups were set up, which allowed differences to be worked through in a methodical manner, and decisions made on best possible information. Often issues that could have been seen as large problems were reduced to slight changes in process or technique once all parties had been able to explain their views and concerns.

Working together has been beneficial for both organisations, as there has been a rapid improvement in the management of aerials as the best of both organisations techniques have been combined to produce high quality, cost effective operations.

What's sauce for the goose is sauce for the gander

Peter Russell, Better Biosecurity Solutions Ltd
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Peter is director and principal consultant at Better Biosecurity Solutions Ltd, with a 30-year career in wider environmental management. Commencing with Waikato Regional Council, as Animal Pest Programme Manager, Peter concurrently wrote the first two Regional Pest Management Plans (RPMPs). He then moved from policy to operational responsibilities, being Biosecurity Operations Manager (2003-2015). In 20 years at WRC one of his most satisfying achievements was building and maintaining positive relationships and partnering with many external organisations. These networks are still strong today where he enjoys the freedom of being self-employed while working even harder on many different projects, up and down the country. Maintaining ecosystem integrity, environmental sustainability, relationship management and making better biosecurity connections is at the core of his business and lifelong interests.

Canada geese were introduced to New Zealand for recreational hunting and for 100 years were managed as game birds. As populations expanded into new habitats they quickly became nuisance pests: environmental (displacing native waterfowl/fouling waterways); agricultural (eating/fouling pasture); and urban (defecating on parks/sports fields). However, it is their risk to aircraft movement and safety at Christchurch International Airport from bird strike that is the prime driver for the development of the first interagency management strategy to manage these problematic birds.

The main parties are: Christchurch International Airport Ltd, Christchurch City Council, Environment Canterbury and Ngai Tahu). Along with key district councils, Waimakariri and Selwyn, and Federated Farmers (High Country Division), all the organisations agree that a collaborative, non-regulatory strategy is the best way to manage Canada geese impacts. Prior regimes were ineffective at controlling them because of conflict between their 'pest v resource' standing. Then in 2011 their game bird status was revoked. They now have no protection, and anyone can control them at any time. And that's the issue - control is haphazard, often done in isolation from other efforts and no one agency is in charge.

The purpose of this Strategy is to provide a framework to enable the suppression of Canada geese numbers in central Canterbury area (between Waimakariri and Rakaia Rivers) for five years to start with. Reducing potential risks of aircraft bird strike is the key outcome sought. Ecological, pastoral and urban/recreational benefits are also anticipated from having lower geese numbers.

Making our size work

Jane O'Hagan, Auckland Council
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Jane is a region-wide community advisor for the Auckland Council Biosecurity team. Her main focus is providing best practice pest control advice, and facilitating access to resources and project planning support.

The sheer numbers of Aucklanders wanting to do pest control and restoration work can be daunting and now we are aiming for a Pest Free Auckland by 2050, it's only going to keep growing. A great problem to have - but how do we make sure everyone that needs the help, gets it?

To keep up with demand, and make sure every group / volunteer is supported from starting out through to self-sufficiency, we've had to come up with some solutions that enable our advice, support and resources to reach the maximum number of recipients possible. From comprehensive pest control guides, to accessing our buying power, and creating a range of do-it yourself project planning templates, we have made it easy for people to get started with a minimum of fuss while still following best practice.

BIOCONTROL

Multi agency partnership in action - Introduction of a new rabbit biocontrol tool for New Zealand

Angus McKenzie, Director, Place Group Limited
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Co-authors: Graham Sullivan (Environment Canterbury) and Janine Duckworth (Landcare Research).

Angus is an experienced project manager and accomplished resource management practitioner with over significant experience in delivery of collaborative projects in private, local and central government sectors. He has exceptional skills in project management, facilitation, policy analysis and advice, business case development, stakeholder engagement and communications. Angus works on projects across the natural resource management sector with a focus on biosecurity, biodiversity, water quality management and operational delivery.

Led by Environment Canterbury on behalf of the national Rabbit Co-ordination Group, this collaborative multi agency project has resulted in the first legal importation and managed release of a new strain of rabbit calicivirus (RHDV1 K5) in New Zealand.

The project team faced (and tackled) many challenges through the importation process, including managing the risk of an illegal release of the virus. This session will review the history of rabbit biocontrol in NZ, discuss the key outcomes from the project, and touch on the future of rabbit control nationally. The session is a chance to explore our shared biosecurity history and will include some valuable lessons learned for those involved in multiagency biosecurity projects and programmes.

Chickens as a bio-control agent.

Jamie MacKay & Jacqui Wairepo, Wildland Consultants Ltd
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The use of birds to control unwanted organisms ('avian bio-control') has been attempted in several systems overseas including the use of ducks in paddy fields to control golden apple snails in China and raptors to reduce the impact of common vole plagues in Spain and central Europe. Here we describe what we believe is the first foray into avian bio-control in New Zealand - using chickens to control introduced plague skinks within fenced enclosures on Aotea, Great Barrier Island.

Folivory impact of the biocontrol beetle *Cassida rubiginosa* on population growth of *Cirsium arvense*

Mike Cripps, AgResearch
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Mike is a scientist at AgResearch, Lincoln. His research is primarily focused on pasture weed management, with an emphasis on biological weed control.

The folivorous beetle, *Cassida rubiginosa*, was released in New Zealand in 2007 as a biocontrol agent against Californian thistle (*Cirsium arvense*). The impact of the beetle was assessed in a population of *C. arvense* over two years, from spring 2015 to spring 2017. Experimental plots (1-metre diameter) were isolated within the population by removing the *C. arvense* shoots in a 2-metre perimeter area surrounding the plots with a broadleaf selective herbicide. This allowed for thistle shoot population density and spread to be measured from year to year, following treatment with different levels of folivory. The folivory treatments were imposed by applying zero, five, ten or twenty larvae per shoot within the experimental plots in early spring. Shoot growth and development were measured throughout the growing season, along with estimates of % folivore damage. In the year following treatment (spring 2016) shoot population density was significantly reduced by 28 and 75% in the ten and twenty larvae per shoot treatments, respectively. However, following the second year of treatment (spring 2017), there were no significant changes in shoot population density. Thistle shoot spread (the number of shoots entering the perimeter zone of the treated area) was reduced in both years where ten or twenty larvae per shoot were applied. Five larvae per shoot had no effect on shoot population density or spread. The percentage of plants reaching a reproductive stage (flowering or seeding) was negatively correlated with increasing percentage folivore damage. This data will be presented in conjunction with observations and measurements recorded by regional council biosecurity officers from several release sites where *C. rubiginosa* folivory has ranged from trace amounts to nearly all shoots in a population completely defoliated.

Nassella trichotoma - Modelling the costs and benefits of proposed classical biocontrol in New Zealand

Shona Lamoureaux, AgResearch Limited
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Co-author: Graeme Bourdot

Shona is a senior scientist in AgResearch's Plant Functional Biology Team with more than 15 years' experience in plant population ecology and weed management. Her current research includes the ecology and management of weeds in pastures and natural ecosystems, modelling the potential distribution of weeds, and weed risk assessment.

Nassella tussock (*Nassella trichotoma*), an invasive weed of grasslands in New Zealand, is being considered as a target for classical biological control. We conducted a cost benefit analysis for a hypothetical fungal agent released against the metapopulation of the weed in the Hurunui District of North Canterbury using the net discounted present value (NPV) criterion with a 100-year time frame and a discount rate of 8%. The costs of the programme were assumed to occur in the first nine years ($0.4m y-1 in years 1-5 for research plus $0.025m y-1 in years 6-9 for post-release monitoring). The benefits, taken to be the savings made in the current annual control programme, were accrued from year 6 and were calculated as the product of the proportional reduction in the population size of the metapopulation expected from the agent and the cost of the district's current control programme ($4.5 m y-1). The rate at which the agent's maximum impact is approached was given by a logistic function. Under this model, the slower-acting the agent is, the greater the maximum impact must be for NPV > 0.0. Maximum expected agent-induced reductions in the current metapopulation of 47, 65 and 76% were estimated using a matrix population model for the weed with 10% reduction in per capita seed production and either 5, 10 or 15% reduction in plant growth. These agent-induced effects were taken from relevant literature as representative of those to be expected. The NPV was greater than zero for all three scenarios so long as the agent achieved 90% of its potential impact within approximately 50 years from release. The analysis indicates that a plant pathogen-based classical biological control programme for nassella tussock in New Zealand is likely to be economically worthwhile.

Horehound biocontrol - a case study in public consultation

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Co-Authors: Gavin Loxton (Sawdon Station) and Richard Hill (Manaaki Whenua Landcare Research)

Ronny works at Landcare Research since 2008 as part of the biocontrol group. She works on target and non-target effects in weed biocontrol, and is also working on biocontrol for environmentally invasive invertebrates.

White horehound (*Marrubium vulgare*), is a perennial herb in the mint family. It has become a weed especially in dryland sheep farming in the eastern parts of the South Island of New Zealand. A farmers' group was formed in late 2016 to replicate in New Zealand the programme for biocontrol of horehound undertaken in Australia. Manaaki Whenua-Landcare Research (MWLR) was approached to be the research provider. Following notifying in the media of the intent to pursue biocontrol for horehound, MWLR was contacted by a concerned medical herbalist who harvests this plant in the wild for use in his products. A dialogue developed, during which the herbalist informed us that others would soon follow suit, and the following weeks brought a steady stream of letters of opposition from medical herbalists. Opposition to biocontrol in New Zealand is rare, especially such an organised campaign. As well as the potential to affect the horehound project, this group may oppose future weed biocontrol programme in New Zealand where the target weed is also harvested for medicinal uses. In this presentation we will explain how we are using best practice and lessons learnt in the past to manage this situation and achieve the best possible outcomes for all.

CASE STUDIES

Velvetleaf - Can we win the battle with improved tools and greater knowledge of the enemy?

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Heidi Pene, Waikato Regional Council
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Co-author: Darion Embling (Waikato Regional Council)

Trevor is a senior scientist with AgResearch and has been involved in researching weed management for more than 40 years. Over this time his work has covered weeds in pastoral, arable, horticultural and environmental situations. Specific research areas include dynamics of the soil weed seed bank and seed ecology, herbicide residues and persistence in the environment, herbicide application and use of adjuvants, border biosecurity and new incursions, and, of course, how to kill weeds. Trevor is a keen photographer of plants, and with colleagues has published three books on identification of weeds and their seeds.

Two years of research in the laboratory and field has better equipped us for our battle with velvetleaf. We now have improved herbicide options in pasture, maize and barley and more importantly a better understanding of their limitations. We have a greater understanding of the soil seed bank for velvetleaf and laboratory studies have increased our knowledge of conditions required for germination. Unfortunately, improved tracking and surveillance has found more infested sites in Waikato and Auckland, but our ability to fight this pernicious weed has also increased with these improved tools and greater knowledge. So can we win?

People, Cities & Nature - Wellington mammal monitoring 2017-18

Joe Murphy, Victoria University of Wellington
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Co-author: Shaun Thomason (Victoria University of Wellington)

Joe is an ecology and biodiversity student from Victoria University of Wellington who has spent the summer monitoring mammal populations throughout Wellington suburbs. The project was part of a summer scholarship scheme with matching funding from VUW and Wellington City Council.

Monitoring of the presence or absence of mammalian species took place in Wellington in November and December 2017 as part of the nationwide People, Cities and Nature MBIE-funded project. Eight suburbs were chosen, and three sites were chosen within each suburb representing three different habitat types - forest, amenity and garden. Tracking tunnels and chew-cards were used to gain an indication of the distribution of species of interest.

The species of interest were two rat species (the Norway and ship rat), house mouse, hedgehog, weasel, stoat, ferret and possum. All these species have been introduced to New Zealand and are ecological pests.

Of the species listed, the three found with the highest distribution were hedgehogs and rats, followed by mice. However, rats can remove the evidence of mouse presence on chew-cards, so mouse numbers may be under-represented. There was no evidence found of possum presence and just two indicators of mustelid presence - one in Lyall Bay and one in Karori.

Pest densities varied by suburb; suburbs with high prevalence of rats and mice often included coastal walkways consisting mostly of taupata and New Zealand flax.

Gardens contained a higher incidence of hedgehogs relative to rats or mice. Forests contained a higher incidence of hedgehogs and rats, significantly more so than mice. In amenity sites there was no significant difference in abundance between all three species.

Tracking tunnels were found to be much more sensitive than chew-cards in detecting presence of hedgehogs. However they were often disturbed by dogs and cats and removal of the bait prior to pest visit to the station could be skewing results. It was noticed anecdotally that even after removal of the bait, hedgehogs would still visit the station, even returning in consecutive nights.

Chew-cards (active for six nights) were a more sensitive indicator of rats, maybe due to not being tampered with by cats and dogs. There was a significant increase in detection of rats from day two to day eight, whereas this was not observed for mice. Two weta motels were also placed in each transect and it was not thought that they would be found in the first week. However 4/48 motels contained weta seven days after deployment.

Who rules the roost? Trapping innovations for Banded Dotterel restroration

Darren Lees, Greater Wellington Regional Council
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Darren is a Biosecurity Officer at GWRC, working in pest animal control for over 10 years. Darren has worked extensively with volunteer groups to provide best practise trapping techniques and over the last few years been doing intensive predator trapping around shorebird nesting sites, refining methods, trialling lures and traps to get optimal breeding success.

This presentation will go over findings of the three year Parangarahu Lakes trap trials study of how the A24 gas trap compares to the doc traps, and how they can be incorporated into an existing trapping network. It will cover:
- different coloured trap box trial and the difference in trapping rates
- monitoring through trap catch data
- modified trap network layout for the banded dotterel nesting sites

Confessions of a weed manager - we all know we should monitor. Some monitoring examples from around the country, to inspire conversations.

Illona Keenan, Wellington City Council
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Darryl Kee, Weedworks

Illona is the Biosecurity Technical Advisor, Urban Ecology Team, Wellington City Council. Illona manages the pest plant and animal contracts in Wellington City Council's parks and reserves.

Darryl currently running business called Weedworks, having spent 27 years working on weeds throughout New Zealand, including roles as a Biosecurity Officer, working for DOC and Zealandia.

Often it is a struggle to put the appropriate resources into monitoring and answer the right questions. Presenting at NETS2018, provided an opportunity to investigate monitoring options for Wellington City Council's weed control programme, covering more than just outputs such as work undertaken, numbers of hectares managed, species controlled at what life stages.

By tapping into the participants of the 'War on Weeds' workshops funded through DOC, various agencies and community groups were contacted about how they monitor their weed control. This presentation will cover:
- What question the monitoring was to answer (and did it provide an answer)
- Examples showing what monitoring worked well (or not). Did this lead to different outcomes such as more resources, changes to weed management?
- How various agencies showed innovation in their monitoring techniques.

I will outline Wellington's new approach to monitoring as a result of this fact finding, and hopefully have time for discussion.

The Curious Case of *Wilsonia backhousei* on Saxton Island

Bradley Myer, Kaitiaki o Ngahere
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Bradley is the Managing Director of Indigena and parent company Kaitiaki o Ngahere. Brad has a Post Graduate Diploma in Environmental Management from the University of Auckland and a Bachelor of Commerce from Lincoln University. Brad has been working in the field of ecological restoration and biosecurity for 20 years and has spent two field seasons on South Georgia leading the operational delivery on the ground. Brad co-authored the 'South Georgia Non-Native Plant Management Strategy 2016-2020' and the 'Field Guide to the Introduced Flora of South Georgia' with Kelvin Floyd and Dr Jennifer Lee. These days Brad is part of the Invasive Species Team at the Secretariat of the Pacific Regional Environment Programme and is based in Samoa.

Wilsonia backhousei is a prostrate, matted shrub with succulent leaves and a woody rhizome that grows in the intertidal zone. It is endemic to Australia. In New Zealand it is known only from Saxton Island in the Waimea Inlet in Nelson. It was first recorded on Saxton Island in 1993. By 2010 it had spread over an area of 1.3 hectares.

The means of arrival has been the subject of some debate. Some felt that it had arrived by itself and should be declared indigenous. Others felt that it was an introduced alien and should be eradicated while an opportunity still existed. A sewage treatment plant was commissioned on the nearby Bells Island in 1983. The area where the main population of *Wilsonia* is now was excavated when the sewerage pipes were installed. Apparently machinery used to excavate the intertidal zone of Saxton Island was imported from Australia.

In 2010 the Tasman District Council commenced the installation of an auxiliary pipe between Richmond and Bells Island. Although Saxton Island is privately owned, the Department of Conservation are responsible for managing the foreshore, and through the consent process Kaitiaki o Ngahere were engaged by them to attempt an eradication of the *Wilsonia backhausei* prior to the implementation of the civil works.

Due to the rare nature of the target, and to the best of our knowledge, no one had ever set out to eradicate this species from anywhere before. Herbicide trials were established, resource consent was granted, and research into the characteristics of the target was conducted.

On the 28th of April 2010, 500l of water and 3.5l of Grazon was applied to the target. The initial programme involved two other follow up treatments within that year, in the lead up to the excavation. Initially the results were mixed, but the following year an innovative change to the methodology was made and the population collapsed dramatically.

In subsequent years the programme continued with an annual treatment. In 2016 the Department of Conservation reclaimed the programme and it continues today.

This presentation will identify the methodologies and techniques used, provide results, discuss challenges and the lessons learned.

Day 3 Friday 27 July 2018

MPI's National Biosecurity Capability Network (NBCN)

Andrew Sander, Ministry for Primary Industries (MPI)
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Andrew joined MPI in 2013 after many years in the New Zealand Police, where his expertise was focussed around specialist searching at crime scenes, street policing, terrorism and community engagement. His role changed into biosecurity response responsibilities overseeing the National Biosecurity Capability Network (NBCN) with MPI attached to the Operations Directorate. He has been involved in numerous responses in functions such as Operations Manager, Liaison and Health & Safety as well as numerous readiness projects in the Response Capability and Capacity team.

In order to respond to Post Border incursions of unwanted pests and organisms MPI has developed the National Biosecurity Capability Network (the NBCN). To align with the strategic direction of the newly formed 'Biosecurity New Zealand' business unit, achieve MPI's strategic goals of 'Grow and Protect', and also to align with MPI's vision of a biosecurity team of 4.7m by 2025, MPI is reviewing the structure of the NBCN and how the capabilities are managed throughout NZ.

This is an opportunity to hear what the NBCN will look like in July 2019 (after the review has taken place) and what Biosecurity NZ believes it will look like in the future.

This presentation will aim to cover the following:
- Introducing the NBCN to delegates
- Introducing the new structure and concept changes
- What the future brings with biosecurity training both internally at MPI and externally
- Engagement initiatives with Tangata Whenua in responses focussed on Tangata Whenua Liaison functions

Eradication of the Great White Butterfly from New Zealand

Kerry Brown, DOC
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Kerry is a Technical Advisor Threats for Department of Conservation based in Nelson. Kerry has nearly 40 years experience in ecological management that is focused on weed and animal pest management and island biosecurity including eradication. He trained as a Park Ranger at Lincoln and in Wildlife Management at Otago were he went on to do an MSc in Zoology. Subsequent training was based on project management through the NZ institute of Management. He has performed various field based, operational and science based technical roles. Kerry is currently a senior technical advisor with DOC. Kerry led the Great White Butterfly eradication technical advisory group.

The Great White Butterfly is a Northern Hemisphere species that was first found in Nelson in May 2010. An eradication attempt was initiated by the Department of Conservation in November 2012, due to the risk GWB posed to New Zealand endemic cress. Of New Zealand's 79 species of native cress, 55 are currently threatened by extinction. Tactics used to achieve eradication included: intensive visual searches by field staff; public awareness and engagement; insecticide spraying; host plant removal; and science support (developing a lure, augmenting natural enemy populations, genetic analyses, data analysis and modelling). The GWB was eradicated from New Zealand by June 2016. This presentation explains how eradication was achieved.

MARINE

Molecular tools for marine biosecurity application: prospective approach to surveillance and control measures

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Co-authors: Xavier Pochon & Susie Wood (Cawthron Institute)

Anastasija is a marine biologist with internationally recognized expertise in aquatic ecology and biosecurity. She has participated in a number of regional and international research projects, field expeditions, conducting experimental and observational studies in aquatic ecosystems, and employing a range of different surveillance techniques (traditional and molecular). As a Marine Scientist at the Cawthron Institute, Anastasija is currently coordinating the core-funded sub-contract project within NIWA's marine biosecurity research programme and is one of the key-researchers working on development and application of novel molecular tools for ecosystem surveillance.

The emerging field of environmental DNA and RNA (eDNA/eRNA) diagnostics is transforming our understanding of biological diversity and providing new methods for biological monitoring. In a nutshell, the use of eDNA or eRNA allows identifying presence of species from a small amount of bulk environmental samples (water, sediment, biofilm), improving the sensitivity and cost-effectiveness of aquatic surveillance. Recent technological advances in high-throughput sequencing and real-time Polymerase Chain Reaction diagnostics tools have the potential to revolutionize surveillance for non-indigenous marine species by enabling rapid, accurate, and simultaneous detection of multiple species within a range of easily obtained environmental samples such as water, sediments, biofilms or biofouling samples.

Our recent research has focus on developing and applying eDNA/eRNA-based methods for investigating New Zealand's marine biodiversity, and marine biosecurity surveillance. In this talk we will: (1) present examples of how molecular tools can support on-going marine biosecurity surveillance (e.g. detection of target pests), risk assessment and control of transport vectors (e.g. bilge and ballast water); (2) describe current endeavours to increase the robustness and reproducibility of results; and (3) outline further research directions.

Towards pest-free ports, marinas and urban marine environments

Oliver Floerl, Cawthron Institute
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Co-authors: Grant Hopkins and Patrick Cahill (Cawthron Institute, Nelson)

Oli is a marine ecologist with 19 years' experience in biosecurity and biofouling research and is Team Leader for Biosecurity at Cawthron institute. His particular interest is the development of practical tools and approaches to assist regulators, industry and the public in limiting the spread of marine pests and diseases. A bit like the invasive species his work is focused on, Oli arrived in New Zealand via several stepping stones (Wales and Australia in this instance). He has an adjunct position at SINTEF Ocean (Norway) and is an honorary research fellow at the University of Auckland.

Many of New Zealand's harbours and estuaries have become colonised by populations of non-indigenous marine species. Some of these species have the potential for causing considerable impact, and significant effort is made to prevent their spread to new areas and habitats. Targeted surveillance, pest management programmes and the management of marine transport pathways all contribute to reducing the potential for pest species to spread and establish in new locations. An additional opportunity for achieving the same objectives, and one that has not yet been adequately tackled in New Zealand or internationally, is the suppression of, or control over, biofouling development on coastal artificial infrastructure. Suppressing or controlling biofouling on artificial structures could eliminate large swathes of habitat suitable for invasive pest recruitment, and subsequently hamper range extensions/spread by reducing the scale of propagule reservoirs.

In this presentation, we will describe how effectively controlling biofouling on submerged infrastructure has the potential to provide substantial biosecurity benefits, at local and national scales, provide examples of current endeavours in this area, and outline priorities for innovative research and technology development.

Creating a fire break for Undaria in Fiordland

Jen Brunton, Ministry for Primary Industries
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Jen is a Senior Adviser at the Ministry for Primary Industries where she is mainly responsible for coordinating and providing technical advice to the marine biosecurity partnerships that MPI is involved in. And since Day One, Jen has also been involved in the joint-agency response to Undaria in Fiordland.

Fiordland's marine environment is an international treasure with unique and fragile marine ecosystems. Marine pests are recognised as the number one threat to the area, and the protection from the impacts of introduced marine pests is key to maintaining its values.

In April 2010, a single specimen of *Undaria pinnatifida* (Undaria) was found growing on a barge mooring rope in Sunday Cove, Breaksea Sound, Fiordland, during an annual surveillance exercise. Undaria is widespread throughout New Zealand however this was the first detection of Undaria in the Fiordland Marine Area. As a result, a joint-agency response team was formed, consisting of Environment Southland (lead agency), MPI, and DOC.

Local elimination of undaria from Sunday Cove, alongside pathway control measures to prevent re-invasion was the response option. From July 2010 until May 2017, regular dive surveys to monitor Undaria in Sunday Cove occurred; things were looking promising until April 2017 when a widespread population of Undaria was discovered about 2km away from the response site. At this same time the Fiordland Marine Regional Pathway Management Plan was launched - the first of its kind.

New initiatives to assist in preventing the further spread of Undaria via human vectors were implemented in December 2017. Work is now underway with the support of science to manage Undaria in Fiordland in the long-term with the hope of preventing further spread to the wider Fiordland Marine Area.

NEW APPROACHES

What are we protecting? Novel approaches for monitoring biodiversity to inform invasive species control decisions

Pete Caldwell, Boffa Miskell
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Pete is a biosecurity consultant at Boffa Miskell, an environmental consultancy based in Christchurch. Pete manages terrestrial plant and animal pest species within riverbed sites, under the partnership with Land Information New Zealand (LINZ), and is involved in managing wilding tree control programmes. Pete seeks to use innovative approaches to ensure indigenous biodiversity is protected from invasive species.

Invasive species control is generally carried out as soon as resources allow, and often without fully considering the impact of control options on non-target species. Novel monitoring approaches can play an important role in identifying the presence and distribution of native species. This data can be used to refine control plans to better protect threatened species through the selection of appropriate control methods. This presentation will explore new technology and processes, and how the data provided by this technology can be used to inform control plans. Examples covered in this presentation include thermal imagery, remote photography, and high-resolution aerial imagery.

The development of best practice guidelines for feral cat control with PredaSTOP

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Co-authors: H. Blackie (Boffa Miskell Ltd); C. Eason (Cawthron Institute/Lincoln University); R. Dickson (Hawkes Bay Regional Council); M. Mitchell and A. Glen (Manaaki Whenua Landcare Research); D. MacMorran (Connovation Ltd).

Lee is a Senior Ecologist and Biosecurity Consultant at Boffa Miskell Ltd. He is currently leading several research programs looking at low residue and species-specific toxins as well as advanced monitoring tools for invasive mammalian pests. In his previous role, Lee was the co-leader of an MBIE funded research program at Lincoln University focused on the development of smarter tools for pest control in NZ.

PredaSTOP™ is currently one of only two registered toxins for feral cat control in New Zealand. The active ingredient in PredaSTOP™ is para-aminopropiophenone or PAPP for short. PAPP is a low residue vertebrate toxic agent registered in New Zealand in 2011 as PredaSTOP™ for the control feral cats and stoats. When feral cats are controlled we believe it is imperative that it is done with a tool that is as humane as possible. When PredaSTOP™ is delivered at a lethal dose, cats and stoats quickly become drowsy and then unconscious with minimal symptoms of distress. PredaSTOP™ has the potential to be an effective and affordable tool for reducing feral cat densities in large-scale predator control (Glen & Dickson 2017), however, since its registration this tool has not been widely used for feral cat or stoat control and this is partly due to the lack of best practice guidance for end-users. A best practice manual has recently been written for anyone involved in the planning and use of PredaSTOP™ for feral cat control in New Zealand. It provides end-users with detailed instructions from the planning phase all the way through to completion to ensure the operation is compliant with legal requirements as well as maximising the chances of success. The learnings and outcomes from two control operations, the field trials undertaken for the registration of PredaSTOP™ for feral cats, and the legal requirements for this toxin, were all used to develop these best practice guidelines. The methods and results from these two feral cat control operations undertaken by and with support from Hawkes Bay Regional Council will be presented to outline the methods for use and efficacy of this control tool.

Pest Control Hub - Yor one stop shop for pest control information

Cameron Bunton, Northland Regional Council
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The Pest Control Hub is a biosecurity focused website developed by the Northland Regional Council to convey information on local Northland pests and weeds. The website has been designed to make finding and accessing pest control information easy; a tag-based search engine allows customers to search for a pest based on name, key features and legal status.

The Pest Control Hub provides a detailed description of the pest as well as supporting images, videos, relevant regional and national rules, and a way for members of the public to report/request further information on a pest.

NEW WEED SOLUTIONS

Recent Innovations to improving the herbicide control of weeds

Peter Raal, DOC
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Pete has over 20 years' experience as a specialist weed ecologist. He uses his extensive knowledge of the chemistry of herbicides and surfactants and how they work on different weeds to design and implement innovative herbicide trials on difficult to control weeds in order to build both DOC's and the nation's technical capability to control weeds.

In response to making weed control operations more economic, the discovery of new and/or improved herbicide mixtures, surfactants and delivery systems are important, along with strategies to optimise their use. However, the discovery of new innovations has only seen a modest upsurge in recent years. Nevertheless, a few new developments have proven to be interesting, and have brought useful innovation to the industry. I provide here a short description of some of the new innovations that could enhance some weed control activities in New Zealand.

Grass control

- X-it Grass Basal is a ready-to-use, oil-based herbicide mixture initially designed to treat inaccessible, highly scattered pampas tussocks using the helicopter wand system. However, it is proving to be highly effective against most dry or damp scattered individual tussock grasses and larger creeping grasses (bamboo, Phragmites and Arundo donax) in in lower density infestations.
- The product is used to treat the basal shoots of the grasses, which are the points where grasses grow from at, or just above, the soil surface. This means that less herbicide than traditional foliar spraying is used and there is little, if any, collateral damage.

Potential new boom spray herbicide to control the stipoid needle grasses

- Grazon at 30 l/Ha with methylated seed oil delivered at 150 litres per hectare has twice killed Nardus stricta (mat grass. Mat grass occurs together with Nassella tussock and Chilean needle grass in the Pooideae subfamily, which means triclopyr ester may also be effective against these species.
- Nassella tussock pot trials using foliar sprayed triclopyr ester has resulted in >95% death of the foliage of treated plants and they have not set seed. Because Grazon is a woody weed herbicide, other grasses are unaffected. Regional Councils have been asked to consider doing boom spraying trials at the landscape scale to determine whether triclopyr ester is effective against the needle grasses.

Surfactants and additives to improve herbicide efficacy

Methylated seed oils (MSO) have been instrumental to the successful control of wilding conifers using the ester herbicides and significantly improve the performance of the Sulfonylurea herbicides (for example, metsulfuron-methyl). A MSO surfactant is a better adjuvant than the organosilicones:

- MSO will improve performance conditions that are not ideal for plant growth (hot and dry) and do not favour optimum herbicidal activity. If an herbicide must be applied under less than ideal conditions, a MSO will improve performance
- MSO will ensure good herbicide penetration through the stem cuticles of broom and gorse and the waxy leaf cuticles of other weeds and give consistently higher kill rates. This is especially true for the ester herbicides (i.e. MSO's are lipophilic, or oil-loving, and improve cuticle penetration of lipophilic herbicides, such as the esters). Organosilicones don't do this.
- MSO's give good rainfastness.

MSO additive to improve spreading and penetration into plants

Methylated seed oils are excellent penetrators but only good spreaders. Organosilicones are excellent spreaders but poor penetrators.

A polyether-modified polysiloxane adjuvant has recently been discovered that can be added to an MSO to turn it into an excellent spreader, like organosilicones. This means we now have both an excellent spreader and penetrator, which may facilitate using less herbicide to achieve the same kill rates. Evidence of this is presented for the foliar boom spraying of wilding pines.

Drilling and filling of large tree weeds
Drilling and filling is an effective way of killing large tree weeds but is expensive because of the large number of holes often required to affect a kill. Recent work done on large wilding conifer trees using Tordon Pasture Boss suggests that a 'one-hole wonder' drill and fill solution may have been found, which could result in significant time savings. It is expected that all trees that can be killed using X-Tree Wet and Dry will be susceptible to this herbicide, which means we may have a single herbicide drill and fill option to control a wide range of large tree weeds. Experiments are being planned to test this hypothesis.

Saflufenacil: A new tool in the 'war' against pest plants

Peter Robinson, Kiwicare Corporation Ltd
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Peter is General Manager - Research and Development for Kiwicare Corporation based in Christchurch. Peter started out doing fisheries and lakeweed research in the NZ Hydro Lakes and was part of the successful elimination of Lagarosiphon from Doctors Creek in the Lower Waitaki. Peter then spent 15 years working for the Wool Research Organisation of NZ (WRONZ), where he became Environmental Division Head and worked on sheep dip residues and environmental effects completing a PhD in Entomology (Aquatic Toxicology). Peter then spent time with a spin-out company of WRONZ before a short stint with Landcare Research finally joining Kiwicare in November 2016.

Glyphosate is one of the most important tools in the 'war' against pest plants. This tool can be made more effective by the addition of a new active, saflufenacil.

Kiwicare has obtained exclusive rights to saflufenacil, which is a recently developed active in the BASF range.

Saflufenacil is a herbicide of the pyrimidinedione chemical class. It has a mode of action like other inhibitors of protoporphyrinogen IX oxidase (PPO). This means that it interrupts the chemical pathway for production of chlorophyll resulting in a build-up of hydrogen peroxide (H_2O_2) which damages tissues and causes rupturing of cells. Kiwicare have found that when used in combination with glyphosate, there is a synergistic effect between saflufenacil and glyphosate. It is thought that rapid damage by the saflufenacil in green tissue results in greater absorption and movement of glyphosate into vessels; the weed withdraws nutrients from damaged areas increasing flow of glyphosate to other parts of the plant including roots, resulting in more effective control. The effects of saflufenacil are fast and seen in most weeds within two days.

One of the challenges associated with pest plant control is the required mixing of different chemicals to achieve the desired outcome. The consequence of this type of tank mix is that individual preferences and interpretations of mixing ratios can result in inconsistent outcomes, the risk of spillage has implications for health and safety and risks damage to the environment and the need for multiple plastic containers raises concerns about sustainability. Kiwicare have formulated a combination herbicide, Weed Weapon Extra Strength, which is a tested combination of glyphosate and the optimum level of saflufenacil. It gives troops in the 'war on weeds' the most effective weapon for control of the broadest range of pest plants without the need for mixing chemicals.

New solutions for control of submerged aquatic weeds

Paul Champion, NIWA
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Co-authors: D Hofstra & D Rendle (NIWA)

Paul is a senior researcher with specialist expertise in biosecurity, plant ecology and conservation of endangered plant species, especially in freshwater and wetland habitats. Focus research areas include assessment of weed potential of introduced plants, proactive management of aquatic weeds and facilitating the application of research by management agencies. He also enjoys running plant identification workshops and communicating biosecurity science.

The presence of invasive weeds invariably has a detrimental effect on native biodiversity, and the uses and values of our freshwaters. Removal of invasive weed beds may enable the recovery and restoration of native vegetation. The methods or tools available for weed control include habitat manipulation: biological, chemical, mechanical, manual and integrated weed control. The use of herbicides to control aquatic weeds has always been controversial, with many perceived risks posed by their use including toxicity to humans and other animals, non-target plants and the aquatic environment in general. However, many of the gains made in the management of aquatic weeds have been due to the availability of selective herbicides permitting their control without damage to native species. One of our goals is to continue to provide solutions for weed issues in New Zealand by assessing tools and products that are used elsewhere for their performance on our weeds, always aiming for smarter tools and use profiles to minimize environmental load, costs and off target impacts. This talk presents findings from trial work this summer that evaluated new aquatic herbicides on submerged weeds.

UPDATES

Global Trends In The Development Of Rodenticides And Opportunities For Innovation

Charles Eason, Cawthron Institute (and Lincoln University)
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Co-authors: Prof Wayne Linklater and Dr Michael Jackson (Victoria University of Wellington); Dr Shaun Ogilvie, (Cawthron Institute); Dr Helen Blackie and Dr Lee Shapiro (Boffa Miskell Ltd).

Professor Eason has >200 refereed publications, >300 reports on pest control technologies, and has enabled registration of six new pest control tools in NZ. Internationally, tools for animal pest control have declined steadily. Eason has had major impact, helping ensure this has not occurred in NZ. In addition, he has influenced how common rodenticides, such as 1080 and brodifacoum, are used to protect endangered species globally and minimize side-effects. He has played a key role in the design of toxins that minimise animal welfare impacts. He is internationally recognised as the world leader in the field of vertebrate pesticide toxicology, illustrated by numerous keynote speaker requests. He was awarded the NZ Science and Technology Silver Medal in 2002, the NZ Science Communicator of the Year Award in 1994, Companion of the Royal Society in 2016 and the Thomson Medal in 2017 for science leadership.

The history of research discoveries in rodenticide development, as well as current and future-focused research are explored. Research endeavouring to retain essential tools, develop new toxins and delivery systems and explore non-lethal control options, as well as address community concerns, has advanced. Lessons learned from the research, registration and technical challenges associated with advancing new technologies are presented. There are exciting opportunities for transformational change based on the integration of existing and new tools, such as advances in wireless technology for species recognition, new self-resetting traps, drones, species-specific toxin-delivery systems enhanced with advanced lures and new toxins which increasingly combine 'low-residue' characteristics with selectivity and humaneness. Putting our efforts into 'silver bullet' technologies for small mammal pest control is the wrong approach to biodiversity conservation. Research and development should focus on blending the practical skill of pest control practitioners with emerging technologies for transformational change, as well as novel fundamental research into biocontrol and new avenues.

Automated pest recognition and decision making for species-specific control

Brent Barrett, Boffa Miskell Ltd
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Co-authors: Helen Blackie (Boffa Miskell Ltd); Simon Knopp and Clive Marsh (Lincoln Agritech Ltd); Kenji Irie (Red Fern Solutions Ltd).

Helen is a biosecurity consultant at Boffa Miskell Ltd. Her work is focussed on the development of innovative technologies and tools for wildlife management and biosecurity. Helen currently leads projects in both New Zealand and Australia which are focused the integration of new automated, technologies to detect and control potential incursions.

Adding intelligence to trap design and toxin delivery is set to open up a new world of control possibilities with high species specificity.

PAWS (Print Acquisition for Wildlife Surveillance), is a well-developed technology capable of automatically identifying animal species interacting with a specifically designed surface. The technology was initially developed as a means of wildlife monitoring and surveillance, and is currently being customised for New Zealand via DOC and Predator Free. Ongoing advances in PAWS technology mean it is now capable of on-board processing or instant decision making, which has opened up new avenues of application. For example, recent work has focused on real-time identification to activate species-specific traps to control invasive mammals in island biosecurity scenarios. Future work will see expansion into real-time communication with other control tools, such as toxin delivery systems or toxin application via drones. The automation of decision-making via this new technology will play a large role in the future delivery of threat-specific responses, providing a transformative tool for large-scale pest control.

Planning Predator Free Miramar - a world first

Glen Falconer, Greater Wellington Regional Council
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Glen is the Team Leader of the Pest Animals section at Greater Wellington Regional Council. He has over 20 years' experience in planning and implementing pest control operations across the Wellington Region.

This presentation will cover what has achieved so far and pass on our experiences, thinking and planning approach in a world first operation - Predator Free Miramar.

Wellington City Council has partnered with Greater Wellington Regional Council and the NEXT Foundation with the goal of making Wellington the first predator-free capital city in the world. The initial focus of the project is to work with community groups already operating in the area, then plan and implement an eradication operation on the Miramar Peninsula for rats and mustelid species, and sustain at zero density.

From there it will be spread out across the rest of the city and provide an example of urban eradication on the mainland (that is not entirely separated by predator proof fencing) and an opportunity to understand pest, economic, political/regulatory, and social dynamics and learn about unintended consequences, both positive and negative. In order for this project to be effective we need community involvement and collaborative efforts - a combination of professional and citizen predator control actions.

Improving on Innovation - Revealing the Effectiveness of Hessian for Aquatic Weed Management

Marcus Girvan, Boffa Miskell Ltd
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Marcus is a biosecurity project manager at Boffa Miskell, an environmental consultancy based in Christchurch. Boffa Miskell's strategic partnership with Land Information New Zealand (LINZ) has meant that over the past eight years he has been managing weed and pest control operations in hill country, riverbeds and lakes across New Zealand. Marcus currently manages aquatic weed operations in 16 lakes, and is seeking to employ innovative methods and technologies to deliver more cost effective and timely control.

Land Information New Zealand (LINZ) administers approximately 8% of New Zealand, including the beds of many of its iconic lakes. Lagarosiphon major has been an issue in South Island lakes for decades, with many of the tools used today being the same as those used in the 1970's. Effective new tools to manage aquatic weeds are few and far between, however LINZ's use of the biodegradable hessian fabric in a number of southern lakes since 2016 has proven to be a winner; or has it? This presentation will explore the truth about hessian - what we have learned, what's been achieved, and where we went wrong.

Innovation and partnerships for the control of wilding conifers in New Zealand

Sherman Smith, Ministry for Primary Industries
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Sherman is the Programme Manager for the collaborative National Wilding Conifer Control Programme. This follows on from his role in leading the development of the 'right tree in the right place' New Zealand Wilding Conifer Management Strategy 2015 -2030. He has been working in the field of biosecurity and biodiversity for over 20 years across both central and local government.

Planted in the right place, conifer trees can provide timber, store carbon, decrease erosion, and provide shelter and shade for stock. In the wrong place, they are a major threat to our ecosystems, iconic landscapes and farms. They can reduce water availability in dry areas, displace native plants and animals, and damage the New Zealand forestry sectors reputation for sustainable wood production. Across New Zealand, Crown land administrators, private land holders, local government, and community groups have collectively spent about $11 million each year on wilding conifer control. Despite this, wilding conifers have been spreading by more than 5% each year. If left unchecked, it was predicted that wilding conifers would cover 20% of New Zealand by 2030. The National Wilding Conifer Control Programme has taken an innovative collaborative partnership approach between all land holders and administrators in an area, as wilding conifer spread does not respect land boundaries. Its success so far has been due to the particular way this collaboration has been approached - which includes governance, prioritisation, research and a process to create nationally-agreed good practice for control operations. In year one, we removed most problematic seed sources and halted wilding conifer spread across over 1.2 million hectares. This has protected vast tracts of land, including High Country farmland and conservation land in parts of; Southland, Otago, Canterbury, Marlborough and the Central North Island. With an anticipated increase in new forest plantings, through its strong partnership approach, the wilding conifer programme will seek to ensure that new plantings do not create a seed source for new wilding conifer invasions.

New Zealand's national weed management decision-support system: Achievements and opportunities for further development

Graeme Bourdot, AgResearch
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Co-authors: Darren J. Kriticos (CSIRO Australia), Mike Dodd (AgResearch), Josef Beautrais (AgResearch), John Kean (AgResearch)

Graeme completed my PhD in 1980 in the Plant Science Department at Lincoln College (now Lincoln University) located in the Canterbury region of New Zealand. His topic was 'A study of the growth and development of yarrow (Achillea millefolium)' which focussed on understanding aspects of the growth and ecology of this problematic clonal weed of cropping land in New Zealand. Graeme joined the Agricultural Research Division of New Zealand's Ministry of Agriculture and Fisheries in 1980 as a weed scientist and worked initially on weed problems in cereal crops. He became interested in the economics of weed management and the application of ecological theory, especially weed population dynamics, in weed management decision-making. He continued along that path, moving more into pastoral weed ecology and management with time and developing research interests in herbicide resistance evolution and biological weed control. Graeme is currently a Principal Scientist with AgResearch, a New Zealand Crown Research Institute, based at Lincoln, and leads the AgResearch pastoral weeds research programme.

The National Policy Direction for Pest Management 2015 requires that a proposal to include a weed (or other pest) in a Regional Pest Management Plan be supported by a favourable cost benefit analysis using a robust and nationally consistent approach. Historically, Regional Councils' efforts to undertake such analyses have been hampered by the lack of availability of crucial biophysical data regarding the target weed, including its current distribution, potential future distribution and its rate of spread in the absence of control. To redress this, Scientists from AgResearch and CSIRO have collaborated to develop a platform of five tools that together support the required robust and nationally consistent approach to cost benefit analyses. The five tools are: a national weed occurrence database that automatically harvests regional weed spatial data (NWDD); a database of Climex models and their projections

for New Zealand (CLIMENZ); a weed spread model (MDiG); a spatial weed risk assessment model (WRASP); a cost benefit model (CBA for regional pest management). In this paper, we illustrate the decision-support system by first demonstrating the currently available CBA and CLIMENZ tools. We comment on the adoption of the CBA tool by Regional Councils and its contribution to targeting resources to the most deserving weed problems. We then outline a potential program for making all five tools available to more fully meet the needs of the Regional Councils for prudent resource allocation and compliance with the National Policy Direction for Pest Management 2015.

On Farm Biosecurity: Experience and new experiments.

Laurence Smith, Environment Canterbury
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Laurence's involvement in Biosecurity has spanned nearly 38 years and almost 28 years in the NZBI. His work has spanned from controlling pests to assisting with policy creation and everything in between. Evolving pest issues create opportunity for change in how we manage pests. With the ability of pests to spread within New Zealand ever increasing, never has there been more need for change. For the last 5 years he has been promoting the need for land occupiers to take action to protect their properties from incoming pests and to stop spread from their land.

Recent biosecurity incursions, such as velveltleaf and *Mycoplasma bovis*, have highlighted the need for better biosecurity practices on farms. People, vehicles and equipment post a high biosecurity risk and should be managed accordingly.

Environment Canterbury is leading by example in this area. For the past five years our biosecurity staff have observed formal biosecurity protocols and used mobile wash down facilities on board their trucks when moving between properties. More recently, all field based operational staff across the organisation have been equipped with biosecurity kits for removing dirt and disinfecting footwear, clothing and equipment. We have also developed a portable, easy to use 12 volt wash down system that plugs into a cigarette lighter and uses minimal water, making it suitable for use on smaller vehicles.

This presentation will discuss our biosecurity protocols and share our experience with other organisations who have staff in the field that need to practice on farm biosecurity when moving between properties. Actions seen to be taken are more likely to engender behaviour change in the community than communications alone.

Out of sight, out of mind? Ensuring the safety and security of a distributed workforce

James Knapp, OSPRI New Zealand Limited
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As Health and Safety Lead, James provide advice and support to help OSPRI ensure the health, safety and physical security of our workers; a diverse role that encompasses an interesting spectrum of risk. James is a relative newcomer to health and safety, having spent only the past six years in full-time H&S roles. His previous work background is broad but has usually involved operations in challenging environments ranging from Antarctica to Australia to Afghanistan. Insights from those experiences strongly influence his current focus on engaging with workers who face high-risk situations and may have once been "out of sight and out of mind".

Recently James led OSPRI participation in Institution of Occupational Safety and Health (IOSH) sponsored research into OSH leadership and management of distributed (or remote) workers, carried out by the University of East Anglia. He keeps in regular contact with the Government Health and Safety Lead, Agricultural Leaders Health and Safety Action Group and is a Recognised Safety Practitioner as a Member of the International Institute of Risk and Safety Management.

Philosophically, James believes H&S is best 'done' at the coalface as a part of normal work, and enjoys enabling people to problem-solve by asking "how" work can, or could, be done safely and efficiently.

How do you exercise your duty of care to people you can't see?

Biosecurity workers and volunteer workers often operate in remote environments either alone or in small teams. They present and face several unique challenges to their health and safety. Those challenges include rapidly changing risk situations, less opportunity for face-to-face communications, limited access to resources or emergency services, greater incident consequences as a result of interacting risks, high reliance on individuals to manage risk, and increased vulnerability to interpersonal violence.

With a nationally-distributed workforce of pest control and disease management contractors who work in remote and rural environments all over New Zealand, OSPRI has committed to industry leadership for lone worker safety. OSPRI has thoroughly analysed the risks and incidents over the past five years, and has strategically developed overlapping layers of defence for our staff.

Risk controls include but are not limited to leadership training, effective two-way communications, satellite vehicle impact alerting, welfare checks and lone worker tracking, improved personal protective equipment and clothing, worker empowerment education and outreach events, simplified offline hazard mapping and event reporting, and bespoke workplace first aid and risk management courses.

More is planned with the launch of our new three-year health and safety strategy, and OSPRI wants to share our experience and learnings with others in the biosecurity industry.

Biosecurity 2025 – Where to from here?

Dr Andrew Bell, Manager, Border and Biosecurity Systems Policy (MPI)

Protecting New Zealand's environment from the impacts of pests and diseases is of growing importance to New Zealanders.

New Zealand has a comprehensive regulatory framework in place to minimise the risks posed by all invasive pests and diseases, however, no regulatory approach can provide 100% protection. The implementation of the Biosecurity 2025 Direction Statement provides the opportunity and framework for New Zealander's to step in and play their role in ensuring our biosecurity system is effective.

An effective biosecurity system needs to be agile enough to deal with the changing natural environment, collaborative enough to ensure all activities consider biosecurity implications, and flexible enough to enable full participation. Working collaboratively, all participants, are encouraged to identify and, where appropriate, lead initiatives.

This presentation will cover both the developing strategic context and the practical implications of implementing Biosecurity 2025 to deliver a collaborative biosecurity system appropriate for New Zealand in the 21st Century."

GEMS

Trialing X-stump gel at Mid Dome.

Jourdan Lethbridge, Boffa Miskell Ltd
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Jourdan is a biosecurity consultant at Boffa Miskell based out of Christchurch. He manages the biosecurity component of river and lake beds on behalf of Land Information New Zealand, as well as managing the biosecurity component for the Mid Dome Wilding Tress Charitable Trust.

Exec Crop Solutions approached us to trial a new chemical product they are looking to release called X-stump gel. X-stump gel is essentially a gel version of X-tree Wet and Dry and is to be used as the chemical component of a 'cut and paste' control technique.

We were very keen to design a trial using this product at Mid Dome on *Pinus contorta*. We wanted to go for a worst case scenario approach by doing only one cut per tree and leaving the majority of the lower branches on the tree. Without any chemical component, trees left with foliage on will continue to grow and produce seed, so we concluded this would be the best approach for proof of concept. We selected a control site with a range of tree sizes that has been untouched by control. We selected 90 trees for the trial: 30 of the trees receiving no chemical; 30 of the trees receiving a normal stump application; on the last 30 trees we wanted to to test if the product was weather fast so we added in a water component of spraying the stumps before and after the application of chemical 10 times with a spray bottle.

The trial was carried out in December 2017 while the trees were in optimal growing conditions. The trees have had three months since the initial control and we have recorded some exciting initial results.

Controlling possums in low lying scrub using Maxi Bins

Brad Campbell, Greater Wellington Regional Council
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Brad is a Senior Field Operator with Greater Wellington Regional Council's BioWorks Unit. He has undertaken field work throughout the Wellington Region to implement the Regional Possum Predator Control Programme.

This 2-minute talk will look at new ideas to control possums in areas with low lying scrub such as gorse, tawhini, Darwin's barberry. The GWRC BioWorks team developed and produced a ground based bait station call Maxi Bins which they have been successfully using for about two years.

Biosecurity Advocacy

Phoebe Andrews and Kayla Rench, Unitec

Co-authors: Brian Shields, Liz Brooks and Andrew Nelson (Auckland Council); Nigel Adams and Diane Fraser (Unitech)

Phoebe Andrews and Kayla Rench are currently in their final year of study of a Bachelor of Applied Science, double majoring in Animal Management and Welfare and Biodiversity Management in the Environmental and Animal Sciences Practice Pathways at Unitec, Auckland. Phoebe and Kayla have been selected for a summer studentship with the Treasure Islands programme through Auckland Council Biosecurity (Brian Shields and Liz Brooks), who have funded the project. The results of this study will be submitted as a research project in part-fulfilment of the requirements of their degrees. Phoebe and Kayla are supervised at Unitec by Senior Lecturer Dr Diane Fraser and supported by Assoc Prof Nigel Adams.

The 'Treasure Islands' campaign is an advocacy programme implemented by Auckland Council and the Department of Conservation (DOC) in 2009 to ensure the protection of the conservation islands of the Hauraki Gulf Marine Park (HGMP). The HGMP contains 30 major island groups which provide refuges for a number of New Zealand's endemic and threatened wildlife and are at risk from human mediated introductions of potentially damaging pest/predators. The increasing use of the HGMP poses an ongoing risk to the status of the pest/predator free island, and therefore biosecurity advocacy is of high value to the islands. The aim of this initiative is to provide education and awareness of the conservation value and biosecurity risk to public travelling within the HGMP, using Treasure Island advocates. Treasure Island advocates have been placed at wharves and on ferries during busy summer periods over the last few years, striving for a friendly, non-threatening communicational approach, to maximise the dissemination of biosecurity knowledge in relation to the HGMP. This presentation will summarise the effectiveness of the communication tactics used and suggest recommendations for developing these Auckland Council advocacy roles in the future.

Dissemination of biosecurity information and compliance of ferry passengers travelling to selected islands in the Hauraki Gulf.

Kayla Rench & Phoebe Andrews, Unitec

Co-authors: Brian Shields, Liz Brooks and Andrew Nelson (Auckland Council), Nigel Adams and Diane Fraser (Unitech)

Phoebe Andrews and Kayla Rench are currently in their final year of study of a Bachelor of Applied Science, double majoring in Animal Management and Welfare and Biodiversity Management in the Environmental and Animal Sciences Practice Pathways at Unitec, Auckland. Phoebe and Kayla have been selected for a summer studentship with the Treasure Islands programme through Auckland Council Biosecurity (Brian Shields and Liz Brooks), who have funded the project. The results of this study will be submitted as a research project in part-fulfilment of the requirements of their degrees. Phoebe and Kayla are supervised at Unitec by Senior Lecturer Dr Diane Fraser and supported by Assoc Prof Nigel Adams.

The Hauraki Gulf Marine Park encompasses 30 island groups and over 400 islands in the greater Auckland region, 15 of which are pest free. The location, wildlife and scenic attractions make these pest free islands highly accessible and, as such, popular destinations for national and international visitors. The Treasure Islands Campaign is a collaborative venture initiated by Auckland Council and the Department of Conservation to raise awareness about potential pests and pathogens that can travel with visitors inconspicuously on their footwear, equipment or food. The aim of the current study was to survey ferry passengers before they embark on their trip to assess their level of awareness of biosecurity compliance actions and where they sourced information for their travel plans. Passengers also provided suggestions for potential ideas to help them learn or spread the biosecurity message in order to benefit future travellers to the islands. The outcome of the study will help to bring new suggestions for the dissemination of biosecurity information to support the Treasure Island Campaign and the biosecurity protection of the Hauraki Gulf Marine Park.

Perspectives in Biosecurity - a new journal (POSTER)

Mel Galbraith, Unitec Institute of Technology
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Co-author: Dan Blanchon (Unitec Institute of Technology)

Mel is a Senior Lecturer in Environmental and Animal Sciences, Unitec Institute of Technology, specialising in biodiversity, ecology and biosecurity in the Biodiversity Management major for the department's Bachelor of Applied Science degree. His interests in biosecurity lead to the establishment of the journal, Perspectives in Biosecurity, of which he is co-editor. Mel's professional memberships include the Ornithological Society of New Zealand (current council member), the New Zealand Ecological Society (past president) and the New Zealand Biosecurity Institute.

Mel has always had an interest in natural history, especially ornithology and herpetology, which he formalised through study at the University of Auckland. This has led to involvement in many ecological restoration projects, initially on islands, but increasingly within the urban Auckland. Mel's practical participation in biodiversity management is currently focused through three projects - Tiritiri Matangi Island, Motu Kaikoura, and the Pukorokoro Miranda coast.

Perspectives in Biosecurity is a new peer-reviewed journal, intended to address the under-representation in current publications of the multi- and interdisciplinary nature of biosecurity. Biosecurity is not just about the ecology of species. At present, non-ecology papers, at best, may be scattered amongst a range of other discipline-based journals, but they may not be published at all. The benefit of Perspectives in Biosecurity is the provision of a single publication for biosecurity, accepting papers from across, and between, the range of disciplines. This scope includes (but not necessarily restricted to) invasion biology and ecology, invasive species identification/diagnostics, management and eradication/control, new invasive species records, modelling, biosecurity law and policy, relationships between human society and invasive species. Perspectives in Biosecurity is an online publication hosted by ePress at Unitec Institute of Technology, and is currently free-access. We invite all stakeholders in biosecurity in New Zealand and the wider Pacific region to consider Perspectives in Biosecurity as a means of sharing formally information about their projects, successes, and failures.

Incursion by Shaun Matthews: using art to raise weed awareness. An innovation in community engagement

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Illona is the Biosecurity Technical Advisor, Urban Ecology Team, Wellington City Council. Illona manages the pest plant and animal contracts in Wellington City Council's parks and reserves.

Having a few thousand Plant Me Instead books in storage, Wellington City Council looked for new ways to raise awareness about weeds. Working with our City Arts team we commissioned two artists to create art in public space to highlight one or more of our key messages:

- Weeds are suffocating our native forests
- Not all green is good
- Which climbing weed species are bad

Shaun Matthews' 'Incursion' was installed in March 2018, in four locations across the city as a Parks Week event. It was a series of large photographic images of eight different climbing weeds on fabric. Hung high amidst the trees and bush, Shaun's images 'smother' the plants behind them to remind us of the huge and devastating impact weeds have on our native ecosystems. Having postcards available at the base of the works, provided information on the particular weed, with links to community groups and Weedbusters. Shaun's project was supported by the Wellington City Council Public Art Fund. https://www.shaunmatthews.com/

The other art project was by Anna Bailey from String Bean Puppets. Anna will create a puppet show for children and families to raise awareness about ecological weeds. The show introduces two of the climbing weed species to explore the impact they can have on native plant species. It is centred around a tale of a kereru and a child and their journey to protect a baby kohekohe tree from dangerous climbing weeds. Anna will present a series of free puppet shows during the July 2018 school holidays. https://stringbeanpuppets.wordpress.com/

Sharing this innovation, we will hopefully encourage other agencies to do this throughout the country, or employ these artists!

Field testing innovative modifications to Philproof bait stations to target rats and exclude possums

Dale Williams, Bay of Plenty Regional Council
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Dale is a Biosecurity Officer with BOPRC, based in Rotorua. Part of his role includes, providing support and advice to community care-groups about pest animal control methods and strategies. Many of these groups are maintaining and operating networks of bait stations, and they have experienced mixed results depending upon what pesticide and baiting regime they use. Dale's experience (largely focused on Pest Animal Management) dates back over 30 years, where he has worked as a Forest Research Institute and Landcare Research, Science Technician, a Department of Conservation Technical Support Officer and Biodiversity management trainer.

Philproof bait stations are widely used in New Zealand's native ecosystems to simultaneously control possums and rodents (primarily shiprats).

There are a number of reasons why it may be desirable to present pesticides to rats while denying access to possums;

- Some pesticides are registered for use on rodents but not for possums and must be used in rodent-specific bait stations
- Some pesticides are registered for both possums and rodents but the amount of bait required to kill possums is considered (by DOC) to be unacceptably high.
- Being able to control rats (with a slow acting anticoagulant) prior to targeting possums (and/or wallabies) with Feratox encapsulated cyanide may result in a better %kill on all target species.

This could be achieved by either; installing additional infrastructure (rodent specific bait stations) or by modifying multi-species bait stations to exclude possums.

The latter option appears to be more desirable as it should be cheaper. Ideally, the modification would also allow the bait station to be returned to a state that will allow access to both possums and rodents when a broad spectrum pesticide (e.g. 1080) is used.

A number of modifications to large (1.5 kg capacity) Philproof bait stations were developed and the most promising were tested in the field to confirm that they would prevent possums from accessing bait while allowing unrestricted access to rats.

Field trials were carried out at four sites within podocarp/broadleaf forest within the western Bay of Plenty between October 2017 and mid-February 2018 and the behaviour of possums and rats was recorded with Moultre trail cameras.

One design, a simple plastic baffle attached to the floor plate of the Philproof bait station, successfully limited the total bait taken by possums to less than 6%, without restricting access to shiprats.

A second modification, used in addition to the baffle, further reduced bait taken by possums to less than 1% without discouraging rats and may be useful to restrict access to bait by non-target wildlife such as weka.

Both modifications allow the bait station to be returned to a state that targets both possums and rodents.

Before proceeding with further development of these modifications, the author needs feedback from the pest control industry and wildlife managers on the scale of interest and applicability of these modifications, throughout the country.