



New Zealand
Biosecurity Institute

NETS2023

26-28 July, Paihia

Toitū te whenua, toitū te moana, toitū te tangata
If the land is well, and the sea is well, the people will thrive

CONFERENCE HANDBOOK

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Toitū Te Whenua, Toitū Te Moana, Toitū Te Tangata

If the land is well, and the sea is well, the people will thrive

Welcome to NETS2023...

It is my pleasure to welcome you to the 72nd NZBI National Education and Training Seminar (NETS) held in Paihia. This three-day seminar provides a multi-sectoral and multi-agency forum for discussion and debate on how we can collectively minimise the risk of biosecurity threats to New Zealand. NETS provides a fantastic opportunity to share, learn, connect, and get energised.

The theme for this year's NETS is *Toitū Te Whenua, Toitū Te Moana, Toitū Te Tangata* - an acknowledgement that when we protect our valued systems, people will thrive.

NETS would not be possible without a dedicated and committed Organising Committee. I would like to thank the NETS2023 team - Nick Ward, Keith Barber, Viv Lepper, Kane McElrea, Bronwyn Bauer-Hunt, Sara Brill, Aless Smith, Chelsea Neverman, Robert Nathan, Ngati Kawa, and Sofia Chambers – for pulling this programme together. And I would also like to thank this year's sponsors Manaaki Whenua Landcare Research, Boffa Miskell Ltd, Northland Regional Council, NIWA, Ministry for Primary Industries, Connovation Ltd, Auckland Council, Key Industries Ltd, and NZ Environmental Management for their generous support.

We have a great line-up of speakers, field trips, workshops and networking opportunities. I encourage you to forge new contacts, solidify existing ones and share your knowledge and expertise.

Help us shape the various ways we all protect Aotearoa.

Jono Underwood
NZBI President

Day 1 Wednesday 26 July 2023

- 8.00 Registration at Copthorne Bay of Islands
- 8.30 Move to Te Whare Runanga at the upper Waitangi Treaty Grounds
- 9.00 Pōwhiri
Karanga manuhiri into the whare runanga
All seated
Himene and Karakia
Tangata Whenua speak first
Manuhiri reply with mihi [waiata will be distributed to attendees for this]
Taumata will finish before handing over to two guest speakers to officially open the conference.
Hariru and Hongi

10.30 Morning Tea - Treaty Grounds

- 11.00 A hikoi around the Treaty grounds and korero to set the scene of our conference, and an opportunity to gain more knowledge about the history of Waitangi and the significance of the Te Tiriti Partnership for our biosecurity work

12.30 Lunch

- 1.30 The more we look, the more we find: community's role in biosecurity surveillance to protect our taonga.
Jack Crow, Deputy Chair of Northland Regional Council.
- 2.00 A new workforce out of the old undergrowth
Haami Piripi, former CEO of Te Runanga o Te Rarawa
- 2.30 What legacy are we leaving our lakes?
Mary de Winton, NIWA

3.00 Afternoon tea

MANA WHENUA PARTNERSHIPS

- 3.30 Mauri O Te Kauri
J. Murray, Te Rarawa Anga Mua (Education)
- 3.50 Kauri protection in Puketi and Omahuta forests
S. Prime, Tiakina Kauri
- 4.10 Supporting Iwi to protect their special places from wilding conifers
R. Milne, MPI
- 4.30 Enhancing biosecurity for Aotearoa through collaborating with Mana Whenua on incursion investigations, engagement, and surveillance.
J. Wardle, Ministry for Primary Industries

AQUATIC

- Mana Moana Biosecurity Ambassadors - reducing biosecurity risk from returning cruise ships.
J. Darby, MPI
- Out of sight out of mind? Protecting freshwater through biosecurity.
J. Lethbridge, Boffa Miskell Ltd
- Enhancing marine biosecurity surveillance in New Zealand through the development of the Marine Vessel Portal (MVP)
D. Pickering, Bay of Plenty Regional Council
- Real-time aquatic invasive species detection using computer vision on remotely operated vehicles
R. Pearson, National Institute of Water and Atmosphere (NZ)

4.50 New Zealand Biosecurity Institute Annual General Meeting

6.00 Mix 'n' Mingle

Day 2 Thursday 27 July 2023

PEST PLANTS

- 9.00 Syncing weed control data from iNaturalist to ArcGIS
N. Charman, OMB Free Welly | EcoNet NZ
- 9.20 Catching a weed so our (wet)lands thrive: the story of *Cuscuta campestris* (golden dodder) so far
K. Bodmin, Department of Conservation
- 9.40 An updated list of conservation weeds in New Zealand
K. McAlpine, Dept of Conservation
- 10.00 The story of Aki Tai Here
T.K. Parata, Aki Tai Here

ANIMAL PESTS

- Learnings from a ground-based wallaby elimination project on iwi land
T. Day, Day in the Bush
- No more wild deer in Te Taitokerau - partnering with hapū, industry, government and the community for the future of deer management in Te Taitokerau
N. Fitzgibbon, Northland Regional Council
- Brown bullhead catfish in the Rotorua Lakes
T. Te Kurapa, Bay of Plenty Regional Council
- Red-eared slider turtles - a problem that only communities can solve
N. Ling, Waikato University

10.20 Morning tea

FIELDTRIPS - buses leave at 11am

Project Island Song

This trip presents an opportunity view the islands of Ipipiri and to be formally welcomed onto the whenua of Ngati Kuta and Patukeha at Te Rawhiti Marae in Rawhiti. Ngati Kuta and Patukeha are the kaitiaki of Rakaumangamanga, the mountain which is the third navigational marker in the vast Pacific triangle named by the great navigator Kupe. Following a Powhiri at the marae we will make our way to the islands of Ipipiri to witness first-hand the work of Project Island Song. Project Island Song is a unique partnership between community group the Guardians of the Bay of Islands, Te Rawhiti hapū (Ngati Kuta and Patukeha) and the Department of Conservation. This partnership is dedicated to restoring ecological balance to the islands, drawing together the energy, talent and culture of local people to bring the birdsong back to Ipipiri, note by note. Come and experience the pest free Islands of Ipipiri in the Bay of Islands first hand. Walk among regenerating native bush and trees, take in stunning sea views. Listen to the birdsong and spot reintroduced tieke (saddleback), toutouwai (North Island robin), pōpokatea (whitehead) pāteke (brown teal) and many other species. *Numbers will be limited, surcharge applies.*

Kororāreka Historical Tour and Predator Free Russell

The Bay of Islands was settled by Māori in voyaging canoes over a thousand years ago. Kororāreka was originally a māori settlement where māori would come to the coast to fish and seek sheltered anchorage. Kororāreka or Russell was the first permanent European settlement and served as a shore station for whalers, a swashbuckling town full of whalers and sealers with a reputation as the 'Hell Hole of the Pacific'. Learn about Hone Heke, who organised the felling of the flagpole above Kororāreka in protest about the unfulfilled promises of British colonisation, and enjoy a visit to the famous Duke of Marlborough. Join us on this trip to see the historic sights and gain a unique understanding of the history of Kororāreka and wider Bay of Islands. The trip will include stopping at key places of significance and we'll take a look at the exciting work of the Russell Landcare Trust who have embarked on an exciting Predator Free 2050 project aiming to completely remove rats from over 800ha of native forest on the Russell Peninsula. *Numbers will be limited.*

Kororipo Heritage Park

Nestled at the upper end of Kerikeri Inlet, the Kororipo Heritage Park incorporates the Kerikeri Basin, the Stone Store, Kemp House, Kororipo Pā, and Rewa's Village. Steeped in history, this is culturally and historically one of the most important sites in Aotearoa New Zealand. It is a place where Maori and Europeans lived side by side and some of the most important early meetings between these two very different cultures took place. Amazing example of multi-agencies working together to manage site in holistic way, supporting Ngati Rehia as the lead. On the walk from Rainbow Falls, Ngati Rehia representative Kipa Munro will talk about the history of the site, the cultural significance, biosecurity risks associated with high visitor numbers, and how Destination Northland, DOC, FNDC, Hertiage NZ, Far North Holdings, and Ngati Rehia are managing the site together. *Numbers will be limited.*

Community Weeding and Restoration Alive and Well in Northland!

This walk will check out a community nursery supplying plants to a number of conservation projects in the area including Project Island Song. From there across to the historic Kerikeri Basin area across Hongi Hika's Village & Pa site and onto the Wairoa Stream Track. We will see some of Northlands serious weed issues. Then a walk through a 2km stretch of restored and mature native habitat bordering the Wairoa Stream. You will be able to see how this award winning community group has (and are) transforming what was a weed wilderness into a natural habitat and community asset. The walk also takes you past the 'rediscovered' (the surrounding area was covered in jasmine) Te Wairere Waterfall. Along the way, details of the challenges of the project, and the involvement of the community and schools. From a weedy wilderness to a popular 'wilderness' walk in Kerikeri. *Numbers will be limited.*

Biofouling in the Bay of Islands

Come and join us at the Waitangi Yacht Club to take part in a hull inspection, above the water! Together we will dive into the Level of Fouling (LoF) scale and what makes up some of the biofouling in the Bay of Islands (and beyond). After all the hard mahi, it is time to take the plunge into a relaxing and healing experience in the world famous (in Northland) hot pools at Ngawha Springs as guests to Parahirahi Ngawha Waiariki Trust. *Numbers will be limited.*

Lodore Farm and Pukeiti Forest

A 700 ha dairy farm in the warm temperate north can have significant outcomes for kiwi conservation. Walk to a 130ha stand of pristine Northland bush that has been fenced off and intense predator control undertaken to ensure a remnant population of kiwi survive. Fencing and re-vegetation of waterways provides corridors for other native birds and increases water quality in the streams. Then visit Pukeiti forest, for a different community and kaitiaki groups working together around one of Northlands most outstanding remnant ancient forests - pest animal control (including pig and goat control), bat conservation, kokako protection in this magnificent forest where boot stations and boardwalks have been installed for Kauri protection. *Numbers will be limited.*

6.00 Happy Hour

7.00 Conference Dinner

Day 3 Friday 28 July 2023

PARTNERSHIP

9.00 Biosecurity Advisory Groups: facilitating community involvement in pest management
L. Smith, Environment Canterbury

9.20 Predator Free 2050 - lessons Learnt
K. McElrea, Boffa Miskell Ltd

9.40 A case study for iwi and local government partnerships around pestfish surveillance in some Northland dune lakes
R. Tana, Northland Regional Council

10.00 Predator eradication at large landscape scale
J. Kim, Predator Free - Northland Regional Council

TECHNOLOGY

Having the conversations to improve predator detection technologies
J. Bell, Biosecurity Technology Spearhead, Science for Technological Innovation

State-of-the-art projects optimising the use of environmental DNA for biosecurity in New Zealand
K. Fernandes, University of Otago

Night vision goggle-assisted helicopter search and destroy for Bennett's wallaby.
B. Glentworth, Environment Canterbury

Maximising research impact to help achieve a wallaby-free Aotearoa.
T. Ashcroft, Biosecurity New Zealand

10.20 Morning tea

WRAP UP

10.50 GEMS - Short Presentations

11.10 Practical, sustainable farming practices to help climate change - and involve schools and the wider community
Andrew and Vicky Booth, Farmers

11.30 What's AI all about and how can it help in biosecurity?.
Madeline Newman, AI Forum

12.00 President's Closing and Call to Conference NETS2024

NETS2023 will close with a whakawaatea from Ngati Kawa Taituha

12.30 Lunch

WEDNESDAY 26 JULY 2023

OPENING PLENARY SESSION

The more we look, the more we find: community's role in biosecurity surveillance to protect our taonga

Jack Crow, Northland Regional Council

Jack has had 45 years' experience in biosecurity management, including as a Biosecurity Officer at Northland Regional Council, 11 years as Biosecurity Manager at Auckland Regional Council and Auckland Council, and a biosecurity consultant in the Pacific and New Zealand. He is currently the Deputy Chair of Northland Regional Council.

New Zealand is constantly battling new organism incursions that threaten the economy, native species, Māori values and lifestyles. To protect our marine environment and native taonga from these threats and other challenges we must work collectively.

We need to collaborate and share knowledge; embrace both western science and Mātauranga Māori; invest in building capability and capacity at a community, hapū, and iwi level; creating a knowledge hub with access to information, data and research; and building a system and model that is agile and resilient to new threats.

The recent discovery of *Caulerpa* in Northland has highlighted the need for a National Biosecurity Surveillance Strategy. Often incursions are discovered too late for eradication to be feasible, but there is opportunity for greater community involvement in the surveillance of new organisms to ensure the nation is better prepared to act quickly in the future.

Although the creation of a national strategy takes time, our environment and people need us to act with urgency and to protect what's important to all of us.

Toitū te whenua. Toitū te moana. Toitū te tangata.
If the land is well. If the sea is well. The people will thrive.

A new workforce out of the old undergrowth

Haami Piripi, former CEO of Te Runanga o Te Rarawa

Mea nei te toto e toi tonu nei ki Aotearoa, te toto i heke mai i a Tane, e paopao haere ana i te Ao i te Po, i te Ao. Anā ko Te Taiao tēra e tātai iho nei ki a au e tū mai rā hei kaitiaki, he mana tuku iho mai i ōku tūpuna. Ki te tuku tonu atu ki āku uri whakatupu. Uhi, wero, ka tau mai te toki a Haumie, hui e taiki e.

Ko toku ingoa ko Haami Piripi he reo no Te Hiku o Te Ika a Maui tae noa ki te riu o Hokianga Whakapau Karakia. Me mihi ka tika ki te hūnga kua okioki, rātou kua hoki ki te kainga tūturu mo te tangata. Haere e ngā mate haere.

Thank you for the opportunity to make a presentation in relation to the theme of this conference Toi Tū Te Whenua, Toi Tū Te tangata Toi tū Te Moana.

I have titled my presentation “A new workforce out of the old undergrowth”. This will give you a clue about the perspective that I bring to the work ahead of us.

In trying to establish a basis for a legitimacy of purpose across the spectrum of stakeholders involved, I have proposed that a treaty-based relationship is the most appropriate vehicle and form for engaging with Maori around the work we are undertaking and planning for in this initiative.

This will enable a relationship with iwi māori kaitiaki involving three distinct stakeholders. The first being māori families living in situ to the site specific aspects of the work, people who have lived there since time immemorial and will still be living there when everything we build today has gone tomorrow. It is a perpetual presence that is nature nurtured by history and expressed in people through their communities.

Each whanau on the ground is also part of a hapu and iwi network that usually revolves around a common marae as a convention centre for all their cultural activities being a true institution of our forebears and an ongoing assembly point for every whanau, hapu and iwi event.

Within the dynamics of those relationships, and reflected in the proliferation of māori nomenclature lies a “māori world view”, holistically constructing our universe and responding to the imperatives that are derived from it.

That is the realm of matauranga māori and also the extent of the Wai262 claim for us as māori. It is a source of ancient and divine knowledge which can be harnessed and introduced as cultural capital to enhance and improve contemporary organizational systems and to resolve issues or solutions.

And right now, my friends, we need better solutions to combat unpredictable atmospheric changes and unprecedented weather-related events which as we know have a direct impact upon biosecurity.

If the national biosecurity mission is to work together to ensure New Zealand is protected from the impact of invasive species, then the next step for me as a locally grown māori is to try to discern more precisely the scope and lens of the actions necessary for to respond to specific challenges.

With a clear and transparent foundation in place we can take stock of the entire arsenal of tools and mechanisms that we have at our disposal.

In Aotearoa we don't have to look far for the provenance associated with the past chronology of our environmental management and of natural resources tracing the last few hundred years of historical human occupation and establishment of resource management rules and tikanga.

And even without the justification derived from past grievances or injustices, there are very strong reasons for engaging with whanau, hapu and their iwi in the pursuit of conservation outcomes.

Moreover if New Zealanders continue to ignore their presence, relevance and potential in the “business” of biosecurity, it would eventually lead to failure. Because no business in its right mind would, or could ignore such an important contributor to an outcome that has been mutually agreed. A principle of reciprocity which is driven by Te Tiriti o Waitangi, is a first nation response to a national need and our imperatives are derived from an indigenous world view. Of course the workforce that I refer to, has always been here and has a terms of reference that is millenia old. It has been lying almost hidden in the undergrowth of past blizzards of change, But like Te Tiriti, its words are still clear and cannot be obliterated.

My presentation will also focus upon how we can strategically position ourselves as a team to address priorities that have already been identified and require raising awareness and a continuous development of best practice. This creates new ideas and opportunities for innovation while introducing aspects from the past and integrating them with the professional and contemporary expectations of today.

Kia arai te motu.

What legacy are we leaving our lakes?

Mary de Winton, NIWA

Mary.deWinton@niwa.co.nz

Mary is a Freshwater Ecologist based at NIWA in Hamilton and manager of the Aquatic Plant Group – a team of researchers working on aspects of aquatic vegetation. A focus of Mary’s research is the management of aquatic weeds within the wider framework of freshwater biosecurity. Current research projects include monitoring of weed control operations to explore trade-offs between impacts and benefits along different timescales. Mary frequently provides operational advice to agencies on aquatic weeds. On the flip-side, Mary is also involved in research aimed at restoring native submerged plants to degraded waterways.

We often hear about the dire state of freshwaters in Aotearoa New Zealand, with lakes in particular prone to receiving high loads of contaminants and having resultant poor water quality. But ‘biopollution’, the invasion of aquatic invasive species (AIS) in lakes, also has a significant impact on freshwater values and presents a seemingly intractable problem to address. In the case of our worst submerged weeds, not only is it difficult to keep them out of lakes due to the challenge of human mediated pathways, but there is also a limited toolbox of control techniques to manage them once established.

Success for managing such AIS in lakes depends upon evidence-based decision making, expanding management approaches, adopting new technologies and retaining all effective control tools. There are several recent success stories of achieving weed eradication or advancing their progressive containment within our lakes. These examples provide hope that an invaded future is not the legacy we will leave for our lakes.

MANA WHENUA PARTNERSHIPS SESSION

Mauri O Te Kauri

Joanne Murray, Te Rarawa Anga Mua (Education)
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Jo Murray (Ngāti Haua & Te Tawhūi (ngā hapū o Whangapē, Hokianga) - Te Rarawa, Te Orewai (Pipiwai) /Ngāti Hine, Ngāpuhi) has worked in the education sector for over 29 years, including with Kohanga Reo (ECE), Kura Teina (Jnr School), Wharekura (Secondary) as a Kaiako (Teacher), Tumuaki (Principal) & MoE contractor, currently, Kaiwhakapūmau for Te Aho Tū Roa & Toimata Foundation, doing regional and national Kaupapa Māori Environmental & Science focused mahi. She is also currently independent trustee on Te Rarawa Anga Mua - Education/Noho Taiao (Environmental) initiatives. Project lead for Mauri o Te Kauri building relationships and partnerships with learning communities, focused on 'connecting people to people and people to place'.

Dr Valance Smith (Ngāpuhi, Waikato, Ngāti Haina, Ngāti Pākehā) is Assistant Pro-Vice Chancellor (Māori Advancement) and leads the Mātauranga Māori Strategy at AUT. Valance provides cultural leadership to AUT, his most recent research applies mātauranga Māori across many disciplines of research including kaitiakitanga, well-being, and research in design for health. He is co-lead for Ngā Rākau Taketake investments, Oranga and a co-lead project support partner with Te Rarawa for Mauri O Te Kauri.

Te Rarawa Kaurilands are our living laboratories where we are trialling the use of rongoā Māori & traditional indigenous scientific approaches as a case study for the treatment of Kauri Dieback. This is our first iwi driven rangahau (research) and investigation using our Mātauranga Māori (Korero Tuku Iho) to guide us which involves our hapu, marae, whanau, kura, Mātanga (experts), Rongoā Māori and kaimahi – iwi lead, community driven!

Kauri protection in Puketi and Omahuta forests

Samuel Prime, Tiakina Kauri
samuel.prime@mpi.govt.nz

Co-author: Mita Harris- Pou Matua ā-rohe he whakamaru Kauri - National Operations Manager Kauri Protection.

Tiakina Kauri is a kauri protection programme based in Biosecurity New Zealand, Ministry for Primary Industries (MPI). Through our work, we lead and invest in key kauri protection activities in partnership with mana whenua and collaborating agencies, including the Department of Conservation (DOC) and regional councils across kauri lands.

An example of our ongoing mahi is the work programme we are carrying out in the Puketi and Omahuta forests. Through our Northland-based team, we have built relationships with the local hapu and are supporting them via funding and training as they carry out their aspirational plans to protect kauri in their rohe.

We have thus far funded three roopu groups in the area, allowing them to complete objectives including:

- Mātauranga Māori application to protect kauri and support their recovery
- Advocacy to educate and inform hard to reach people
- Supporting events for kauri advocacy
- Training for local iwi in health & safety and ground surveillance
- Supporting the creation of a lead roopu with representatives from the total area of the Puketi and Omahuta forests.

Supporting Iwi to protect their special places from wilding conifers

Leigh Strange, MPI
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Presented by Randall Milne, MPI

The National Wilding Conifer Control Programme, through its community partnership fund, has been privileged to support a number of Iwi-led projects in Te Taitokerau, Taupō, Tarawera and Murihiku, and on Aotea Great Barrier Island. 19 of 34 projects funded in this way are directly led by or working closely with Runanga / Hapū Trusts and/or Marae, to carry out wilding control in their takiwā. One example is the Mt Tarawera wilding pines project, led by Ruawahia 2B Trust (Ngāti Rangitihi) and The Bay of Plenty Regional Council. Funding from the NWCCP enabled essential wilding pine control work to continue on Ruawahia/Mt Tarawera by a project team of seven Ngāti Rangitihi iwi members.

‘Eradicating wilding pines is the healing of not only the whenua, but our people too. It’s hard work but it’s very important’ said Michale Playle, project foreman for the Ruawahia Wilding Pine project.

The achievements in these projects belong to the tangata whenua involved but we have been pleased to support, and to capture some of their stories in short videos. We would like to share these during NETS:

- Northland wilding control video Kokata Spit and Northland wilding control video Far North
Produced by our partners at Northland Regional Council,
- Protecting Orākei Kōrako from wilding pines produced by the MPI media team, and
- Mt Tarawera wilding pines produced by our partners at Bay of Plenty Regional Council.

Enhancing Biosecurity for Aotearoa through Collaborating with Mana Whenua on Incursion Investigations, Engagement, and Surveillance.

Josh Wardle, Ministry for Primary Industries
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Co-author: Charlie Mackie

Joshua is an Aquatic Incursion Investigator at Tiakitanga Pūtaiao Aotearoa, Biosecurity New Zealand (BNZ). He completed his Bachelor of Science at the University of Canterbury and joined the Ministry for Primary Industries (MPI) in 2021 as a Biosecurity Support Officer. Following this, he was selected to participate in the MPI Graduate Development Programme, where he worked as a Policy Analyst in the Emissions Trading Scheme for Forestry, before ultimately joining the Aquatic Incursion Investigation team. Josh will be co-presenting with Charlie Mackie, who is a member and key representative of Te Whanau a Rangiwhakaahu, the hapū in the Matapouri Bay area, with ties to Ngātiwai. Charlie has a keen interest in biosecurity and conservation and works to raise awareness within his hapū and community, championing kaitiakitanga.

In 2021, a freshwater scientist discovered three unidentifiable fish in the tidal wetlands of Ngunguru on the east coast of Northland. The species was later identified as the Australian flatback mangrove goby (*Mugilogobius platynotus*) marking its first known appearance in New Zealand and highlighting potential biosecurity concerns to Biosecurity New Zealand (BNZ).

Following the scientist's report, and several suspected iNaturalist posts, a joint investigation was launched by BNZ between government agencies and mana whenua to investigate the incursion. BNZ and the Northland Regional Council worked with members of Te Whanau a Rangiwhakaahu, with permission from Ngātiwai, to survey the fish population in the Matapouri Bay area, just north of Ngunguru, where the iNaturalist posts originated.

The successful collaboration prompted the formation of an ongoing partnership between government agencies, mana whenua, and local communities in the Matapouri Bay and Ngunguru area. This collaboration has led to research into the goby's ecological impacts, including on taonga species, and the proposal and support of a master's project. Additionally, the partnership is engaging with the community to raise awareness of biosecurity practices and improve reporting through surveillance. This engagement aims to educate members of the public, in particular younger generations, on biosecurity awareness, kaitiakitanga, and the importance of reporting suspected exotic pests and diseases.

Join us for a presentation showcasing the ongoing work of this partnership between government, mana whenua, and local communities.

AQUATIC SESSION

Mana Moana Biosecurity Ambassadors - reducing biosecurity risk from returning cruise ships.

Jo Darby, MPI
jo.darby@mpi.govt.nz

Presented by: Anika Whapshott and Steph Godsiff, Directors at Blah Blah Marketing, and Mana Moana biosecurity ambassadors.

Anika has 18 years' experience in sales and marketing within the tourism industry. She has been based in the Bay of Islands for 18 years, previous to setting up Blah Blah Marketing, and after uni, with her passion for travel, Anika spent a year in Africa, rode a motorbike around Australia and hitchhiked to the Bay of Islands where she fell in love with outdoor lifestyle, the temperature and the people! She worked for 4 years with Fullers Bay of Islands her last position was International Marketing and Sales Manager for Awesome Adventures Bay of Islands and Awesome Adventures Fiji. Anika has been a director and partner of Blah Blah marketing and Events for 15 + years and loves the variety the Event Management and Marketing consultancy offers.

Steph grew up in Hawkes Bay and following high school she went to Massey University and graduated with a degree in Psychology and a diploma in Business Management. Following that she spent 12 years in NZ, London and Europe working for large Corporations in project management, project administration and training roles specialising in product development, IT projects and risk assessment. One of Steph's passions is travel and she cycled the length of Central and South America, joined the masses travelling around Europe and took any opportunity to scuba dive she could! Moving out of the corporate world, Steph went to work as a dive instructor in the Caribbean for 2 years, and on a visit back to NZ she passed through Paihia /fell in love with Northland and started working at Paihia Dive. Steph moved back into the consultancy world 14 years ago when she joined Blah Blah Marketing as a director.

Biosecurity New Zealand has teamed up with local Northland hapū, the Northland Regional Council, Far North Holdings and Blah Blah Marketing to protect the region from unwanted pests and diseases potentially carried here on visiting cruise ships.

After a two-year break due to the Covid-19 pandemic, cruise ships have now returned to Waitangi. In response, an ambassador programme has been created to help educate cruise ship visitors on the importance of good biosecurity behaviours.

The initiative, called Mana Moana, sees seven ambassadors from local hapū greet cruise ship visitors as they disembark this summer cruise season. The ambassadors, often working alongside Biosecurity New Zealand quarantine officers, welcome the passengers and talk to them about biosecurity, emphasising its importance to Aotearoa. In particular, they remind visitors to leave fruit and other foodstuffs onboard the ship, or bin it if accidentally brought off the ship, explaining why this is important to avoid introducing pests and diseases that may be present in the items. The ambassadors also explain the fragility of Northland's ancient native forests, particularly the ongoing threat of disease infection to native Kauri trees.

Deliah Quedec, one of the Mana Moana biosecurity ambassadors, says she got involved because she is passionate about protecting the environment: "We are spreading the word on the importance of protecting our insects, rivers, forests; our ecosystem as a whole." Deliah says she used to harbour misconceptions about cruise ships, but changed her mind after boarding one and seeing the work done on waste and the messaging presented about biosecurity.

The design and delivery of this partnership initiative with three Northland hapū is a direct outcome of listening to hapū concerns voiced at a Northland Wānanga in Waitangi regarding the return of cruise vessels to the rohe moana (the defined customary fishing area).

Out of sight out of mind? Protecting freshwater through biosecurity.

Jourdan Lethbridge, Boffa Miskell Ltd
Jourdan.Lethbridge@boffamiskell.co.nz

Jourdan is a Christchurch-based biosecurity project manager at Boffa Miskell, an environmental, planning and design consultancy with offices across Aotearoa. Jourdan has been managing weed and pest control operations in New Zealand's riverbeds and lakes for the past six years. He currently oversees aquatic weed operations in 11 lakes and waterways throughout New Zealand.

Freshwater is a resource we cannot live without, but freshwater biosecurity is often overlooked and undervalued. Only 3% of the Earth's total water is freshwater, and of that only 0.5% is accessible in lakes, rivers, and streams. It is vital that we understand the risks that invasive aquatic weed species pose to Aotearoa's freshwater assets and provide our lakes, rivers, and streams with the protection required.

It's easy to focus on those weeds that are easily visible, such as wilding pines marching across our landscapes. However, aquatic weeds are having an equally significant impact in some of our lakes and rivers, yet these impacts often remain out of sight and out of mind.

This presentation will illustrate the value of our freshwater systems and investigate the biosecurity tools and resources available to help protect them. It will also ask what else we need to succeed, and how you can help on this journey.

Enhancing Marine Biosecurity Surveillance in New Zealand through the development of the Marine Vessel Portal (MVP)

Dave Pickering, Bay of Plenty Regional Council
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Dave is a Biosecurity Officer (Marine & Freshwater) working with the Bay of Plenty Regional Council. He is heavily involved in marine pest surveillance work around the country, in areas such as Bay of Plenty, Great Barrier Island, Coromandel Peninsula, Raglan, Napier, Gisborne, Picton, and more. BOPRC have developed a database called the marine Vessel Portal (MVP), and in conjunction with other stake holders, are using this to better implement better biosecurity practices to the public (boat owners), as well as being able to track marine biosecurity threats around the country in the form of heavily fouled vessels or vessels that are known to have pests on the hulls.

The theme of this conference, "if the land is well, and the sea is well, the people will thrive", recognizes the critical role the Biosecurity plays in protecting the environment, which is vital for people's wellbeing. In New Zealand, marine biosecurity is a key component of this effort. Active surveillance is carried out to locate any new incursions and prevent the spread of any existing invasions from invasive marine species.

The Marine Vessel Portal (MVP) is a database we have developed and implemented to enhance the workflow of our Marine Biosecurity programs. This has led to improved targeting of high-risk vessels, better resource allocation, and an increased efficiency in managing potential marine biosecurity threats through a greater understanding of the marine pest pathways along our coastlines.

The MVP is being used by a collection of stakeholders, including Northland Regional Council, Bay of Plenty Regional Council, Auckland Council, and others, as part of a bigger plan to roll out a Clean Hull Plan in conjunction with the Top of the North Partnership. Through the use of the MVP and collaboration with other stakeholders, we are developing a more coordinated and effective approach to marine biosecurity management.

In conclusion, the MVP and collaborative efforts represent a critical component of our effort to protect the sea and promote human well-being through enhanced marine biosecurity surveillance in New Zealand. By working together, we can continue to develop effective solutions to protect our marine environment and the well-being of our people.

Real-time Aquatic Invasive Species Detection using Computer Vision on Remotely Operated Vehicles

Rose Pearson, National Institute of Water and Atmosphere (NZ)
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Co-authors: Jeremy Bulleid, Gareth Preston, Leigh Tait, National Institute of Water and Atmosphere

Rose is a remote-sensing scientist at NIWA. Her work primarily focuses on the development of automatic techniques and tools for inferring properties of interest from remote sensing data including on the automatic detection and recording of the (GPS) locations of targeted invasive species.

Early detection of invasive species improves chances of eradication and reduces the burden associated with the ongoing management and minimisation of impacts to primary industries and the environment.

In aquatic environments this is traditionally achieved by human divers performing biosecurity surveys, which are expensive and can be dangerous. This work can be supplemented by Remote Operated Vehicles (ROVs) equipped with cameras and other sensors, which allow footage to be collected remotely over a wide area.

While ROVs are becoming more accessible as they become cheaper and their usability improves, ROV-based surveys typically remain more expensive than those performed by human divers. This is in part due to the time and expertise required to review the captured video imagery.

We present an ROV-integrated system for automated aquatic species detection with location tracking using deep learning. Deep learning is a machine learning (ML) technique that is well suited to image-based object detection. The system is designed to be as generic as possible, such that it can be deployed on different ROVs. The system streams a video-feed annotated with bounding boxes around each detected species instance to a locally hosted webpage. The webpage can be viewed by any device with a WIFI connection to the system ensuring it can be used in the field. The web-client supports remote system control (i.e. initiating inferencing), configuration to different ROV cameras, and supports ML model updates.

We then share preliminary results exploring the efficacy of the system when used for Mediterranean fanworm (*Sabella spallanzanii*) detection. Efficacy is considered by comparing the system detections against those made by experts reviewing the captured ROV video feed.

THURSDAY 27 JULY 2023

PEST PLANT SESSION

Syncing weed control data from iNaturalist to ArcGIS

Nigel Charman, OMB Free Welly | EcoNet NZ
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Nigel has been growing the Old Man's Beard Free Wellington community to progressively control old man's beard across Wellington City. From his experience working in IT, Nigel has formed communities by organising open-source projects, meetup groups and conferences. He is now blending his passion for the environment with his IT background improving the systems for managing weeds. EcoNet has developed an open-source synchroniser to add and update records from iNaturalist to its CAMS ArcGIS app. The iNaturalist weed control schema has been created with input from the iNaturalist.nz trustees.

Old Man's Beard Free Wellington (OMBFW) has about 3000 observations in iNaturalist. While iNaturalist is great for reporting and confirming weeds, it doesn't help with ongoing management and control.

EcoNet has developed the CAMS app to manage and control weeds on an ongoing basis. It is being used extensively by the STAMP group and others, for example for managing moth plant around Auckland.

If only we could join iNaturalist and CAMS, we'd get the best of both worlds!

To do this, EcoNet has developed a synchroniser process to add new or updated observations from iNaturalist to CAMS. This allows OMBFW and others to manage their weed data using iNaturalist. It utilises the 'Weed Management Aotearoa NZ' iNaturalist project with observation fields for weed control and status data. The implementation is open-source, so you can use and modify it (for free) to sync iNaturalist data to your organisation's GIS app.

In this talk, Nigel will present the iNaturalist weed control schema and synchroniser. He'll discuss the challenges that the project faced, and where it might head in the future.

Catching a weed so our (wet)lands thrive: the story of *Cuscuta campestris* (*golden dodder*) so far

Kerry Bodmin, Department of Conservation
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Co-author: Zoe Lunniss, Dunedin City Council

Kerry has over 20 years' experience in biosecurity and plant ecology, particularly in wetlands. She has previously worked as a wetland scientist, led the didymo incursion response, and managed both biosecurity (painted apple moth) and biodiversity work in local government. She has been extensively involved in willow control work and has various wetland publications and guides. Her current DOC role focuses on freshwater biosecurity in the North Island.

The annual parasitic plant *Cuscuta campestris* (golden dodder) has found a new environment in which to flourish, the herbaceous wetland habitats of Aotearoa / New Zealand. Present since the 1940's, *C. campestris* probably entered the country numerous times as a contaminant of imported seed. Although herbarium records show a sporadic distribution throughout NZ, DOC investigations revealed historic populations had not persisted and recent web-based 'finds' were misidentified species. Wild populations of this parasitic weed were found to be restricted to a small number of wetlands in the wider Huntly area in the Waikato Region.

Its prolific growth, volume of seed production and impacts on host species usually categorise this plant as a weed of production environments around the world, reducing the yield of many cropping and horticultural species. *C. campestris* has an extensive host range, which includes clover, and therefore threatens pasture environments within New Zealand, but its biggest ecological threat is to the herbaceous wetland ecosystems of this country.

What started off as novel weed control in two DOC managed wetlands has turned into a biosecurity operation with the long-term aim of eradication. Some outcomes to date include this species being (re)designated as an Unwanted Organism (Biosecurity Act 1993), listed as 'Progressive Containment' in the recent Waikato Regional Pest Management Plan 2022, and having a comprehensive and continuous weed-led control programme.

Along the way questions around ecology, weed management, public awareness, legislation, regulations, guardianship, recreation and conservation has led to a diverse response 'team'. The key to successful management of this species to date has been a collaborative approach, adaptive management and connections formed between multiple agencies and landowners, finding common ground and passionate people. Control and eradication of this novel parasitic weed will allow our wetland plants, and the species and people they support, to thrive.

An updated list of conservation weeds in New Zealand

Kate G. McAlpine, Dept of Conservation
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Co-author: Clayson J. Howell, Dept of Conservation

Dr Kate McAlpine has been researching environmental weeds at the Department of Conservation for more than 20 years, and represents DOC on several national governance groups, including the National Pest Plant Accord, the National Interest Pest Response, and the National Biocontrol Collective. Kate is also a council member of the NZ Ecological Society and facilitates the annual mentoring scheme for early career ecologists. Check out her weedy work stories on Instagram @katemcweedatwork.

Weeds are a major cause of global biodiversity decline. Despite biosecurity regulations at the New Zealand border, an estimated 25,000 exotic plant species have already been introduced and at least 2,600 have been recorded wild. In New Zealand, approximately 30 new species naturalise each year, so definitive weed lists quickly become out of date. We present the updated list of environmental weeds in New Zealand, last published in 2008. We considered 747 (TBC) plants for inclusion on this updated list. Candidates were compiled from all plants prioritised nationally as Unwanted Organisms, those listed in 16 Regional Pest Management Strategies, as well as those with managed infestations on land administered by the Department of Conservation. Candidate plants were assessed for the land environments in which they are known to occur, the extent to which they are established and their potential impacts. Compilation of the list was complicated by nomenclature inconsistencies and inaccurate spatial recording of infestations.

We recommend that the naturalisation status of exotic plants should be regularly assessed by an independent panel. Weed risk assessments of newly naturalised species will be made easier if there is increased effort to ensure that weeds are listed and recorded at species level, and that spatial references of infestations are accurate.

The Story of Aki Tai Here

Te Kaurinui Parata, Aki Tai Here

Supported by: Michael Ulrich, Aki Tai Here and Weed Action Native Habitat Restoration Trust
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Ko Manaia te maunga, Pataua me Ngunguru ngā awa, Paratene te Manu te marae, Ngāti Takapari me Ngāti Korora ngā hapū, Ngati Wai te iwi, ko Hori Parata me Moea Armstrong ōku mātua, ko Te Kaurinui Robert Parata tōku ingoa.

Te Kaurinui returned from study in Wellington to apprentice under his father Hori Parata in the tikanga of working in te taiao and with taonga species, and under Te Warihi Hetaraka in whakairo at the Hihiaua Cultural Centre. He has been with the Aki Tai Here crew since it began 2021.

This is the story of Aki Tai Here - how a Waka Hourua complimentary collaboration led to the formation of a tangata whenua environmental team based in Whangārei Heads.

In late 2020 a partnership was formed between local environmental group Weed Action Whangārei Heads and kaumātua of Te Waiariki, Hori Parata leading to an agreed Waka Hourua approach to leadership in Te Taiao.

From initial meetings and agreements to on the ground training a bona fide environmental team Aki Tai Here has been built and now sustains mahi for 4-5 people with close ties with whenua in Pātaua South.

With support from Weed Action, NRC, DoC and ReNative this crew are trained in predator control, track cutting, weed survey and specialist skillsets to deliver habitat restoration outcomes by controlling a suite of environmental weeds on native habitats of the Manaia ecological district.

The ATH crew incorporate mātauranga of the lands they work on and maramataka into their professional practice. The crew have developed their own methodology in working out key weed species in steep and difficult terrain, primarily in native forests of Whangārei Heads.

Our story will show some of the outcomes and benefits of the work as well as how a complimentary collaboration, based on reciprocal support and cultural respect, can work when commonalities of purpose is aligned.

ANIMAL PEST SESSION

Learnings from a ground-based wallaby elimination project on iwi land

Tim Day, Day in the Bush
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Co-authors: Richard Guest and Philip Commins, Day in the Bush, Rotorua; Dale Williams and Davor Bejakovich, Bay of Plenty Regional Council Toi Moana, Rotorua

Dr Tim Day owns and operates Day in the Bush, a private contracting company that provides a range of pest animal behaviour advice and pest control services across the Bay of Plenty, wider New Zealand, and internationally. Tim has over 35 years' experience in the pest control industry and employs a range of experienced staff and contractor in projects for community conservation groups, hapu and iwi, private forestry companies, local and regional councils, and DOC.

The National Wallaby Eradication Programme in the Bay of Plenty aims to work with mana whenua and other landowners to maintain a containment zone, with zero tolerance for dama wallaby populations outside this area. Significant surveillance effort has identified several satellite wallaby populations outside the containment zone, some of which are on iwi-owned land. Elimination of discrete wallaby populations is a challenge that requires the identification of suitable wallaby elimination methods that have both a high chance of success and meet the immediate and long term aspirations of mana whenua.

Camera surveillance north of Lake Rotorua across 800ha of iwi-owned forests, delimited a population of up to 25 wallaby living on 350 ha of the area. After engagement with iwi, a ground-based elimination was planned, using an array of 575 modified Philproof bait stations, coupled with 54 surveillance cameras. Pindone and Feratox were used to knock down possums (over 11,000 killed) and rodents, then wallaby were targeted from the same stations using wallaby prefeed and Feratox presented in multiple ways. Fourteen wallaby carcasses were found, but cameras indicated just four initial survivors. Behaviour of the survivors and the ongoing elimination of each individual are discussed.

Our key learnings have been: effective possum (and rodent) control is required before wallaby control using bait stations becomes effective; wallaby are highly neophobic and require a large period of pre-feeding before being 'comfortable' at bait stations; some wallaby are highly unlikely to feed on baits; some juvenile wallaby cannot feed from bait stations; dispersal of survivors is a risk; interference by non-target species can disrupt success; the available tools for wallaby control are currently too limited for rapid success, especially where landowners are unfamiliar or inexperienced with all options. We remain confident that elimination of this population will be achieved.

No more Wild Deer in Te Taitokerau - partnering with hapū, Industry, Government and the community for the future of Deer Management in Te Taitokerau

Nicky Fitzgibbon, Northland Regional Council
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Co-author: Grant MacPherson

Nicky is the Biosecurity Manager, Incursions and Response for the Northland Regional Council. For the last 10 years she has worked in roles across the biosecurity system and emergency management both here and in Australia. A self-confessed biosecurity nerd, she is passionate about working with and empowering communities to take their own biosecurity journey to future proof the system.

Te Taitokerau has historically been considered one of the few wild deer free regions in New Zealand. However, since the late 80's to early 90's, escapes from deer farms and illegal releases have resulted in several wild deer herds being reported around Northland.

In 2022 the Department of Conservation released Te Ara ki Mua, a framework to improve management of wild animals across New Zealand. One of the objectives of the framework is to prevent any further expansion of the range of wild deer.

While the current wild populations in Te Taitokerau remain small and discrete there is the opportunity now to develop an efficient and sustainable programme with the aim of eliminating the current populations and preventing any further establishment of wild deer into the future.

A programme of this size will require a significant concentrated investment of resources and the formation of true partnerships. We anticipate that as the program develops and evolves the workstreams and leadership may also need to evolve to align with the direction mana whenua, central government partners (DOC), council, industry and community wish to take.

By supporting the development of a 'Te Taitokerau Wild Deer Elimination Strategy', we have a unique time-bound opportunity to stop the spread of wild deer within Te Taitokerau before our ngahere (forests) and in particular our precious kauri are destroyed. It's a big task, one we can't do alone, and that takes time.

Our first priority is Russell Forrest. Illegal deer releases have resulted in the establishment of a Sika deer herd in and around the Russell Forest Area. We are working together with local hapū, the Department of Conservation, and landowners to design an eradication program to completely remove them from the Russell Forest.

In this presentation we'll cover the development of the program and share our aspirational strategic goals, as well as discussing some of the challenges and opportunities we are currently seeing by taking a co-design approach.

Wild Deer are not part of our story and we want to keep it that way!

Brown Bullhead Catfish in the Rotorua Lakes

Te Wakunua Te Kurapa, Bay of Plenty Regional Council
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Co-authors: William Anaru, Te Arawa Lakes Trust; Alvin Setiawan, NIWA

Te Wakunua is a Biosecurity Officer at the Bay of Plenty Regional Council with a primary focus on freshwater pests.

The Rotorua Lakes, in the Bay of Plenty Region in New Zealand comprise of 18 lakes in close proximity to one another with a high volume of visitors to the district (>3.3million/year pre COVID). The high volume of visitors from local, domestic and international markets makes the lakes highly susceptible to human assisted transfer of aquatic pests. The Bay of Plenty Regional Council invests significantly in freshwater biosecurity across the Rotorua Lakes. This presentation will focus on our brown bullhead catfish programme.

Brown bullhead catfish were first discovered in the Rotorua Lakes in 2016 and generated significant public and political interest in the Bay of Plenty. To date, brown bullhead catfish remains the Bay of Plenty Regional Council's biggest freshwater pest programme and has seen the removal of over 80,000 catfish from Lake Rotoiti and more recently, Lake Rotorua. This project has seen significant investment in operations to remove the catfish, research options to disrupt the population, and a communications program using conventional and unconventional methods to engage the community.

There will be a particular focus on partnership with our iwi partner's Te Arawa Lakes Trust and NIWA in the delivery of this program over previous years and in to the future.

Red-eared slider turtles - a problem that only communities can solve

Nicholas Ling, Waikato University
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Nick is an associate professor in ecology and biodiversity at the University of Waikato. His research interests include the ecology and control of aquatic vertebrate pests, principally fish but more recently freshwater turtles. Since 2018 he has been advocating for greater recognition of the potential problem of red-eared slider turtles in New Zealand. Nick is a member of both the IUCN freshwater fish and species monitoring specialist groups.

Red-eared slider turtles (RES) are the most common turtle in the pet trade and one of the 100 worst invasive species worldwide. They are often deliberately released by owners no longer willing to keep them, or they escape from poorly contained enclosures. Wild RES have been reported from more than 100 locations from Kaitaia to Invercargill. Contrary to popular belief that they are unable to breed in the New Zealand climate, breeding has been reported at a number of northern locations.

Removing RES from the wild presents numerous challenges, principally the extremely low catch per unit effort (CPUE) that precludes direct participation by statutory authorities. However, engagement and participation by local communities shows promise for local control and eradication of this species. At Cook's Beach, Coromandel, a population of RES is being actively controlled by members of the local community, with more than 60 RES having been removed from local ponds since 2021. Important considerations for community engagement include education of the risks or impacts of RES, enthusiastic participation by the local community in active control methods, and assurances of the humane treatment of animals removed.

FRIDAY 28 JULY 2023

PARTNERSHIPS SESSION

Biosecurity Advisory Groups: Facilitating community involvement in pest management

Laurence Smith, Environment Canterbury
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Laurence is the Principal Advisor for Biosecurity at Environment Canterbury. His work includes an overview of a range of initiatives, one of which is aimed at helping connect the community with the council's pest management programme. Laurence leads a dedicated team focussed on building capacity in the community to respond effectively to existing and future threats.

At Environment Canterbury (ECan) the Biosecurity section has implemented a new approach to involve the community with our pest management programme in the form of Biosecurity Advisory Groups (BAG). Four groups across Canterbury meet several times a year to workshop and progress topics aimed at improving aspects of pest management and our future focus for biosecurity. The groups include community members from a range of backgrounds and areas of expertise, all with a common desire to see better biosecurity outcomes achieved for Canterbury. Rūnanga and local council representatives, along with ECan Councillors, also sit on the groups, to ensure values are appropriately represented and opportunities can be fully explored. The groups completed their first three-year term at the conclusion of 2022 at which time we completed a review, highlighting successes and some areas for improvement that we aim to progress over the next term. This talk aims to share the journey so far and outline a model for community engagement that could prove beneficial in other regions of New Zealand.

Predator Free 2050 - Lessons Learnt

Kane McElrea, Boffa Miskell Ltd
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Kane joined Boffa Miskell in July 2021, with over 11 years of biosecurity experience working with Northland Regional Council. Kane is experienced in developing and implementing strategic projects and meaningful relationships with iwi/hapū, community organisations and agencies. Kane has extensive experience in the development and delivery of significant biosecurity programmes and partnerships, including the establishment of multiple landscape scale predator control and eradication programmes. Key programmes include the establishment of Predator Free Whangarei and Predator Free Bay of Islands - two landscape scale predator eradication projects in Northland. Kane was previously a member of the PF2050 National Leadership Group and Co-chair of the 'Empowering and Inspiring Communities to Take Action' workstream, working alongside key stakeholders to develop strategic action plans for Predator Free 2050. Kane now provides strategic and operational advice to a number of the Predator Free 2050 landscape projects throughout New Zealand and is undertaking work on behalf the national predator free collaborative groups to develop a predator free data strategy.

For decades New Zealanders have been attempting to eradicate predators (possums, mustelids, rats and cats) from New Zealand's offshore islands and fenced sanctuaries. More recently, numerous projects are now attempting to remove these same predators from large landscapes throughout the country.

Since the government's 2016 Predator Free 2050 announcement, agencies, organisations, iwi, hapu and community groups have had to quickly prepare, plan and implement predator eradication projects over the last 7 years. Through the rush and haste to get projects going (often a result of tight funding pressures), and the need to show progress, critical new knowledge has been gained and some mistakes have been made, which leads to important lessons being learnt along the way.

If we don't take time to stop and reflect on these lessons, then share them, we can only be prepared to make the same mistakes again and again, which in turn will limit our ability to become Predator Free by 2050 or achieve any other aspirational goal.

A case study for iwi and local government partnerships around pestfish surveillance in some Northland dune lakes

Raymond Tana, Northland Regional Council
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Co-authors: Claire Heyns and Nicky Fitzgibbon, Northland Regional Council

Ray is a Biosecurity Officer with the Northland Regional Council, based in Whangarei. He has a background in Freshwater Fish Ecology at Waikato University where as a post graduate student and Research Technician he worked with pestfish removal efforts in shallow Waikato lakes. Additional experience with pestfish also includes working for the Department of Conservation as a senior ranger in Hamilton.

Northland/Te Tai Tokerau, is home to over 400 Dune lakes which are recognised globally as rare ecosystems being found only in four countries (Australia, New Zealand, Madagascar and United States). Many of Northlands dune lakes hold deep spiritual, cultural, and historical significance to iwi, of which nine (Te Aupōuri, Ngāti Kuri, Ngāti Kahu, Te Rarawa, Ngāi Takoto, Ngāti Kahu/Ngāpuhi ki Whaingaroa, Ngāpuhi, Ngātiwai and Ngati Whātua) have tribal boundaries encapsulated within Te Tai Tokerau. Dune lakes are highly vulnerable to external influences and are easily degraded through factors such as eutrophication (causing algal blooms), aquatic weeds, land use practices, and pest fish, which contribute to their gradual decline in water quality.

For mana whenua of these lakes, who wish to practice kaitiakitanga (guardianship and protection) over them, establishing working relationships or partnerships with local government can be considerably difficult under a constitutionally challenging environment. In this presentation we outline Northland Regional Councils growing partnership with mana whenua from Te Roroa in a biosecurity context. Specifically, we discuss the development of training and surveillance opportunities around pestfishing to build capacity, and practical experience that will support aspirations of kaitiakitanga for Te Roroa across their dune lakes as well as meet objectives of Northland Regional Councils (NRC) Regional Pest Management Plan. In addition, we outline the ongoing use and development of camera surveillance and drone technology to improve detection of pestfish in dune lakes as incursion response tools.

Predator Eradication at large landscape scale

Joanne Kim, Predator Free - Northland Regional Council
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Co-authors: Maaka McKinney, Project Manager for Predator Free Pēwhairangi Whānui

There are two large landscape scale eradication projects happening in Te Tai Tokerau, funded by PF2050Ltd and the Northland Regional Council - Whangārei and Pēwhairangi Whānui (Bay of Islands).

Aotearoa has done great with predator eradication on offshore islands - particularly uninhabited ones - but it has proven to be more challenging on the mainland where communities reside. In this 'proof of concept' phase we have learnt that people and communities are the ones that hold the key to success. This notion is further reinforced because eradication means that a dense coverage of devices is required - it is an intensified model of suppression so having community onboard is critical.

Whangārei and Pēwhairangi Whānui are very different with varied delivery partners. This presentation will cover each of the projects and discuss how it plans to achieve predator eradication - on the mainland.

TECHNOLOGY SESSION

Having the Conversations to Improve Predator Detection Technologies

Jamie Bell, Biosecurity Technology Spearhead, Science for Technological Innovation
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Jamie has worked in robotics start-ups and research groups for over 15 years, in applications ranging from autonomous forklifts, driverless vehicles, fruit picking, precision spraying and underwater robots. Now the mission is flying and walking robots that will help to find the last predators as a part of the Biosecurity Technology Spearhead from the Science for Technological Innovation National Science Challenge.

The Science for Technological Innovation (SfTI) Challenge's Biosecurity Technology Spearhead is developing novel connected sensors- which are moved and serviced by robots- to track down possums, mustelids and rodents, especially for low density populations in forests. This project has been shaped by hui at Te Kura Toitu O Te Whaiti Nui a Toi and the surrounding whenua. We value the mātauranga that has been shared with us in these hui as we now better understand rohe-specific tohu that our sensors should detect as well as how our robots should look and behave. Educational activities, work, internships and field testing activities are also planned at this Kura and the surrounding ngahere. On this project, we are grateful for all of the feedback we receive, which helps us to improve the technology, as we strive for a predator-free future.

State-of-the-art projects optimising the use of environmental DNA for biosecurity in New Zealand

Kristen Fernandes, University of Otago
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Kristen started in the Gemmell Lab at the University of Otago as a Postdoctoral Fellow in 2022. Her postdoctoral research is part of the Smart Idea project funded by MBIE and works in collaboration with institutions and researchers across New Zealand and around the world to implement novel pest monitoring methods using environmental DNA to accurately measure the distributions and densities of introduced mammals (rats, possums, and stoats) at local and landscape scales.

Environmental DNA (eDNA) is a promising tool for biosecurity purposes in New Zealand. It involves detecting genetic material from various organisms in environmental samples such as water, soil, and air. In New Zealand, eDNA has been used to monitor and detect the presence of invasive species, including mammalian pests, which pose a significant threat to the country's biodiversity and economy. However, implementing eDNA for biosecurity purposes requires careful consideration of sampling techniques, data analysis, and interpretation. We have implemented eDNA techniques across New Zealand and beyond to investigate the effectiveness of this method for detecting mammalian pest species at low densities from local to landscape scales. Here, I will present case studies of the projects currently being undertaken using eDNA, and the pros and cons of these methods for pest management.

A novel nocturnal pest control application is here, Night Vision Goggle Assisted - Helicopter Search & Destroy for Bennett's wallaby.

Brent Glentworth, Environment Canterbury
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Brent has been involved in the pest and biosecurity industry since the early 1980s, training with the Agricultural Pest Destruction Council and working in various sectors including Pest Destruction Boards, DOC, MAF, and extensively with Environment Canterbury. Brent currently leads Canterbury's wallaby programme in partnership with Tipu Mātoro - National Wallaby Eradication Programme.

Tipu Mātoro, the National Wallaby Eradication Programme, has been running for three years. A shortage of tools for achieving the programmes high level aims continue to be a hurdle.

The closest, new-to-market surveillance tool that provides opportunity for 'at the moment' control of Bennett's wallaby is helicopter thermal camera assisted search and destroy, operating with assistance of night vision goggles (NVG), when these nocturnal animals are out of their hiding cover and actively moving around and feeding.

Only one New Zealand company, Highland Helicopters Ltd, has resourced the specialised state of the art thermal camera equipment, a unique to NZ helicopter type suited to the work, and put together a skilled team to implement this work with Health & safety concerns at the forefront. Investing heavily in training and the various approvals required has been arduous, but necessary.

Historically, night flying use of helicopters assisted with NVG, has been limited to human emergency/rescue/crisis or National Defence Force use. However applications for nocturnal pest surveillance and control where they may exist at low levels is obvious.

While at the early stages in implementation of this methodology a proof-of-concept trial was completed in winter 2022, and further work is running at present, indicating that:

- the tool can be initiated and operated safely under set criteria,
- wallabies (along with many other nocturnal mammal species) can be positively identified, and mapped over various landscapes which are difficult or hazardous to survey by other ground based night work,
- the application has the ability to run surveillance operations over large areas faster than other methods, and
- wallabies at low levels can be located, mapped and effectively and humanely destroyed.

Maximising research impact to help achieve a wallaby- free Aotearoa.

Travis Ashcroft, Biosecurity New Zealand
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Travis works as a Senior Adviser for Biosecurity Zealand and is the Science Lead for the Tipu Mātoro National Wallaby Eradication Programme, and current chair of the wallaby research advisory group. He has over 20 years' experience working in various Biosecurity-related roles both within New Zealand and Australia.

Both dama and Bennett's wallabies are serious pests in Aotearoa New Zealand, impacting our native ngāhere, production landscapes, and economy. If left unchecked, their environmental and economic impact will continue to increase, and they could spread across a third of the country within 50 years. Working in partnership with central and local government, iwi, Federated Farmers, Forest and Bird, landowners, and communities, the Tipu Mātoro National Wallaby Eradication Programme was stood up on 1 July 2020, with the aspirational vision of a wallaby-free Aotearoa. By 2025, the Programme's aim is to contain wallabies within designated containment areas.

To help achieve this, we have invested over \$3 million in research since 2020. Building the right knowledge and tools relies on maximising research impact to produce research that has high operational value. To enable this, a national wallaby research plan was developed to guide research investment and innovation, and a process was embedded to allow effective prioritisation and research dissemination.

Here we present a brief overview of the research plan; how research dissemination is embedded to maximise impact; and current and recently completed research whose outcomes have added value in helping the wallaby programme achieve its strategic aim.

CLOSING PLENARY SESSION

Practical, sustainable farming practices to help climate change - and involve schools and the wider community

Andrew Booth, Northland

Andrew and wife Vicky are sharemilkers on a 174ha, 400-cow farm in Titoki, 30km west of Whangarei alongside the Mangakahia River. His grandfather and father worked the land and Andrew has lived there all his life, apart from stints studying at Lincoln University and on farms in Canterbury, Hawke's Bay and Waikato.

Andrew's vision is a farm he is proud of and happy to bring anyone on to as an example that dairy farmers are doing all they can to enhance the land and environment they farm.

"Growing up on the land has certainly made me appreciate it a lot more," says Andrew.

Andrew and Vicky are the 2023 Northland Regional Supreme winners for the Ballance Farm Environment Awards. The Booth's also won a number of other awards including the NZFET Climate Recognition Award and Northland Regional Council Water Quality Enhancement Award.

Andrew is also a DairyNZ Climate Change Ambassador.

What's AI all about and how can it help in biosecurity?

Madeline Newman, AI Forum

Madeline joined the AI Forum as Executive Director in 2022. She has extensive experience in strategy, transformational change and helping people to see the potential that innovative technologies bring and is excited to be leading the AI Forum of New Zealand as Executive Director at such a pivotal time.

Originally from New Zealand, Madeline spent 20 years working with AI and Tech in mental health, financial services and regulatory sectors in the UK. Her more recent work included helping to shape and deliver the Financial Conduct Authority's internationally renowned RegTech innovation programme; and Head of Innovation and Product for a science based digital mental health service. She brings new thinking and international to our AI community.

In 2023, ChatGPT has dominated the AI conversation but it's only one tool in a much broader toolset being used across an increasing number of problem areas to help make better use of our limited resources.

Join the discussion on AI applications in Bio Security, sustainability and regeneration, with examples of live use cases.

POSTERS & GEMS

Chilean myrtle (*Luma apiculata*) - an alarming new weed starting to spread

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Co-authors: Fiona Thompson and Briar Cook, DOC

Chilean myrtle (*Luma apiculata*) is a spectacular tree, native to Chile and Argentina, that is starting show alarmingly weedy tendencies in New Zealand. It tolerates a wide range of light environments and produces copious fruits that are widely distributed by birds. Seedlings are very shade tolerant and can form dense colonies under closed canopies, dominating invaded sites. Even in its native environment, it can “leave almost no space for other trees”. It is widely planted in gardens in New Zealand but is not yet common in the wild. It was first recorded naturalising near Invercargill in 2002, and more recently in Nelson, New Plymouth, Christchurch, Gisborne, Dunedin and Rakiura. It has potential to invade forest ecosystems and displace native plant species throughout the whole of New Zealand. Seedlings are likely to be difficult to detect in the early stages of invasion, and there is emerging evidence that *L. apiculata* can be difficult to control with herbicide. Work is underway to have this emerging weed declared an Unwanted Organism and added to the NPPA.

Rapid detection of dama wallaby populations using trail cameras

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Richard Guest, Day in the Bush, Rotorua

Trail cameras are one of the key tools used to identify dama wallaby populations living outside the containment zone in the Bay of Plenty. Data from over 1700 camera locations has resulted in more than 5000 wallaby interactions outside the containment zone. In discrete satellite wallaby populations, the first wallaby interaction is almost always recorded rapidly, within 1 to 4 days of camera deployment, showing our choice of camera positions is good. However, to understand and delimit a wallaby population, or have high confidence that wallaby are not present, an 8 week surveillance period is necessary. Quality data on wallaby populations, as well as data on other species present, is essential when working with communities and landowners to plan wallaby control operations.

Habitat preference for ship rats around an urban environment

Greater Wellington Regional Council

Rat eradication in the urban environment presents many varied and unique challenges. The Predator Free Wellington project has built up a wealth of information on rat preferences of habitat, particularly vegetation types in the urban context.

Alligator Weed - A New Incursion in the Wellington Region

Lawrence Davenhill, Greater Wellington Regional Council
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I am a senior biosecurity officer within our pest plant team at Greater Wellington Regional Council and coordinates the alligator weed eradication program in the region.

Wellington's first known incursion of Alligator weed has turned up in Taita, Lower Hutt. Hear the story of its unexpected discovery, ongoing control and investigation into where it came from.

Wallaby Eradication (Wellington Region)

Greater Wellington Regional Council

A small population of wallaby was detected in Kaitoke, Upper Hutt in late 2021. GW implemented an eradication and surveillance operation. The origins of the wallaby formed part of an MPI investigation which added complexity and a whole lot of learning, as evidence was gathered to determine the source and age of the population. No wallabies have been detected since April 2022 and the area continues to get surveillance and still attract sighting which cannot be verified.

'Beacon and corridor' planting schemes for targeted pest animal control

Rebecca Simpson, Boffa Miskell
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Bec is a graduate from the University of Canterbury who started working in biosecurity at Boffa Miskell in late 2022.

The Avoca Valley restoration is a highly ambitious community project that seeks to revegetate 38ha of historically grazed habitat on the edge of Christchurch city. Initially, this includes the planting of 45,000 plants and trees, with the vision of creating dry lowland podocarp forest. Some wetter areas will be planted with browsing vulnerable plants while others will initially use kanuka as a nursery plant, allowing for grazing underneath. Pest animal control is required to protect the vulnerable palatable species until they are mature enough to withstand browsing.

In context of the valley, meaningful pest control is a key part of the restoration project. 'Beacon and corridor planting', a new system developed by Boffa Miskell, will be implemented through an internally funded research project devised to try and improve pest control outcomes. These planting patterns have been specifically designed to corral and move possums through the valley away from young, palatable plantings, and towards traps. This presents better trapping opportunities which require less travel and effort, thus lowering the carbon footprint of the operation.

The assessment of the biosecurity awareness and perception of a sample of leisure craft owners/passengers using Tākapa Moana/Hauraki Gulf.

Diane Fraser, Te Pukenga - Unitec
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Name of presenters/Co-authors: Dayna McKenzie¹, Mikaella Fenton¹, Lauren Cunningham¹, Kevin Tatlonghari¹, Chelsee Neverman², Nigel Adams¹, Diane Fraser¹.

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Dayna McKenzie and Mikaella Fenton, Lauren Cunningham and Kevin Tatlonghari, are all third-year students in the Bachelor of Applied Science, in the School of Environmental and Animal Sciences at Te Pūkenga (trading as Unitec), Auckland in 2023. The students were selected for a summer studentship with the Auckland Council Biosecurity team, who provided funding for this project. The students were supervised by Associate Professors Diane Fraser and Nigel Adams.

Marine vessels, including recreational craft, are known to be vectors of invasive marine and terrestrial pest species. Over 1.5 million adult New Zealanders are estimated to be involved in recreation boating in some form with a substantial portion utilizing Tākapa Moana/the Hauraki Gulf. The data on the knowledge of biosecurity awareness of recreational boat users in Tākapa Moana/the Hauraki Gulf are limited. This pilot study involved the sampling of a selection of leisure craft owners or passengers at a selection of east coast Auckland boat ramps, using an anonymous survey between December 2022 and March 2023. The survey included questions about which islands were visited and the frequency of visits, the type of vessel and its storage when not in use, the perception of Auckland Council's biosecurity communication material for 2022/2023, and the basic demographics of the boat users. These findings will add to the understanding of the current biosecurity knowledge of leisure craft owners/passengers using Tākapa Moana/the Hauraki Gulf.

Getting wild about wild ginger

Michael Ulrich, Aki Tai Here
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Over the last two years Pataua South based environmental team Aki Tai Here in partnership with Re-Native and Weed Action Native Habitat Restoration Trust have been dealing with solid wild ginger infestations over dozens of hectares within native ecosystems of the Whangarei District. With a work ethic on continual improvement of efficiency and outputs we have made the despairing doable, putting even the the wildest ginger infestation on the back foot while being sensitive around native vegetation.

This 3 minute gem will look at some of the 'tricks of the trade' and what we have developed around approaches, techniques and methods that take can ginger out of the wild.

Development of an automated detection tool for incursions of invasive submerged weeds

Daniel Clements and Jeremy Bulleid, National Institute of Water and Atmospheric Research (NIWA)

Early detection of an invasive species enables early intervention, and along with prevention, early detection provides the best (most cost-effective) opportunity to successfully manage invasive species that pose a biosecurity risk. Typically, aquatic weed invasions that go unnoticed or are overlooked, or where management interventions are delayed, become problematic resulting in a decline in the values and functions of aquatic ecosystems. When aquatic weeds establish and are left to proliferate, they compete with, and displace native species. This can cause significant habitat alteration, impact adversely on recreation and cultural values, hydroelectric generation, and compromise agricultural productivity by impeding water delivery. Surveillance methods that can be efficiently deployed are required to detect and locate incursions at an early stage of invasion, so that control strategies can be implemented. Current surveillance methods are limited and rely heavily on divers to detect incursions. The development of new detection methods, that operate at larger spatial scales and can be deployed readily by management agencies, will improve detection capability, leading to reduced management response times and better outcomes. NIWA researchers have developed a method for remote detection of invasive aquatic weeds utilising advances in remote sensing, recognition software and machine learning, initially targeting two of New Zealand's worst submerged aquatic weeds, lagarosiphon (*Lagarosiphon major*) and hornwort (*Ceratophyllum demersum*). This presentation outlines the development of NIWA's portable invasive species detector module that can be deployed from manned or unmanned surface vessels. The project has applied an Artificial Intelligence (AI) Deep Learning (DL) approach to detect submerged target species. A prototype module contains a software 'detector' that has been trained to identify targets in live stream video imagery. When it identifies a target is present within a video frame, the GPS location, the time and the total number of instances detected within that video frame are recorded. The resulting GPS detection file can then be projected in mapping applications (e.g., ArcGIS), so that control or eradication of the weed can be undertaken. The prototype module has been trialled in NIWA's flume facility to determine its ability to detect lagarosiphon and subsequently initial field testing has been conducted at Lake Wakatipu and the upper Kawarau River (Queenstown, South Island). Whilst the project has primarily developed a detection tool to target invasive submerged weeds in New Zealand waterways, in principle, the system could be used for recognising other relevant target species including pest fish, native species (e.g., taonga species, kōura and kākahi) and is also applicable in the marine environment.

See you later Alligator: A literature review on terrestrial impacts and management of alligator weed (*Alternanthera philoxeroides*).

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Co-author: Trevor James, AgResearch Ltd

Deborah is a Research Associate at AgResearch, Ruakura, Hamilton. She has a Masters of Biological Science from the University of Waikato on clover root weevil and subsequently worked as a policy analyst at MAF and then MPI for several years before having a break for family. Returning to work at AgResearch in 2019 Deborah has been involved in range of weed related research from weed seed bank studies, cover crops, herbicide trials, and lasering of weeds. Currently Deborah is involved with the See You Later Alligator SFFF project, which brings together plant pest managers from several North Island regional councils and horticultural, agricultural stakeholders to bring greater understand of alligator weeds terrestrial impacts and best management practices on-farm.

Alligator weed (*Alternanthera philoxeroides*) is an herbaceous stoloniferous perennial that grows in both aquatic and terrestrial sites. It has the status of aggressive invader in 32 countries across the world and considered by many as the world's worst weed. In New Zealand alligator weed is widespread in Northland and Auckland and is in managed sites throughout the rest of the North Island. Alligator weed is an unwanted organism in New Zealand.

In 2022 funding by MPI's Sustainable Food and Fibre Futures (SFFF) Fund provided some resources to develop the See You Later Alligator - alligator weed working group (AWWG) and co-fund a three-year research programme into the impacts and management of alligator weed growing in terrestrial environments. The AWWG includes AgResearch weed researchers and co-fundings from the Waikato, Horizons, Bay of Plenty, and Greater Wellington Regional Councils, Kiwifruit Vine Health, with in-kind support from NZ Rural Contractors and the Foundation for Arable Research.

As a known pest plant around the world, alligator weed has been extensively researched. However, research has been heavily focussed on its aquatic form and much less is known on its impacts and management in terrestrial environments where biocontrol options are absent. Identifying the knowledge gaps of alligator weed in its terrestrial form via a literature review was a first milestone for the AWWG. Results from this review found alligator weed impacts a wide range of crops and pasture species, with terrestrial alligator weeds allelopathy and below ground biomass being important as to its impacts and persistence. For example, soil incorporated with alligator weed residues of just 4 - 5% could exerted up to 76-87% reduction of maize emergence due to phytotoxins found in alligator weed. In pasture, impacts are more variable and relative to soil moisture with alligator weed outcompeting pasture swards in wet and high nitrate soils. For management of alligator weed in terrestrial environments the most effective treatment for larger infestations was metsulfuron methyl (48 g a.i. ha⁻¹) with adjuvant. However, repeated applications are required as the terrestrial form of alligator weed is resilient to chemical control due to its large underground biomass reserves and poor translocation of herbicides to the root system. The literature review observed several knowledge gaps, specifically animal health impacts and robust control strategies in dealing with terrestrial alligator weed in different production environments. This will be a focus of our coming research programme.