New Zealand Biosecurity Institute

NETS2019

HE WAKA EKE NOA *ALL HANDS ON DECK*

24-26 JULY 2019
TRINITY WHARF, TAURANGA

CONFERENCE HANDBOOK

Major Sponsors

NIWA Taihoro Nukurangi

Biosecurity New Zealand
Ministry for Primary Industries
Manatū Ahu Matua

BAY OF PLENTY REGIONAL COUNCIL TOI MOANA

Land Information New Zealand Toitū te whenua
Boffa Miskell
BIOSECURITY PARTNERSHIP

Key Industries
Protecting people, crops and native species

Sponsors & Trade Displays

MINKPOLICE

DESIGNED-2-KILL

Manaaki Whenua Landcare Research

Wildlands

UPL OpenAg™

BAY DYNAMICS NEW ZEALAND

Connovation
CONSERVATION BY INNOVATION

econode

Thank you to all our NETS2019 sponsors...

Major Sponsors

Key Industries
Protecting people, crops and native species

NIWA
Taihoro Nukurangi

Biosecurity New Zealand
Ministry for Primary Industries
Manatū Ahu Matua

BAY OF PLENTY REGIONAL COUNCIL
TOI MOANA

Land Information New Zealand
Toitū te whenua
Boffa Miskell
BIOSECURITY PARTNERSHIP

Mix 'n' Mingle Sponsor

Manaaki Whenua
Landcare Research

Happy Hour Sponsor

BAY DYNAMICS
NEW ZEALAND

Dinner Sponsor

Wildlands

Trade Displays

Connovation
CONSERVATION BY INNOVATION

UPL
OpenAg™

MINKPOLICE

BAY DYNAMICS
NEW ZEALAND

econode

DESIGNED-2-KILL

WELCOME to NETS2019...

E āku nui, e āku rahi, e āku rau rangatira, tēnā koutou.
To the many and the multitude, and the leaders, greetings.

Nei rā te mihi ki a tātau ngā kaitiaki-koiora, tātau e kua herea nei i raro tēra kaupapa.
This is the greeting to all of us involved in biosecurity and everyone brought together because of it.

No reira huri noa, Tēnā koutou, tēnā kotou, tēnā tātau katoa.
To all gathered, thank you to you and us all.

I would like to extend a warm welcome to everyone who has joined us for our 69th annual NZBI National Education and Training Seminar (NETS) in beautiful Bay of Plenty. 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.

NETS2019 is about you, the people of biosecurity in New Zealand. This is Biosecurity Week and these seminars will bring you a broad range of topics, from a range of experts and people working at the coalface of the biosecurity system. NETS is not a holiday, but an opportunity to take a breath and show off who we are and what we do!

The theme for NETS2019 is: *He waka eke noa – All Hands on Deck*. 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 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: Heidi Pene, Donna Watchman, Thomas Malcolm, John Mather, Shane Hona, Dale Williams, Nicky Oliver-Smith, myself 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: NIWA, Ministry for Primary Industries, Key Industries, Boffa Miskell and LINZ, Bay of Plenty Regional Council, Wildland Consultants, Manaaki Whenua - Landcare Research, UPL, Alpeco, Econode, Connovation and Bay Dynamics.

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, people 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 NETS2019 an enjoyable and valuable experience.

Darion Embling - NZBI National President

Day 1 Wednesday 24 July 2019

9.00 Conference opening - powhiri, official welcomes

9.30 BOP biosecurity and the big picture (*D. Leader, Bay of Plenty Regional Council*)

9.50 Tauranga Moana (*C. Bidois, Tauranga Moana Biosecurity Capital*)

10.10 Iwi biosecurity initiatives in Tauranga Moana (*R. Tuanau, Ngaiterangi Iwi*)

10.30 *Morning tea*

11.00 NZ ecosanctuaries – mice that roar (*J. Innes, Manaaki Whenua – Landcare Research*)

11.20 Biodiversity outcomes from NZ sanctuaries: a national meta-analysis (*R. Binny, Manaaki Whenua – Landcare Research*)

11.40 GEMS

12.00 *Lunch*

	PREDATOR FREE 2050	PEST PLANTS
12.50	TBfree to Predator Free - a platform for transition? *N. Hancox, OSPRI NZ*	Optimising the management of alligator weed invading waterways. *D. Clements, NIWA*
1.10	Latest technology and non toxic solutions for PF2050 *H. Kaiser, Designed2Kill*	Working side by side in the battle against alligator weed in the Bay of Plenty. *S. Stephens, Bay of Plenty Regional Council*
1.30	If you're trapping and you know it . . . clap your hands!!! *H. Louw, Wellington City Council*	A collaborative effort in wilding conifer control *S. Smith, Biosecurity New Zealand*
1.50	Fabulous volunteers pest animals *R. Kemp, Auckland Council*	Money doesn't grow on trees! *J. Lethbridge, Boffa Miskell*
2.10	Towards Predator Free Taranaki - an operational update *S. Ellis, Taranaki Regional Council*	The need for biosecurity: herbarium records of major weeds explained by human assisted dispersal *T. James, AgResearch & H. Pene, Waikato Regional Council*
2.30	Predator Free Miramar - a world first *P. Horton, Greater Wellington Regional Council*	Manchurian wild rice *K. Denyer, Papawera Geological*

2.50 *Afternoon tea*

	VERTEBRATE PESTS	ENGAGEMENT
3.10	Beyond containment - detecting wallabies at the invasion front *P. Caldwell, Boffa Miskell Ltd*	Winning the War against Weeds: engaging with schools and communities *M. Dawson, Manaaki Whenua - Landcare Research*
3.30	Optimising mustelid control through landscape analysis and mapping *H. Blackie, Boffa Miskell Ltd*	Introducing Find-A-Pest, a new NZ app for biosecurity surveillance *R. Milne, Environment Southland*
3.50	Norbormide field trial results for Norway rats *L. Shapiro, Boffa Miskell Ltd*	Surveillance for 'new to region' pest plants in the Bay of Plenty *R. Pender, Wildland Consultants*
4.10	Cat amongst the pigeons: social license learnings from a RPMP review *I. Bassett, Auckland Council*	Hauraki Gulf pest prevention *L. Brooks, Auckland Council*
4.30	Unwanted feral deer – time for national collaboration *K. McElrea, Northland Regional Council*	Behaviour change in boating communities on marine pests in Northland *C. Bunton, Northland Regional Council*
4.50	Surveying fragmented landscape - pest animals in the residential red zone of Canterbury. *B. Barrett, Boffa Miskell Ltd*	NZ Wilding Conifer Group: the critical role of communities in wilding conifer management *R. Bowman, NZ Wilding Conifer Group*

5.10 *New Zealand Biosecurity Institute Annual General Meeting*

6.00 *Mix 'n' Mingle, Trinity Wharf*

Day 2 Thursday 25 July 2019

MARINE

8.30 Slowing the spread of Mediterranean fanworm in New Zealand - working collaboratively to manage an established marine pest. (*K. Walls, Biosecurity New Zealand - MPI*)

8.50 Towards inter-regional pathway management (*Top of the North Marine Biosecurity Partnership*)

9.10 Marine biosecurity in the Bay (*H. Lass, Bay of Plenty Regional Council*)

FIELDTRIP BACKGROUNDERS

9.30 One Fish, Two Fish, Catfish - New Fish? (*L. MacDonald, Bay of Plenty Regional Council*)

9.50 Port of Tauranga biosecurity excellence: a key partnership targeting biosecurity challenges of the future (*M. Whitworth, Ports of Tauranga*)

10.10 KiwiNet builds surveillance and response capacity for the kiwifruit industry (*J. Mather & L. Peacock, Kiwifruit Vine Health*)

10.30 *Morning tea*

FIELDTRIPS - buses leave at 11am

FROM VINE TO VESSEL
Join us on a full kiwifruit experience that will take you from the orchard – where the fruit of a billion-dollar industry is created - to the port, where the fruit we grow is exported across the globe. You'll visit the renowned Kiwifruit Country, which hosts thousands of international visitors a year and has incorporated best-practice biosecurity into everyday tours; follow the fruit trail to a local pack-house known for their commitment to sustainability and proactive biosecurity practice; view the steep and deep gullies of Te Puke where wild kiwifruit vines have been successfully controlled; and finally, stop at New Zealand's largest port to see container inspections and detector dogs in action.

MAUAO and MATAKANA
Tauranga City Council's Gordon Carmichael Reserve in Bethlehem is our first stop, looking at alligator weed management and the recent viability testing of red-eared slider turtle nests - aquatic pets and pest fish constantly being released to TCC storm water systems and reserves across the whole city is a growing problem. Then we are off to Mauao (Mount Maunganui) where we can see Matakana and hear about the pest issues and biodiversity initiatives on this island. Weather and tracks permitting, you can take a walk up or around Mauao, and then enjoy a soak in the hot pools before heading back to Trinity Wharf.
Route may vary, cash payment ($15.00) for hot pools entry will be required on the day for those who want to have a soak!

LAKE ROTOITI
Join us on a trip to Lake Rotoiti where we will board a boat and take a cruise around this picturesque lake. Local guides will provide a commentary during the cruise and will discuss the local history, and biosecurity and biodiversity projects here including the catfish programme and interventions designed to make long term sustainable improvements to our lakes. Be sure to bring your togs and towel as our final stop will be at the historic Manupirua Hot Springs (which are only accessible by boat) for a soak and a swim.
Limited to 45 registrants. Route may vary, charge applies.

MAKETU
The first stop of this trip will be the Pāpāmoa Hills Regional Park, a prominent site with panoramic views of the western Bay of Plenty, from Mauao to Maketu. This site was valued highly by local Māori for kāinga and fortified pa. From here, we'll visit a range of pest control and ecological restoration sites, including the Kaituna Wildlife Management Area, and a local Coast Care project. We'll also visit the Maketū Estuary, where major engineering works have been undertaken to restore the mauri (life force) of this incredibly important site, which was bypassed by the diversion of the Kaituna River for flood protection decades earlier.
Route may vary.

6.00 *Happy Hour*

7.00 *Conference Dinner, Trinity Wharf*

Day 3 Friday 26 July 2019

	TECHNOLOGY	INVERTEBRATES & DISEASES	AQUATICS
9.00	The potential for precision pest control using drones (or UAV's, RPAS, UAS) *C. Morley, Toi Ohomai Institute of Technology*	Argentine ants: the stealthy invasion and 120 reasons we can control them *P. Visser, Key Industries & Brian Sheilds, AC*	Salvinia at Papamoa: all hands to the waterway! *F. Velvin, Biosecurity New Zealand - MPI*
9.20	IoT network enables the Predator Free Punakaiki project *N. Hatch, Vodafone New Zealand Limited*	Myrtle rust in Aotearoa/New Zealand: citizen science tool kit development *L. Lima, Biosecurity New Zealand - MPI*	New lakeside monitoring tools will help communities join the fight against invasive species *T. Burton, NIWA*
9.40	Drones v Invasives *S. Vye, Environment & Conservation Technologies (ECT)*	Invasive invertebrates: a threat to sustainable livelihoods in the Pacific? *D. Stronge, Manaaki Whenua - Landcare Research*	Eradication economics for freshwater pest plants *D. Hofstra, NIWA*
10.00	Map-plications: engaging public through GIS *H. Payn, Land Information New Zealand*	Do the right thing *Lisa Tolich, Auckland Council*	Best practice for aquatic weed management *P. Champion, NIWA*

10.20 *Morning tea*

COLLABORATION

10.50 Community, industry, local and central government collaboration to achieve a successful incursion response on Rakino Island (*M. Harrison, Auckland Council*)

11.10 A story of success: student summer studentship collaboration between Unitec and Auckland Council (*D. Fraser, Unitec & C. Neverman, Auckland Council*)

11.30 Crown land and its management: Is it a case for all hands on deck? (*K. Gallagher, Land Information New Zealand*)

11.50 Storytelling through social media (*H. Tapiata, Speaker, Author, and Social Media*)

12.10 Community groups, pests and citizen science: Empowering non-specialists to measure biodiversity outcomes (*M. Peters, people+science*)
,

12.30 Closing address and awards

12.45 *Lunch*

Day 1 Wednesday 24 July 2019

Tauranga Moana Biosecurity Capital (TMBC)

Carlton Bidois, Co-Chair Tauranga Moana Biosecurity Capital (TMBC)

Carlton has an extensive background of iwi and hapū representation across a diverse range of institutions. He is an environmentalist at heart and specialises in environmental management, having worked in this sector for over 15 years. Carlton has also been an iwi representative to the Department of Conservation (DOC), gaining the confidence of iwi and hapū to speak on high level conservation issues. He commands an intimate knowledge of the Kaimai Forest range and its conservation concerns. Carlton is also lead advisor for co-governance/co-management negotiations between DOC, iwi/hapū and various community conservation groups that are currently underway.

Carlton is a founding member and current chair of Manaaki Te Awanui Environmental Research and Development Trust, which conducts major cross-cultural research and restoration projects in the Tauranga Harbour and surrounding catchments.

Tauranga Moana Biosecurity Capital (TMBC) is a collaboration that has its roots in a collective effort to 'build a biosecurity team of 4.7 million New Zealanders' – to shift how we, as New Zealanders, think about biosecurity, how it connects to our everyday lives, and how people can get involved.

TMBC brings together a 'coalition of the willing' and establishes Tauranga Moana iwi at the centre of our regional biosecurity team in a broad collaboration between iwi, community groups, industry, businesses, agencies, educators, scientists and others striving to achieve biosecurity excellence.

TMBC's focus is on working with our rangitahi in partnership with educators, connecting our communities to the importance of biosecurity, and building social licence and collaboration between iwi, hapū, community organisations, industries, local businesses, science leaders and Mātauranga Māori experts as well as central and local government.

Tauranga Moana Biosecurity Capital was launched by the Minister for Biosecurity and Primary Industries Damien O'Connor in October 2018. TMBC is considered an exemplar for regional collaboration and partnership. Our hope is that other regions will pick up and adapt the TMBC model to extend biosecurity excellence across the country.

New Zealand ecosanctuaries – mice that roar

John Innes, Scientist, Manaaki Whenua - Landcare Research, Hamilton
InnesJ@landcareresearch.co.nz

John started work at the then Forest Research Institute (now SCION) at Rotorua in 1980, moved to Hamilton to work with Manaaki Whenua – Landcare Research after Crown Research Institutes came along in 1992, and now approaches his use-by date. He has studied mammal pests (especially ship rats), species recovery and sanctuaries over this time, and is currently on the kōkako, kākāpō and takahē Recovery

Groups. He and Manaaki Whenua colleagues host an annual national sanctuaries workshop that recently birthed the Sanctuaries of NZ Inc (SONZI) group, and yielded data underpinning this talk.

We define an *ecosanctuary* in a New Zealand context as 'a project larger than 25 ha implementing multi-species, pest mammal control for ecosystem recovery objectives, and with substantial community involvement', and present attributes of 84 projects meeting this definition. Our definition includes some islands, ring- and peninsula-fenced ecosanctuaries, unfenced ecosanctuaries ('mainland islands') and some aerial 1080 sites. Although in aggregate their area is small (0.2% of the NZ mainland), their impact has been huge, mainly by allowing the restoration of diverse, iconic fauna, some of which had previously been extirpated entirely from the mainland.

We suggest that ecosanctuaries need to be inclusive and respectful of diverse world views and resultant objectives. The growing scale of pest-free aspirations in pastoral landscapes challenges our knowledge of whether pests or habitat shortage primarily limit fauna recovery. There is a strong need for more national, agency-led guidance about best practice pest control, pest monitoring and biodiversity outcome monitoring techniques. Otherwise, diverse community groups are condemned to their own trial-and-error processes about what does and does not work.

Biodiversity outcomes from NZ sanctuaries: a national meta-analysis

Rachelle Binny, Manaaki Whenua - Landcare Research
BinnyR@landcareresearch.co.nz

Rachelle is a mathematical biology researcher at Manaaki Whenua - Landcare Research and Principal Investigator at Te Pūnaha Matatini, New Zealand's Centre of Research Excellence for Complex Systems and Networks. Prior to this she completed her Bachelors with Honours degree at the University of Dundee, Scotland, and a Marsden-funded PhD at the University of Canterbury. Rachelle's research lies at the interface of biology, mathematics and data science. Since starting at Manaaki Whenua, she has caught the biodiversity bug, and has been working on statistical models for describing long-term trends in ecosystem restorations, using monitoring datasets collected by NZ's ecosanctuaries.

Aotearoa's ecosanctuaries have a highly successful track record of ecosystem restoration and pest management, both on islands and the mainland. The biodiversity outcome monitoring and pest monitoring that they have conducted, often over several years, presents a valuable opportunity to gain key new insights into the impacts of pest control for indigenous flora and fauna, and the long-term trajectories for restoration. Over the last few years, we have collated an extensive database of monitoring data, comprising over one million records from 26 sanctuaries, including DOC mainland islands, ring-fenced, peninsula-fenced, and unfenced sanctuaries. This work was made possible by the partnership and data sharing among a large number of sanctuaries, communities, agencies, and local and regional government.

By analysing this data in aggregate, we acquire new understanding of biodiversity responses to pest control that could not be obtained by considering only one or a handful of sites in isolation. Our results show large benefits to biodiversity, across a range of sanctuary types and taxonomic groups from over 15 years of pest control, with greatest benefits for deeply endemic species. We also compare the benefits for biodiversity of full pest eradication relative to varying levels of suppression. These results are a real testament to the passion and dedication of staff and volunteers across all of NZ's sanctuaries.

GEMS

Horehound biocontrol - an update

Ronny Groenteman, Manaaki Whenua - Landcare Research
groentemanr@landcareresearch.co.nz

Co-author: Gavin Loxton, Sawdon Station

Ronny is a weed biocontrol scientist with Manaaki Whenua - Landcare Research since 2008.

In this rock-star of a project we were able to release two biocontrol agents against horehound within 18 months of the project kicking in. This short presentation will show the unique release techniques and will update about release and re-distribution plans.

Weed occurrence records - sharing them helps us all!

Graeme Bourdot, AgResearch
graeme.bourdot@agresearch.co.nz

Co-author: Dr Shona Lamoureaux, AgResearch, Lincoln

Dr Graeme Bourdot is a principal scientist at the Crown Research Institute, AgResearch, and is based at Lincoln. He leads a national team of scientists addressing some of the big weed management issues facing New Zealand's pastoral sector including herbicide resistance evolution, biological control, internal biosecurity, sleeper weeds and weed control economics. The team's impact to date has been through its many published weed management guides (e.g. the Ute Guide series), online weed identification and information tools (AgPest), weed ID books, the online Regional Pest Management Cost Benefit Analysis tool and scientist involvement on various weed management Technical Advisory Groups including the National Pest Plant Accord. Graeme has authored more than 200 papers in peer-reviewed science journals and conference proceedings, co-supervises post-graduate students, is a Subject Editor for the European Weed Research Society journal, Weed Research, and is Vice President of the International Bioherbicide Group.

Knowledge of where a weed is already established in New Zealand, where it could establish if allowed to spread (current and potential distributions), and its rate of spread, are three parameters essential to any regional weed risk (and cost benefit) analysis, and for determining the most appropriate regional management programme type (Exclusion, Eradication, Progressive Containment, Sustained Control). Scientists can access global occurrence data (e.g. from the Global Biodiversity Information Facility, GBIF) to build models that predict potential distributions of weeds in New Zealand, and to estimate spread rates. But mapping the current distributions remains problematic. Whilst some weed occurrence records are available from herbaria, a large pool of records remains difficult to access from the disparate databases held by regional councils. A solution to this problem is to share our weed occurrence data through GBIF. The web-based tools Find-a-Pest and iNaturalist provide a conduit to GBIF for new records; existing records would be submitted independently.

The spread of kauri dieback disease: Are ferry passengers to Waiheke Island aware of this serious issue?

Tayla Furlong and Laura de Castro, Unitec students
tayla.furlong@gmail.com, gateway.laura@gmail.com

Co-authors: Liz Brooks and Chelsee Neverman (Auckland Council); Nigel Adams and Diane Fraser (Unitec)

Tayla and Laura are currently in their final year of study of a Bachelor of Applied Science, majoring in Biodiversity Management, in the School of Environmental and Animal Sciences at Unitec, Auckland. Tayla and Laura have been selected for a summer studentship with the Pest Free Hauraki Gulf programme through Auckland Council Biosecurity (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. Tayla and Laura are supervised at Unitec by Senior Lecturer Dr Diane Fraser and supported by Assoc Prof Nigel Adams.

Waiheke Island is a large human inhabited and popular tourist destination island in the Hauraki Gulf, Auckland, New Zealand. It is also home to some of New Zealand native Kauri tree (*Agathis australis*). Kauri dieback (*Phytophthora agathidicida*) (KDB) is a major threat to this species throughout Auckland and other regions; currently the island's kauri trees are free from the disease. However, due to the island being a popular travel destination, the high commuter activity and the ease of transport of KDB in soil on shoes, wheels and equipment, the risk of spread of KDB disease to Waiheke kauri is significant.

This study aims to assess ferry passengers travelling to Waiheke Island as to their awareness of the risk of KDB and its spread. Awareness was assessed using an anonymous survey of passengers before boarding the ferry at Queens's Wharf, Auckland. This included varying levels of messaging and advocate support: a) no presence of KDB biosecurity advocates, b) presence of KDB advocates and c) after a shoe wash station had been installed but without presence of KDB advocates. This information will be helpful in improving educational messages, as well as help develop engagement and behaviour change strategies in the Pest Free Hauraki Gulf programme. It will also hopefully help to prevent the spread of KDB and protect New Zealand's iconic kauri trees.

The effect of climate change on the potential range of the house crow in New Zealand.

Diane Fraser, Unitec
dfraser@unitec.ac.nz

Co-authors: Glenn Aguilar and Mel Galbraith (Unitec).

Diane Fraser, Glenn Aguilar and Mel Galbraith are all Senior Lecturers in the School of Environmental and Animal Sciences at Unitec, Auckland. Diane was granted a NZBI Travel Award to present the material together with Mel Galbraith at the International Ornithological Conference in Vancouver, Canada in August 2018. All three staff are involved in teaching and research that is integral and underpins the three-year undergraduate Bachelor of Applied Science degree, with majors in Biodiversity Management and Animal Behaviour & Welfare within the school.

The potential habitat suitability for the house crow (*Corvus splendens*), a bold, adaptable and globally invasive avian species, has already been predicted for New Zealand. This study aimed to assess the

impact of climate change on the future potential invasive range in New Zealand under current and four climate change trajectories; RCP2.6, RCP4.5, RCP6.0 and RPC8.5, for 2050 and 2070. Under these modelling criteria, there was minimal change in the potential invasive range, although a slight southerly shift down the country was predicted. This suggests that, under these criteria, current climatic conditions would best suit the establishment of the invasive house crow in New Zealand.

The practicalities of surveying ferry passengers to assess awareness of kauri dieback.

Tayla Furlong and Laura de Castro, Unitec students
tayla.furlong@gmail.com, gateway.laura@gmail.com

Co-authors: Liz Brooks and Chelsee Neverman (Auckland Council); Nigel Adams and Diane Fraser (Unitec)

Laura and Tayla are currently in their final year of study of a Bachelor of Applied Science, majoring in Biodiversity Management, in the School of Environmental and Animal Sciences at Unitec, Auckland. Laura and Tayla have been selected for a summer studentship with the Pest Free Hauraki Gulf programme through Auckland Council Biosecurity (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. Laura and Tayla are supervised at Unitec by Senior Lecturer Dr Diane Fraser and supported by Assoc Prof Nigel Adams.

Biosecurity awareness surveys have previously been conducted on ferry passengers travelling to unpopulated islands in the Hauraki Gulf, Auckland, New Zealand, such as Rangitoto/Motutapu and Rotoroa. Numerous factors, such as ferry terminal facilities, number and attitude of passengers, approach to communicating with passengers and the topic of the survey can all influence the success or failure of a study. This poster aims to outline the issues faced when conducting a survey of ferry passenger awareness of kauri dieback disease and its spread before travelling to Waiheke Island, which is a popular tourist destination and heavily populated island in the Hauraki Gulf. This information will support future surveys in this situation as well as help develop engagement and behaviour change strategies in the Pest Free Hauraki Gulf programme.

Impact of the gall fly (*Urophora stylata*) on Scotch thistle (*Cirsium vulgare*) seed production

Mike Cripps, AgResearch
mike.cripps@agresearch.co.nz

Co-authors: Jovesa Navukula and Seona Casonoto (Lincoln University) and Chikako van Koten (AgResearch)

Mike is a weed scientist with particular expertise in biological control, including classical and bioherbicide approaches. He gained substantial experience from research carried out in North America, Europe, and New Zealand, testing plant invasion mechanisms and underpinning theory of biological control by comparing invasive weeds in their native and introduced ranges. Broadly, his research involves consumer-plant interactions, the ability for natural enemies to regulate weed populations, and the evolutionary dynamics that drive resistance to weed control measures.

The gall fly, *Urophora stylata*, was released in 1998 as a biological control for Scotch thistle (*Cirsium vulgare*). In the summer of 2018, a survey was conducted to assess the frequency and intensity of attack by the gall fly on Scotch thistle seedheads; prior to this its effectiveness had not been evaluated. A stratified random selection of 20 Scotch thistle populations was used to ensure 10 populations on each of the North and South Islands, and that all selected populations were on land designated as sheep and beef pasture, where the weed is most problematic. The gall fly was found at 14 of the 20 Scotch thistle populations and was absent from the populations surveyed in the West Coast, Otago, and Southland. Surveyed plants (usually 30 per population) were grouped into three attack frequency categories according to the proportion of seedheads attacked per plant: no attack, partial attack, and complete attack. Compared to plants with no seedheads attacked, partial attack resulted in 14% fewer seeds per seedhead, and complete attack (all seedheads per plant attacked) resulted in 47% fewer seeds per seedhead. Similar reductions were recorded for seed weight, and seed germination rates, indicating that the biocontrol agent not only reduced the number of seeds, but also the quality of seeds. Intensity of attack was measured as the proportion of the seedhead that was galled. There was a significant relationship indicating that seed production decreased with increasing attack intensity. This research represents the first assessment of the Scotch thistle gall fly in New Zealand and indicates that it can have significant fitness impacts on the weed.

Biocontrol of annual grass Bromus species in New Zealand.

Gavin Loxton, Farmer
sawdon@lupins.nz

Co-author: Seona Casonato, Manaaki Whenua - Landcare Research, Lincoln.

Gavin is the chair of the Horehound Biocontrol Group 2017-2019.

This project will determine if biocontrol is a viable solution for the winter annual grass species cheatgrass (*Bromus tectorum*) and ripgut brome (*Bromus diandrus*) in New Zealand. Annual bromus species are a serious weed on high country farms. The long sharp seeds of *Bromus diandrus* cause significant long term animal welfare issues. As a winter annual, bromus species are the first to use soil moisture and nutrients, outcompeting more desirable perennial species. This early establishment enables prolific summer seeding which can add significantly to the fire fuel load of rural and semi-rural countryside.

Our project aims to assess whether the biocontrol agents smut fungus, *Ustilago bullata*, and the soil bacteria *Pseudomonas fluorescens* could be implemented in New Zealand.

Water quality and habitat enhancement of Lake Whangape: a partnership project between DOC, Waikato Regional Council and Waikato Tainui

Kerry Bodmin, Department Of Conservation
kbodmin@doc.govt.nz

Affiliations: Waikato Regional Council and Waikato Tainui

Kerry has over 20 years' experience in biosecurity and plant ecology, particularly in wetlands. She started a new role at DOC as the Project Manager for Lake Whangape Restoration project in January 2019. She has previously worked for a crown research institute (NIWA), central government (MAF/MPI) and local

government (Waitakere City Council), a charitable trust (Weedfree Waitakere), and at the Auckland Museum in the herbarium.

Hydrological modification, sedimentation, nutrient loading and aggressive spread of alligator weed has resulted in the decline of lake water quality and habitat condition at Lake Whangape over the past 40 years. Lake Whangape Restoration Project is a partnership between DOC, Waikato Regional Council and Waikato Tainui. This project aims to work in partnership to restore the health of Lake Whangape using a mix of strategies and incorporating Mātauranga Māori at all levels. Intervention measures include fencing, restoration planting around the lake margins and associated wetlands, and weed control. Catchment initiatives include working with landowners to improve water quality through eight diffuse pollution attenuation projects and implementation of a kaitiaki monitoring framework. Two weeds present biosecurity challenges. Alligator weed, the most serious economic and ecological plant pest to the Waikato Region, will be controlled to containment levels. Lake Whangape is also one of only two known NZ sites of Cuscuta (golden dodder). There is an opportunity to eliminate Lake Whangape as a 'source' population for further dispersal of these two weeds to the Lower Waikato, and potentially to eradicate Cuscuta from this site. Funding for this 5-year project has come from Ministry for the Environment Freshwater Initiatives Fund and Waikato River Authority through the Waikato River Cleanup Fund.

Biocontrol programmes: progress on a tight budget.

Alix McKenzie, Unitec student
Presented by Diane Fraser, Unitec

Co-authors: Graham Johns and Diane Fraser (Unitec) and Emma Edney-Browne and Holly Cox (Auckland Council).

Alix has just completed her Bachelor of Applied Science, majoring in Biodiversity Management, and Graham Johns has just completed the Certificate in Animal Management (Captive Wild Animals) in the School of Environmental and Animal Sciences at Unitec, Auckland. Alix and Graham have been selected for a summer studentship with the Biocontrol Division of Auckland Council Biosecurity (Emma Edney-Browne & Holly Cox), who have funded the project. Alix and Graham are supervised at Unitec by Senior Lecturer Dr Diane Fraser.

Biological control agents are important tools in the war against invasive pest plants. Auckland Council's Biosecurity Team has been actively releasing biocontrol agents, such as the Chinese privet lace bug and Tradescantia leaf beetle, for the biocontrol of invasive pest plants in the region. Over recent years, due to limited resourcing, monitoring of the success of biocontrol agents has been restricted. This study outlines the progress that can be made in assessing and expanding biocontrol programmes with an incremental increase in funding and utilising summer studentships for completion of the work.

PREDATOR FREE 2050

TBfree to Predator Free - a platform for transition?

Nick Hancox, OSPRI NZ
nick.hancox@ospri.co.nz

Nick has worked for more than 30 years at the sharp end of animal pest management communications, advocacy and policy. He is currently Senior Policy Advisor at OSPRI.

Wildlife pest management under the national Bovine TB eradication plan involves intensive possum control and wildlife disease and population density surveys delivered through a framework of more than 100 Tuberculosis Management Areas (TMAs) covering 7.78 million ha. Each TMA has its own management plan, timeframe for TB eradication, and over-arching contract for delivery of field operations and services.

While this planning and management framework has been developed primarily to support eradication of TB from possums, it could be adapted to support other predator eradication. This points to possible benefits from well-managed local or regional transitions from TB possum control, to longer term multi-species predator eradication. The sooner these transitions can be planned and managed, the greater the opportunities for retaining and reallocating management systems, operator knowledge, capacity and infrastructure, while maintaining very low possum densities as a step towards other predator freedom goals.

Latest Technology and Non Toxic Solutions for PF2050

Heiko Kaiser, Designed2Kill
heiko@alpeco.co.nz

Heiko is the founder of Alpeco and D2K Ltd, companies that are specialized in latest pest control technology, product development and Non-Toxic pest control solutions. D2K Ltd is based in the heart of New Zealand in Rotorua, and works alongside industry, stake holders within PF2050, councils, domestic market and many trapping communities. The company has a national and international recognition, as a developer, manufacturer and supplier for non-toxic solutions such as long lasting lures, 24/7 monitoring with pest app software, Pest Trail cams for a visual aspect, and a complete DIY product range of stations, traps and much more to suit every need. Its development team has a solid background of more than 12 years in the New Zealand Pest Control industry in New Zealand, and works together within its international network works in over 30 countries in supply and development.

With strong involvement and know how, as well a toolbox full of alternative solutions for PF2050, we will share some national and international developments that are or can become tools for our tools box now or very soon. It's important to know **why** should you investigate into latest technology and **why** you should try those innovations or developments.

We will demonstrate about how simple the of use of technology can be, how you have a good chance to increase your catch rates, and how you can improve the chance that pests find your traps - instead of just waiting for them to pass. We will also demonstrate that technology can be very beneficial to save kauri trees, dollars, or even volunteer time.

A further part of the presentation will be looking at the many products available, and how to access them. Our solutions are plug & play, easy to load and use, and are sustainable. We are working toward perfection and need your help. Tell us what you need, and we try to bring it to you or even make it for you. Some examples are:

- organic lures that last and not get mouldy
- NAWAC approved rat snap traps that kill all 3 type of rats under $10.00
- sustainable recycled plastic DOC200 stations
- the launch of NB-IoT with Vodafone and MinkPolice system.

This presentation will add value on all levels of trapping and might support the long-term goal and investment into PF2050.

If you're trapping and you know it . . . clap your hands!!!

Henk Louw, Wellington City Council
henk.louw@wcc.govt.nz

Henk has recently been appointed as the biosecurity specialist for pest animals at the Wellington City Council. He has been in the environmental field for over ten years and has an interest in urban conservation and connecting people to their natural environment. In 2009 he was fortunate enough to be part of a research team who spent a year on Gough Island, focussed on mice predation on albatross and other pelagic bird species. He is passionate about biosecurity and how it can benefit a holistic approach to biodiversity management.

Wellington City is a unique place to live and work. Its communities are more passionate, knowledgeable and connected to nature than ever before. They value protection and restoration of their local natural habitats and actively seek out ways to maintain the city's close relationship to the natural environment.

In recent years, an increased focus has been placed on pest animal control. Wellington City Council maintains a close relationship with programmes and initiatives such as Predator Free Wellington and Capital Kiwi. These initiatives have increased both local awareness and engagement towards biosecurity in urban back yards and rural private land.

Wellington City Council (WCC) has ambitious goals which include a pest animal control network covering 70% for its reserves by 2020 and 100% by 2025. Further objectives include increasing the area of land under integrated pest control and creating buffer zones and corridors for our significant natural areas. This involves supporting landowners, occupiers and community groups to engage in pest animal control.

This is attainable through creating effective in-house systems, supporting innovation and research, partnering with predator free initiatives and collaborating with national and regional governments. The most important aspect though remains to enable and engage our local communities through all we have learnt.

WCC has made great strides in this sector but there are still many unknowns. This requires further investment into research and innovation, improved networks for debating, collaboration and sharing of data. I will share a few ideas and strategies of how WCC approaches pest animal control through building relationships and trust and how we focus on shared outcomes for our city and its communities.

Fabulous Volunteers Pest Animals

Rebecca Kemp, Auckland Council
rebecca.kemp@aucklandcouncil.govt.nz

Rebecca is a Senior Biosecurity Advisor, contract manager possum control programme for the Auckland Region and engagement/support with community groups undertaking animal pest control in the Auckland Region. A member of the Biosecurity Team in Auckland since 2004, Rebecca has a long term relationship with the NZBI including branch Chair and National President.

With the heat on to 2025 Pest Free Auckland, and a national pest free 2050 target pest animal control cannot be achieved by contractors and Council staff alone. Our volunteer base is a crucial element to the success of such programmes on both public and private land. We currently have some fabulous volunteers working on projects across the Auckland Region, but how do we inspire more volunteers to come on board and how do we support our current volunteers to be the best they can be and share their extensive knowledge and refined skills to others? Some simple additions to a volunteers' tool kit can make all the difference to an engaged volunteer. Building strong relationships and collaborating information and ideas are also extremely important elements in building a successful volunteer base.

Towards Predator Free Taranaki - an operational update

Steve Ellis, Taranaki Regional Council
steve.ellis@trc.govt.nz

Steve began work as a possum control field operator shortly after the commencement of Taranaki's 'Self Help' possum control programme. His field experience includes roles in both control and monitoring. Later, Steve's role expanded to include pest plants, contract management and leading the growth of the self-help programme to include over 4,000 properties across Taranaki's ring plain.

Steve is a past convener of the Local Government Biosecurity Working Group and Chair of the National Pest Control Agencies. Steve led the design of the Towards Predator Free Taranaki project, the first and largest Predator Free 2050 Ltd funded project. A predator free team has been formed alongside Steve's biosecurity and site-led biodiversity teams.

Towards Predator-Free Taranaki is a landscape scale project aimed at restoring the sound and movement of our wildlife and rejuvenating native plants in urban and rural Taranaki, and protecting agriculture.

Support from the New Zealand Government's Predator Free 2050 funding has enabled Taranaki to build on long running community pest programmes, as we work towards becoming predator free.

The project is made up of four work streams:

- **Rural Predator Control**: targeting mustelids (ferrets, stoats, weasels) throughout 230,000 hectares of existing possum control areas across an intensively farmed landscape. A network of remotely monitored traps have been laid to target ongoing sustained control until eradication is possible. Landowners are given the tools, training and support required to continue effective control.
- **Urban Control**: engaging the region's urban population, aiming to have one in five households trapping. Taranaki's children are the key champions of this work stream with primary schools

distributing traps and collecting data within their community. Our education team have worked with teachers to incorporate the project into both the maths and science syllabus.

- **Zero possums**: working with Iwi, landowners and government to eradicate possums from 8,600 hectares, including bush, farmland and urban environments and preventing reinfestation using both natural and a 'virtual barrier' made up of over 1300 electronically monitored traps.
- **Research and Monitoring**: the project is partnering with Manaaki Whenua - Landcare Research to discover pest movements in farmed landscapes to better inform targeted control programmes. The project has initiated social research to understand barriers and enablers to people's involvement in pest programmes.

Towards Predator Free Taranaki's success is in the hands of the region's people - it involves schools, community groups, farmers and residents doing their bit.

Taranaki has a history of strong community collaboration and enthusiasm at all levels. This is a massive opportunity for the region and for New Zealand as we work towards becoming predator free.

Predator Free Miramar - a world first

Paul Horton, Greater Wellington Regional Council
paul.horton@gw.govt.nz

Paul is a senior biosecurity officer with GWRC. Has been working with the team for two years now. With an interest in wildlife and wild places, this work provides a great balance of conservation and community work.

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 on working 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.

PEST PLANTS

Optimising the management of alligator weed (*Alternanthera philoxeroides*) invading waterways.

Daniel Clements, NIWA
daniel.clements@niwa.co.nz

Dr Daniel Clements is an aquatic plant scientist for NIWA's Freshwater Biosecurity group. He has been a professional in the field of aquatic vegetation ecology and management since 2007, working as an aquatic weed scientist for Agriculture Victoria Research, Australia. His current research focus in New Zealand is the ecology of invasive aquatic plants, their impacts on aquatic ecosystems, and their management.

Aquatic plants are integral components of freshwater ecosystems and provide essential ecosystem services. However, when invasive species establish in new environments there are few natural checks and balances to inhibit their growth and spread. Excess aquatic vegetation can harm aquatic systems if left unchecked, and negatively impact on agricultural productivity, social amenity and biodiversity values. Prevention and early intervention are recognised as the most cost effective means to manage invasive species that pose a biosecurity risk.

The research programme presented develops management strategies for one of the world's most invasive aquatic weed species, alligator weed (*Alternanthera philoxeroides*), in an early stage of invasion of catchments and waterways, to increase the likelihood of extirpation. Developing methods to manage viable fragment production post herbicide application and improving the effectiveness of detection is required as current management practices have limited extirpation attempts. The application of the herbicides glyphosate, metsulfuron-methyl and imazapyr, and the effectiveness of incorporating surfactant systems and plant growth regulators are evaluated in field and laboratory studies for control of aquatic alligator weed. Further, this research project evaluated the use of high altitude aerial imagery (orthophotos) and unmanned aerial vehicle (UAV) technology to detect alligator weed in an early stage of invasion of catchments and waterways, to enable control strategies to be enacted.

Working side by side in the battle against alligator weed in the Bay of Plenty.

Sam Stephens, Bay of Plenty Regional Council
sam.stephens@boprc.govt.nz

Sam is a Biosecurity Officer for the Bay of Plenty Regional where he focuses on pest plant management. Sam has previously held roles in biodiversity, environmental education, and environmental planning.

After the discovery of alligator weed for the first time in a prominent waterway in the Bay of Plenty region in 2015, Council staff involved in the management of this invasive pest plant now pause and reflect. This presentation will share the lessons learnt to date, and how these lessons can be applied to future management within the region and for other agencies that may be in the same situation in the future.

All the big wins have come from working collaboratively across sections of Council, with external agencies, commercial stakeholders, and with the local community and tangata whenua. Each entity has their own strengths and by only by bringing these together and having continued open communication

can these types of battles be won. This experience has also highlighted the need to form a network that brings together agencies and communities that have experience with managing alligator weed with those that don't, so lessons learnt and best practice can be applied across the country especially in the critical phase following an incursion being discovered.

A collaborative effort in wilding conifer control

Sherman Smith, Biosecurity New Zealand
sherman.smith@mpi.govt.nz

Sherman is the Manager of the Long Term Programmes Team in the Recovery and Pest Management Group at Biosecurity New Zealand. He has worked in the field of biosecurity and conservation, across central and local government, for over 20 years.

Phase I of the National Wilding Conifer Control Programme - running from 2016-19 - has achieved some impressive progress. Collectively we've now controlled 500,000 ha of scattered infestation and over 40,000 ha of dense and intermediate infestation.

A key element of programme success lies in its collaborative model. This has proved a sound one: with operational control managed at a regional level - involving regional councils, four government agencies, and community trusts - and coordination and oversight occurring nationally, including farming and forestry stakeholders. This model's success has brought attention from other biosecurity programmes, both within New Zealand and internationally.

Money doesn't grow on trees!

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

Jourdan is a Biosecurity Consultant at Boffa Miskell, an environmental consultancy based in Christchurch. Since joining the team two years ago he has been managing terrestrial and aquatic pest control operations in hill country, riverbeds and lakes across New Zealand. As a key part of the management of pest species, Jourdan seeks to find cost savings and efficiencies through new methods and technologies.

When managing wilding tree programmes it is likely budgets won't always cover the amount of work required to be done in any given season. Identifying and implementing a range of efficiencies can significantly increase the value of each dollar spent. Taking a step back and analysing the entire operation is the first step to finding efficiencies which will ultimately lead to more dead trees! This presentation will look at ways in which a range of new technologies have been identified and implemented, in addition to finding innovative solutions to further increase efficiencies.

The need for biosecurity: herbarium records of major weeds explained by human assisted dispersal

Trevor James, AgResearch
trevor.james@agresearch.co.nz

Trevor has 45 years in weed research.

Heidi Pene, CG Hale Ltd (contracted to Waikato Regional Council)
heidi.pene@pestplants.co.nz

Heidi has a Masters in plant ecology and has worked as a pest plant officer for Waikato Regional Council for 19 years. Her special areas of interests are pampas, velvetleaf, and Noogora bur.

New Zealand has been colonised for less than 200 years yet most of our major weeds, which are all introduced from elsewhere, were widespread within the country within a short period. This cannot be explained by their own natural spread rates which in most instances are slow. The introduction and early spread of weeds were determined from the dates and spatial locations of their herbarium records. These records generally show rapid dispersal within and between the North and South Islands of New Zealand. This strongly suggests that they must have been moved by an agricultural or other human assisted pathway. That our major weeds were dispersed widely soon after introduction by human activities, probably unintentionally, but intentional movement cannot be ruled out, particularly to get from one island to the other. If improved internal biosecurity practices are not adopted then we could expect new weeds arriving into New Zealand to spread at a rate faster than their natural spread would determine.

Currently we have many pro-active mechanisms in place to stop some of the pathways, for example, roadside dumping is illegal, machine hygiene is promoted, some plants are banned from trade (eg National Plant Pest Accord) and there are rules that are in place to restrict movement of UO's. But is this enough? Have we got all the pathways covered?

Although the weeds discussed here were largely spread before biosecurity was recognised as a priority, two relatively recent incursions (yellow bristle grass and velvetleaf) moved very quickly across the country, indicating that we could still do better.

Working together to eradicate Manchurian wild rice

Karen Denyer, Papawera Geological
karen.denyer@papawerageological.co.nz

Karen is a consultant ecologist currently on contract to MPI managing the Manchurian Wild Rice programme. She is also conducting an intensive island-wide invasive plant survey of Great Barrier Island for Auckland Council. Karen is presenting on behalf of Kim Brown (MPI) and co-presenters are: Trevor Bullock (Northland Regional Council), Ruairi Flynn (Auckland Council), Chris Hale (Waikato Regional Council), Jen McGowan (Greater Wellington Regional Council).

Co-authors: Trevor Bullock (Northland Regional Council), Ruairi Flynn (Auckland Council), Richard Gribble (Waikato Regional Council), Jen McGowan (Greater Wellington Regional Council), Frances Velvin (Biosecurity New Zealand MPI)

Collaboration is a key ingredient in the effort to eradicate Manchurian wild rice (*Zizania latifolia*) (MWR) from New Zealand. This Unwanted Organism, and Notifiable Organism under the Biosecurity Act 1993 is highly invasive, forming 3-4 metre high dense monocultures along the banks of rivers, streams, drainage channels and damp pasture. Some infestations extend for several kilometres. It clogs drainage systems and destabilises banks, leading to flooding.

Eradication from New Zealand is managed through the National Interest Pest Responses Programme (NIPR), led by Biosecurity New Zealand (part of the Ministry for Primary Industries (MPI)) in collaboration with the four regional councils where MWR is present: Northland, Auckland, Waikato and Greater Wellington. Biosecurity New Zealand also has contracts with these councils for the operational management of the eradication programme. Technical advice is provided by NIWA through a contract with Biosecurity New Zealand.

Treatment is largely via selective herbicide applied by commercial spray operators sub-contracted to the regional councils. Several contractors are required to cover the range of habitats, with sprays deployed variously from the ground, helicopters or airboat. In addition, some local grower groups and individual farmers also apply the herbicide treatments, under the supervision of the local council and as part of the national NIPR programme. Enhanced reporting processes, annual best practice days and regular communication are key to the success of this collaborative approach.

VERTEBRATE PESTS

Beyond containment - detecting wallabies at the invasion front

Pete Caldwell, Boffa Miskell
pete.caldwell@boffamiskell.co.nz

Pete is a biosecurity consultant who manages numerous pest plant and animal control operations across New Zealand. Pete's key projects include managing terrestrial pest species on Land Information New Zealand administered land and wilding conifer management at Mid Dome, Southland. Pete's interests include the ecology and behaviour of pest animals, population growth and dispersal into new areas.

Since their introduction, wallabies, like possums, have proven to be very adaptable to New Zealand's climate and various ecosystems. The cryptic, non-gregarious nature of wallabies ensures that they are difficult to detect when invading new areas or present in low abundance. As Bennett's wallabies expand within and beyond the Canterbury region's geographic containment area, improvements in detection technology and methodologies are essential for informing successful control operations. As wallabies are now within the Rangitata River (northern containment area boundary) catchment, lessons must be learnt from the situation at the southern containment boundary, where wallabies have breached the Waitaki River and are now spreading through Northern and Central Otago. Now is the key time to understand wallaby dispersal at the Rangitata River, and ensure they are controlled before a population establishes on the northern side. This recent research seeks to compare four ground-based detection methods in the form of camera traps, contractors with detection dogs, scat identification, and thermal camera surveys. Ultimately, an estimate can be gained as to whether different methods are situationally advantageous in various applications. A map of detected wallaby presence also helps inform an operational plan for the methodical control of the wallaby population in this area. The complexity resulting from the target species and the difficult field site will also be discussed.

Optimising mustelid control through landscape analysis and mapping

Helen Blackie, Boffa Miskell Ltd
helen.blackie@boffamiskell.co.nz

Co-authors: Lee Shapiro, Andrew Tyrell and Brent Barrett (Boffa Miskell)

Helen is a biosecurity consultant at Boffa Miskell Ltd, and works on a range of innovations in pest control and surveillance.

Mustelids are one of the greatest threats to the survival of New Zealand's native fauna. Even in low numbers, stoats and ferrets seriously influence native species survival. However, many trapping programmes are discovering that their networks are insufficient to prevent predation events. Recent events have highlighted the devastating impact of ferrets in particular on kiwi populations, including the failed 2017 release of kiwi into the Hunua Ranges, the 2018 ferret predation event in Tongariro Forest (resulted in the death of eight kiwi in an eight-week period), and the predation events at Pūkaha Mount Bruce (with 28 kiwi deaths attributed to ferrets entering the reserve). Each of these areas had intensive predator control networks already in place.

It has become clear that traditional spatial deployment of traps is not sufficient for the goals of many conservation projects. As a result, we have established a new GIS model for determining the optimal placement of mustelid traps within the landscape, based on habitat preferences, behavioural characteristics and knowledge of past capture events. This analysis can be used to determine capture 'hot spots', likely routes of invasion and to prioritise trap deployment and checking. This presentation will describe this model, and provide examples of how it has been implemented to improve mustelid control in the Hunua Ranges and at Pūkaha Mount Bruce.

Norbormide field trial results for Norway rats

Lee Shapiro, Boffa Miskell Ltd
lees@boffamiskell.co.nz

Co-authors: Charles Eason (Cawthron Institute and Lincoln University), Duncan MacMorran (Connovation Ltd), D. Rennison and M. Brimble (University of Auckland)

Lee is an Associate Principal 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.

Norbormide is a rat specific toxicant. It causes vasoconstriction (narrowing) of small arteries and vasodilation (widening) of large arteries in rats, which causes a rapid fall in blood pressure. Death is thought to result from circulatory disorders and heart failure due to irreversible coronary constriction. The species-specific nature of this toxin is seen as a considerable advantage in terms of risk to non-target species. Research by Connovation Ltd and the University of Auckland has identified an effective method of synthesising norbormide without the taste aversion in Norway and ship rats.

Extensive cage trials with this formulation in a highly palatable paste bait have proven this formulation to be both effective and fast acting. Successful field efficacy trials for Norway rats were completed in 2018/2019 and results from these trials will be presented. The ability to target rats with a very low risk of impacting non-target species will enable both widespread rat control across remote locations and targeted control in sensitive areas like islands and in close proximity to urban areas.

A cat among the pigeons: social license learnings from a Regional Pest Management Plan review

Imogen Bassett, Auckland Council
Imogen.Bassett@aucklandcouncil.govt.nz

Dr Imogen Bassett is Biosecurity Principal Advisor at Auckland Council and has led the development of Auckland Council's new Regional Pest Management Plan.

While the government's Predator Free 2050 programme targets possums, rats and mustelids, it is widely acknowledged that there's another predator that also has substantial biodiversity impacts, but for which management is much more socially complex; namely, cats. Cats are our most popular companion animal. In 2015, 48% of households in Aotearoa-New Zealand owned cats (1.8 per home on average). Therefore, this is truly an 'all hands on deck' topic - everyone has an opinion on cat management, and we have direct effects through our choices of pet ownership behaviours. The last year or so have seen regional councils around the country consulting on proposed Regional Pest Management Plans, and many of these have included new approaches to cat management of one sort or another. Public reaction has often been polarized and emotional. There are clear parallels with other polarizing topics in pest management, such as 1080 and indeed the overall goal of predator eradication. In this talk, I will reflect on some of what I've learnt from my involvement in developing Auckland Council's new Regional Pest Management Plan. Key themes include acknowledging the role of values as well as evidence in policy/management interventions, the importance of language, listening, trust and messengers.

Unwanted Feral Deer – Time for national collaboration

Kane McElrae, Northland Regional Council
KaneM@nrc.govt.nz

Kane is the Biosecurity Manager – Partnerships and Strategy with Northland Regional Council.

Northland is the only region within New Zealand that is predominantly free of wild deer. For over 21 years, Northland has managed to suppress wild deer populations to very low levels and keep them out of significant high value kauri forests. Research has shown that without proactive management deer will occupy every available habitat within New Zealand and with a growing national pest free movement, is it now time for a collective discussion on where deer should or shouldn't be within New Zealand's fragile and threatened environment. After 21 years of trying to manage this issue regionally, the lessons learnt need to be shared and a national programme developed to reduce the risk wild deer pose on our environment. The wild deer issue needs serious discussion at a national level and to be supported from the ground up by communities and regions who are most at risk.

Surveying fragmented landscape - pest animals in the residential red zone of Canterbury.

Brent Barrett, Boffa Miskell Ltd
brent.barrett@boffamiskell.co.nz

Brent 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 the Western Australia Government.

Very few events in New Zealand's recent history have modified an urban landscape to the magnitude that the Christchurch earthquakes have. The legacy this created included a large cleared and highly fragmented urban habitat known as the Residential Red Zone (RRZ) which is currently administered by Land Information New Zealand (LINZ). Recently, there has been growing concern over the possibility that the RRZ provides habitat for a growing number of pest animals that may adversely affect the surrounding residential properties. In response to these concerns LINZ engaged Boffa Miskell Ltd to conduct extensive pest animal surveys to identify the local abundance these species in the RRZ. The primary targets of this survey were possums, rats, mice, rabbits, mustelids and Canada geese. The methods employed, the challenges faced, and the interpretation of results will make the subject of this presentation. This was an area which continues to experience high levels of public use for activities ranging from running and biking through to exercising dogs. This work was therefore unique due to the complexity that the researchers faced as a result of continual unrestricted public walking access to the flat RRZ land, and the access restrictions that result from land being exposed to the possibility of rolling rocks.

ENGAGEMENT

Winning the War against Weeds: Engaging with schools and communities

Murray Dawson, Manaaki Whenua - Landcare Research
dawsonm@landcareresearch.co.nz

Co-authors: Hugh Gourlay (Manaaki Whenua - Landcare Research), Robinne Weiss (InterpTech), Monique Russell (Urban Ecoliving Charitable Trust)

Murray works as a botanist at Manaaki Whenua - Landcare Research, Lincoln. He is passionate about citizen science and outreach, and has led several recent projects working with schools on invasive plants and fostering environmental awareness. Murray's research interests include horticultural and systematic botany, and he has produced several interactive plant identification keys and smartphone apps. Murray has authored some 40 refereed papers and more than 80 popular articles, reviews and reports.

Pest plants in New Zealand are an increasing problem and now outnumber our native flora. Discovering what weeds are where is essential for their effective management, and community observations are increasingly important to uncover new infestations and species.

Educational programs targeting schools and students, and through them wider communities, can be effective in fostering citizen science observations, and raising awareness of pest plants, biocontrol initiatives, ecology, and environmental awareness.

Since 2016, Manaaki Whenua - Landcare Research and our collaborators have worked with schools from Auckland, Gisborne, Canterbury and Westland on the 'Winning the War against Weeds' and 'The Great Weeds Hunt Aotearoa' programmes.

In this presentation we recount our experiences gained and lessons learnt from engaging with schools and communities.

Introducing Find-A-Pest, a new NZ app for growing and focusing general biosecurity surveillance by councils, industry groups and the public

Randall Milne, Environment Southland
randall.milne@es.govt.nz

Co-authors: Stephen Pawson & Andrea Grant (Scion); Jon Sullivan (Lincoln University);
Jane O'Hagan & Ellice Protheroe (Auckland Council); Ashlee Lawrence (Northland Regional Council)

Randall is the senior biosecurity officer for pest plants at Environment Southland. He has over 15 years' experience in the development and operation of environmental policy, particularly regional pest management strategies.

The best way to stop a new pest, once it has reached NZ, is to detect it early and hit it hard. This applies equally to high risk national pests and to pests still spreading within NZ. Early detection depends on effective surveillance. To improve surveillance, the Biosecurity 2025 initiative envisages a biosecurity team of 4.7 million facilitated by a tool kit of smart technologies. iNaturalist NZ (previously NatureWatch NZ) has demonstrated the potential, and importance, of widely engaging New Zealanders in surveillance. However, iNaturalist NZ has lacked a good way to focus its users on what to look for, where, and when. Over the past two years we have been working with regional and national government agencies, primary industries, NGOs, Te Tira Whakamātaki, and the Bioheritage National Science Challenge, to create new tools to support the biosecurity network Our focus is to improve the detection of local, regional, and national pest incursions. This now includes a free mobile phone app, Find-A-Pest. Users of the app are supported by a highly flexible backend system that delivers relevant content, supports identification (optionally with or without the help of iNaturalist NZ), and where appropriate alerts Biosecurity NZ to potential new to New Zealand finds. Backend infrastructure also facilitates the transfer of data (summaries and raw data) back to councils and industries for inclusion in their systems. In February 2019 we launched a trial version of Find-A-Pest (http://findapest.nz), and from February through April we have been testing its potential in selected community and regional groups in conjunction with Northland, Auckland, and Southland councils. Our hope is that using Find-A-Pest will greatly increase the number of early detections of important pests and support campaigns to successfully eradicate, contain, or prevent the spread of pests in NZ.

A new surveillance programme for 'new to region' pest plants in the Bay of Plenty

Richard Pender, Wildland Consultants
Richard.Pender@wildlands.co.nz

Co-authors: Chris Bycroft, Jo McQueen, Sarah Beadel, Donna Watchman

Richard is an ecologist with Wildland Consultants, based at the Rotorua office. He has over 20 years' experience training and working as a horticulturist and botanist in New Zealand and oversees. He completed his PhD in botany at the University of Hawaii, where he studied the ecology and evolution of Hawaiian lobeliads, one of the world's most impressive adaptive radiations of flowering plants.

While in Hawaii, Richard also undertook research projects that assessed the potential risk of hybridisation between indigenous and naturalised congener plant species, and undertook studies on the pollination and seed dispersal of endangered plant species. Prior to returning to New Zealand, he worked as a manager for the Koolau Mountains Watershed Partnership on Oahu, where he oversaw invasive ungulate and plant control projects. Richard has also previously worked for the Department of Conservation as a botanical field technician and as a Biodiversity Delivery Planner. Before working as an ecologist, Richard completed a diploma in horticulture and worked in botanic gardens in New Zealand and England. Richard's knowledge of amenity plants has proven invaluable when conducting new to region pest plant surveys in the Bay of Plenty.

The Bay of Plenty Regional Council has developed a surveillance strategy for the management of pest plants in the region. This strategy includes a targeted surveillance programme for the early detection of new to region pest plants from high risk sources. To field test the methodology and feasibility of this early detection programme, the council commissioned Wildland Consultants to undertake surveys within Rotorua City during 2017. Twenty sites were initially identified that were believed to be high risk areas for the establishment of new to region pest plants. These sites included green waste dumping areas, nurseries, public gardens, and reserves that border suburban gardens. In total, forty-three new to region pest plants were located at the survey sites. All of the new to region pest plants were introduced to New Zealand for amenity horticulture purposes. The likely pathways for the naturalisation of these plants is via legal or illegal green waste dumping or dispersal by wind, water, or animals from public or private gardens within the city. This initial survey in Rotorua City highlights the potential biosecurity threat posed by introduced amenity plant species that have not yet naturalised regionally or nationally. Using the knowledge gained from this initial project, a new to region pest plant survey was undertaken throughout the wider Bay of Plenty. This presentation will summarise the results of this survey and discuss ongoing surveillance requirements.

Hauraki Gulf Pest Prevention

Liz Brooks, Auckland Council
liz.brooks@aucklandcouncil.govt.nz
Co-author: Jonathan Miles (Auckland Council)

Liz joined Auckland Council late in 2017 following three years managing Motutapu Restoration Trust. Her career in conservation started with DOC in 1987, and extended from Head Office, to the Minister of Conservation's Office, to Auckland Conservancy, and North Head. She has held a variety of roles from

both partnerships and operations sides of the business. Her current role entails responsibility for Hauraki Gulf biosecurity.

The Hauraki Gulf is a nationally significant environmental and cultural feature of the Auckland Region. The gulf is a major provider for commercial and recreational use for both residents and international visitors. Its highly productive marine environment and pest-free island sanctuaries boast high ecological significance. With 40+ pest-free islands, and aspirations to eradicate pests from inhabited Aotea, Kawau and Waiheke, work in the Hauraki Gulf Marine Park is expanding to meet these goals and create a legacy to that will protect the environment in perpetuity. Under the Natural Environment Targeted Rate (NETR), funding has been allocated to expand and create new projects. Biosecurity teams are working together to prevent pest invasions and create behavior change programs to prepare users for a Pest Free Hauraki Gulf.

Areas of growth include:

- An interregional hull surveillance program to control pathways of invasive marine organisms from accidental introductions via boat users in the North Island. A collaboration between Auckland Council and the northernmost regional councils.
- Increasing inspections including the use, training and number of dogs and their handlers to streamline and rapidly respond to invasive species incursions.
- Continuing to build relationships with the Department of Conservation to incorporate awareness and behavior change programmes. The aim is to have users of the gulf aware of the impacts and potential to carry harmful pests when moving throughout the region.
- Ambassadors for Pest Free Hauraki have increased to disseminate biosecurity information at the wharf. Target passengers are travelling to pest-free island sanctuaries or carrying goods or equipment that could inadvertently be carrying invasive species.
- Expanding the Pest-Free warrants program to encompasses all operators in the gulf. Warrants are a successful collaboration run in conjunction with Auckland Council and the Department of Conservation to build relationships with gulf users and further disseminate updated biosecurity information.

Pest free islands are also a major tourism attraction, and with the Americas Cup looming up, biosecurity for increased visitor pressure is a further area of planning and development. With increased funding from NETR, Auckland Council will be able to expand these programs under the jurisdiction of the Hauraki Gulf Controlled Area Notice 1998. Defendable boundaries are a major advantage to pest management, but eradications can only be achieved with further collaboration and implementation of current and new practice working in conjunction with one another.

Behaviour change in boating communities on marine pests in Northland

Cameron Bunton, Northland Regional Council
cameronb@nrc.govt.nz

Cam is a Marine Biosecurity Officer who started as a cadet at the Northland Regional Council almost seven years ago. Over the years he has worked on the Northland Marine Biosecurity programme alongside many other officers and has had the opportunity to watch and take part in this evolving programme.

Authors: Kylie Pederson and Sue Rosandich (Northland Regional Council)

With the introduction of Northland's Marine Pathway Plan in 2018, community education has been at the forefront of the Northland Regional Council's marine biosecurity activities in the last few years. NRC has taken a three-pronged approach to improving marine biosecurity acceptance and compliance. This has included on-water education surveys, hull surveillance and marine industry support. The key objective of our education programme is to educate people about the effects of marine pests and reinforce the message of 'clean hulls' to stop the spread of marine pests. We have found that education messages and enforcement can make a difference but that the human connection was crucial to reach the boating community. While our on-water surveys were originally meant to be a tool to detect changes in knowledge on marine pests in the boating community, the results soon showed that the direct interaction with boaters during these surveys themselves were actually a key driver of behaviour change. Simple messaging, in-person contact, and positive interactions were key. This is very encouraging and we will share our experience, tools and results to date. Our industry support started by focussing on marinas. We have developed relationships with marina managers and haul out yard operators and we have worked with them to implement biosecurity management plans for their operations. While this is a work in progress, there has already been a positive change from marinas including, for instance, a biosecurity charter focussed on stopping the spread of pests and facilitated by NRC. This has resulted in marinas putting their own strict rules on boats entering their facilities, and communicating and reporting to the NRC team for advice and updates. Overall, the positive behaviour changes detected in both the recreational and commercial communities in Northland regarding marine pests is very encouraging and a good example of the importance of the use of social science techniques for successful management implementation.

NZ Wilding Conifer Group: the critical role of communities in wilding conifer management

Richard Bowman, NZ Wilding Conifer Group
bowmanz@actrix.co.nz

Richard is the chair of the NZ Wilding Conifer Group. He is also a member of the Mid Dome Wilding Trees Charitable Trust. Formerly he was Biosecurity Manager at Environment Southland and member of the BioManagers Group.

Rowan Sprague, NZ Wilding Conifer Group
rowan@nzwildingconifergroup.org

Rowan is the National Coordinator for the NZ Wilding Conifer Group. She has recently completed a PhD at Lincoln University focused on the spread of wilding conifers in the Mackenzie Basin.

Land managers and volunteers have been controlling wilding conifers in New Zealand's landscapes for decades. Community groups, regional councils, and central government agencies all see the need to stop the spread of this pest across the country. However, despite the increase in funding and control effort over recent years, agencies and community groups need even more advocacy and support for their work. Additionally, the National Wilding Conifer Control Programme needs a well informed and independent group to provide advice and feedback from stakeholders affected by wilding conifers.

The NZ Wilding Conifer Group was recently formed, by combining the NZ Wilding Conifer Management Group and the national programme's Stakeholder Advisory Group, to address both these needs. It will also promote sharing of knowledge about wilding conifer management and will help focus research to deliver the tools and techniques wilding control urgently needs. Last year the Group appointed a national

coordinator (Rowan Sprague) with support from the Ministry for Primary Industries. Over the past six months, she has visited many of the community groups and regional councils involved in the management of wilding conifers. In this presentation, we will discuss the state of wilding conifer management 'on the ground', the feedback from community groups, and effective strategies for community engagement. We will go on to discuss how the NZ Wilding Conifer Group will provide connections to local communities as well as to facilitate linkages to regional and national strategies.

We conclude that the community is a powerful voice and that community involvement, awareness and understanding will be vital for the achievement of the goals of the NZ Wilding Conifer Strategy over the next 15 years.

Day 2 Thursday 25 July 2019

MARINE

Slowing the spread of Mediterranean fanworm (*Sabella spallanzanii*) in New Zealand - working collaboratively to manage an established marine pest.

Kathy Walls, Biosecurity New Zealand - MPI
katherine.walls@mpi.govt.nz

Kathy is a Senior Adviser, Biosecurity New Zealand, MPI where she has been working on responses to marine pests since 2009.

Sabella spallanzanii (Sabella), commonly known as Mediterranean fanworm, was first detected in New Zealand in 2008, at the Port of Lyttelton. A biosecurity response was mounted soon after this detection in an effort to eradicate the population there. When Sabella was discovered in the Port of Auckland, some 1,500km to the north in 2009, response activities were also undertaken in this new location. However, Sabella was found at several other sites in Auckland and the lead government agency at the time determined that eradicating Sabella from New Zealand was not feasible. In 2012, Sabella was found in another harbour north of Auckland. Since that time, small populations have been found in seven other locations.

Sabella has been designated as both an Unwanted Organism and a Notifiable Organism under the Biosecurity Act, 1993. In New Zealand, this species of fanworm forms dense, filter-feeding colonies over a range of marine habitats, both manmade and natural. It is an effective colonizer of vessel hulls and has most likely spread via this vector. Sabella poses risks to New Zealand's native biodiversity and aquaculture industry. Biosecurity New Zealand has been working collaboratively with councils to eliminate local populations, where possible, in an effort to slow its spread around New Zealand. During this time, the efforts to manage Sabella have become the call to action for managing this and other marine pests around the country.

Towards inter-regional pathway management - Top of the North Marine Biosecurity Partnership

Samantha Happy, Auckland Council
samantha.happy@aucklandcouncil.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 journey towards inter-regional marine pest pathway management. This talk will present on the challenges, complexities, issues and benefits of the previously unchartered waters of inter-regional pathway management, since the introduction of pathway plans under the Biosecurity Act.

The area covered by this partnership is home to the biggest boating populations in the country, and number and movement of boats are increasing. Currently, each region has their own sets of rules or policies which boaties and other marine users traveling across regions find confusing.
Four of the councils (Northland, Auckland, Waikato and Bay of Plenty) have been exploring options to bring some consistency in marine biosecurity rules across regions, with the support of Biosecurity New Zealand (MPI) and DOC.

An informal consultation period was run from March to May 2019 as part of the process to better inform the councils on the views of stakeholders who are impacted by marine pests. A discussion document was released and included potential options to address the issue, ranging from 'Status quo', 'Lead the way with consistent rules for clean hulls' to 'Go even further - make rules for other pathways too'. For the consistent rules for clean hulls options, several options are also explored: 'Clean hull required at all times', 'Clean hull required only when moving' and 'Clean hull required only when moving to specially identified places'.

We will present on the collaborative process of this inter-regional and agency initiative, the results of the feedback gained during the consultation process, and what the next steps are for the ToN partnership. This example of a move towards inter-regional rules provides an opportunity to understand the challenges that exist and potential solutions.

Marine Biosecurity in the Bay

Hamish Lass, Bay of Plenty Regional Council
hamish.lass@boprc.govt.nz

Hamish is a biosecurity officer at the Bay of Plenty Regional Council.

The marine environment in the Bay of Plenty is highly valued for numerous reasons including economic values, cultural values, biodiversity, tourism, recreation, harvesting of seafood, aquaculture, natural character and amenity.

In 2013, a single Mediterranean fan worm (*Sabella spallanzanii*) was detected in Tauranga Harbour. Following that detection, a systematic surveillance operation was developed in collaboration with key stakeholders. Since the 2013 incursion 13,249 boat hulls, 136 kms of marina walkway pontoons, 560 swing moorings , 1800 wharf piles 18km of marina rock walls and 2.3 kms of beach have been searched. This has resulted in the discovery of infestations at Bridge Marina, Sulphur Point Marina and moored boats.

This surveillance, and the management of marine pests in the region, has been based on a collaborative and strategic approach and the development of the Marine Biosecurity Management Plan for the Bay of Plenty. BOPRC, iwi, industry, MPI and other stakeholders work together towards common environmental, cultural, social and economic goals. To support the management plan, BOPRC has developed a Small Scale Management Plan (SSMP) under section 100v of the Biosecurity Act. This was required to give BOPRC powers to manage any new incursions as no marine pests are listed in the current Regional Pest Management Plan.

FIELDTRIP BACKGROUNDERS

One Fish, Two Fish, Catfish – New Fish?

Lucas MacDonald, Bay of Plenty Regional Council
lucas.macdonald@boprc.govt.nz

Lucas is a Biosecurity Officer from the Bay of Plenty Regional Council, based in Rotorua. He has a background in earth sciences and resource management after graduating from the University of Auckland in 2016. Lucas has been working primarily on the project management of the brown bullhead catfish incursion in Lake Rotoiti and Rotorua along with a variety of other aquatic pest issues in the Rotorua lakes.

The Rotorua district comprises of 16 lakes in a close proximity and with a high volume of lake users; this makes the area particularly susceptible to human assisted transfer of aquatic pests. The first live capture of brown bullhead catfish in March 2016 generated significant public and political interest in the Bay of Plenty and, to date, Bay of Plenty Regional Council has removed over 55,000 catfish from Lake Rotoiti and more recently, Lake Rotorua. As human assisted transfer of catfish now poses the largest threat to other unconnected lakes, a comprehensive communications program has also been rolled out, with a range of conventional and unconventional methods used to engage the community. This presentation will discuss the initial response and ongoing management of catfish by the Bay of Plenty Regional Council along with the research undertaken with partner agencies to develop tools to potentially disrupt the population and minimise the spread of catfish to further lakes.

Port of Tauranga Biosecurity Excellence - a key partnership targeting biosecurity challenges of the future

Mark Whitworth, Ports of Tauranga

Mark has been with the Port of Tauranga for 9 years and has a background of 12 years in the stevedoring management and managing vessel operations and planning. Previous to this, Mark had 5 plus years in the meat industry in planning and logistics.

With an extensive background in exporting and logistics, Mark's role as Cargo Services Manager sees him interacting with exporters and importers on a daily basis as well as overseeing on-port logistics and movement of cargo. Mark enjoys the challenge of finding solutions to exporter's problems that enhance the logistics supply chain, minimize cost and maximize efficiency and service.

Port of Tauranga is the natural gateway to and from international markets for many of New Zealand's businesses. The Port's location is central to key export commodity sources. We have direct and dedicated access to New Zealand's largest import market, the capacity to expand our infrastructure, and unrivalled sea, road and rail connections.

A commitment to customer service and innovative shipping solutions has established the Port of Tauranga as New Zealand's largest and most efficient port. The Port's key strength lies in our ability to grow to meet customer requirements and market demands. We have the land holdings to expand, and the integrity, innovation and commitment to meet our customers' future needs.

Port of Tauranga is New Zealand's largest port by volume – and it's most efficient. With export volumes in excess of 10 million tonnes the Port of Tauranga is the largest export port in New Zealand.

KiwiNet builds surveillance and response capacity for the kiwifruit industry

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

John is Operations and Compliance Officer with KVH. He has been with KVH since May 2013 and has worked with growers, regional councils and community groups, and technical staff to help build knowledge around biosecurity and best practice. His role includes assisting with co-ordination of KiwiNet representatives. Meeting and sharing knowledge with these representatives from across the kiwifruit industry is one of the best parts of his job. John plays a key role in implementing the Psa-V National Pest Management Plan (NPMP), including all aspects of compliance. John is an Authorised Person under the Biosecurity Act and issues permissions for requested movements of risk items including kiwifruit plant material used for (non-Psa) research, and machinery movements where KVH authorisation is required. John also works with landowners to ensure that NPMP mandatory requirements around orchard management are met. He also works with councils and landowners to ensure that wild kiwifruit infestations are detected and destroyed.

Linda Peacock, Kiwifruit Vine Health
Linda.peacock@kvh.org.nz

Linda has been with KVH since 2011 and has worked with growers and technical teams from all growing regions over the past six years, helping build knowledge around best practice management of Psa. She is a member of the Psa steering group and also the Zespri crop protection steering group with input into research projects and facilitation and implementation of results from the KVH/ZESPRI research projects. More recently, her role has had increased focus on biosecurity and now includes co-ordination of the KiwiNet representatives from across the post-harvest sector. Meeting and sharing knowledge with a wide range of great people across the industry remains the best part of her job. Linda has been involved in the kiwifruit industry for 30 years, in both growing and post-harvest roles, and prior to joining KVH was technical manager at Direct Management Services (DMS).

The 2010 Psa incursion cost the kiwifruit industry almost $1 billion in lost earnings. Kiwifruit Vine Health (KVH) was immediately established by the industry to build a robust biosecurity function to manage the disease, and later given mandate to lead readiness and response activities for other biosecurity threats.

The kiwifruit industry had to quickly build biosecurity knowledge, ensure orchard practice minimised impact of unwanted organisms, and develop systems to effectively utilise our own industry people and existing networks. Attributes that have been fundamental to our successful recovery from Psa and have been incorporated into our preparedness efforts for other biosecurity threats.

KiwiNet was established four years ago as a network across the kiwifruit industry to act as champions for readiness activities, and a deployment network should we be faced with a future biosecurity response. The network currently consists of 70 coordinators across 32 organisations. Members meet regularly, learn of latest and emerging threat organisms, practice-run possible incursions, and who are ready to mobilise should government or other industry need assistance. KiwiNet members take these learnings back to their organisations, as champions for further building biosecurity awareness and best-practice.

Thanks to KiwiNet, the kiwifruit industry has been a leading provider of personnel for recent fruit fly responses. KiwiNet people are upskilled, knowledgeable of fruiting and other plant species, routinely record information accurately, are physically fit and able to work around steep or challenging terrain in urban or other environments, and regularly interact with the public to build awareness of biosecurity actions.

KiwiNet has greatly assisted government over the years by ensuring a team of skilled people can be quickly mobilised and on-the-ground within 24 hours of any request for assistance. This is GIA (Government Industry Agreement) working as it should.

What does it take to upskill an industry, create a biosecurity network and ensure responders are the best possible people for the job? What's worked well and what are the lessons learnt? Where can we make further improvements?

NB: Prevention refers to keep risks offshore - which is outside KiwiNet scope.

Day 3 Friday 26 July 2019

TECHNOLOGY

The potential for precision pest control using drones (or UAV's, RPAS, UAS)

Craig Morley, Toi Ohomai Institute of Technology
craig.morley@toiohomai.ac.nz

Co-authors: Philip Solaris (X-Craft, Auckland)

Craig obtained PhD from University of Canterbury, Christchurch, NZ and is an Associate Professor at Toi Ohomai Institute of Technology, Rotorua. He has worked for the University South Pacific in Fiji, as a conservation biologist and at the Department of Conservation as a Biodiversity/Threats programme manager in Northland. With his students in Fiji, he won the BP Gold conservation award for his work on protecting Fiji's endangered ground frog. He has been the President for the Society for Conservation Biology (SCB) Oceania Section and was also on the SCB Board of Governors. He is a member of the IUCN Invasive Species Specialist Group and World Commission for Protected Areas. He has extensive networks with iwi, local advisory groups, and national ecological and international scientific organisations. The majority of his research career has been dedicated to understanding the impact of invasive species, particularly on islands and in agricultural systems. He was the chairperson of Keep Rotorua Beautiful aimed at engaging the community, to make Rotorua a more environmentally friendly city and beautiful city. He firmly believes in conservation-based evidence and the values of kaitiakitanga to promote and enhance biodiversity, sustainability and good community practice. His current research is around using innovative technology to control invasive species.

Drones (UAV's, RPAS or UAS) and remote image sensing cameras have considerable potential for use in pest control operations. Drones equipped with remote sensing cameras could be flown over forests and remnant bush sites, particularly those not currently receiving any pest control, to record the unique spectral signature of the vegetation and to detect the presence of pest species to assess the damage they cause. Drones could then be deployed to precisely distribute either toxins or kill traps to these identified locations. Predator-free 2050 is an ambitious policy announced by the New Zealand Government where several pests are to be eradicated by 2050. In order to achieve this goal, pests must be identified, targeted and controlled, requiring creative and novel ideas. Drones provide flexibility, can fly in remote and difficult terrain, and are considerably cheaper to purchase and operate than the conventional planes and helicopters currently used in aerial pest control operations. Current challenges associated with Drones include payload capacity, battery limitations, weather, and flying restrictions. However, these issues are rapidly being resolved with sophisticated technological advances and improved regulations. A directed and targeted approach using drones is an additional and novel tool in the pest management toolbox that could significantly reduce pest control costs, cover inaccessible areas not receiving any pest management, and will help New Zealand advance towards its predator-free aspiration by 2050.

IoT network enables the Predator Free Punakaiki project

Nick Hatch, Vodafone New Zealand Limited
nick.hatch@vodafone.com

Nick is the rural and agriculture sector lead for Vodafone's Internet of Things line of business. Nick has 18 years' experience in operations, business development, account management & sales leadership across large organisations in the telecommunications.

While walking in stunning Punakaiki, home of the world famous Pancake Rocks on New Zealand's West Coast, Grant Parrett had a revelation that this beautiful scenic location was missing something special - birdsong. After expressing his concerns to DoC, he discovered that all the existing bird populations in the area are under threat. To eradicate predators and create a native bird sanctuary, Grant and other local volunteers launched Predator Free Punakaiki and have turned to an innovative IoT pest control solution, MinkPolice, which already has a track record of success in Europe.

The first step to controlling 'the big three' predators - rats, stoats and possums - was to create a virtual fence of traps along the peninsula. To target the rats and stoats, they installed 30 MinkPolice traps as well as A12 possum tracking devices.

Within each trap there is a SIM that connects via Vodafone's IoT network to the MinkPolice smart-phone application. Volunteers receive a notification whenever a trap is activated, which sends them to the exact location of that trap, to clear it, reset it and trap more pests more often.

Initially, the traps used Vodafone's global SIM on the 2G IoT network, but Vodafone is currently working with Predator Free Punakaiki to change them from their current 2G networks to their new Narrowband-IoT (NB-IoT) network to increase the range of connectivity coverage. NB-IoT is also important because it will help to extend the battery life of the sensors so that volunteers won't have to charge them as often.

Drones v Invasives

Samuel Vye, Environment & Conservation Technologies (ECT)
sam.vye@ectech.co.nz

Cameron Baker, ECT, will assist.

Sam is a geoscientist with experience developing technical environmental projects around the world in remote locations. He has extensive knowledge of autonomous technology, including drones, and how this technology can be utilised in the fight against invasive pests. Sam co-founded ECT to provide New Zealand with a specialist service company using heavy-lift drones for conservation projects. In January 2019, ECT performed a world-first in Galapagos - an application of rodent bait across an entire island by drone.

Drones can be used in many more ways than the common real estate photography. Whether it's using high-grade sensors on a drone for predator surveillance, or a heavy-lift drone for accurate dispersal of toxic bait. There are many ways to utilise drones in biosecurity with many benefits over current traditional methods, including; cost/time efficiency, ease of logistics, data reporting, accuracy and efficacy.

Here we look at the Seymour Norte project in the Galapagos, where our drone successfully dispersed 1,500 kg of brodifacoum bait across an entire island in 2 days. This was all made possible from the collaboration of technology experts and conservation scientists.

Map-plications: Engaging Public through GIS

Helen Payn, Land Information New Zealand
hpayn@linz.govt.nz

As a biosecurity and biodiversity advisor at LINZ, Helen is involved with connecting different groups to the potential of GIS

Discover how a story of doing good for the environment can be told through maps! Sharing information through a compelling visual medium can strengthen social license to operate. Map-plications can also give the public an opportunity to contribute to environmental programmes. See the potential maps, apps and 3D mountain views hold for engaging the public.

INVERTEBRATES & DISEASES

Argentine ants- the stealthy invasion and 120 reasons we can control them.

Peter Visser, Key Industries
peter@keyindustries.co.nz

Co-author: Brian Shields (Auckland Council)

Peter has worked with Key Industries since 2000. He is a research manager involved with new chemistry and pest control development, and the development of control strategies for both invertebrate and vertebrate pests, including rabbits, wallabies and Argentine ants.

Since starting a control strategy in late March 2013 the numbers of Argentine ants in Vivian Bay, Kawau Island have gone from plague proportions over the 23 ha to now sitting close to eradication. The story of Vivian Bay Argentine ants control is an example of collaboration, good will and partnership between a number of willing and interested parties. It's a great case study of community, local government, central government, students, and industry working together for a common goal. It shows that with focus and passion a lot can be accomplished and while we are not quite at the end goal we are now in sight of it.

With over 120 personal being involved over the six year programme the goal of eradicating the Argentine ant population is almost accomplished. The project's success story has extended beyond the boundaries of an eradication project. With friendships made and knowledge gained educating a wide range of influential industry/biosecurity personal as to the dangers and nature of this top 100 invasive species has reached far beyond the boundaries of Vivian Bay.

Myrtle Rust (*Austropuccinia psidii*) in Aotearoa, New Zealand: citizen science Tool kit development

Lorin Lima, Biosecurity New Zealand - Ministry for Primary Industries
lorin.lima@mpi.govt.nz

Lorin holds a Bachelor of Arts in Environmental Studies from the University of Redlands and Master of Science in Geographic Information Systems (GIS) from Johns Hopkins University. Lorin is currently a Senior Adviser of Operations in the Long Term Planning & Transition Team at Biosecurity New Zealand. She joined the Ministry for Primary Industries (MPI) as an Adviser in the Biosecurity Response Team focused on intelligence and the use of real-time operational mapping and evaluation across response activities, and quickly became the controller of the 2017 Myrtle Rust Response. Lorin has always been keenly interested in environmental preservation via invasive species control and eradication through the implementation of geospatial and emerging technologies. Prior to joining MPI, Lorin had been performing research on an array of subjects in the natural and agricultural space for the University of California since 2008. Some of her most relevant experience has been in research, project and operations management, and training development in the environmental field over the past 15 years with additional detailed experience in a wide range of subject matter including GIS, CIMS/NIMS, vertebrate pest controls, horticultural arthropods, invasive terrestrial plants, operational implementation of water quality measures, and ecologic restoration and mitigation operations.

Modern advances in technology make citizen science more accessible today than ever before, with the success of such projects dependant on the establishment of a well-devised monitoring programme and dedication of its volunteers. The field of citizen science has expanded rapidly with the accessibility of smartphones globally, providing a huge opportunity for knowledge transfer.

Biosecurity New Zealand and the Department of Conservation, with input from the myrtle rust working group, have developed a learning tool to help people all over New Zealander to identify suspected myrtle rust infections in their backyards and reserves. These initial modules focus on building citizen scientists' capacity to identify myrtle species and recognise the symptoms of myrtle rust. Having people with these basic skills will lead to increased public understanding and community engagement with the added benefit of mapping sightings to help inform a long-term management programme.

This dedication could help to foster a wider biosecurity aware community. These learning tools alongside the utilization of iNaturalist, can be used to address the growing issue of biodiversity loss and collectively mitigate the risk of biosecurity threats to New Zealand as a global community.

Learning modules can be found at www.myrtlerust.org.nz

Invasive invertebrates: a threat to sustainable livelihoods in the Pacific?

Dean Strong, Manaaki Whenua - Landcare Research
StrongeD@landcareresearch.co.nz

Dean has a research and operational background in invasive species management. His research and work spans the social and ecological aspects of biosecurity issues. He is currently is a Researcher (Environmental Social Science) at Manaaki Whenua - Landcare Research.

Invasive alien species (IAS) are a global phenomenon and are recognised as a driver of environmental change which can affect the well-being of people in a multitude of ways. Despite this, the role of IAS in local livelihoods has received relatively little attention. Influencing all three of the sustainable development pillars (social, economic, environmental), IAS should be recognised as a significant development issue. But they are not. As such, IAS issues are new to many sectors and governments and therefore largely go unseen and un-actioned.

Contemporary rural livelihoods in the Solomon Islands are heavily reliant on subsistence/semi-subsistence agriculture. Following a livelihoods' framework developed for the Solomon Islands, this thesis explores the influence IAS have on rural livelihoods in this country. Using two qualitative case studies, *Wasmannia auropunctata* (little fire ant) and *Achatina fulica* (giant African snail), this study investigates how vulnerable/resilient rural livelihoods are to the effects of IAS and the implications IAS have for sustainable development in the Solomon Islands.

The effects of IAS on rural livelihoods are complex and at times contradictory. *W. auropunctata* for the most part is not negatively affecting the dominant livelihood strategy (subsistence/semi-subsistence agriculture) practised in the Solomon Islands. While there are some social impacts associated with *W. auropunctata*, overall Solomon Island households can be considered resilient to this IAS. *Achatina fulica* is a different story. This species is negatively affecting the subsistence/semi-subsistence agricultural sector on which so many rural Solomon Island households depend. This has resulted in households implementing negative livelihood diversification measures as they fail to cope or adapt to the snails' presence. Unlike for *W. auropunctata*, Solomon Island households have not demonstrated any resilience to *A. fulica*.

Understanding how rural livelihoods are affected by various stressors and adverse events can help to design development policies and interventions geared towards building better lives for all people. This can only occur however, if the full range of shocks are recognised. To date, this is not the case for IAS, and as such, they are still a significant missing component of development policy.

Do the right thing

Lisa Tolich, Auckland Council
lisa.tolich@aucklandcouncil.govt.nz

Lisa is the Biosecurity Manager - Kauri Dieback for the Auckland Council Biosecurity team. She is responsible for coordinating council responses to kauri dieback and myrtle rust. Her team is delivering a comprehensive programme of work that includes surveillance and monitoring, treatment and research and social change projects targeting behaviour change and compliance.

The response to kauri dieback disease requires a longer-term management approach and a recognition of the impact that it has on people's everyday lives. Currently there is no known cure and our mitigation responses often take time to implement and even longer to monitor outcomes and benefits associated. At the extreme end of the spectrum, we are asking people to give up their recreational access to significant kauri forests or infected zones to preserve these for future generations.

With this in mind, we are working collaboratively with a number of educational providers, community groups, programme partners and agencies to help drive social awareness and behaviour change. This presentation will focus on a range of educational projects that include empowering teachers to adopt kauri dieback as a topic, connecting schools to kauri reserves on their doorsteps, using art as a medium to explore the very human connection to kauri, the scaling up of our Ambassador programme and the journey from awareness to compliance. In addition, we will explore the challenges of maintaining public support and the acceptance of personal responsibility for combatting an invisible threat.

AQUATICS

Salvinia at Papamoa: all hands to the waterway!

Frances Velvin, Ministry for Primary Industries
frances.velvin@mpi.govt.nz

Co-authors: Peter Wilkins (AsureQuality NZ Ltd); Peter Mora and Wallace Potts (Tauranga City Council); Shane Grayling (Bay of Plenty Regional Council).

Frances has been involved in the biosecurity sector for 20 years. She is a Senior Adviser for MPI and currently manages the National Interest Pest Responses Programme that oversees the eradication of 9 serious aquatic and terrestrial weeds, including salvinia.

Peter Wilkins is a Senior Technical Officer for AsureQuality with over 25 years' experience in biosecurity responses. Peter is the Operations manager for 4 species in the National Interest Pest Responses Programme, including salvinia.

Salvinia (*Salvinia molesta*) is one of the most serious floating freshwater weeds in the world. Its importance as a potentially high impact pest in New Zealand is reflected in its status as an Unwanted Organism and a Notifiable Organism under the Biosecurity Act 1993. Eradication from New Zealand is managed through the National Interest Pest Responses Programme, led by Biosecurity New Zealand (part of the Ministry for Primary Industries) in collaboration with other local and central government agencies.

Salvinia was detected in the Wairakei Stream in early 2018. The stream is managed by the Tauranga City Council as part of the drainage system for the seaside town of Papamoa. In less than one month the infestation developed from being unnoticeable to completely covering about 1km of the waterway. Prompt action ensured the infestation did not spread further downstream or in to other waterways.

Large salvinia infestations are usually chemically treated. However, this site had some unique properties: the infestation was contained by the well-defined banks of a stream, there was good access the full length of the infestation; and the drainage system could provide control of water flow, direction and rate. Consequently, Biosecurity New Zealand, the Tauranga City Council and the Bay of Plenty Regional Council together agreed on a plan to trial mechanical removal. Water flow and direction would be manipulated to float the salvinia to a collection point where the plants would be removed using suctioning, and taken for deep burial at an approved facility. The weir at the collection point drained to the sea, thus providing some protection against further spread from missed plants.

On the day operations were due to start much of the public reserve surrounding the stream was under water, due to a recent heavy rain event in the area, and the previously well contained infestation was now spread over adjacent parklands. The small team organised to remove salvinia from the stream was now insufficient for the mammoth task ahead to also remove from the surrounding land. The call went out - all hands to the waterway!

New lakeside monitoring tools will help communities join the fight against invasive species

Tracey Burton, NIWA
traceyburton1@gmail.com

Co-author: Kelly Ratana (NIWA)

Tracey is a scientist in NIWA's Freshwater Biosecurity team. Experienced in the management of aquatic plants with a focus on the use of submerged vegetation as indicators of lake ecological condition and underwater monitoring and surveillance techniques. Current interests include proactive management strategies for the prevention and spread of freshwater invasive species and lake side monitoring tools for community groups.

Communities have the ability to play an integral role in helping to detect new incursions of aquatic invasive species and note changes in lake ecosystems over time. However, currently there are few organised resources available to help facilitate this potential. NIWA's new 'Lakeside Monitoring Toolkit' for community groups looks to utilize this untapped expertise by providing clear guidance and tools that can be used to not only measure aspects of lake health, but also help in the war against invasive aquatic plant and fish species.

The current version of the 'Lakeside Monitoring Toolkit' introduces nine monitoring modules designed to be carried out from the side of a lake. Current modules provide guidance for monitoring physical site characteristics, water quality, invertebrates (including koura and kākahi), periphyton, fish, aquatic plants, birds and rubbish. User groups can focus on specific modules that suit their interest or utilise the complete suite of lakeside monitoring tools.

Eradication economics for freshwater pest plants

Deborah Hofstra, NIWA
Deborah.Hofstra@niwa.co.nz

Co-authors: Carla Muller & Paul Champion, NIWA

Deborah is a freshwater scientist, leading biosecurity and lake restoration projects at NIWA. Her research has provided solutions for aquatic weed issues through, herbicide efficacy studies on target species and non-target impacts, assessing the effectiveness of grass carp and developing a decision support system for their use, the evaluation of biodegradable benthic barriers for weed control, and the potential application of inundative biological control methods. Biodiversity gains from biosecurity actions are a current focus, along with species selection for restoration projects.

Dr Hofstra serves as a Director on the Board of the Aquatic Plant Management Society, and is on the Science Committee of the International Aquatic Plants Group.

There is a belief across science experts in freshwater biosecurity that if an eradication programme is implemented at the earliest possible intervention point, the cheaper the cost of intervention, the lower the impact (social, cultural, environmental and economic) of the organism and the higher the chance of success.

Given the inherent complexity in making intervention decisions, responses are often decided in relation to specific incursions as they happen in their particular context. However, there are common themes that contribute to eradication success across invasive macrophyte incursions. Analysing New Zealand examples of control programmes for key invasive aquatic weeds at differing stages of abundance and impact, allows common themes to emerge that support the hypothesis that the sooner eradication is selected the lower the total cost (including impacts on values) is likely to be, and the higher the chance of a successful eradication. The analysis also improves the understanding of what economic elements contribute to success at a macro-level, and improves our ability to forecast costs, benefits and the predictability of intervention outcomes at different intervention points.

Best Practice for Aquatic Weed Management

Paul Champion, NIWA
paul.champion@niwa.co.nz

Co-authors: Deborah Hofstra and Mary de Winton (NIWA)

Paul has a background in wetland and aquatic plant ecology. He specialises in freshwater biosecurity, especially risk assessment, developing strategies for the prevention of aquatic weed spread and protection of unimpacted water bodies, and designing and implementing eradication programmes for aquatic weeds. He works closely with a wide range of central and regional authorities in the field of biosecurity. He also has experience in wetland ecology and conservation needs and management plans for nationally endangered aquatic and wetland plants. Paul joined NIWA in 1994 and was appointed Programme Leader - Freshwater Biosecurity in July 2015. He has been a Principal Scientist - Freshwater Ecology since 2004. He previously worked with the Ministry of Agriculture and Forestry coordinating eradication programmes for nationally important weeds.

NIWA has recently completed a three-year Envirolink Tools Project providing tools to support regional biosecurity management of aquatic and wetland weeds. A strategic analysis tool informs the rationale for selection of management approaches. An incursion detection tool details the management interventions that can be taken to prevent the incursion of new aquatic weeds to a region or specific sites (water bodies) within the region. A control toolbox details the range of tools and their appropriateness for desired management goals. An aquatic weed tool provides information for over 70 species, outlining their current and potential distribution, dispersal pathways, potential impacts and control options. Examples showing the use of the tools are presented.

Community, industry, local and central government collaboration to achieve a successful incursion response on Rakino Island.

Malcolm Harrison, Auckland Council
malcolm.harrison@aucklandcouncil.govt.nz

Having a parks and ecological background, with qualifications in the areas of parks, recreation, tourism and ecological management, Malcolm has spent most of his working life in the environmental industry. Malcolm worked as a Park Ranger for 9 years over a 15 year period in Auckland's Regional parks. Much of this time was working at Tawharanui Open Sanctuary with its unique combination of threatened species protection, recreation provision and farming operations. This work was interrupted by 4½ years of travel which involved living in England and Canada to fund travel though Europe, Africa, the Middle East and North America.

Upon leaving regional parks to focus more on conservation, Malcolm worked in the private sector for Treescape Environmental, working on pest control and revegetation projects throughout the upper north Island and Hauraki Gulf. Malcolm moved to Auckland Councils Biosecurity team in 2011, and has held three positions within this team since then. The first was as Biosecurity Advisor to Community groups throughout the Auckland region until 2014 when he took up the role of Biosecurity Advisor for Maunga. This role involved developing and implementing pest plant and animal control programmes for the 14 maunga in Central Auckland, which were returned to iwi ownership following the passing of the Ngā Mana Whenua o Tāmaki Makaurau Collective Redress Bill in 2015. Since mid-2016, Malcolm has held the position of Senior Regional Biosecurity Advisor Animals. This role involves providing internal pest animal advice to councils Biosecurity and Parks teams, planning and implementing pest animal control programmes across the Auckland Region and responding to pest animal incursions within the region.

In May 2017 a Plague Skink was reported as being captured on the pest free Island of Rakino in Auckland's Hauraki Gulf following the movement of a second hand garage onto the island. An incursion response was initiated which lasted 2 months, where by the incursion species was contained and eradicated.

This successful response was made possible through the established community relationships on Rakino and their desire to remain pest free, Auckland Council and Department of Conservations joint Treasure Island Programme in the Hauraki Gulf, the technical advice and learnings from Council, Department of Conservation and contractors, and the logistical support of the Rakino community, private contractors, Department of Conservation the Auckland Harbormaster unit and Auckland Councils Biosecurity Team. This presentation looks at the collaborative effort required to achieve protection of the Hauraki Gulf's pest free islands from a range of organizations and programmes, and the technical requirements of containing and eradicating plague skinks.

A story of success: student summer studentship collaboration between Unitec and Auckland Council.

Diane Fraser, Unitec
dfraser@unitec.ac.nz

Co-authors: Chelsee Neverman, Liz Brooks and Brian Shields (Auckland Council); Nigel Adams and Dan Blanchon (Unitec); Nick Waipera (Plant and Food Research).

Diane is a Senior Lecturer in the School of Environmental and Animal Sciences at Unitec, Auckland, primarily teaching into the Biodiversity Management major and the Animal Behaviour & Welfare major of the Bachelor of Applied Science programme. Chelsee Neverman is an Engagement Biosecurity Advisor for the Hauraki Gulf in the biosecurity team at Auckland Council. Chelsee is a graduate of the School of Environmental and Animal Sciences undergraduate degree majoring in Biodiversity Management. Chelsee was awarded a summer studentship with Auckland Council in 2016, the results of which she used for the completion of her degree. She then gained a graduate position with the biodiversity covenant engagement programme before being employed in her current role.

In 2010, Associate Professor Dan Blanchon (Unitec) and Dr Nick Waipera (Auckland Council) set up the first student research collaboration between Auckland Council and Unitec's department of natural Sciences. Since then over 30 students have been awarded Auckland Council summer studentships under the supervision of Dr Diane Fraser and Associate Professors Dan Blanchon and Nigel Adams. Some of these studentships are biosecurity or kauri dieback advocacy focused, while others are biosecurity/biodiversity research projects. This presentation outlines the format of the research collaboration that benefits all the parties involved. Chelsee's current position is a new role created out of a major expansion of Auckland Council's environmental services budget and draws on her studentship experience. The recommendations of her final report now being enacted and expanded on through the Pest Free Hauraki Gulf campaign. This involves an increase in advocacy around the understanding of biosecurity actions and positive behaviour change of visitors to the Hauraki Gulf. This employment success is just one example of how these relationships can result in a 'Win, win!' for all involved.

Crown land and its management: is it a case for all hands on deck?

Kevin Gallagher, Land Information New Zealand
kgallagher@linz.govt.nz

Kevin is an advisor in biosecurity and biodiversity with the Crown Property division of Land Information New Zealand. Based in the Christchurch office Kevin has a South Island focus across the spectrum of pest plants and animals. Humans have modified substantial areas of land in NZ so opportunities to reverse that trend and restore land to an original natural state rates highly on the 'spinning of Kevin's wheels'.

Land Information New Zealand administers a significant area of land in New Zealand. Many people know about the 1.4 million hectares of Crown Pastoral Lease land. But LINZ also administers a significant amount of un-alienated crown land which is scattered to all corners of New Zealand and includes our major rivers and lakes.

LINZ carries out a significant amount of weed and pest control on this land. This activity is often a reactionary process and is in conjunction with the requirements of Regional Pest management Strategies and Plans. Currently there is little opportunity to venture into 'what about restorations'?

Biosecurity has traditionally been about economic drivers to decide the what, and the where. But thinking about biosecurity with a biodiversity outcome is the way future thinking is being directed.
Is there an opportunity of widening our focus on Crown land and if so who should take the initiative.
The Crown spends your money so should it be 'All Hands on Deck' to achieve this goal?

Storytelling through social media

Hana Tapiata, Speaker, Author and Social Media

Hana will be sharing the power of storytelling on social media and how to better communicate your cause, message and vision with your audience.

Community groups, pests and citizen science: empowering non-specialists to measure biodiversity outcomes

Monica Peters, people+science
monica.a.peters@gmail.com

Monica works freelance at the interface between science and the public on diverse community conservation-focussed projects throughout New Zealand. She chairs a Citizen Science Think Tank in Wellington, which aims to bring greater strategic direction to citizen science in NZ as well as enhance the credibility of citizen science as a research method. Monica is also on the executive of Forest and Bird and blogs regularly under www.monicalogues.com on citizen science and community-led environmental restoration. She was recently awarded a Winston Churchill Fellowship to research citizen science policy and applications in Hong Kong, UK, Germany and Austria.

The grassroots community environmental movement in NZ is strong, comprising unknown numbers of projects ranging from local reserve enhancement, to landscape-scale species and habitat restoration initiatives. The national 'predator/pest-free' focus has made a dynamic period for community biodiversity conservation in NZ even more so. Citizen science - in the form of biodiversity monitoring - plays an important part in community conservation. It's a term that is becoming more frequently used, but clear definitions, let alone guidelines for best practice, are lacking. New technology has helped many groups quantify outputs of their restoration management interventions (e.g., numbers of pests trapped), but groups increasingly seek to measure their project's impact on biodiversity. This presentation will detail steps needed to empower community members to move from measuring restoration management outputs, to measuring outcomes for biodiversity. The inclusion of a citizen science lens frames the monitoring community groups carry out within a broader socio-cultural, environmental and educational context.