Predator Free 2050 Limited Stoat Hui 2023

Summary of landscape project discussion on stoat eradication in New Zealand.

Photo taken by Andrew Veale

Introduction

In July 2023 over 40 people gathered on Waiheke Island to discuss approaches to stoat eradication in Aotearoa. This followed an earlier hui in 2021 in Wellington. After two years, the same and some new representative researchers, other experts, and key members of stoat eradication projects gathered again to have a korero on successes, trials, and operational learnings.

The day had key speakers presenting on specific topics and a panel of key members in the stoat eradication space, discussing different aspects, followed by questions and open discussion from the audience. The goal of this hui was not only to give an update on successes and new findings, but to also discuss gaps and challenges identified in the last two years.

This is an informal paper summarising the discussion and presentations from the hui. Its' purpose is to share the discussion more broadly so that others may benefit from this continuation of stoat learnings. The discussion was primarily based on experiences and personal observations, not scientific research. Not all comments in this report align to Predator Free 2050 Limited's positions, and should be read within the context of the open discussion.

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Current Phase of Project

Capital Kiwi

Capital Kiwi have a single elimination focus on the biggest predator threat to kiwi chicks, stoats.

The core area of the project is a scrubby landscape of around 9000ha in the south-west corner of the North Island in the Wellington Region. The project has high public engagement with over 100 landowners including iwi and the community. There is an intensive trapping network across a wider project area of 24,000ha comprising 4,600 DOC250/200 and Goodnature A24 traps, all of which are baited with Erayz and pulses of fresh rabbit meat. The project uses an array of detection devices, including an intensive trail camera network in approximately 3,000ha of the core which consists of one camera every 35ha. There was a planned 1080 operation, 3000ha aerial and 2000ha ground-based, that kept getting pushed out due to poor weather conditions [this took place in April 2023].

Photo of Jeff Hall holding caught stoat. Photo Credit: Dave Allen.

Catch data shows that the stoat population has reduced dramatically in the core, with only one stoat detected on trail cameras in the 2022 survey. This network is doing more than suppression, but they are unsure if it's an elimination network yet. Unlike an island, Capital Kiwi's project area doesn't have a moat to protect against reinvasion, and there are still limitations in terms of tools to detect and remove individual remaining or re-invading stoats.

Over the 5 years of this project, there have been 800 stoats caught in the DOC traps. There are now 63 North Island Brown kiwis in the project area because of successful stoat control.

Capital Kiwi are now wondering how to distinguish between a resident and an invading stoat and are collecting stoat ears (200+) for DNA and isotope analysis. (The Embedded Research Funding project "Survivor or Arriver" is working closely with Capital Kiwi on the isotope analyses).

https://www.capitalkiwi.co.nz/

Challenges:

- There needs to be 100% support of the overall Kaupapa to restore kiwi by removing stoats.
- If toxins are to be a critical part of stoat elimination, then a challenge will be to obtain approval from landowners on private land across the landscape (people, pets, livestock).
- This project heavily relies on community support and using new technology can be challenging. It is the projects' responsibility to tell the community the reasoning behind any new tool succeeding or failing. The use of new tools has high risk with success being context specific (e.g. Capital Kiwi is largely scrubby hill country in working or inhabited environments, which differs to South Island beech forest or to Coromandel podocarp).
- Initial stages of the project found that hedgehogs were clogging the traps; they raised the traps above ground level to avoid hedgehog interactions.
- The project has noticed that the rabbit population is on the rise and may factor into removal efforts (with rabbits being a key food source for stoats).

Photo taken by Dave Allen.

Pest Free Banks Peninsula

The team at Pest Free Banks Peninsula have two treatment sites. One site is 23,000ha, located on the Extended Wildside, and the other is 5,000ha on Kaitorete. Both project areas have multiple landowners with productive farms. The aim on Kaitorete is to eliminate 6 species: possums, stoats, ferrets, weasels, feral cats, and hedgehogs. Kaitorete has a unique landscape with Te Waihora - Lake Elsmere on one side and the South Pacific Ocean on the other. The team have started their elimination project on the south-west, most narrow end of Kaitorete, and have invested in preventing reinvasion. At the narrow end there are directional fences with lots of traps to target multiple species with a supporting buffer zone. The team is doing a rolling front and will only move across to the next elimination area when they are certain the first area has been cleared, and the population numbers are reduced in the shifting buffer zone. Initially this was done in a single front for all target species, but the regime has shifted to align with the spatial behaviour of each of the target species concurrently.

Workstreams:
Reducing reinvasion:

1. Taumutu trapping buffer, targeting pests over 500ha with the community's support – this acts to reduce pest pressure coming onto the narrow end of Kaitorete.
2. Active Fence – this simple chicken wire fence directs target animals into traps along the fence. Evidence suggests it's working really well; however, as the fence ends at both open ocean and Te Waihora, the team know feral cats are able to walk along the coast without being targeted.
3. Volunteer traplines at Birdlings Flat, to reduce the pressure of animals coming onto Kaitorete from the wider end of the area.

Landscape photo of Kaitorete in Pest Free Banks Peninsula project area. Taken by Joan Lah.

Hedgehogs:
Double door cage traps are set on a 200m x 200m grid that is systematically moved forward. This is working well. The team also run their two hedgehog dogs to inform when they can move the traps or not. The team sought to move traps every 60 days but, due to resources restrictions it's more like every 100 days. The team are currently using 150 cage traps, but aim to reduce this down to 60 as they move traps forward (hedgehogs are removed quicker than other pests).

Mustelids:
With both one Holden trap (equipped with Cellium nodes and MotoLures) and one double set Victor trap every 20ha, there is an overall trap density of one every 10ha. Holden traps are used to target weasels, stoats and ferrets, while Victor traps target weasels only. Holden traps are very effective for all species, plus being live capture are available each trap night.

Feral cats and Possums:
The cage traps (above) are also effective at catching feral cats. The team undertake an intensive 10-night leg hold trap pulse twice a year; however, with their feral cat detection dog now indicating locations, targeted shooting and trapping will start in 2024.

Photo of directional fence on Pest Free Banks Peninsula. Taken by Olivia Rothwell

Detection and Elimination:
A surveillance network, consists of remote reporting DOC150 cage traps and Poditraps, and cameras Detection dog sweeps are also used.

Challenges:

- The project area is built on a social and technical landscape, each with their own challenges. There has been high engagement with landowners for permissions to undertake activity on their properties.
- There are some legal uncertainties over health and safety shared responsibilities with landowners and the trust. Some landowners have denied property access due to not wanting to share this responsibility. The team and Banks Peninsula are currently working through these challenges to see what the legalities are around health and safety.
- An initial challenge is building a reputation and legitimacy as a name. This has been ongoing, and they are starting to see people recognising the organisation.
- Technological development is too slow. Staff is very limited, so they are heavily reliant on remote reporting. Although technology is useful, putting all components together can be difficult. Remote technology is not ‘plug and play,’ causing difficulty in use. Five years on from starting, and a lot of the technology is still the same.

Landscape photo of Kaitorete in Pest Free Banks Peninsula project area. Taken by Olivia Rothwell.

Pewhairangi Whānui

The Purerua-Mataroa Peninsula is one of three project areas, part of Predator Free Pēwhairangi Whānui in the Bay of Islands, Northland. The peninsula is over 7,000ha in total and home to 2000-3000 kiwi. Stoat numbers are low on the peninsula due to a 20-year history of a community led pest control. This is one main driver in kiwi chick survival within the project.

The project aims to eliminate possums, stoats, and feral cats from the peninsula, with a high trap density buffer zone to support this. Rats are controlled to low numbers. The buffer zone is actively preventing reinvasions. The last stoat caught in the zone as in May 2023 at the neck of the peninsula. The project uses first and second-generation toxins (brodifacoum, cholecalciferol and diphacinone). Live capture cage traps and NZAutotraps AT220's have also been successful tools.

From night vision equipment and trail cameras, feral cat numbers are observed to be higher than stoat numbers on this peninsula. There were 20 pāteke (brown teal) translocated in March 2023, but feral cat predation has caused a loss of 50% pāteke. With considerable effort, 13 feral cats have been removed since the release. Cameras are a valuable tool for this, as for stoat detection.

Photo of Cape Brett Lighthouse. Credit to Wendy Bown

There is a strong partnership with iwi and landowners in which trappers have their trust. Iwi and landowners have given special access through private property, and trappers are careful to maintain confidence in the relationships. This strong partnership allows the team to have access to 90% of the land in the project area.

The project is driven by community- based pest control. The community applies what pest control they feel most comfortable with, rather than being told what to do.

Challenges:

- A main challenge is the education of dog owners. A few residents don't appreciate the risk of dogs to kiwi, and this can lead to tension.
- Feral cats are notoriously tricky to catch and require great dedication to the task.
- Feral goats are also an issue and are being culled.

Photo Credit to Wendy Bown.

Predator Free South Westland - Zero Invasive Predators

Zero Invasive Predators (ZIP) has two project sites, Predator Free South Westland (PFSW) and Te Manahuna Aoraki (TMAP). The sites meet at the alps in the Mackenzie Country. Both focus on multiple species. In PFSW, ship rats, stoats, and possums are targeted across 107,000ha from the alps to the lowland coastal forest. In TMAP, hedgehogs, rabbits, feral cats, ferrets, stoats, possums, hares, and Norway rats are targeted across 310Ha from the alps to the high-country tussock lands. Surveillance networks include trail cameras, thermal A.I. cameras, traps, eDNA and dog detection. Cameras are generally spaced 1 per 35 ha and lured with a Motolure dispensing egg mayonnaise. The spacing of cameras has been sufficient for detecting stoats and all targeted species.

This spacing for surveillance has worked well for these sites; however, each project should consider their own context before deciding on the appropriate spacing of their surveillance network. Bait stations containing brodifacoum are used particularly for removing ship rats in PFSW areas where aerial work cannot be conducted (around dwellings and townships). This likely creates toxic rodents, which is an added benefit for removing invading stoats at some boundaries. Toxic rodents as a tool have been effective through secondary poisoning. They have been both ‘naturally’ manufactured by rat elimination efforts, and by targeted placement after manufacturing in the lab (toxin injected rats).

Photo taken by ZIP.

ZIP has found that aerial 1080 operations have been successful for removing resident stoats, but tools for mop-up and incursions are still being worked on. This can be challenging in areas such as the lowland forest of Ōkārito, which have little to no natural boundaries to stoat movement. However, scaling up to increasingly larger sites around these areas with weaker boundaries reduces risk of large-scale reinvasion while tools and techniques continue to be developed.

https://predatorfreesouthwestland.nz/

Challenges:

- Trials using toxic laced rats have been the most successful method of getting the last stoats, but have also been the most challenging. Laboratory and field testing are not the same conditions, and different outcomes have been seen with the two iterations (toxin-fed rats and toxin-injected rats).
- Such trials can be labour-intensive, particularly for feeding the lab rats and retrieving the untouched deployed ones from the field.
- Injected rats in such trials had 100% uptake in the lab, but less uptake in initial field trials than toxin-fed rats.
- The team witnessed some stoats being “picky eaters” that did not eat the injected lab rats.
- Next trial steps are being conducted from the end of 2023 into early 2024, with a naïve population of wild stoats. This will increase the sample size for field trials at a currently uncontrolled site.

Despite some of the challenges to date, the toxic laced rats are still showing promise, and development will continue into 2024. Updates will be given to wider projects as they progress.

Photo taken by ZIP.

Taranaki Taku Tūranga -Towards Predator Free Taranaki

The project area is 240,000ha around the ring plain of Taranaki, covering multiple landscapes including dairy farmland containing riparian planting, patches of scrub and forest blocks. The trapping network consists of over 14,000 DOC200/250's traps on the ground. There are plenty of traps on the ground, but the issue is stoats not going into them. Taranaki have achieved 1 in 5 households with traps, and these traps are checked 8 times a year.

https://www.trc.govt.nz/environment/working-together/towards-predator-free-taranaki/

Challenges:

- Landowner engagement is a challenge in this project, with the majority being farmers or lifestyle block owners. These landowners don't have enough time, and it would be socially unacceptable for the team to turn up in council ute with council branding and tell generational farmers what to do.
- It is important to these landowners that they feel supported, so the team are maintaining strong communication with landowners and are trying to build good engagement and relationships. This is incorporated into the mustelid elimination plan.
- It saves time having a remotely connected trapping network, and landowners like them. They are able to see when the trap goes off and servicing can be done straight away. But maintaining a sensor network is expensive.

Photo of Mount Taranaki. Photo taken by Melissa Brignall-Theyer.

Te Korowai o Waiheke

Te Korowai o Waiheke has a project area of 9300ha with a trap network made up of 1600 DOC200's baited with fresh rabbit meat and eggs. For part of the year, half the traps have stoat bedding as a lure as well, and there have been 184 stoats caught so far. The traps are checked by a mix of staff, farm staff, contractors, and volunteers. Catches are now at a low level, and all stoats are sent to Dr Andrew Veale at Manaaki Whenua for genetic analysis. Through this analysis, Andrew estimates there were 2- 4 denning females from Spring 2022.

Waiheke is at the theorised limit of the distance stoats can swim (5.1 kilometres from the mainland). DNA analysis shows stoats don't swim there very often. Dr Andrew Veale theorises this happens once every 15 years. If they land on another neighbouring island that are predator– free, hopefully they will get caught in a trap there. All the neighbouring predator free islands do have some monitoring and trapping taking place. The hope is that they would be detected and caught before arriving to Waiheke Island.

Photo of sunset on Waiheke Island. Photo taken by Peter Rees.

Traps are checked between weekly and fortnightly in the summer, and once every three weeks in winter. This detect and respond phase is heavily reliant on public sightings. 0800BIRDSONG is the number to report stoat sightings on Waiheke. After a sighting is verified, additional traps and lures are placed in the area that day, and resulted in a stoat catch in the nearby area in 67% of cases last summer.

https://tekorowaiowaiheke.org/

Challenges:

- Toxin has not been used on the island yet for stoats. The team need to find a suitable delivery method for PAPP given the high number of domestic cat and dog owners on Waiheke.
- The lack of stoat detection dogs is a challenge as Waiheke would like to use them after a sighting, but it can take too long for them to arrive.
- Camera monitoring is used on Waiheke, but the team is wondering what number of cameras per hectare is sufficient at low stoat densities, and how long they should be deployed for.

Photo of dotterel on Waiheke Island. Photo taken by Peter Rees.

How would you start a project?

What is detrimental to learning and getting started? Pressures of starting a project.

The best way to start a project is to “just start”. There is no way of knowing what you don’t know until you start, and what you think you know is usually wrong. Since work around stoats has been minimal, projects need to keep going and adapting to their new findings. This is not simple since new tools and technology are not coming as fast as projects need them. When there are opportunities to take part in research & development and trials, there is a high cost associated with no guarantees. These extra costs and resources can take time away from the project focus, and sometimes doesn’t pay off.

There are multiple external pressures on projects to start. Te Korowai o Waiheke had pressure from their community to get traps on the ground as fast as possible, but the community wasn’t as interested about the planning stages. The community also had a big influence on tools used for the project. It’s important to keep everyone happy, while using a safe and effective tool. A good approach is to take the community along the journey; start with low-risk tools, build trust and confidence in the community, then transition to use high risk tools later.

The tool market is also a challenge; how do we buy into things? The rate of new tools coming on to the market is much slower than the demand. Furthermore, there is extra time and cost associated with obtaining approvals for new tools. The market is known for overpromising and under delivering; it is important to not give into it. The market does not know what tools work in different contexts. It is important to figure out where things work best, e.g. stoat bedding is good in the North Island, but not in the South Island. Stoat dogs are a good tool, but training one takes 2-5 years which is too long.

Challenges with brodifacoum

With every tool that is used, it's important to use it correctly. Without proper use of brodifacoum, there is an environmental impact to non-target vertebrates and invertebrates. Multiple projects use brodifacoum because it is a useful tool, but it is seen as relatively inhumane compared to acute poisons such as 1080 and PAPP. However, few alternatives currently exist to achieve similar outcomes for ship rat removal. We can't compete with nice forest food with "yucky" bait food. Stoats are bottom-up animals, but it is possible to control them from the top.

ZIP currently uses 1080 'spot' treatments and brodifacoum for elimination of ship rats in sensitive areas of their project, and they ensure minimal brodifacoum gets into the environment by removing any uneaten bait from stations. ZIP also partners with the local Department of Conservation team in the testing of any native birds found dead within a reasonable vicinity of brodifacoum bait stations, to ensure localised risk is understood and managed.

Stoat Detection Dogs

Te Korowai o Waiheke use stoat detection dogs (scat or scent) after public sightings whenever there is a dog available. There was a case where three stoats were playing in someone's backyard, and traps were placed around the house but there were no catches. The dog came in and detected stoats 500m away from the house. Traps were repositioned accordingly and within a few days, two of the three stoats were caught. During spring, detection dogs try to find dens and there is a focus to deploy live traps in the area.

On Waiheke, stoats tend to hide their scat more because of cat presence. When stoat scat is found, a trail camera is installed, additional alternative traps are deployed, and a dead stoat will be rubbed in and around the traps. Stoats will excrete in their dens and rub a lot where they play. This has been a successful method. Some say it's easier to catch stoats when you find their play sites.

Detection dogs are a powerful mobile tool. You can narrow your target zone from hundreds of meters down to a few meters. Dogs allow you to react and make an informed decision quicker. Scent dogs can target a general area, whereas scat dogs can target a specific area. A scent dog was recently used on Waiheke for a recent incursion. It was a male stoat that was moving around, and the team was targeting lots of areas without getting any hits. The dog came through and was able to narrow down target areas. It was suggested that it is better to use a scent and scat dog together, working in tandem. You can use the scent dog to find an area of interest and then use the scat dog to confirm the area of interest. If scat is found within the area, you can set up a network of traps and trail cameras. Dogs must always wear a muzzle.

Pest Free Banks Peninsula currently has 4 dogs, and handlers use the dogs 4 days a week in the field. Once the initial knockdown is complete, they use dogs for detection and removal. The dog and handler do a sweep through, detect what's left in the area, and the handlers decide what tools to use accordingly. Constant communication and modification with the dog and handler are the best way to use detection dogs. Dogs tend to get bored scanning the same area repeatedly, best to have a sweep through, and come back another time. Feral cats are getting caught much faster with the help of dogs. It would be useful to have a larger dog capacity, and it would halve the amount of time if dogs are working with the team.

Another value of having a dog is advocacy. Having a dog present when speaking to the community is a huge help for building connections.

Photo of conservation dog in Taranaki. Photo taken by Stuart Attwood.

Photo of Emma Feenstra and Pipi (off duty). Photo taken by Stuart Attwood.

Best conditions to use conservation dogs

A scat dog can be used in all conditions, dry, wet, hot, and cold. The only issue is in colder conditions the dog tends to sniff too much. Although the dog can be used in all conditions, it is uncertain to what degree environmental factors can have an effect on DNA in scat. The only known such effect so far is that moisture is bad for DNA.

Scent sticks better to moisture, and air movement can bring the scent to the dog. Scat can last around 2 months in the field. It would be good if DNA in scats could help determine if the stoat of interest is old or young. In Banks Peninsula, Kaitorete is either too hot or windy, so the dogs are currently doing a sweep through at night.

Challenges with detection dogs:

- It is a time-consuming process. It takes a long time to train a dog and the handler. They are high in demand and hard to come by.
- People want to be a dog handler, but don't consider the job is often away from home.
- Training the dog to be interested in one thing is doable, but training the dog to be uninterested in everything around it is difficult (humans, livestock, etc.).
- Invest in a dog handling team rather than a contractor.
- It's hard to find the right handler, but it's also important to give time for the dog and handler to become sharp together.
- Dogs are a powerful tool, but we need to always treat them humanely as a living creature.

Data collection for detection dogs

- Handler and dog should be tracked with a GPS. They send in their tracks and mark their detection points. This shows when and where areas have been checked and covered.
- There needs to be work done regarding data management in data collection for dogs.

How do we measure progress?

Detection Rates

Detection is a crucial part of a project's biosecurity plan. Plan this at the start of your project; don't leave it to the last minute. Detection data can be complicated, so it is important to reduce complicated counting. Have a sustainable regime that is easy to keep up with so you can test it at higher densities. There must be a balance of getting it right to reduce costs and getting it wrong.

You can find probabilities of detection. Is the animal at the site? Yes or no? What is the probability of detecting it or not, when checking the device every day? Since cameras provide data every day, what is the probability that you will detect it the next day?

A toolbox approach to detection should be driven by science and supported by Te Taiao. You must put yourself in the animal's shoes to know what they're thinking, to know what to look for and how to detect them.

Overall, you need to catch more animals than breed naturally as a population; this is one of the key rules in eradication. Some may die naturally, and some may swim off to another island. In recent observations, rats are now found swimming for 7 months of the year (rather than 1 month), likely due to climate change and warming waters. This is significant news for stoats as they are much stronger swimmers than rats and have a greater ability to disperse across water bodies.

Communications

It is easy to miscommunicate that pest eradication is an easy task, when in reality it is not. Although we can push pests to a low number and can still get major biodiversity outcomes. The public and community don't want to hear about how many stoats have been killed, they want to hear about the biodiversity outcomes. If you are totally focused on the eradication of the target species, it can be hard to communicate the biodiversity and conservation outcomes. However, it is still important to communicate the reality of these projects, like how hard it will be to get the last stoat.

Cameras

There are lots of detection tools on the market, but it's how you use them together that matters. They must be set and placed properly, and the adequacy of the tools need to be checked. Dogs are a better indicator, but cameras are a great tool for detection as it doesn't require the pest animal to interact with it for you to see it. Once you get to zero detections, it is then best to go through with a dog in a systematic way to confirm elimination. But what is the confidence in the dog when it doesn't detect anything? We can talk about protocol in theory but putting it into practice on our difficult landscapes will be challenging. Every zero detection has a large financial cost to it.

Photo of researcher Katie Pitt from Lincoln University

Proof of Absence Models

A realistic name for ‘proof of absence’ would be ‘probability of absence’. Although it is not fool-proof, it is an objective sounding bar that can help us make informed decisions. There are three main variables:

1. Devices: dependent on budget and capability
2. Risk map: spatial behaviour of animals in the area at risk of capture/ detection by devices.
3. Area: this is the size of the project which is static.

There is also *G0* (which is the nightly probability of capture of an animal by a removal method located at the centre of its home range) and sigma (an index of home range size), parameters which describe the combination of device trapping efficacy and encounter rates. These differ between individuals and habitats. You must incorporate the uncertainty of models and take the probability of the Proof of Absence model. You can play with uncertainty levels- you can set a pessimistic and worst-case scenario. A way to decrease uncertainty is to increase surveillance; modern cameras work well for smaller animals. As work is continuous, the model changes as it goes on. This Proof of Absence model is only for a particular place and time. It will get reinvaded again unless the mainland is controlled. You can always start at a low level of confidence in a model and put time and energy into the model to grow confidence in the estimated success of elimination.

Also see:
https://pf2050.co.nz/app/uploads/2023/04/QuantitativeDecisionAnalysisPrimer_web.pdf

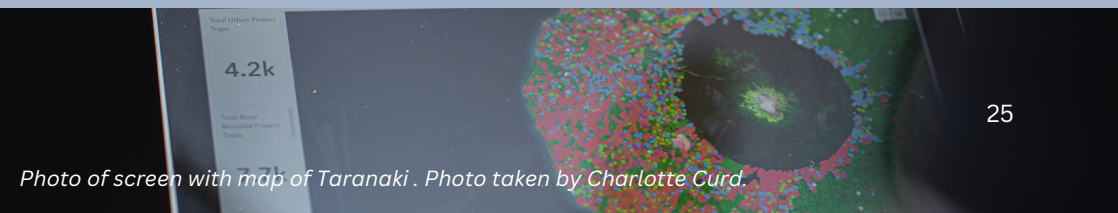

Photo of screen with map of Taranaki . Photo taken by Charlotte Curd.

Did you detect them? What is the home range? One way to inform this would be to release stoats with radio transmitters on them. However, public perception would be difficult to manage as eradication is ongoing. There has already been radio collared released stoats which haven't resulted in anything conclusive. There also needs to be a large enough sample size.

Testing the Model

There needs to be ground-truthing of this model, i.e. proof of the proof. Tāwharanui or Rangitoto-Motutapu Island would be good to test how good the model is against it as it is known to be stoat free.

Ironically, we need the model to fail to know what we've done wrong and know how to fix it. When you think you're at zero, run the model, find a stoat.

Flaws in the model:

- Difficult to know the reliability of the model's outcome.
- The model needs to be able to prove elimination within 2 months as projects on the main islands can expect a reinvasion after 3 months. This amount of time is longer depending on the distance to the north and south islands.

Incorporating predator dogs into the model

Although a camera is good for small animals, a stoat can work through a whole network of trail cameras and not be detected, but a dog will detect it. Just like spotlighting, you need to have multiple sweep throughs with the dog.

Presentations

Throughout the day there were multiple presentations by key people involved in stoat elimination. Please refer to PDF versions of presentations.

Dr Andrew Veale from Manaaki Whenua Landcare Research presented on stoat genetics.

Olivia Rothwell R&D Project Support Manager from Predator Free 2050 Limited presented on the Products to Projects funding stream, in which new tools are currently being developed for stoats.

Dr Helen Blackie from Critter Solutions Limited presented on their new A.I kill trap and A.I thermal camera.

A video presentation by Patrick Garvey from Manaaki Whenua Landcare Research was played. “Fatal attraction: Exploiting olfactory eavesdropping for conservation”.

Photo of Olivia Rothwell presenting. Photo Taken by Shelley Augustine.

Questions for further research

- What is the confidence in the dog when it doesn't detect anything? i.e. is absence of evidence, proof of absence?
- What spacing of trail cameras is effective for different sites? And do we need to keep on revisiting this for every site?
- What distinguishes a resident stoat from a reinvader? It could be its behaviour or genetic, to determine if the individual is from the original population or not.
- If rabbits are a rich food source for stoats in an area, how will they affect removal efforts? This could be answered through the ongoing multispecies elimination trial at Te Manahuna Aoraki Project.
- If we determine the carrying capacity (*k*) of stoats in an area, are we able to find out if the stoat of interest is young or old?
- What search method (day or night) with detection dogs provides the most confidence in removed species in an area? How can this be best tested?

Photo of New Zealand Kingfisher on Waiheke Island. Photo taken by Peter Rees.

Between the first stoat hui in 2021, and this second hui in 2023, stoat eradication in Aotearoa has progressed. Some challenges have been overcome, some challenges remain, new challenges have arisen, more research has been published, and more technology is on the way.

This hui was invaluable and there will be a follow-up stoat elimination focused hui in the future. Predator Free 2050 Limited is working towards helping projects overcome their challenges in stoat eradication. Working collaboratively and sharing learnings and knowledge can help us eradicate stoats in Aotearoa.