

New developments in pest control and monitoring

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Sanctuaries of New Zealand workshop 2013
University of Auckland, Lincoln University & Connovation Ltd

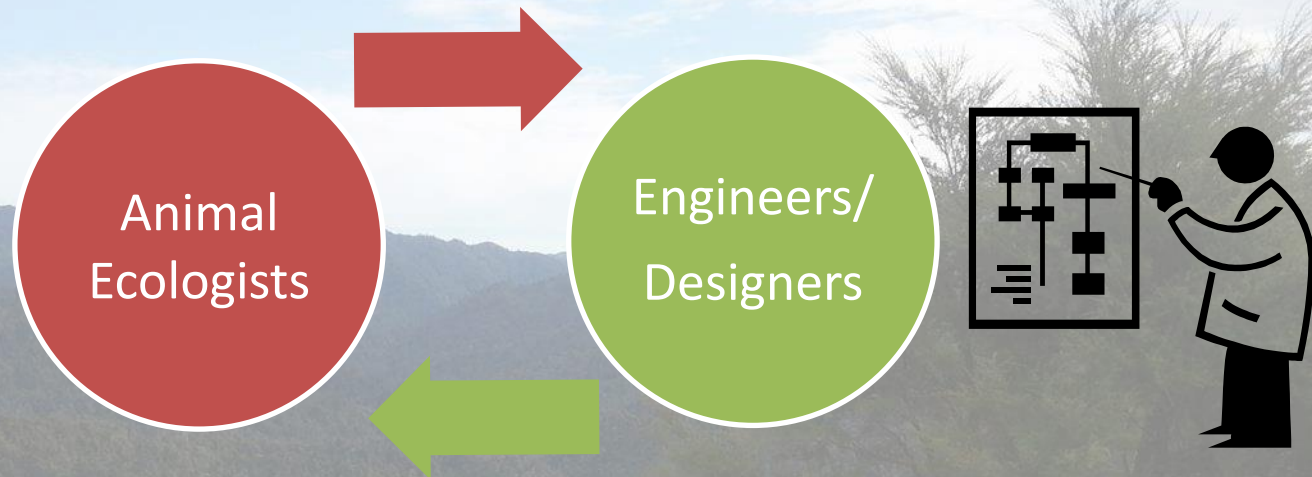


Next steps in pest control

- ❖ Native species in serious decline on mainland
- ❖ Protecting the mainland requires new tools and new ways of thinking
- ❖ How can pests be kept at low densities (or even locally eliminated) over long periods?
- ❖ Multi-kill devices one solution
- ❖ Effective surveillance and detection of pests crucial



A multidisciplinary team approach



- ❖ Solving ecological problems through collaboration
- ❖ Constant feedback and discussions between ecologists, toxicologists, engineers (AUT & LAL) and Connovation Ltd

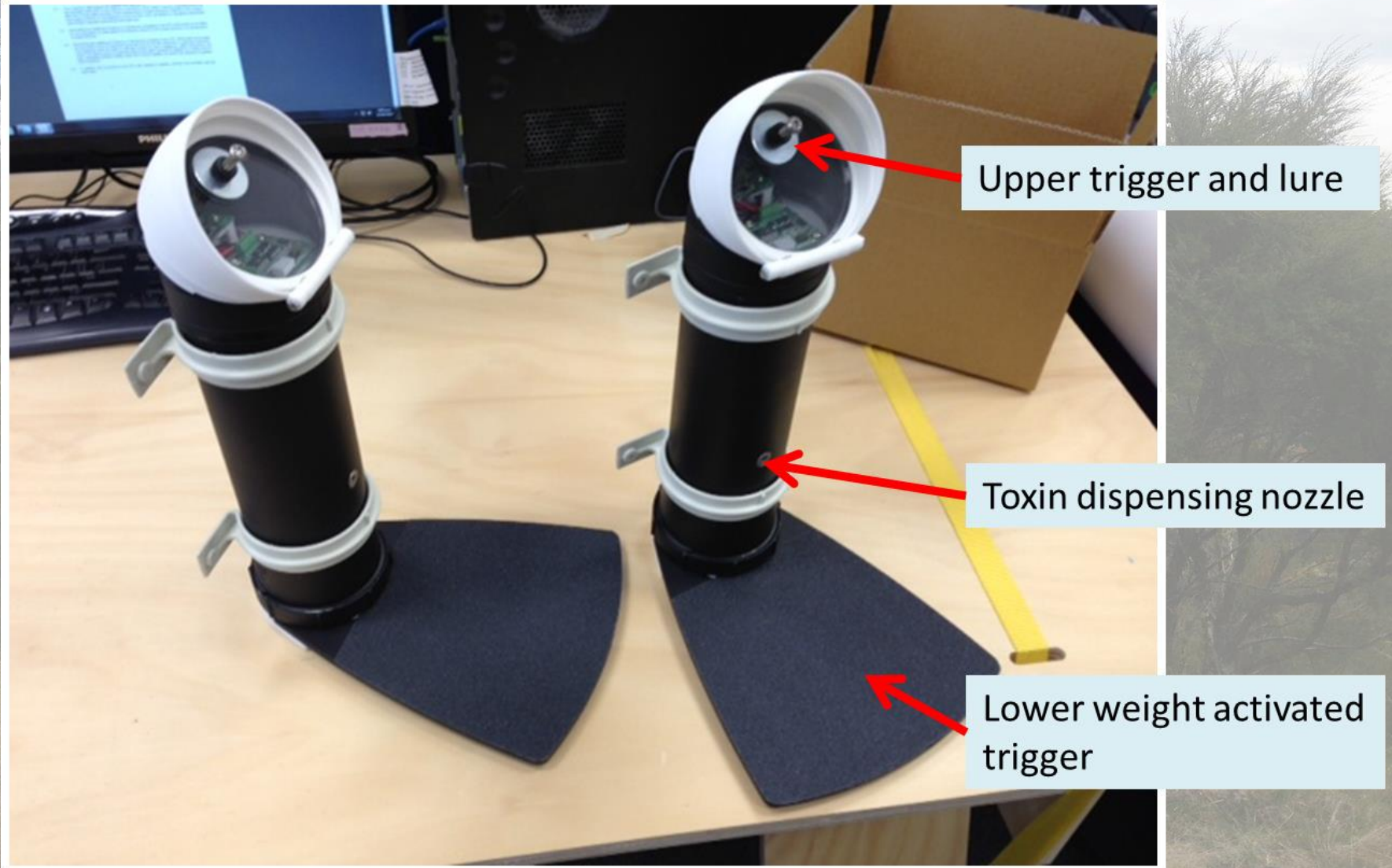
Resettable toxin delivery device

Specifications

- ❖ Species-specific
- ❖ Humane
- ❖ Cost-effective
 - Long-life (> 1 yr)
 - Large kill potential (100+)
- ❖ Lightweight & portable
- ❖ Environmentally resistant
- ❖ Secure toxin storage
- ❖ Data-logging capabilities



The possum spitfire



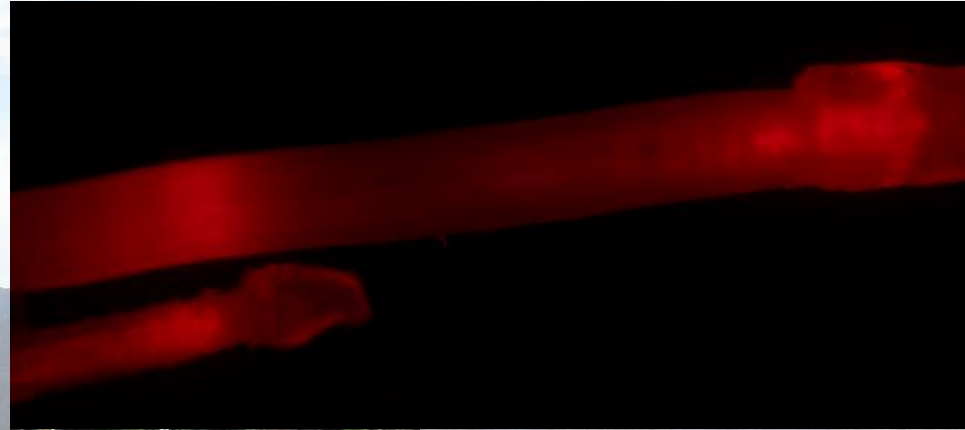
Pen trial results

- ❖ Toxin used = zinc phosphide (ZP)? Why?
 - Low secondary poisoning risk
 - Rapid time until death (c. 1 hour)
- ❖ Highly palatable paste to encourage grooming
- ❖ Possums get sprayed, groom & succumb rapidly



Non-toxic field trials

- ❖ Behaviour observed through camera traps
- ❖ Possums successfully triggered devices and were dosed with paste
- ❖ No non-targets could trigger the system
- ❖ Rhodamine-B dye used to confirm paste ingestion



Long-life scent lures

- ❖ Crucial for long-life control tool
- ❖ Solid state blocks designed specifically for spitfire
 - Attached to a device to provide long-term focussed attraction
 - Developed specifically for the possum spitfire
 - Long-life and very environmentally stable
 - Trials suggest cinnamon is best scent but many other scents possible



Next step: Toxic field trials

❖ The first toxic field trials begin shortly

❖ **Project objectives:**

1. To demonstrate that possum spitfires reduce possum population density and achieve continued population suppression and/or local eradication
2. To confirm the effectiveness of our long-life lures and ensure their continued attraction over a 6-month period.

Automated pest monitoring and surveillance devices



Animal monitoring

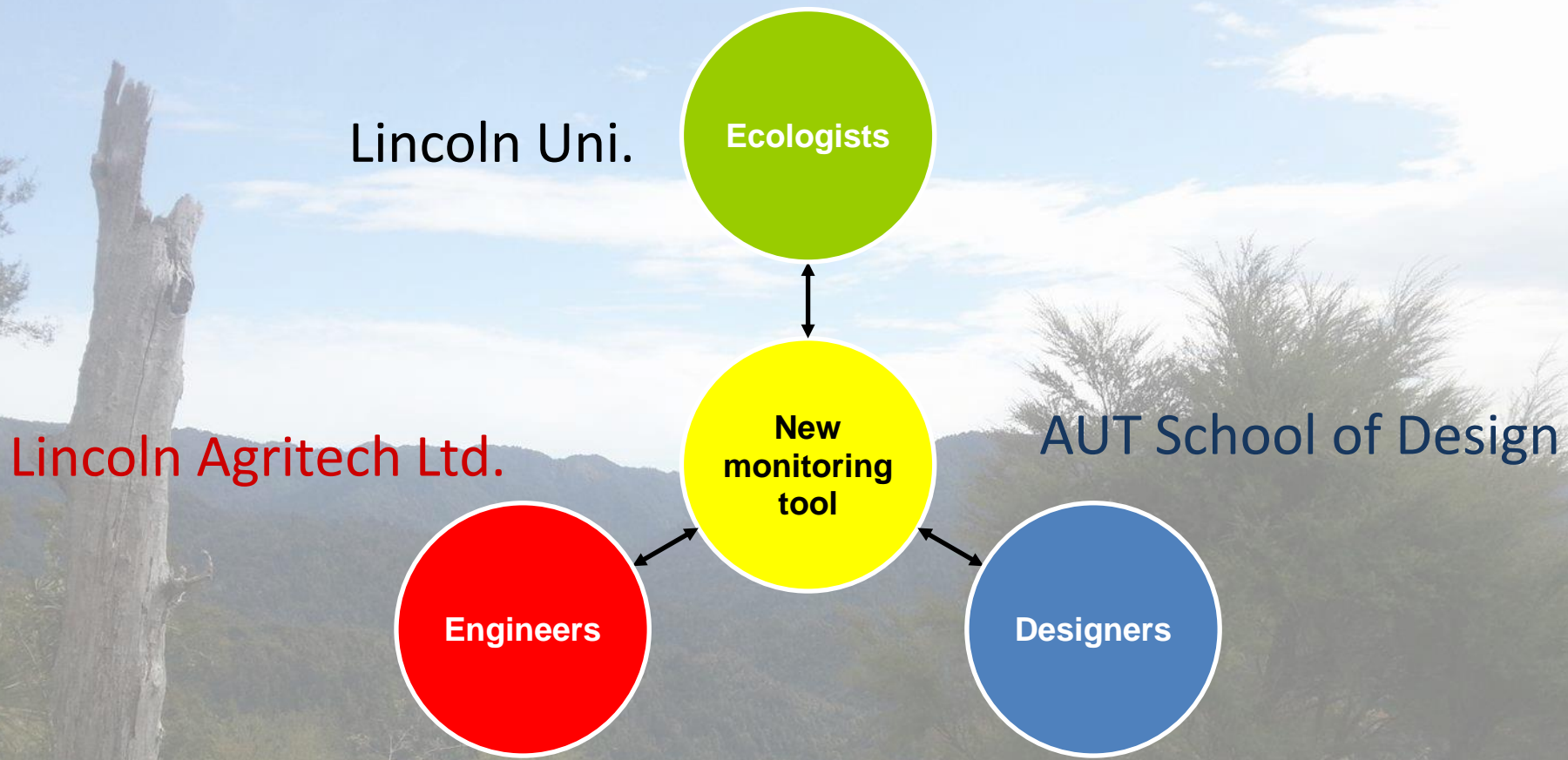
– *an essential conservation tool*

- Detecting presence/absence
- Measuring the effects of management
 - Has control been successful?
 - Is more management needed?
 - Are some species being missed?
- Biosecurity
 - Are species reinvading?
 - Have people re-introduced predators?



Current animal monitoring





- ❖ Developed a new, automated monitoring tool
- ❖ Can recognise species which interact with it
- ❖ Records species, date and time on SD card
- ❖ Robust and long-life

Animal stands
on surface



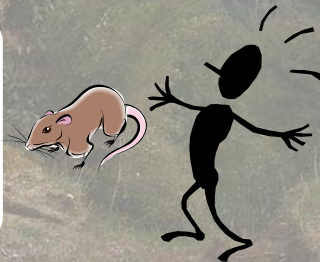
Paw
characteristic
data obtained



Recognition
algorithms run



Animal
successfully
identified

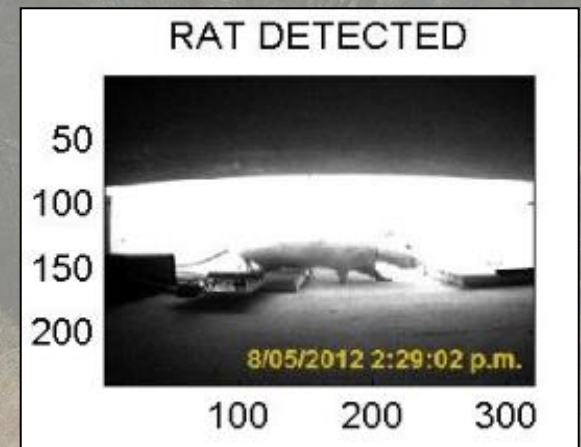
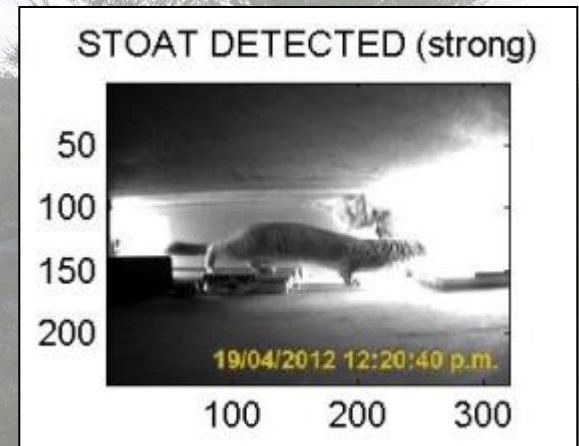
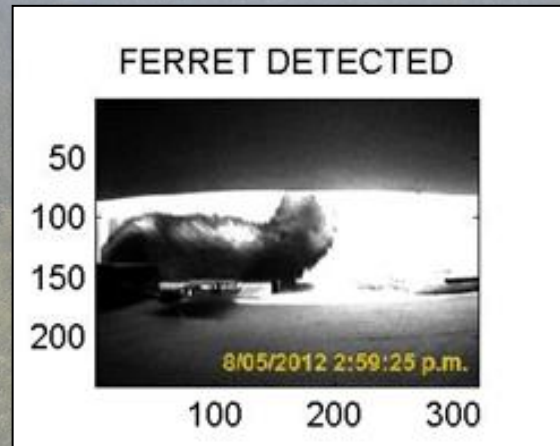


Paw-recognition
surface

Getting the device working

- ❖ Obtained paw-print information on NZ pest species
- ❖ 100% success for identifying:

- Stoats
- Ferrets
- Rats
- Mice
- Possums
- Feral cats
- Weasels
- Hedgehogs



Devices tested in the field targeting a range of species and using a range of architecture types



Simulated Island re-invasion



Simulated Island re-invasion

Rat reintroduced to pest free island to test device
detection abilities



Set

Release

Detect
KILL



Simulated Island re-invasion

- Rat detected 9 times on a device in tunnel during the second night after release
- All recorded data interactions corresponded with camera footage of rat passing through the tunnel
- Rat was filmed approaching but not entering a standard tracking tunnel on the same night
- Kill traps placed out on day 3 and rat killed that same night
- Achieved proof of concept at low density

Happy Ecologist

Happy Engineer



Field trials conducted to determine optimal 'architecture' of the devices (highest rates of animal interactions)



Final working design



Final working design



Traditional tracking tunnels vs our designs

- Deployed devices and tunnels within the same timeframe and habitat
- Freshly deployed and monitored with cameras
- Standard DOC protocol followed

| Type | Visits + detection | Visits no detection | No Visit |
|-----------------|--------------------|---------------------|----------|
| Our Device | 85% | 0% | 15% |
| Tracking Tunnel | 50% | 33% | 17% |

Summary of work so far

- ❖ Device capable of monitoring all major NZ mammalian pests
 - Records time, date and species
- ❖ Remote download techniques possible
- ❖ Has great potential to detect reinvasion scenarios
- ❖ User friendly (no interpretation needed)
- ❖ Lightweight and portable
- ❖ Higher detection rates



Where to next?

- ❖ Larger-scale field trials to demonstrate superiority over current methods
- ❖ Extending battery longevity (6 – 12 months)
- ❖ Incorporating remote download capabilities
- ❖ Commercialisation and scale-up of manufacturing
- ❖ Application to other species