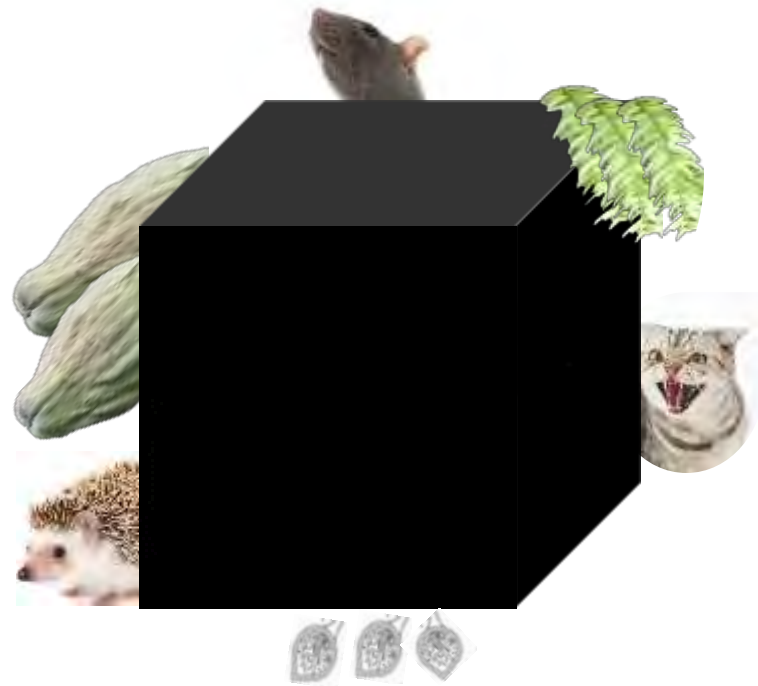


# Pests: What don't we know

*Can science help?*

Margaret Stanley

*School of Biological Sciences  
University of Auckland*



# Outcome-based conservation

## What outcomes do we want?

- Protect our most threatened species?
- Maintain healthy ecological communities?

## Strategy: Eradication vs Manage Below Damage Threshold

Dependent on:

- Size of population
- Amount of funding/investment committed
- Terrain/site & species characteristics

# How's our science communication?

## Achieving Eradication

99% of the funding is used to detect and kill the last 1% of the population

= confirming eradication

The great goat hunt that wasn't: \$91,000 spent, but not a single goat killed

DEBRIN FOXCROFT

Last updated 12:56, June 20 2018

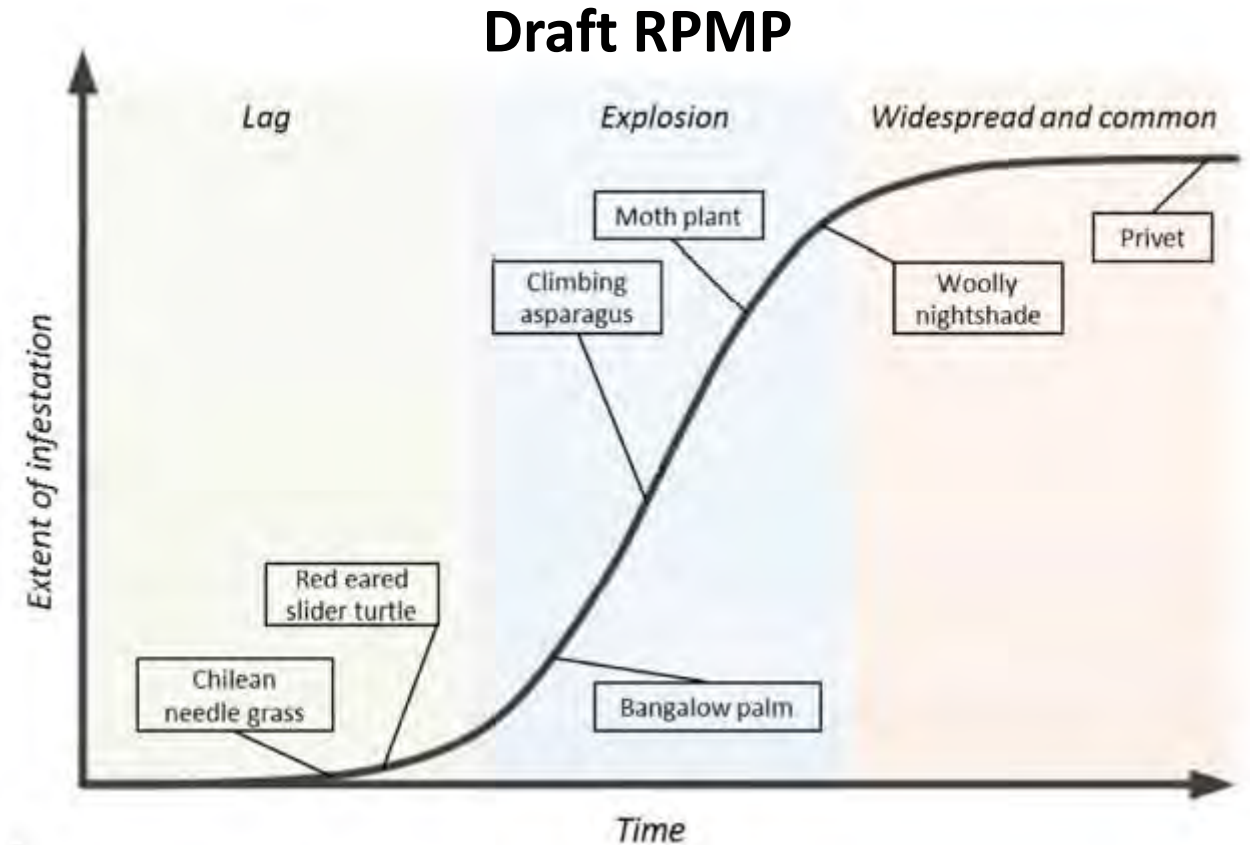


Feral goats destroy native plants.

# Widespread weeds – site-based control

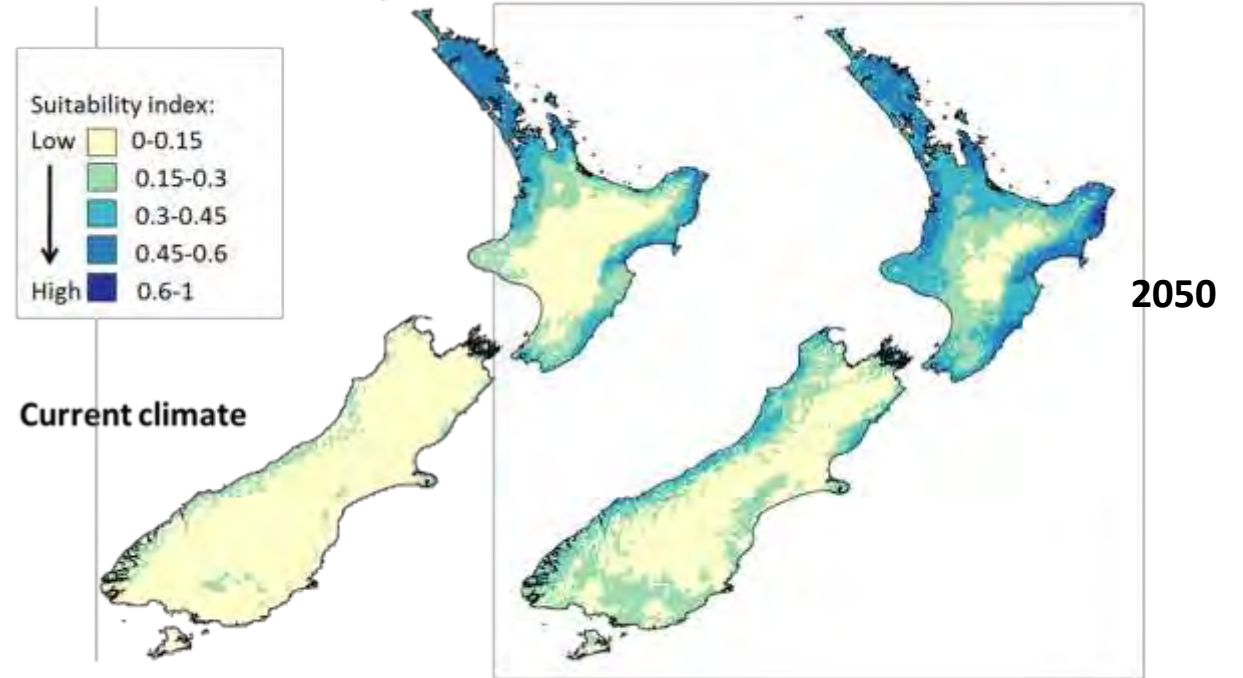
Eradication is a really bad investment for widespread weeds!

= outcome based/site-led



What can science offer widespread weeds?

# Widespread weeds – prevention is the key



Sheppard et al (2016) Future-proofing weed management for the effects of climate change: is NZ underestimating the risk of increased plant invasions? *NZ J Ecology* 40(3): 398-405.

# Widespread weeds – biological control

2011



*Tradescantia fluminensis*



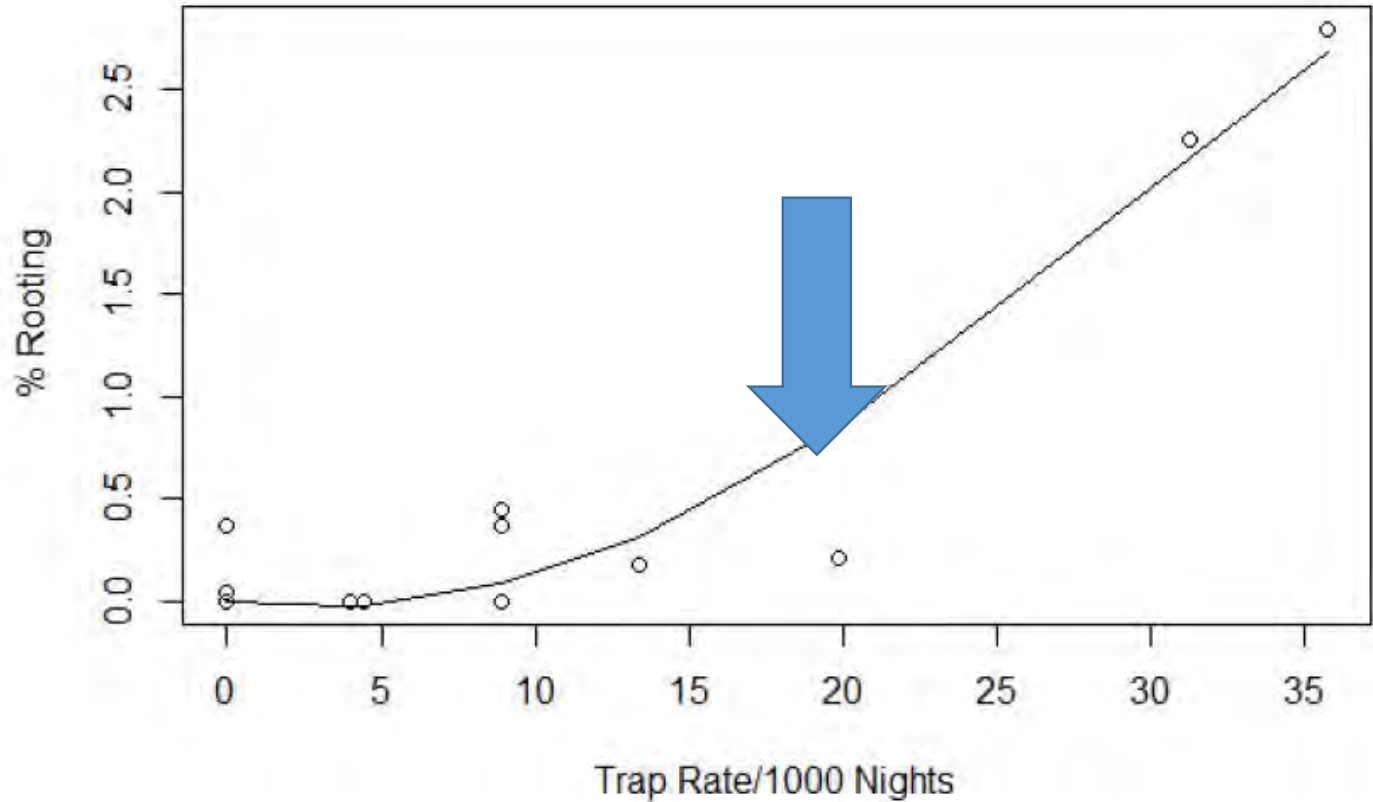
2018



Moth plant?

Climbing asparagus?

# Damage functions – keep pests below thresholds



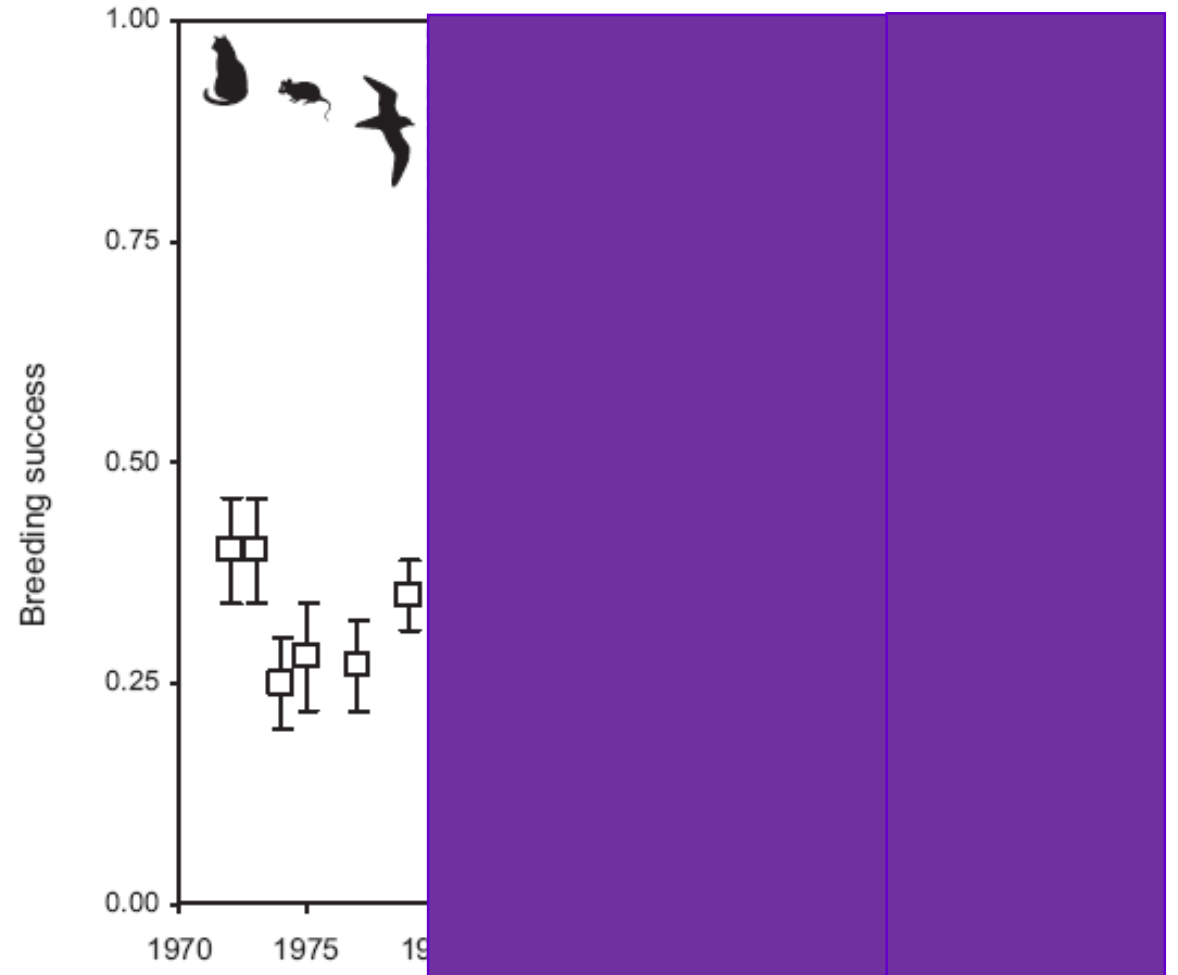
We have few damage functions in NZ conservation!

# Removing species in isolation = indirect ecological effects



Cook's Petrels

Hauturu/Little Barrier Is



**What happens when we remove rats?**

Rayner et al (2007) PNAS

<https://doi.org/10.1073/pnas.0707414105>

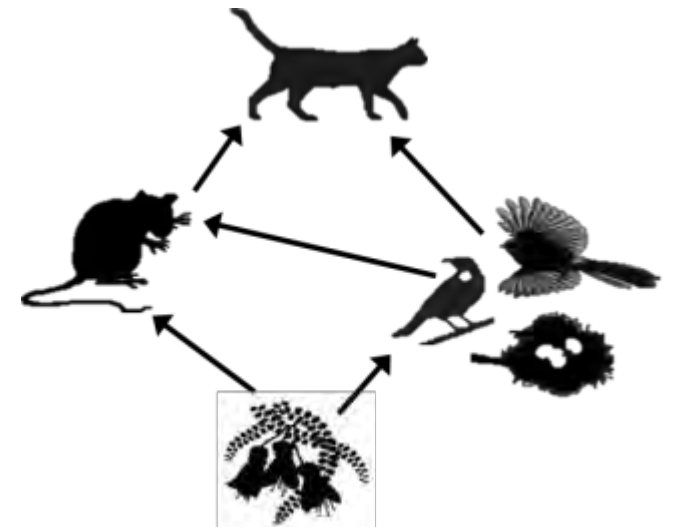


# Owned/unowned cats in urban bush fragments



- 8x Auckland reserves
- ~53 individual cats

The science is clear:  
cats in sensitive  
ecological areas is a  
very bad idea!

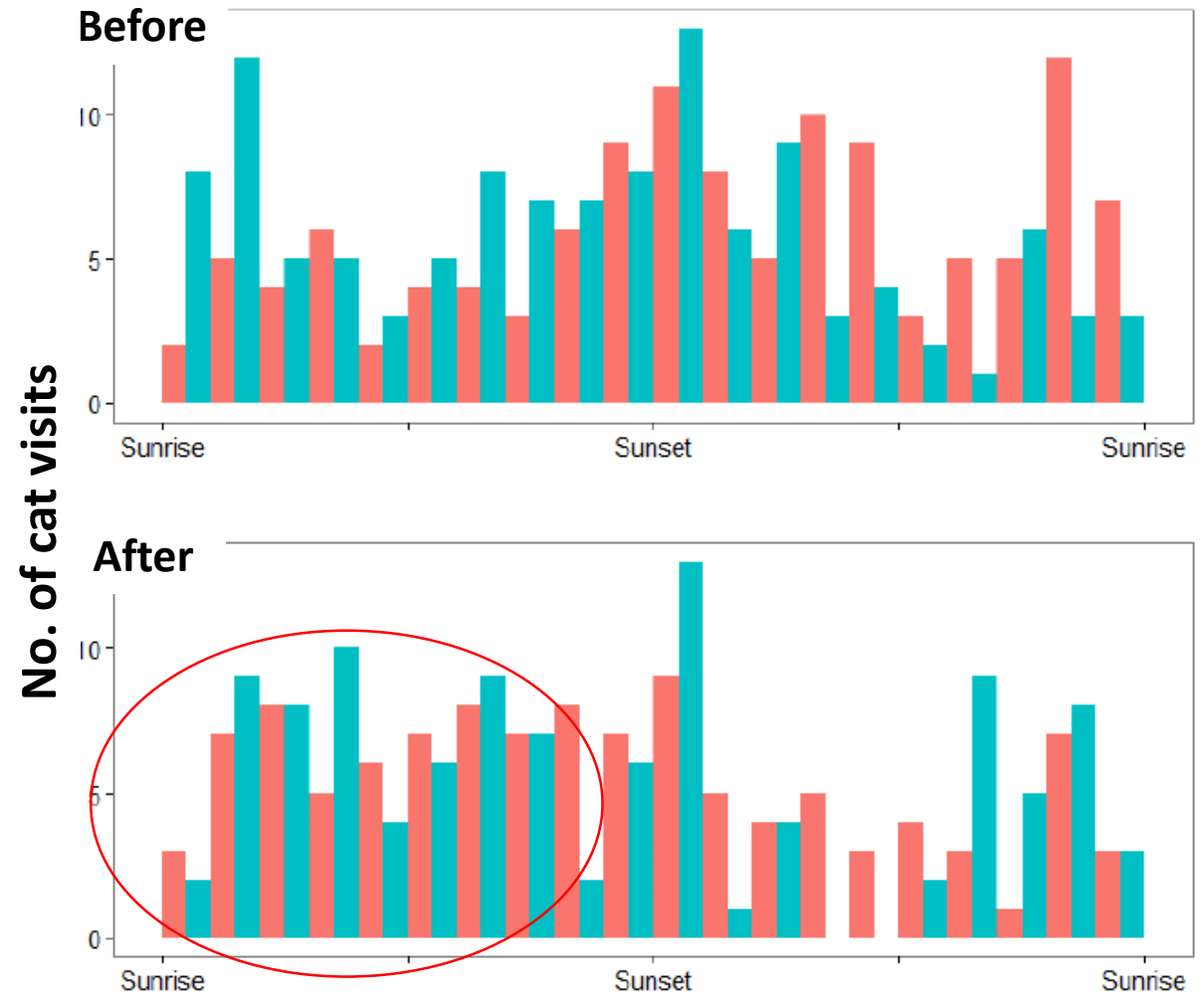


# Rat control = cats shift towards daytime activity

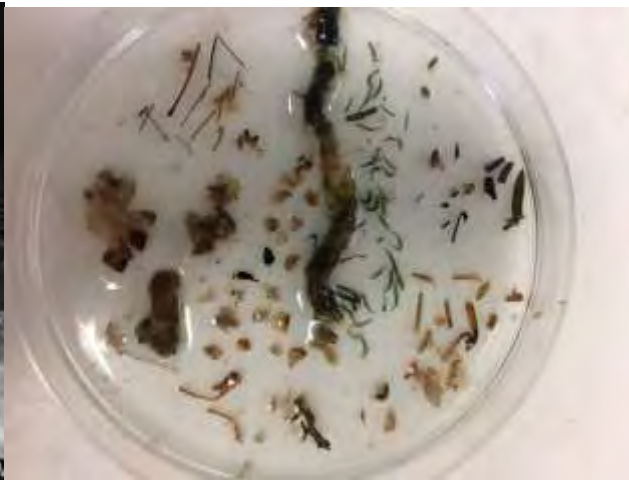
After rat control =  
> cats visiting during day

Adult birds & lizards at  
increased risk?

Is keeping cats in at night  
going to be the answer?



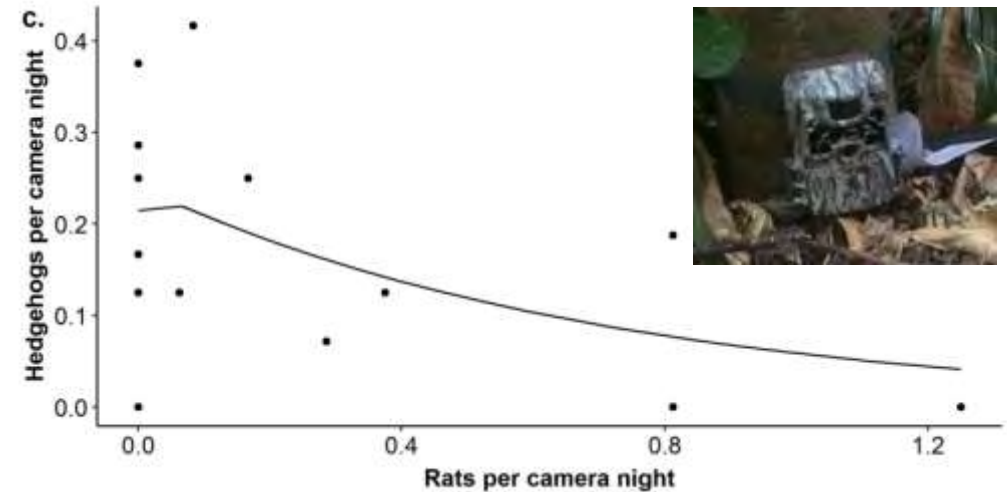
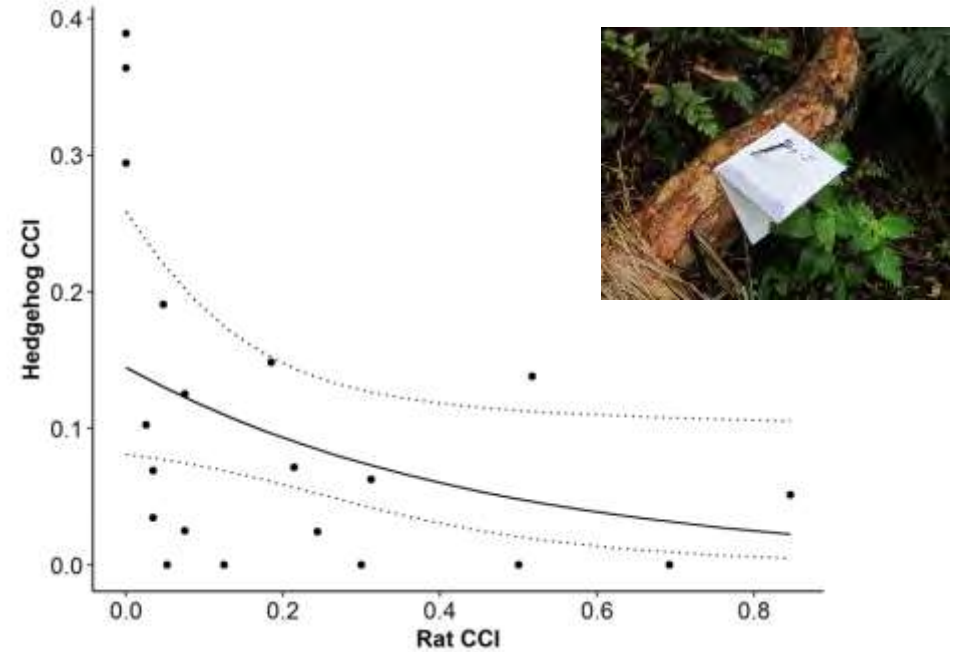
# More hedgehogs in urban bush patches with fewer rats



MSc student: Cathy Nottingham

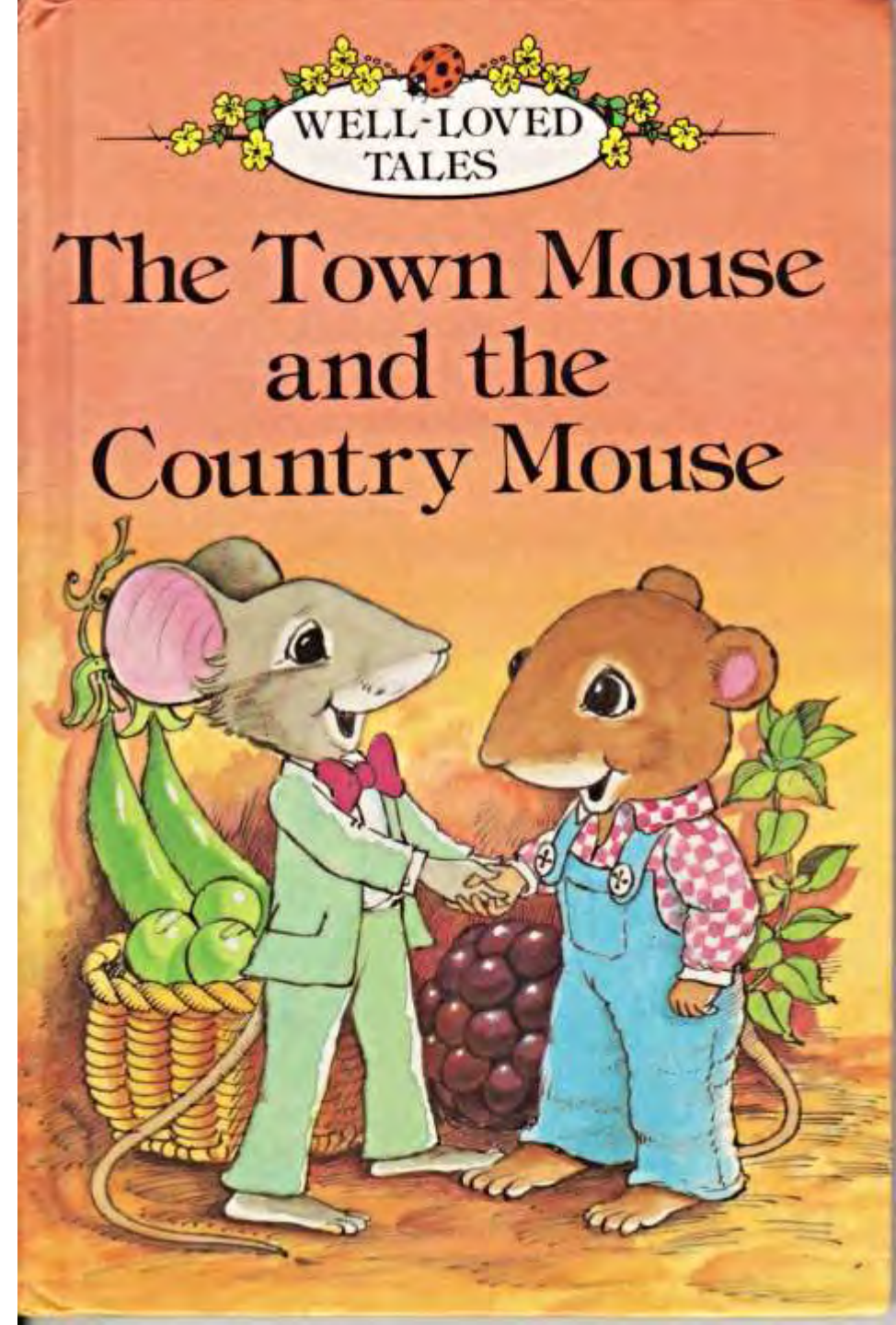
Should we be targeting hedgehogs?

Take note of indirect ecological effects!



What will our research on pests in uninhabited areas tell us about pests in cities?

Russell & Stanley (2018) An overview of introduced predator management in inhabited landscapes. *Pacific Conservation Biology* doi.org/10.1071/PC18013



# Do pests behaviour differently in cities?

## Differences in mammalian pest behaviour

- Home range size?
- Density?

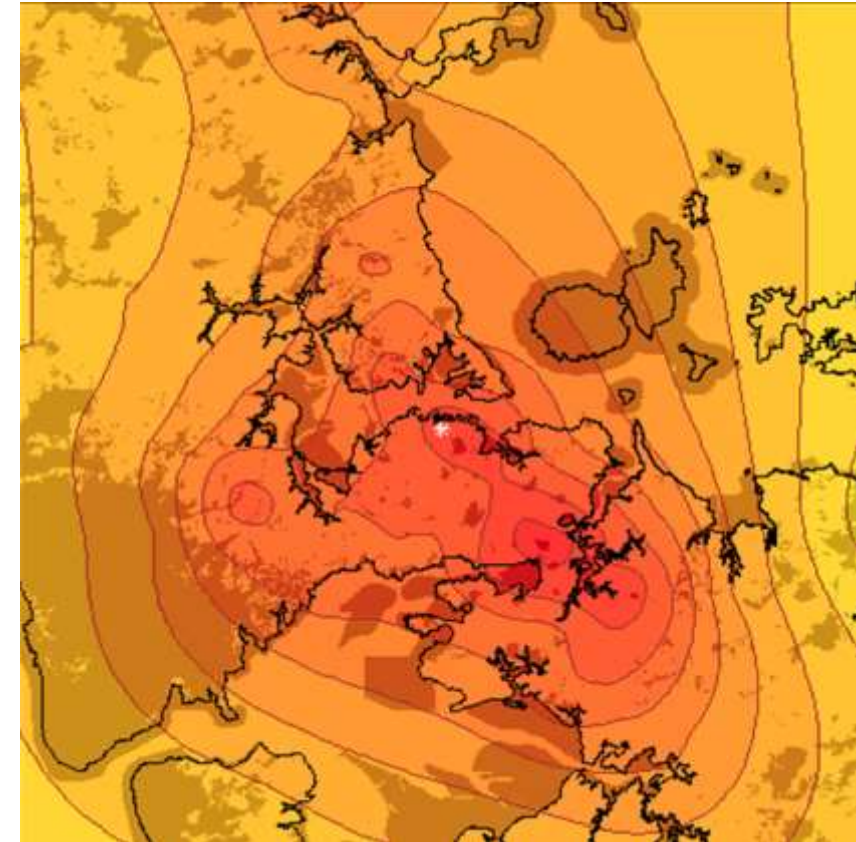
Key ecological parameters = critical for efficient management

Limited set of tools in urban areas

- no aerial baiting!



## Light pollution changes activity

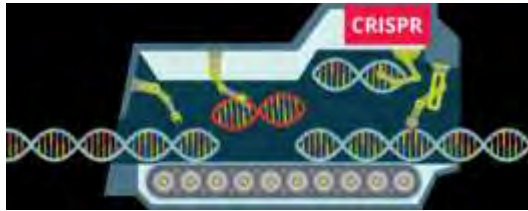


# How 'good' are our tools?



## Range of tools in toolbox

– no tool will be appropriate in all situations



Do you know how effective they are?



# How 'good' are our tools?

*Pest control tools must be: socially & culturally acceptable, technically and economically feasible and humane*

## Sensitivity of our monitoring/control devices:

- What is the probability of detecting/killing a pest if it's there?
- Does this depend on ecosystem/habitat?

Onus on 'tool manufacturers' to prove their effectiveness with good science

**Mistakes are risky**

Too many data capture methods?

How do we resolve to maximise learning?



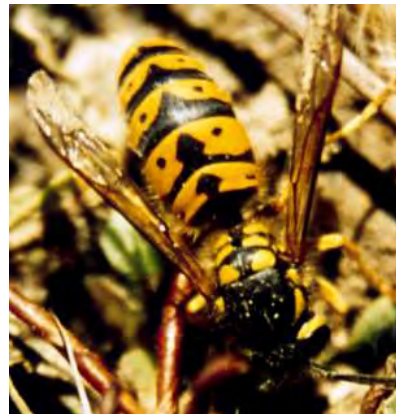
# New pest challenges: pathogens & invertebrates

## Kauri dieback

- Ecosystem level effects?
- Investment moving from testing & containment towards treatment

## New pathogens...game changer

## Invertebrates



Brown marmorated stink bug (Credit: MW-LR)



Myrtle rust

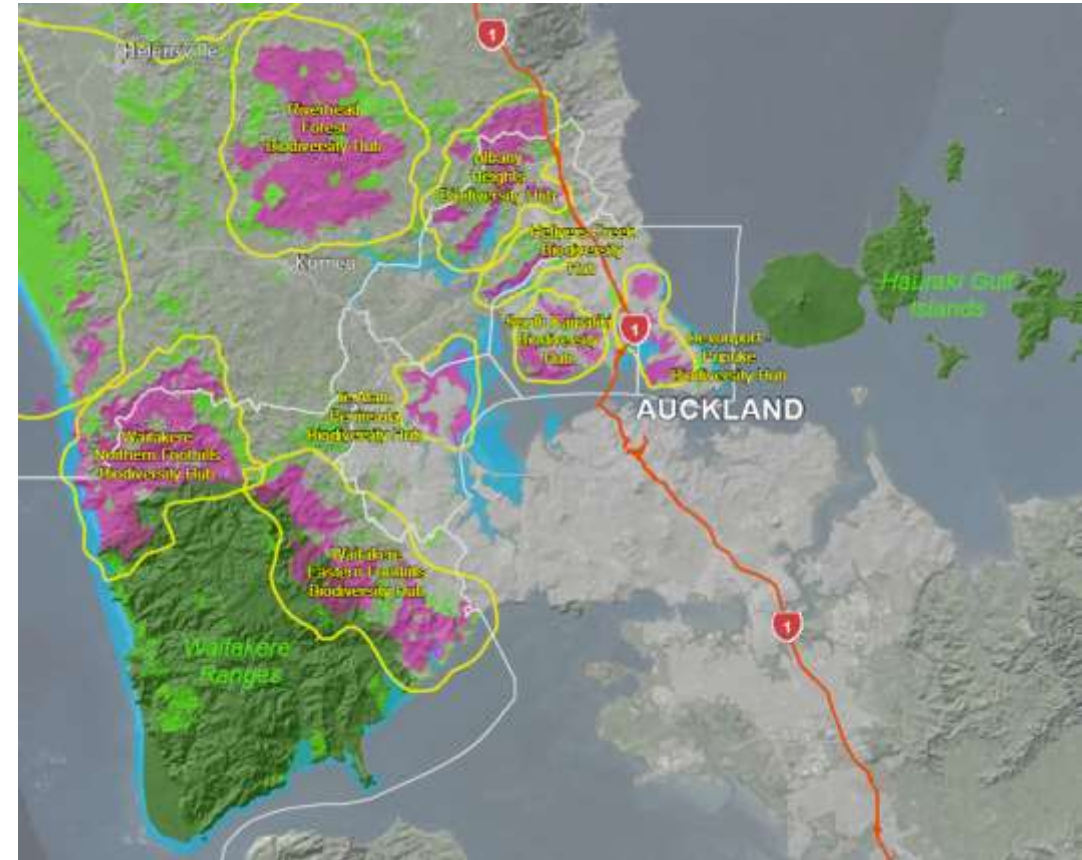




# New Challenges: Landscape connectivity

## Ecological Outcomes:

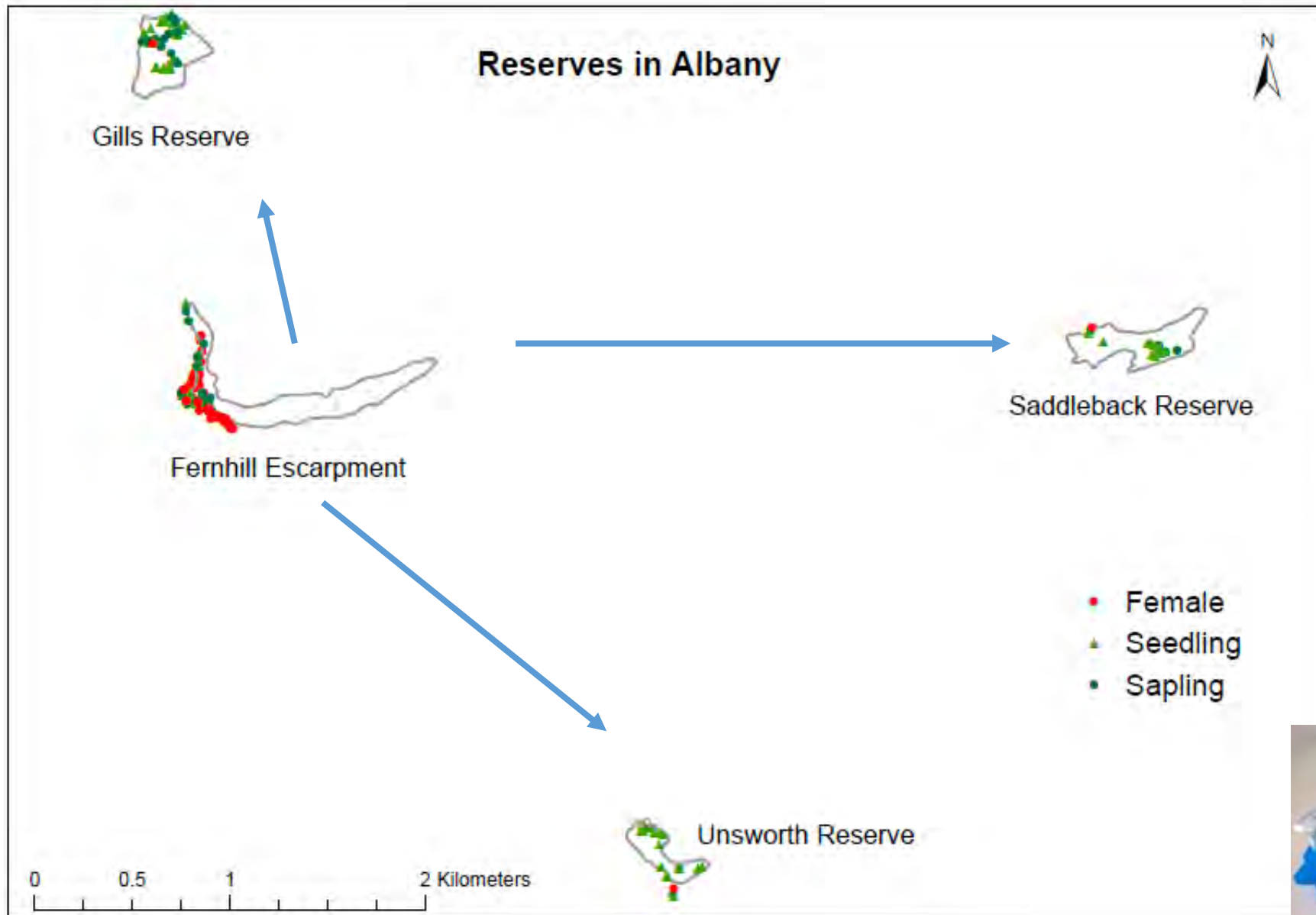
- Are birds moving across the city?
- Healthy connected ecosystems?



Boffa Miskell Ltd (2016) North-West Wildlink

## Are we actually measuring connectivity?

# Ecosystem function – beyond birds?



**Tōtara**





North-West Wildlink = a microcosm of Predator-Free NZ

**Connects:**

- Rural
- Urban
- High ethnic diversity

**Subtropical climate** = pests!



# How do we connect people: social science?

**NWW = one community-driven model of landscape connectivity**

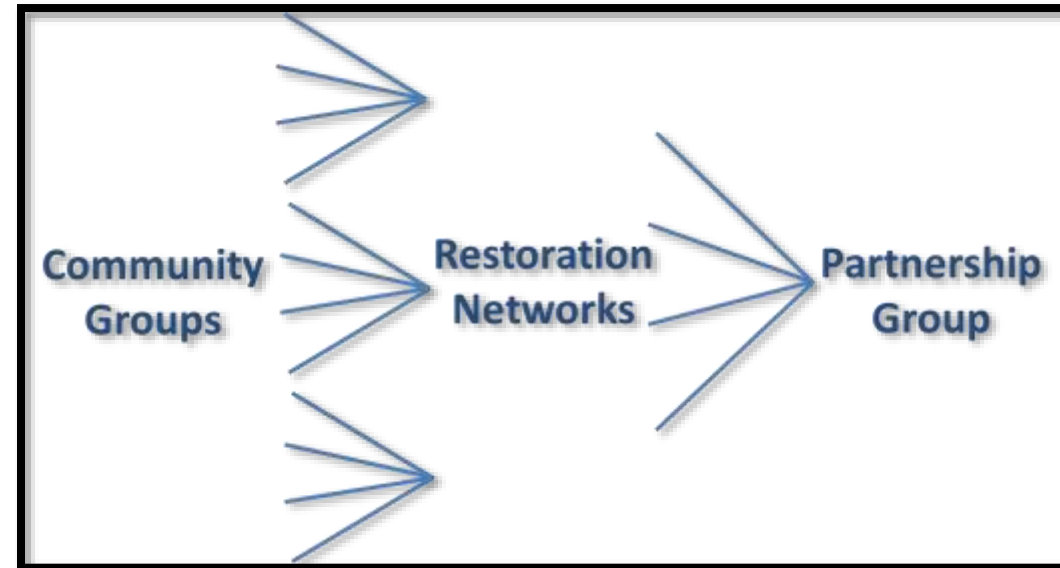
**Know we are part of broader network & vision**

**BUT participation is at local, meaningful scale**



**Successes** e.g.:

- Information sharing!
- Community nursery network
- Strategic landscape planning
- Leveraging technical support; research; funding more efficiently
- Trial tools



**BUT need MORE social science in pest management ...**

# Social science!

- Collective impact: How to connect many individuals & groups at large scales
- Cultural values – Māori
- Changing demographics of Auckland
- Weeds: urban developers? nurseries?
- Behaviour change/actions: weed dumping, planting, etc
- Acceptability & social licence: tools
- Peer (in)groups +/-vs science/environmental messaging

## **Build capacity (+ transdisciplinary – get out of silos!)**

- Mātauranga Māori + Māori scientists (ecological, social, cultural...)
- Social Science/Psychology
- Engineering

# Challenges

- Social & ecological science = small part of pest management
- Co-governance: Māori (e.g. Maunga Authority)
- Community driven science questions
- Keep it outcome focused: not killing pests
- Do we invest in gene technologies? Social licence?
- Ecological representation – rare ecosystems?
- Converted vs connecting with diverse communities – motivations?
- Give people more complex messaging
  - e.g. options + outcomes = costs/benefits of all aspects (e.g. social)

# There is no silver bullet!



**Collective impact =**

***Paddle the waka in the  
same direction***

