

The spatial extent of pest management outcomes

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Background and Context

- Humans have introduced numerous pest species to New Zealand
- Many have had highly significant deleterious impacts on native biodiversity
- Intensive management of pests is undertaken in many areas of high ecological significance

Pests

- Mustelids
 - Stoat (*Mustela erminea*)
 - Ferret (*Mustela furo*)
 - Weasel (*Mustela nivalis vulgaris*)
- Rodents
 - Ship rat (*Rattus rattus*)
 - Norway rat (*Rattus norvegicus*)
 - Kioire (*Rattus exulans*)
 - House mouse (*Mus musculus*)



Pest Impacts

- Predators of
 - birds and birds eggs
 - lizards
 - invertebrates
 - native seedlings
 - Fruit, flowers and seeds of native plants
- Compete with native species for various food sources

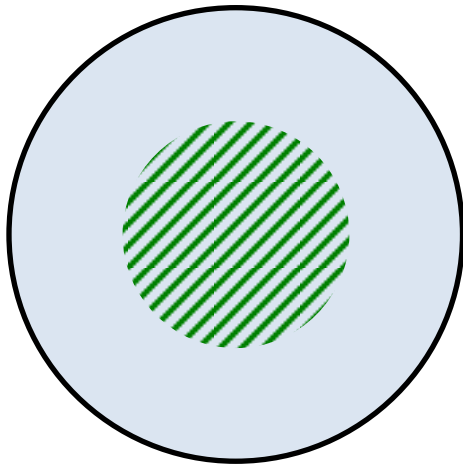


Monitoring

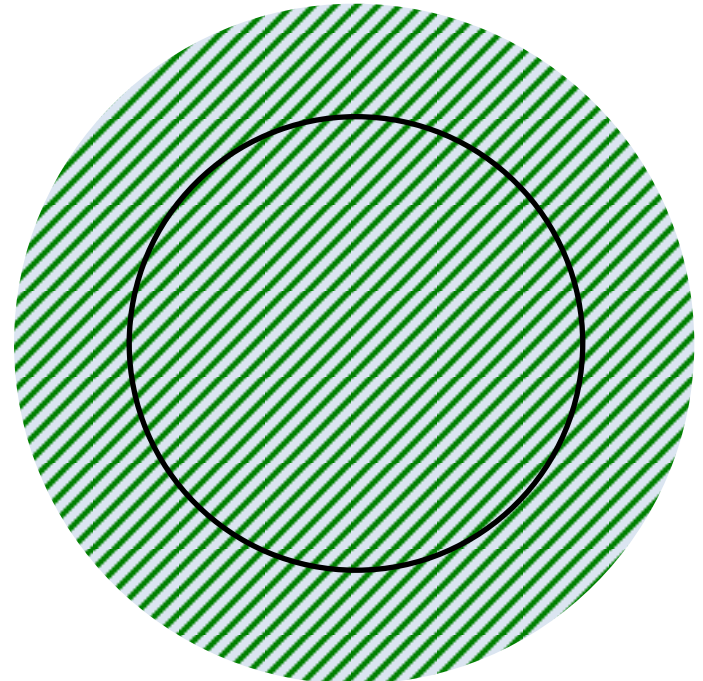
- Both results and outcomes must be monitored
 - Results = change in relative pest abundance
 - Outcomes = targeted changes in native biodiversity
 - Biodiversity indices
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 - Need to be:
 - Readily measurable
 - Sensitive to change in pest abundance
 - Easy and cheap for volunteer community groups to undertake

Spatial Extent

- Are the outcomes of pest management observed
 - Across less than the entire management area?
 - Even outside the management area?
- Is there a gradient of outcomes across and outside the pest management area?

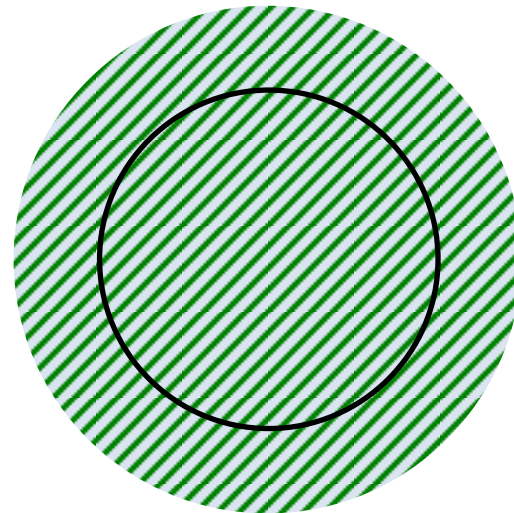
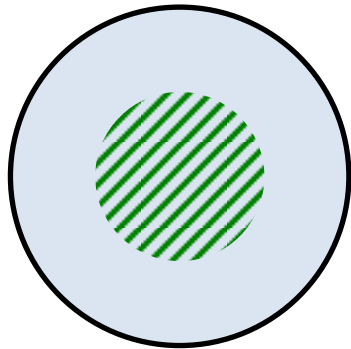


OR



Research Aims

- Determine the spatial relationship between management of mammalian predators and its outcomes for native biodiversity
 - Edge effect – edge vs. core
 - Spill-over effect – edge vs. outside



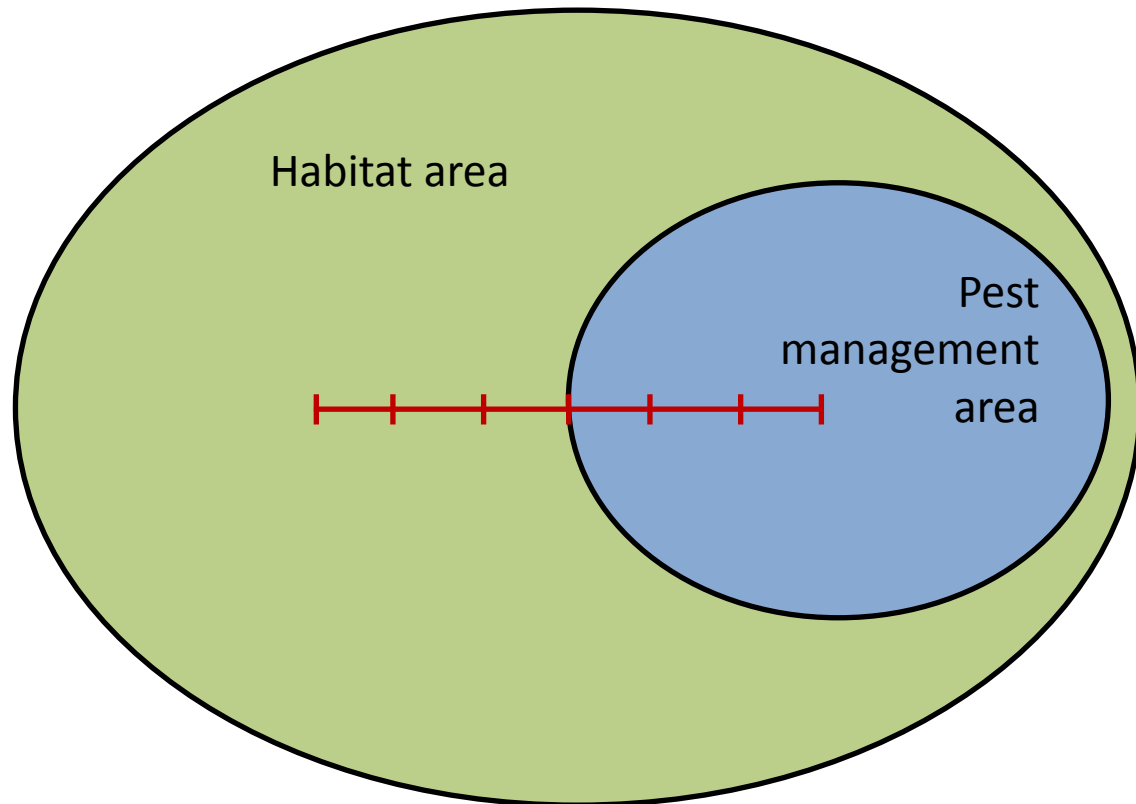
Ark in the Park

- 2300 ha of intensive pest control
 - Poison baits for rodents and possums
 - Kill traps for mustelids



Experimental Design

- Four 1200 m transects which bisect the border of pest management
- Seven monitoring stations per transect
- Biodiversity measurements at each monitoring station



Transects



Biodiversity Indices

- Birds
- Lizards
 - Skinks and geckos
- Invertebrates
 - Weta and ground invertebrates
- Plants
 - Seedling density



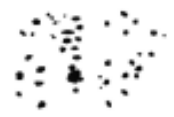


Biodiversity Indices

- Designed to be replicable by non-specialist and volunteer community group members
 - Not highly technical
 - Quick/easy to carry out
 - Low maintenance
 - Cheap
- Also need to be
 - Ongoing and repeatable
 - Representative
 - Sensitive to change

Mustelids and Rodents

- Verification of pest densities
- Tracking tunnels



Mammal footprints
Mouse

Rat

Mustelid


Birds

- Five minute bird counts



Lizards

- Artificial refuges
 - Onduline ACOs for skinks
 - Foam covers for geckos



Invertebrates

- Artificial hides for weta
 - ‘Weta motels’
- Wooden tiles for ground invertebrates

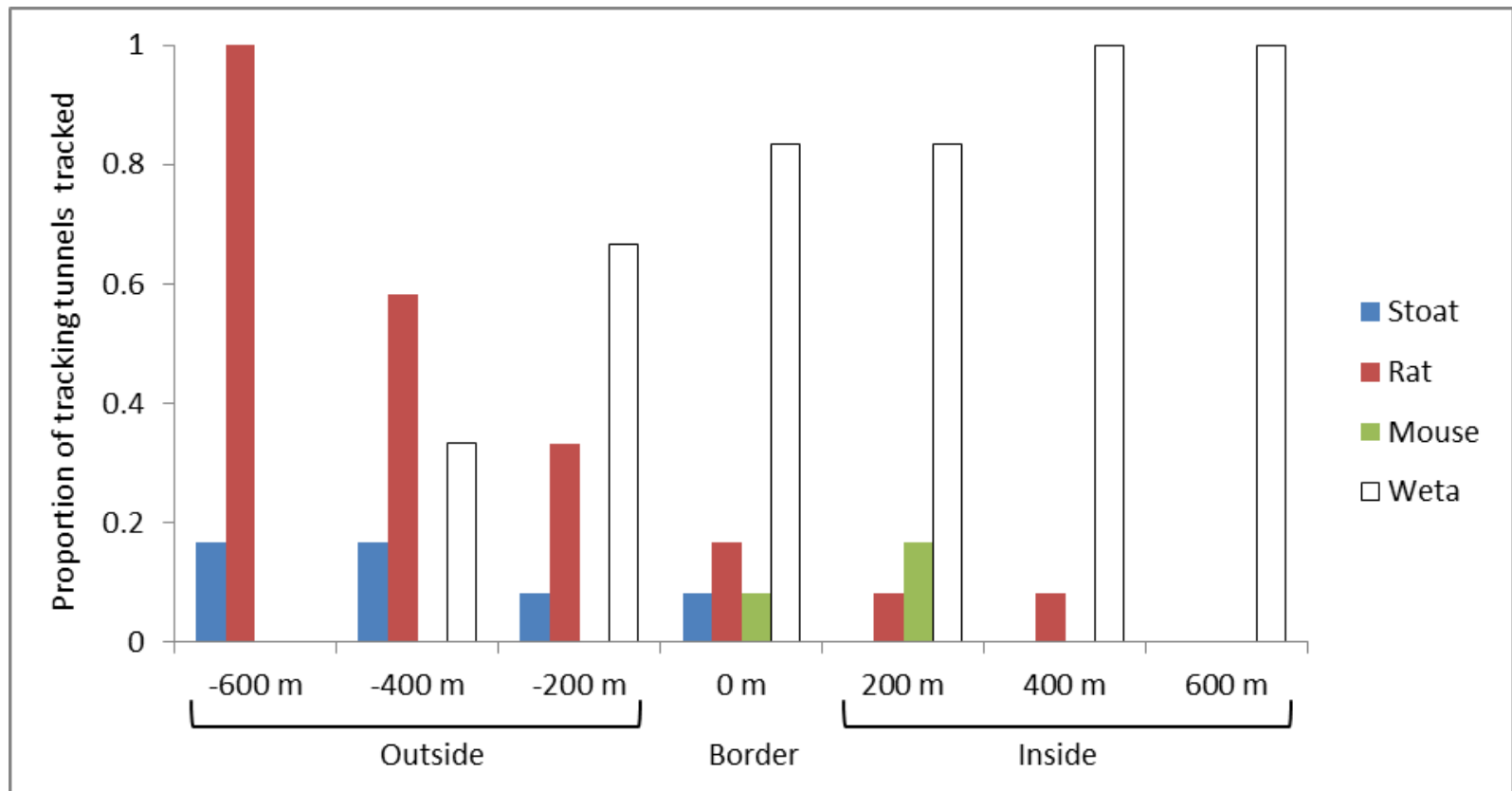


Plants

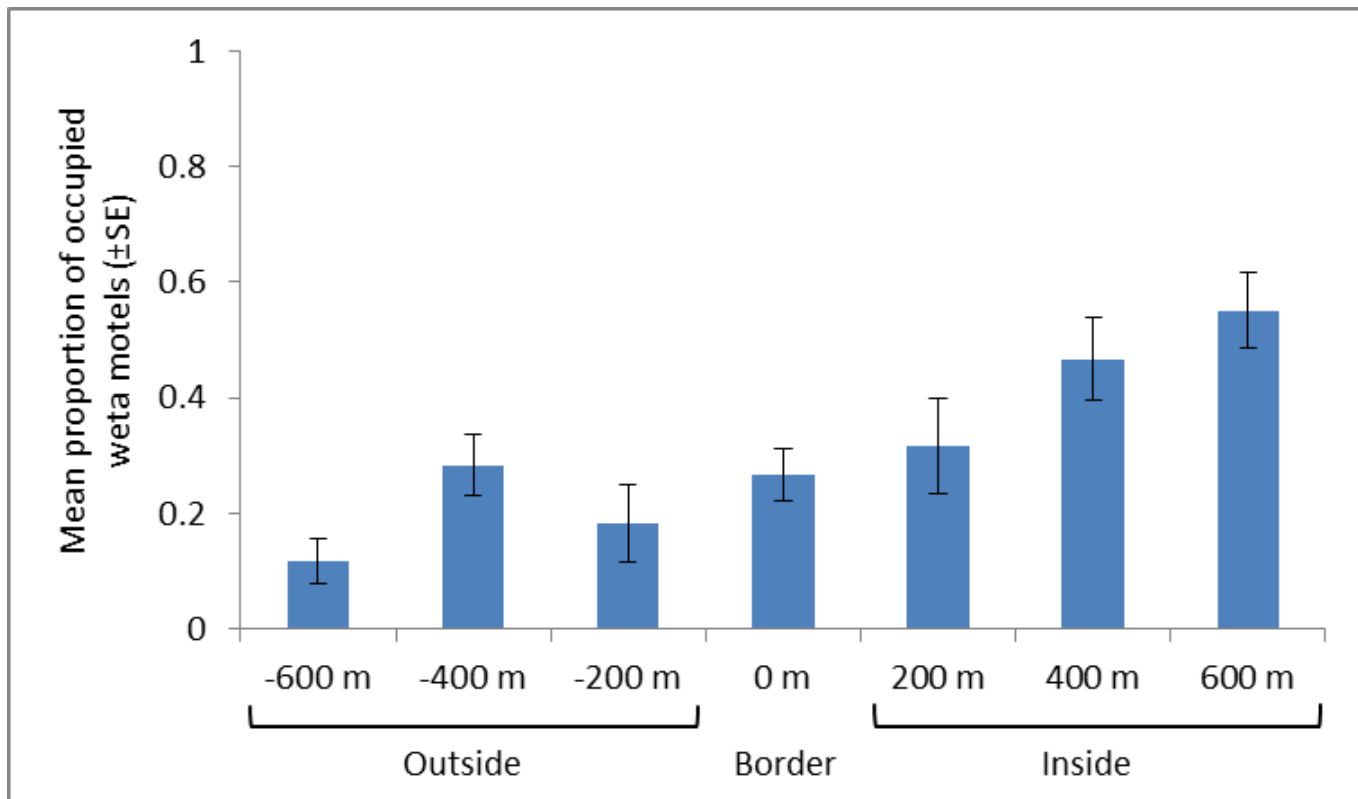
- Rats eat seeds and seed producing structures
- Seedling density
 - 0.75m² seedling plots



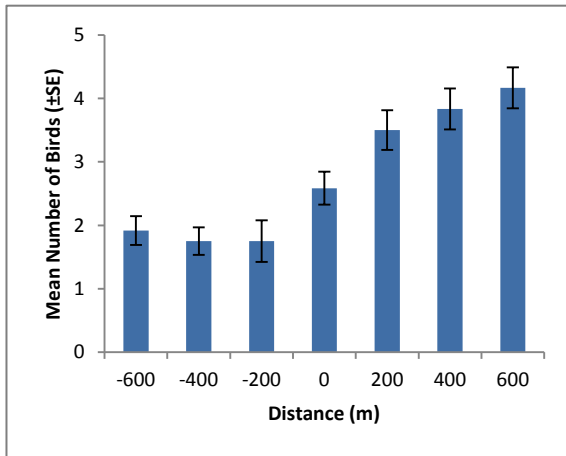
Results – Tracking Tunnels



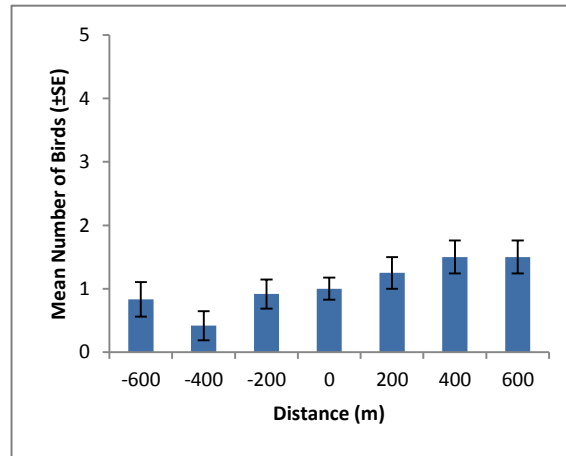
Results – Weta Motels



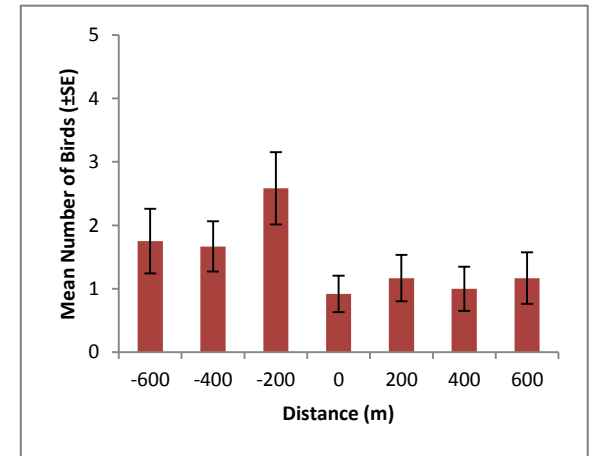
Results – Bird Counts



Tui

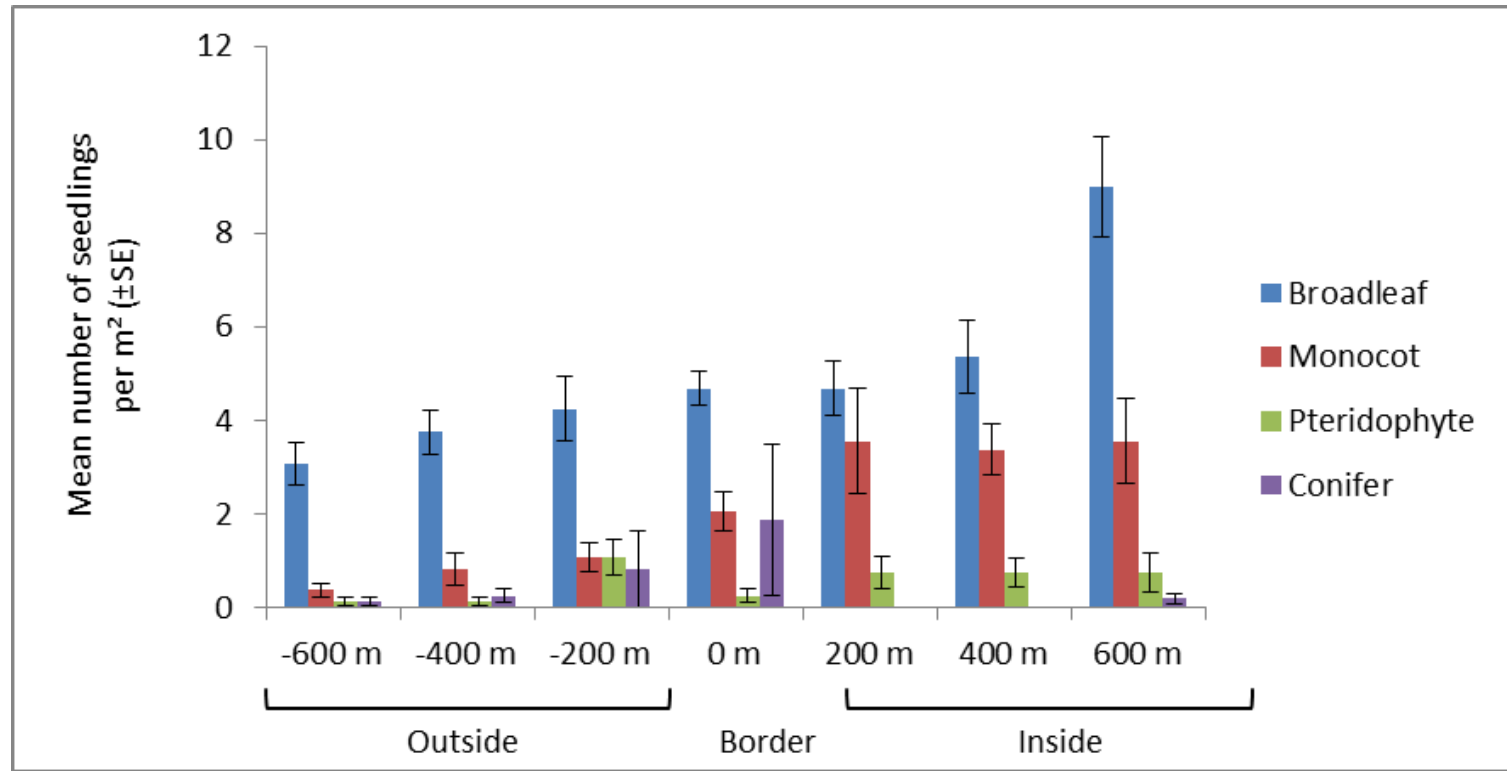


Fantail

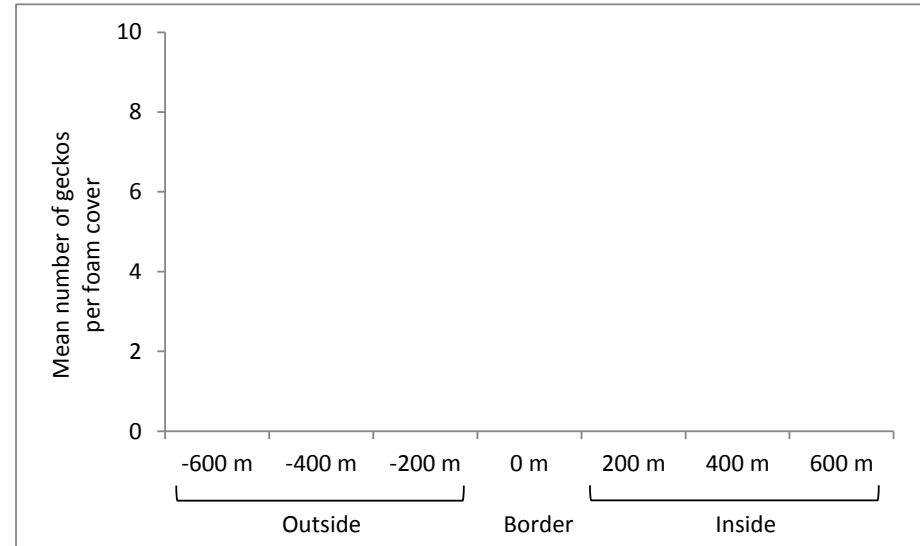
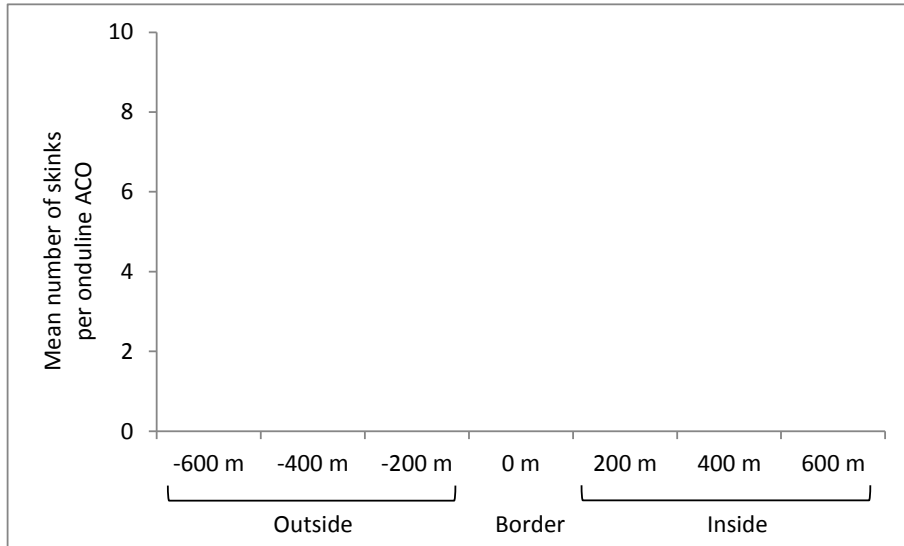


Silvereye

Results – Seedling Counts



Results – Lizard Refuges



Conclusions

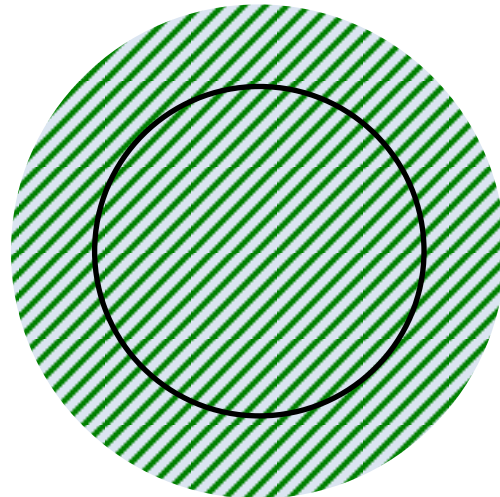
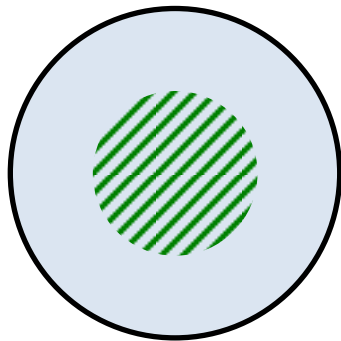
- Evidence was found for both edge and spill-over effects occurring at the border of the pest management area
 - For pests, birds, weta, seedlings
 - Ground invertebrates and lizards had insufficient data (or none!)
- For most taxa, these effects extended beyond 600 m

Practical Lessons

- Neither lizard monitoring method effective
 - Though should be tested again over summer
 - Honey baited tracking tunnels may be a viable alternative
- Invertebrates
 - Weta motels recommended over pine tiles
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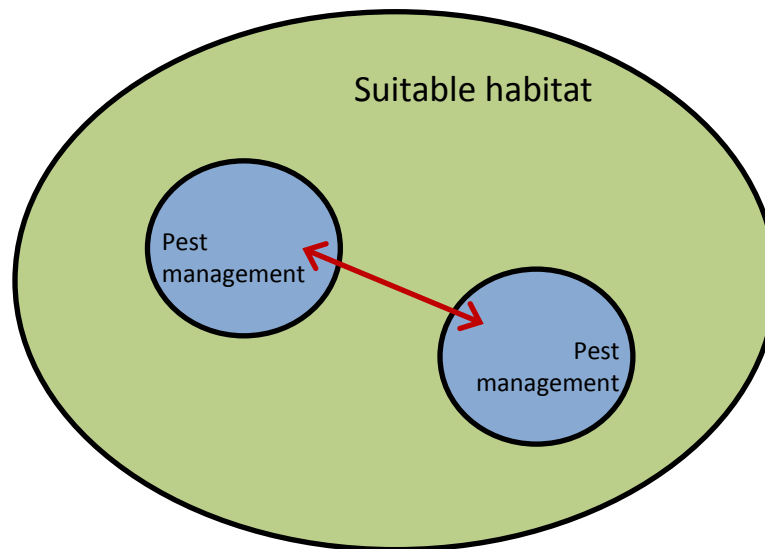
Significance

- Knowing the actual spatial extent of biodiversity benefit important
 - Optimisation of spending and effort in pest management



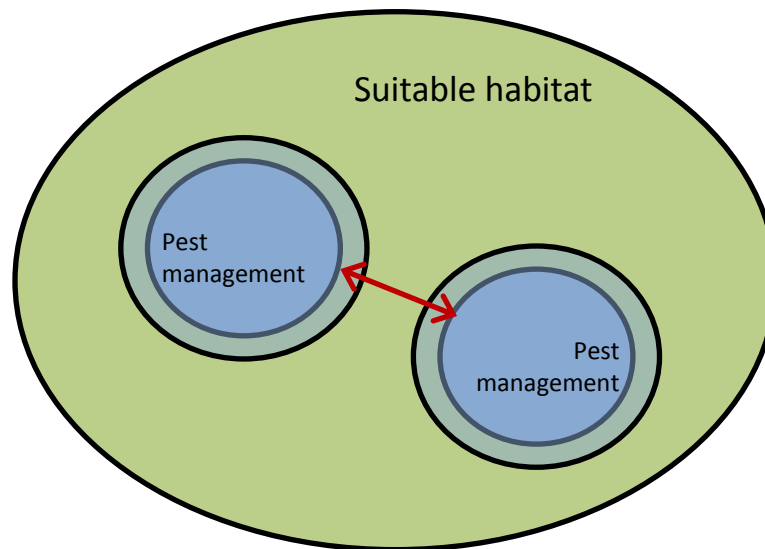
Significance

- Knowledge of spill-over effects can be used to promote habitat fragment connectivity and dispersal
 - Linking pest management ‘islands’



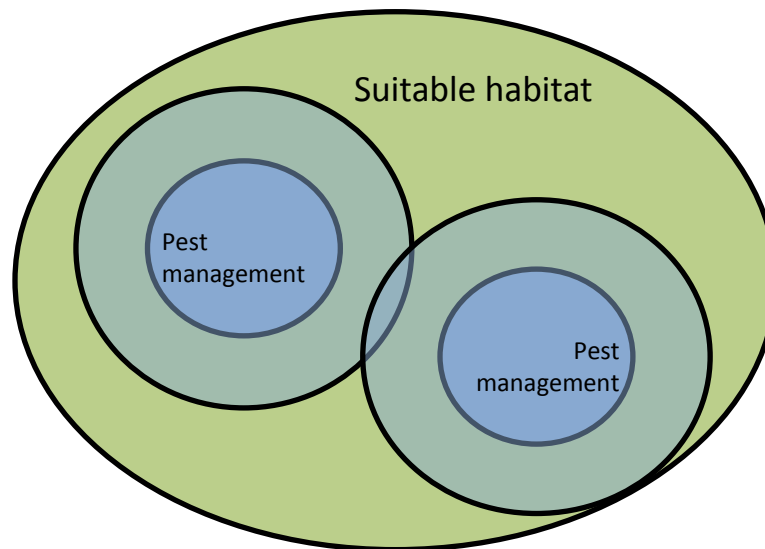
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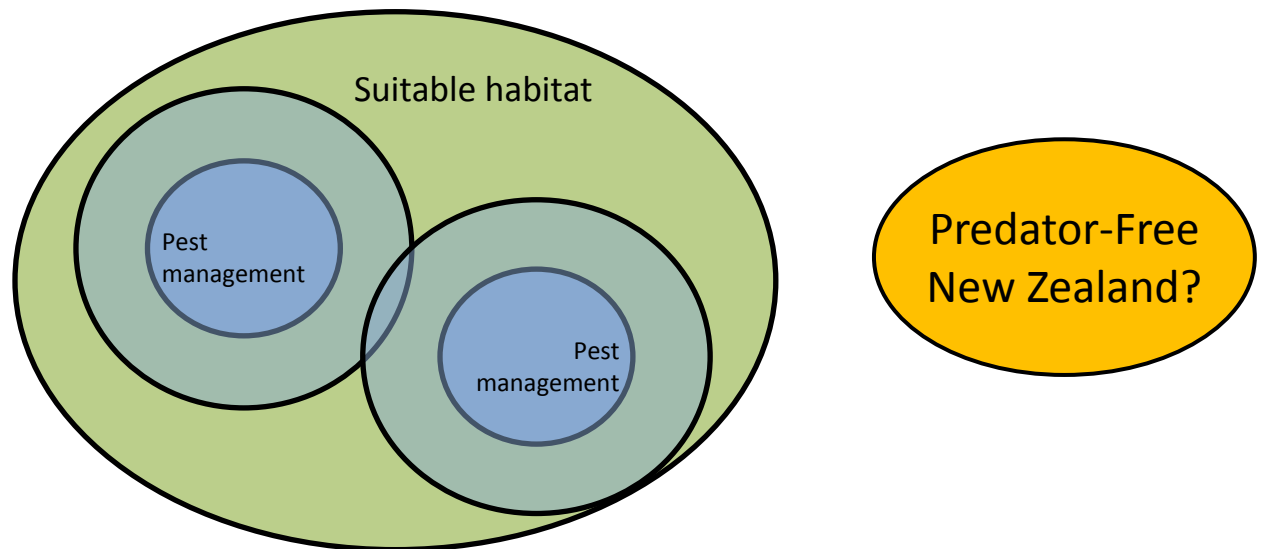
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Thanks!

- Landcare Research
- Ark in the Park
- Auckland Council
- Andy Warneford
- All of my volunteers
 - special mentions to Kelly, Robyn and Sarah



Manaaki Whenua
Landcare Research

