

# Biodiversity benefits from NZ's major predator control regimes

Rachelle Binny

Biosecurity Bonanza

23 May 2017



**LANDCARE RESEARCH**  
MANAAKI WENUA

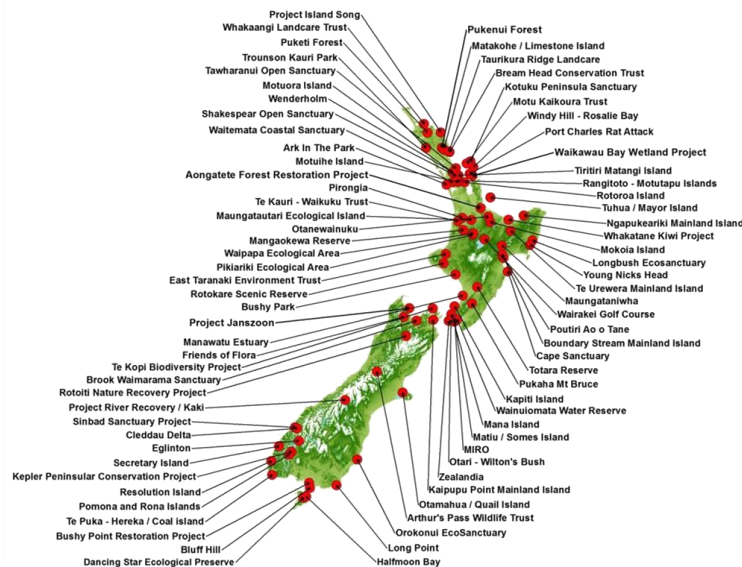
# What are the biodiversity benefits from predator control for New Zealand's major control regimes?

## Aims:

- Compare broad biodiversity outcomes from different control regimes, e.g. pest-free fenced sanctuaries vs. unfenced, intensively managed sites
- Investigate community-level responses

## Approaches:

- Meta-analysis of published outcome literature
- Modelling of unpublished biodiversity outcome monitoring data, aggregated across a large number of predator-controlled sites



Regime	Outcome objective	Sites	Mammals targeted	Mammal control objective	Control method	Agency
1	Ecosystem restoration – maximise indigenous dominance	Marine and lacustrine islands, ring-fenced sanctuaries	All (up to 14 species)	Eradicate all species	Aerial or ground application of brodifacoum, plus follow-up trapping, hunting, poisoning.	DOC, community groups
2	Ecosystem restoration – increase indigenous dominance	Peninsula-fenced sanctuaries, mainland islands	Typically possums, stoats, ship rats plus some of cats, ferrets, weasels, Norway rats, and hedgehogs	Sustained (sometimes seasonal) control of several key pest species	Initial or repeated (2-3 years) aerial poisoning with 1080, and/or sustained (usually annual) ground poisoning and trapping	DOC, community groups, regional, district and city councils
3	Threatened and valued indigenous species recovery	Forests, shrublands, tussocklands	One or several of: stoats, possums, ship rats, cats, ferrets, hedgehogs, Norway rats and mice	Sustained (sometimes seasonal) or pulsed low numbers of target taxa	Aerial 1080 poisoning in most years (beech) or each 2-3 years (non-beech), and/or sustained (usually annual) ground poisoning and trapping	DOC, community groups, regional, district and city councils
4	Maintain or improve canopy health, pasture growth and other biodiversity values	Forest and pastoral landscapes	Possums, sometimes also ship rats and stoats	Sustained or pulsed low numbers of target taxa	Aerial 1080 poisoning each 5-7 years, plus diverse ground poisoning and trapping	DOC, regional councils
5	Tb vector control	Forest and pastoral landscapes	Possums, ferrets, deer	Sustained or pulsed low numbers of target taxa	Aerial 1080 poisoning each 4-5 years, plus diverse ground poisoning and trapping	Tb Free NZ
6	Increase grassland production	Private farms	Rabbits	Sustained low rabbit numbers	Aerial 1080 poisoning and shooting	Farmers

# Major control regimes

- Ring-fenced sanctuaries:
  - Restore ecosystems, maximise indigenous dominance
  - Eradication of all pest mammals
  - Reintroductions of threatened species



# Major control regimes

- DOC's Mainland Islands
  - Restore ecosystems, increase indigenous dominance
  - Intensive, sustained control of key pests
  - Monitoring using standardised methods/measures



# Key questions

1. What are the global effect sizes for broad responses of indigenous biodiversity for each of NZ's major pest control regimes?
2. What are the ecological community-level responses to changes in pest abundance due to control (e.g. trends in diversity measures such as species richness and evenness)?
3. How do responses differ among habitat types, in particular between beech forest and podocarp-broadleaf forest?
4. What are the time lags between changes in pest abundance and biodiversity response, for different species and communities?

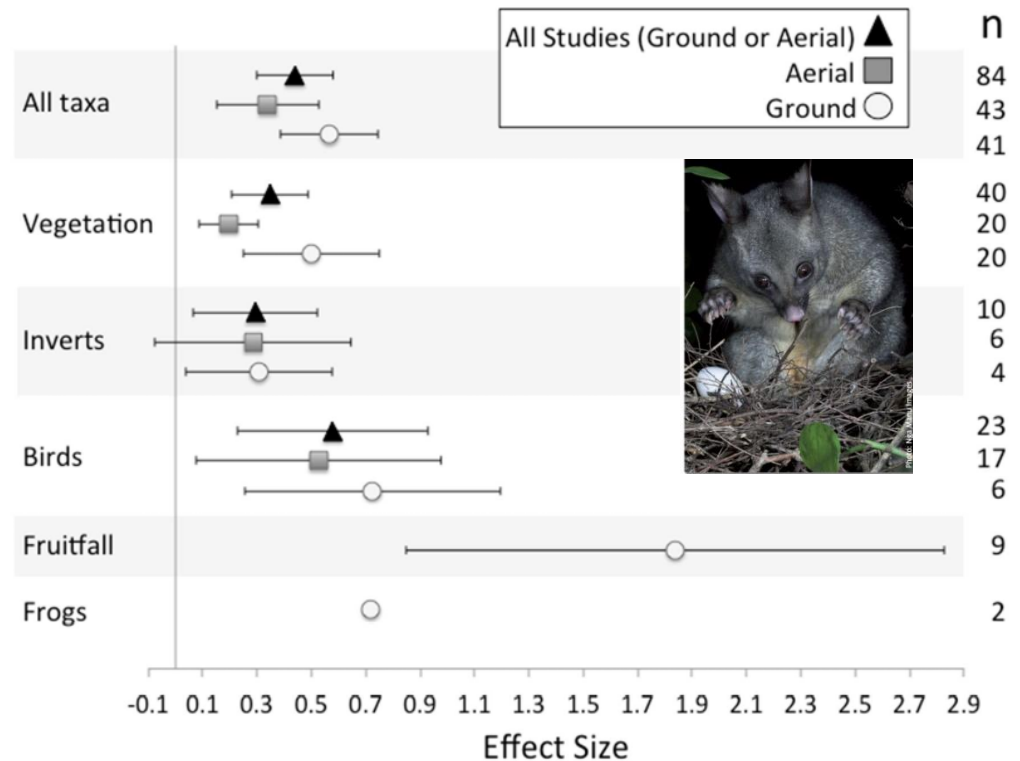


# Meta-analysis

- “Effect size”: measures the effect on a native population of conducting pest control, relative to the effect of not conducting pest control.
- Effect size  $> 0$ , positive response of native biota to pest control
- Effect size  $< 0$ , negative response to pest control
- Effect size  $\approx 0$ , unaffected by pest control

# Meta-analysis of responses to possum-focused control

- 47 accounts, 1990-2014. Excluded eradications, sanctuaries, mainland islands
- Vegetation: 17/20 report increased canopy cover or less tree mortality/browse damage of susceptible species
- Birds: 9/11 report increased nesting success, 5/6 increased population abundance



Byrom AE, Innes J & Binny RN (2016). A review of biodiversity outcomes from possum-focused pest control in New Zealand. *Wildlife Research*, **43**, 228-253.



# The nature of the problem

- Data sharing: discoverability, accessibility, ownership
- Data management: cleaning, databases, maintenance, curation.
- Ensuring data standards/quality
- Handling diverse measures and methods for monitoring pests and biodiversity outcomes at different biological, spatial and temporal scales.



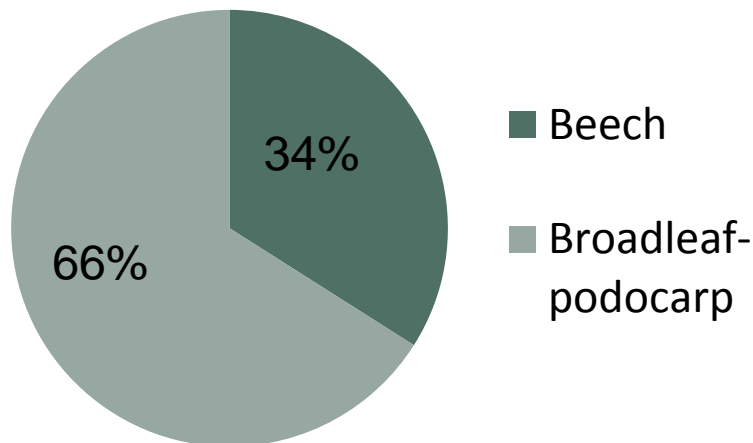
# Biodiversity monitoring database

- Database of biodiversity outcome monitoring data from managed sites
- 782,322 records
- 14 sites (11 sanctuaries, 3 DOC Mainland Islands)
- 12 unfenced, 2 fenced
- 1995-2016
- 438 species (birds, invertebrates, lizards, vegetation and pests)

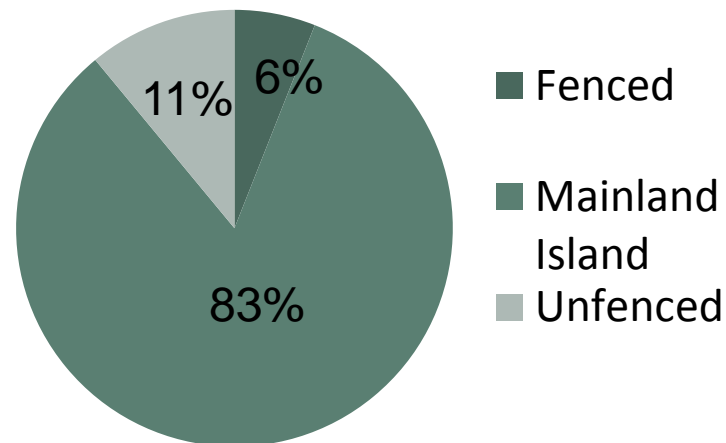


# Biodiversity monitoring database

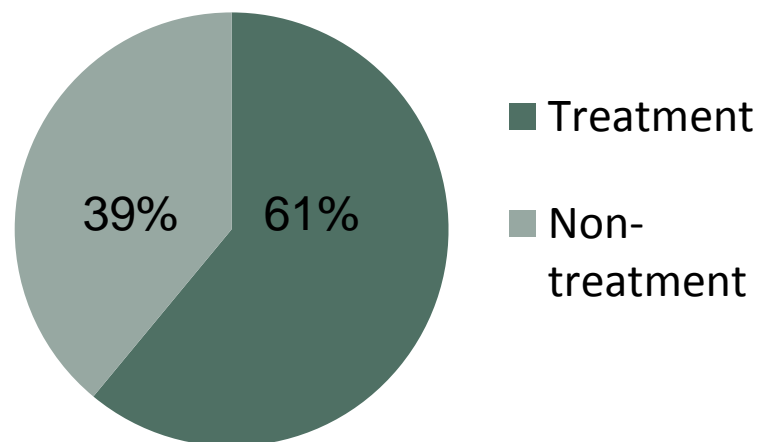
## Habitat



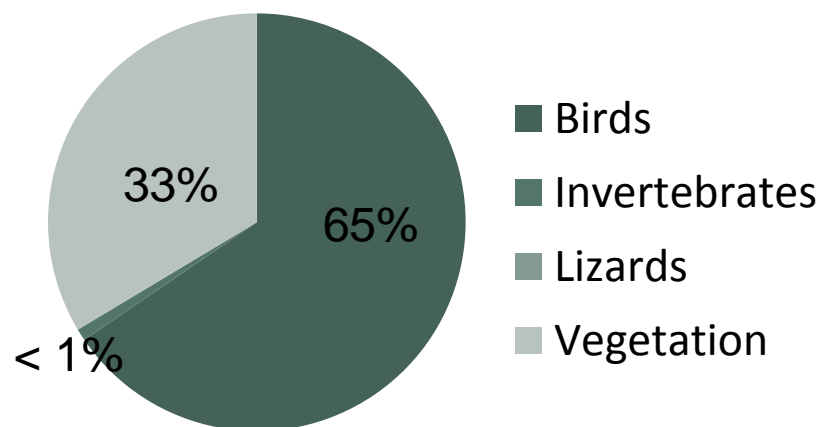
## Site Type



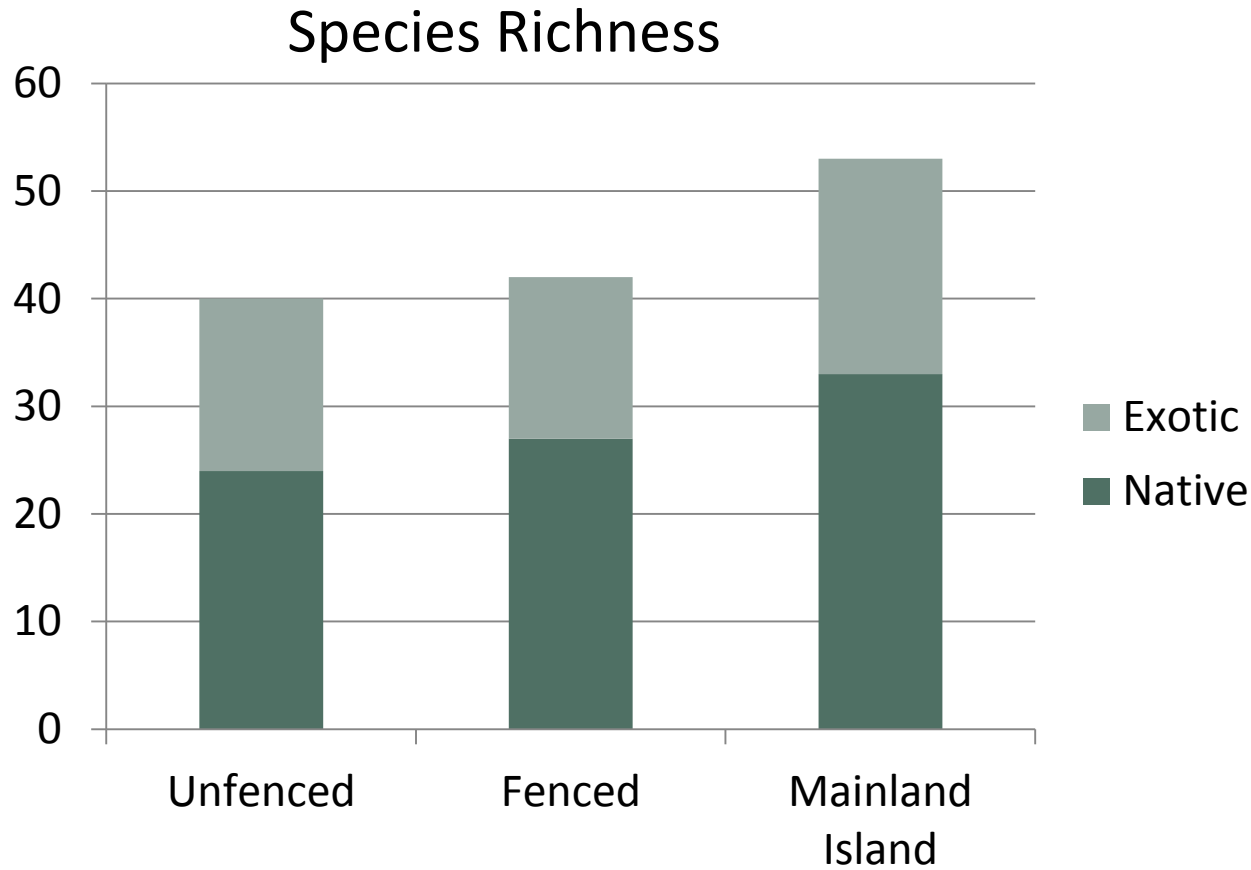
## Treatment type



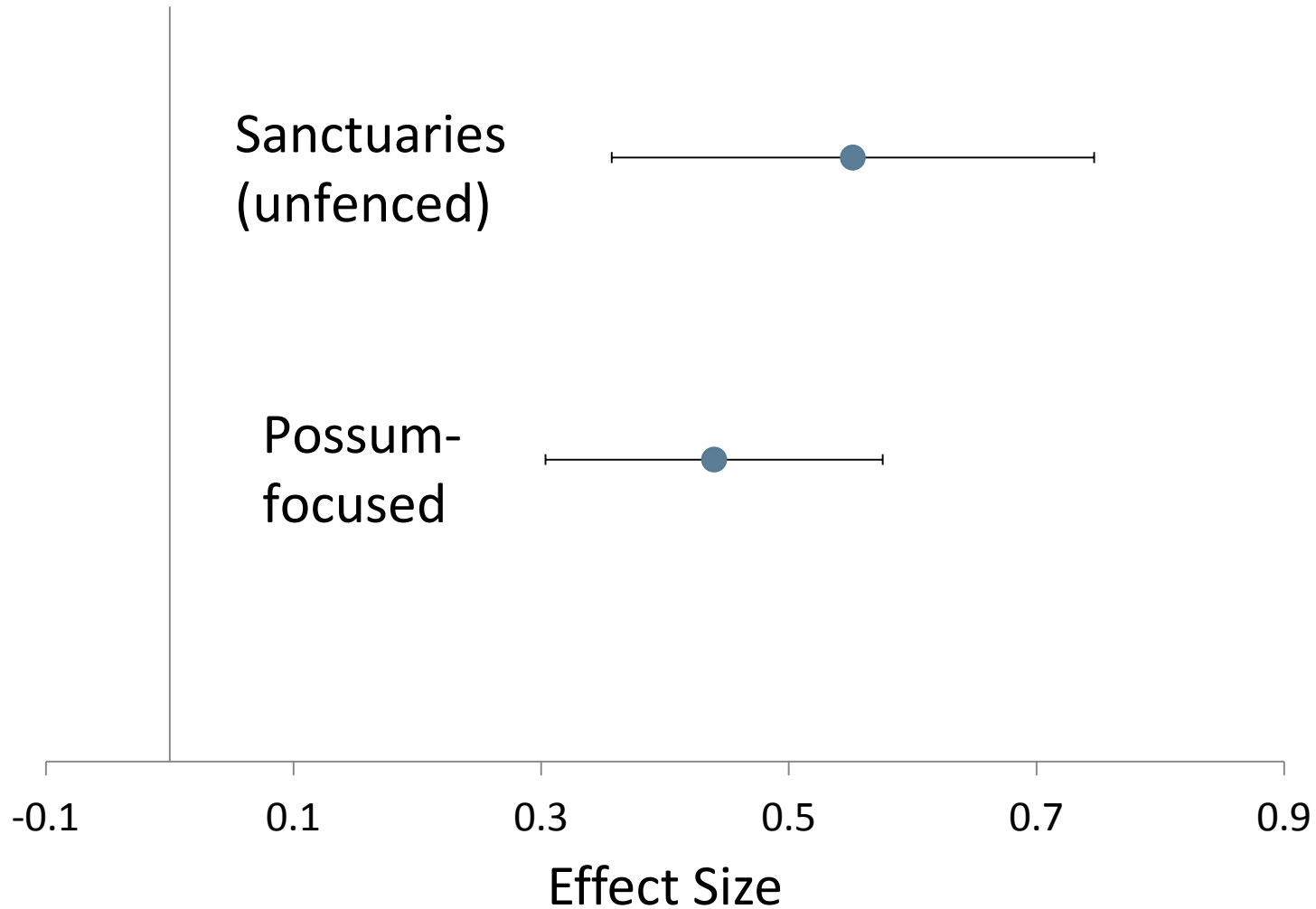
## Taxa



# Bird communities



# Preliminary look at unfenced sanctuaries



# Room for improvement?

- Standardised monitoring methods and measures ✓
- Data management:
  - Discoverability and accessibility
  - Consistent formats for curation
  - Consistent record values (e.g. species names)
  - Record zeros and effort
  - National templates/forms for recording data

# Future directions

- Comprehensive effect size meta-analysis of biodiversity responses for fenced sanctuaries, unfenced sanctuaries and mainland islands
- Explore community-level responses across different regimes (e.g. trends in species richness and evenness)



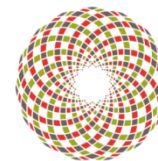
# Acknowledgements

- Andrea Byrom, Roger Pech, John Innes, Neil Fitzgerald, Robbie Price (Landcare Research) and Alex James (University of Canterbury)
- Biodiversity outcomes from possum-focused control:
  - Work funded by OSPRI (who manage the TBfree NZ programme) and MBIE
  - Data/help: Karen Vincent, Alastair Fairweather, Graeme Elliott, Hugh Robertson, Josh Kemp, Jerome Guillotel (DOC), Murray Hudson, Phil Dawson, Paul Livingstone, Bruce Warburton (OSPRI), Robbie Price, Wendy Ruscoe, Peter Bellingham, Frank Cross (Landcare Research).



**LANDCARE RESEARCH**  
MANAAKI WHENUA

National  
**SCIENCE**  
Challenges



**Te Pūnaha Matatini**  
Data ■ Knowledge ■ Insight