



Biodiversity benefits of NZ sanctuaries

Rachelle Binny, Andrea Byrom, John Innes, Neil Fitzgerald, Alex James and Roger Pech

Sanctuaries Workshop, 14 Aug 2018

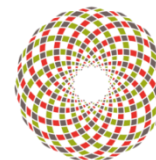


Manaaki Whenua
Landcare Research

NEW ZEALAND'S
BIOLOGICAL
HERITAGE

Ngā Kōhira
Tuku Iho

National
Science
Challenges

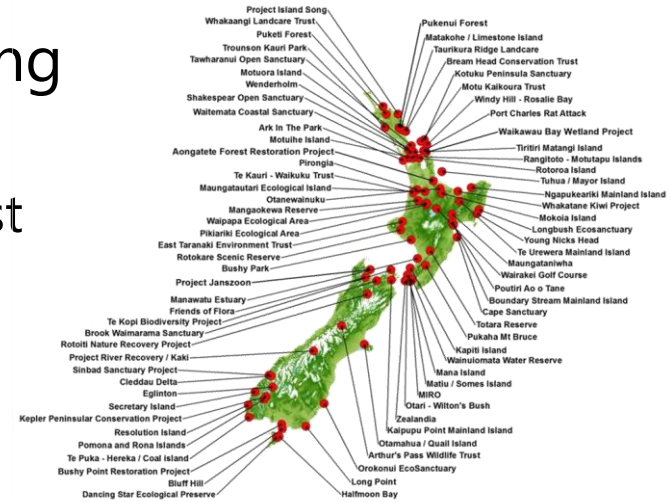


Te Pūnaha Matatini
Data ■ Knowledge ■ Insight



What can sanctuaries teach us?

- Predator Free NZ...then what?
- NZ's sanctuaries present vital learning opportunities:
 - How does biodiversity respond to pest control?
 - Pest suppression vs. eradication
 - Thresholds for control



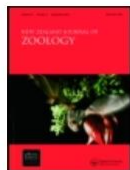


NZ's major control regimes

1. Large-scale aerial 1080
(e.g. OSPRI for TB, Battle for Our Birds)
2. Mainland Islands (unfenced,
e.g. Boundary Stream,
Wainuiomata MI)
3. Fenced sanctuaries
(e.g. Zealandia, Maungatautari,
Orokonui, Rotokare)
4. Off-shore, pest-free islands
(e.g. Tiritiri Matangi)



Fenced sanctuaries and mainland islands



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Six years of intensive pest mammal control at Trounson Kauri Park, a Department of Conservation "mainland island", June 1996–July 2002

C. A. Gillies, M. R. Leach, N. B. Coad, S. W. Theobald, J. Campbell, T. Herbert, P. J. Graham & R. J. Pierce

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Fencing in nature? Predator exclusion restores habitat for native fauna and leads biodiversity to spill over into the wider landscape



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ABSTRACT

Large areas of habitat are being fenced globally to restore and relocate species that can no longer survive in their surrounding landscapes, such as because of introduced predators. Despite their promise, the contributions of fenced and intensively-managed reserves towards achieving wider biodiversity goals are contentious. There has been little empirical evidence that fenced reserves can restore communities or ecological function over larger landscapes in ways that justify their large economic and sometimes social costs. Here we tested whether the exclusion of introduced predators restored mammal-sensitive habitat after 8 years within a mainland fenced reserve in southern New Zealand. We also asked whether the abundance of bird-dispersed fruiting trees and frugivorous birds was elevated immediately outside the reserve as compared with the broader landscape. We found that only saplings of fleshy-fruited tree species sensitive to browsing and seed predation by introduced mammals increased over time within the reserve. These mammal-sensitive trees were also more abundant in the surrounding unfenced landscape when close to the reserve, i.e. within 500 m. Our results suggested that mammal-sensitive trees were benefitting from increased fruit dispersal that was spilling over the fenced boundary as mammal-sensitive frugivores responded to predator control. Using point count surveys at 278 unique sites throughout the broader region, we found that the native frugivore community that evolved in the absence of mammalian predators was a third more abundant within the reserve and immediately outside the fenced boundary than at sites 20 km away in the surrounding landscape. Non-endemic frugivores did not show the same spatial pattern. Our work provides among the first evidence that an intensively-managed wildlife reserve can measurably restore populations of threatened flora and fauna and disperse conservation benefits into wider landscapes.



Biodiversity monitoring database

- Database of biodiversity monitoring data from managed sites
- > 1 million records!
- 26 sites (3 DOC Mainland Islands, 23 other sanctuaries)
- 17 unfenced, 4 ring-fenced, 5 peninsula-fenced
- 1993-2017
- 452 species (birds, invertebrates, herpetofauna, vegetation and pests)





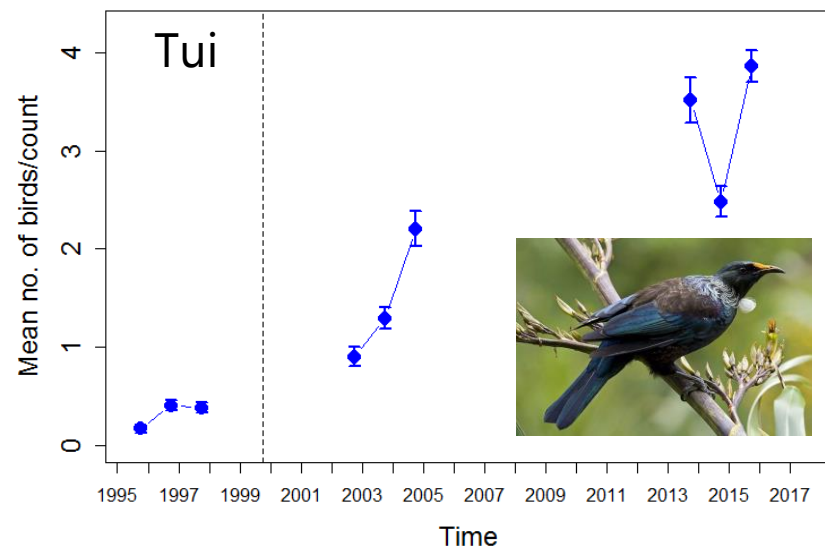
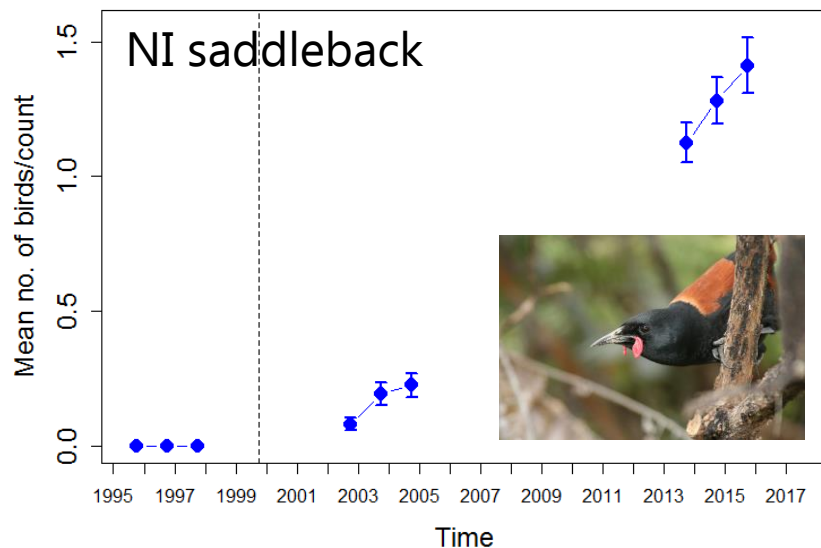
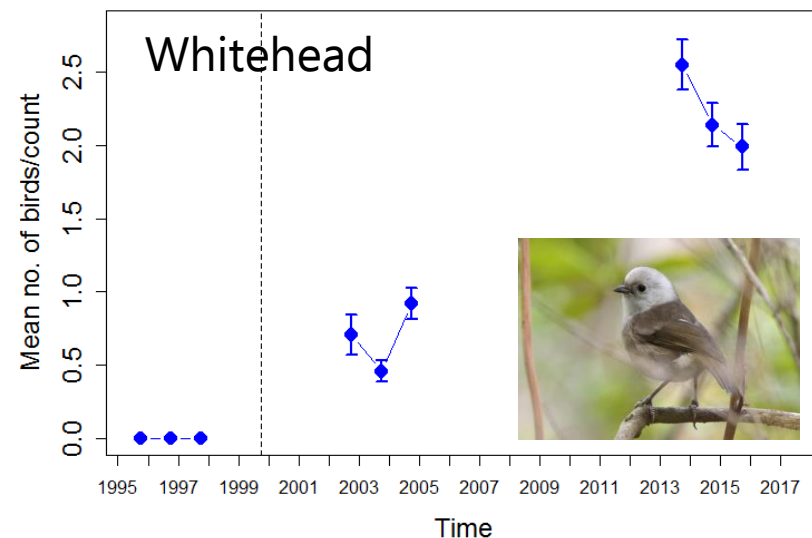
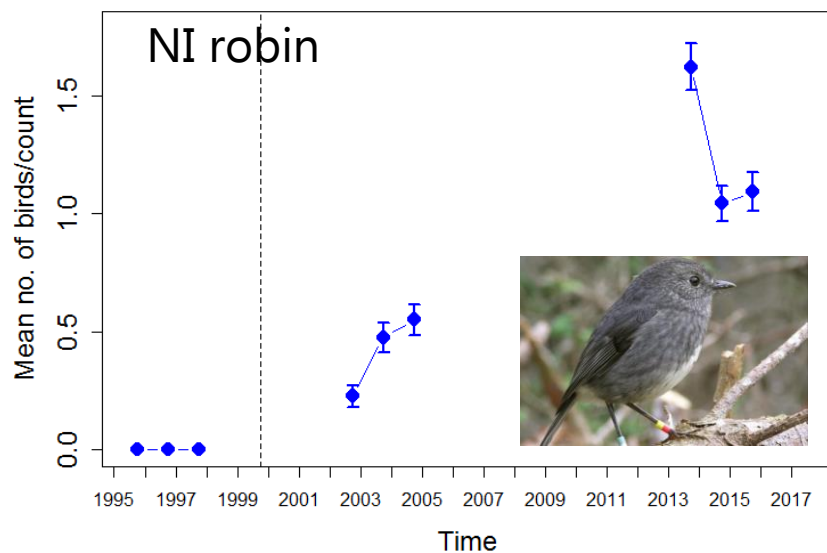
Fenced sanctuaries



Forest birds - Zealandia



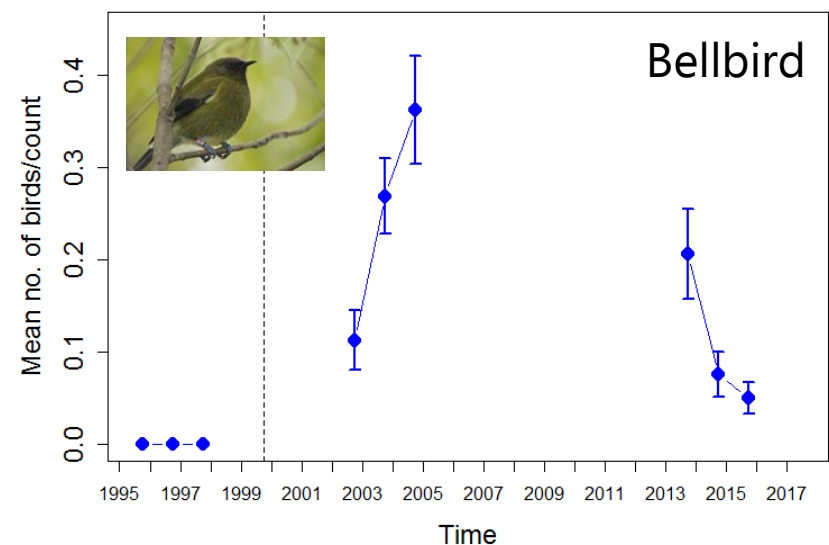
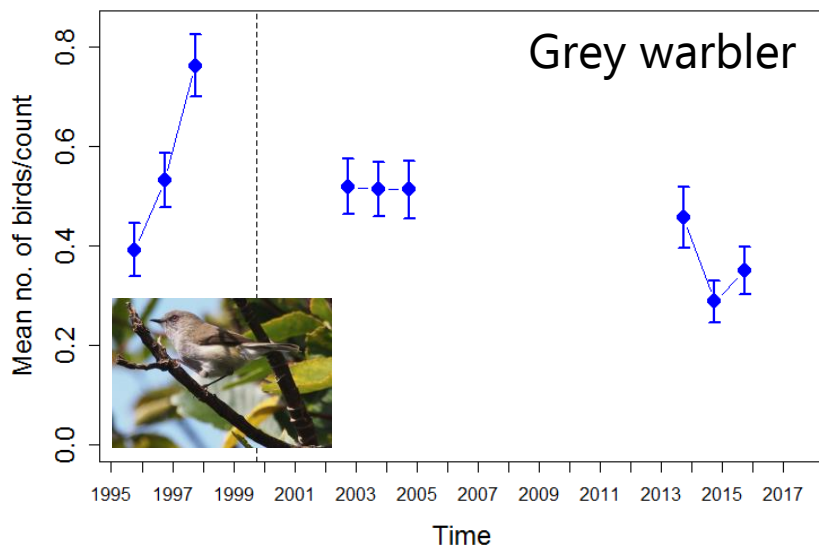
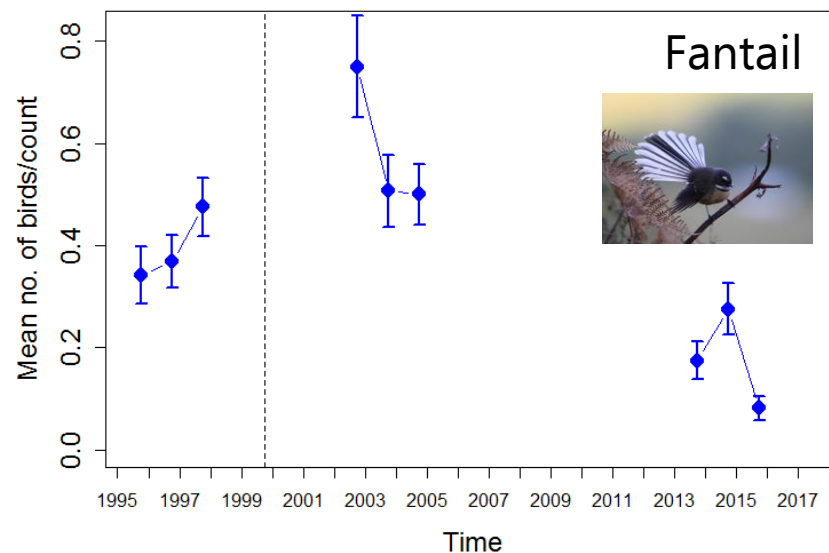
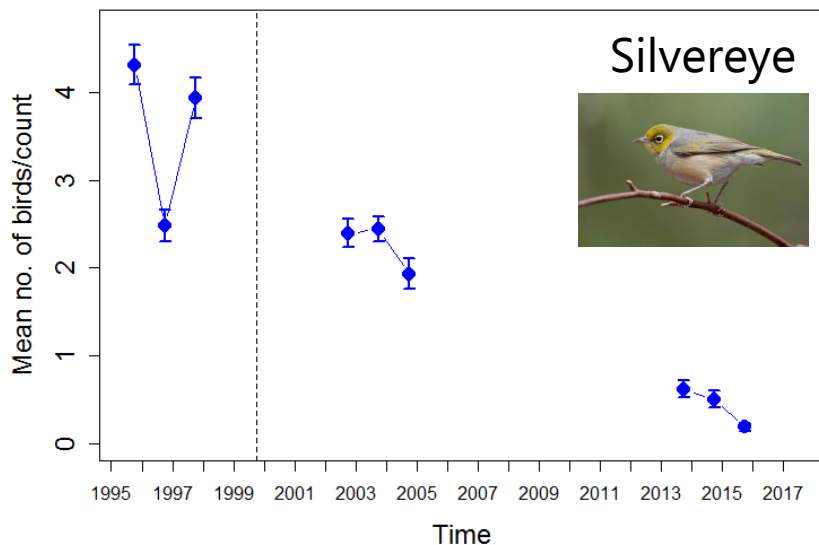
Miskelly CM (2018) Changes in the forest bird community of an urban sanctuary in response to pest mammal eradications and endemic bird reintroductions. *Notornis*, 65: 132-151.



Zealandia – forest birds



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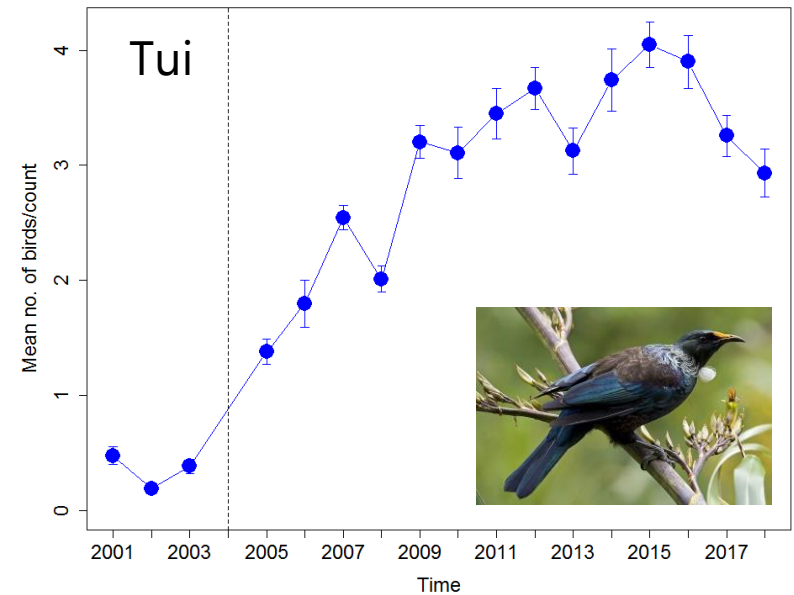
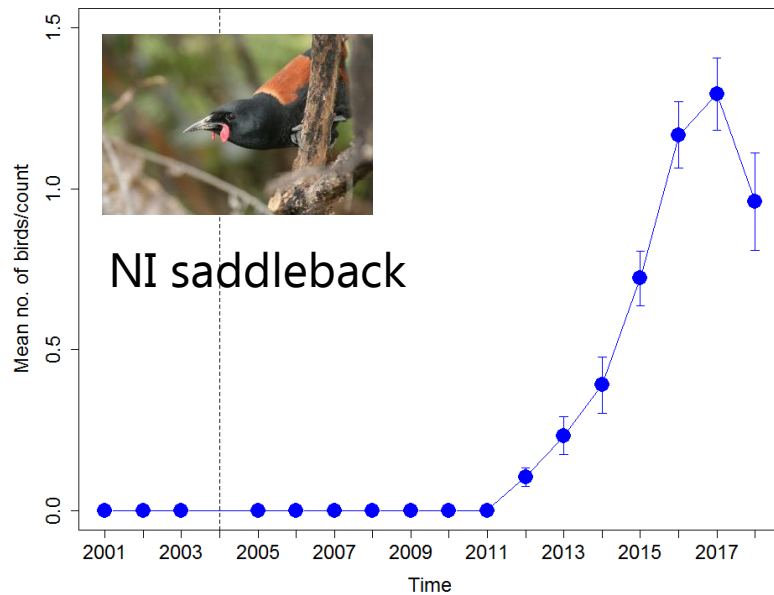
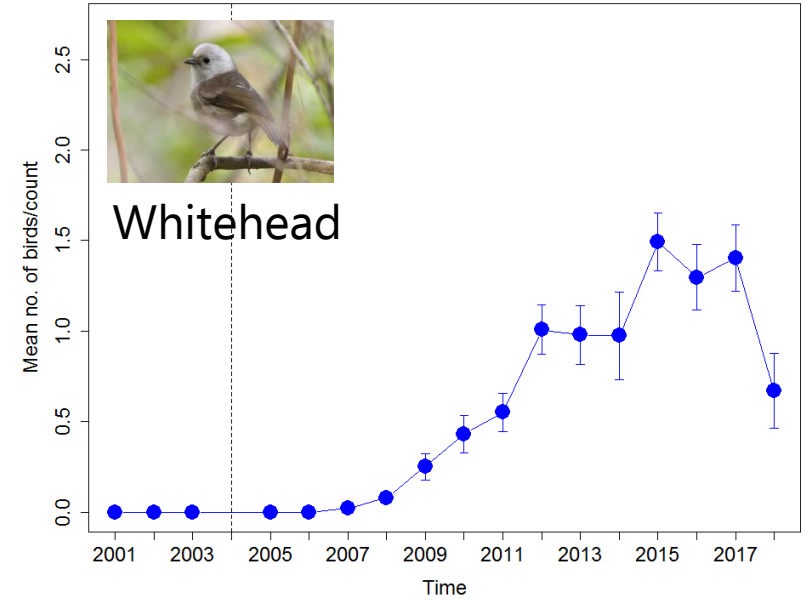
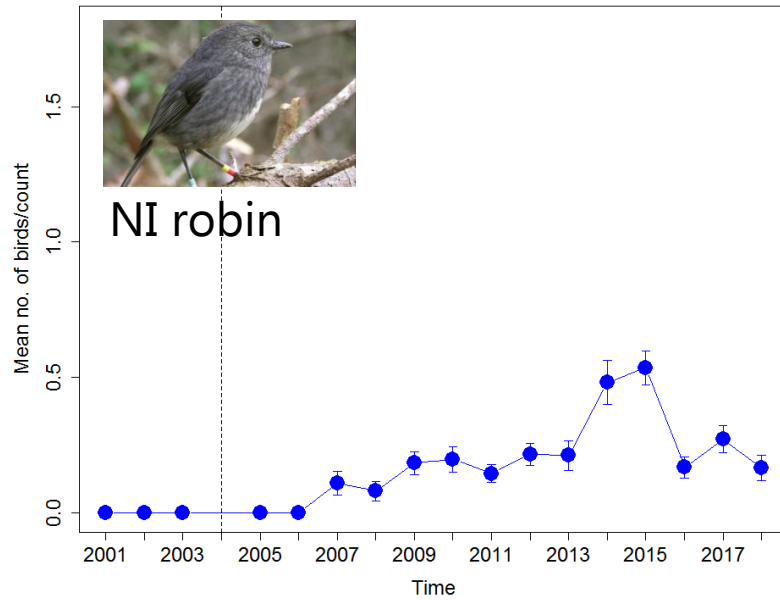




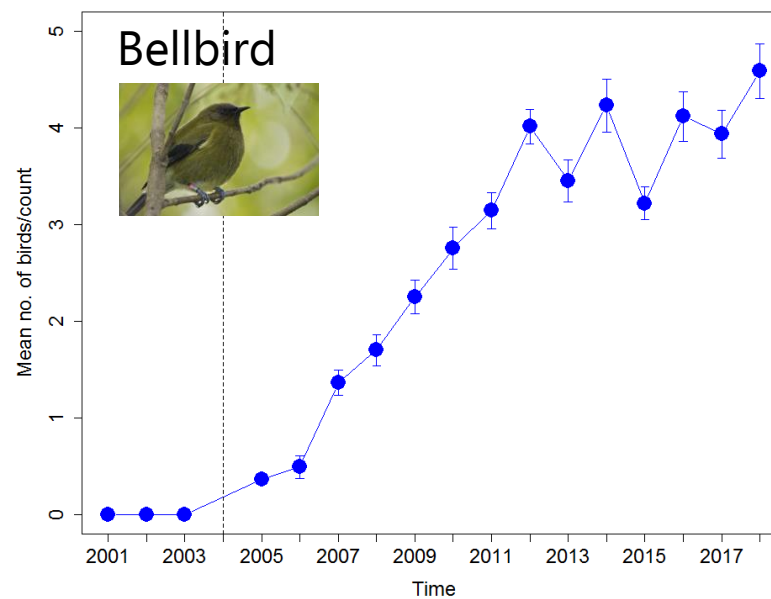
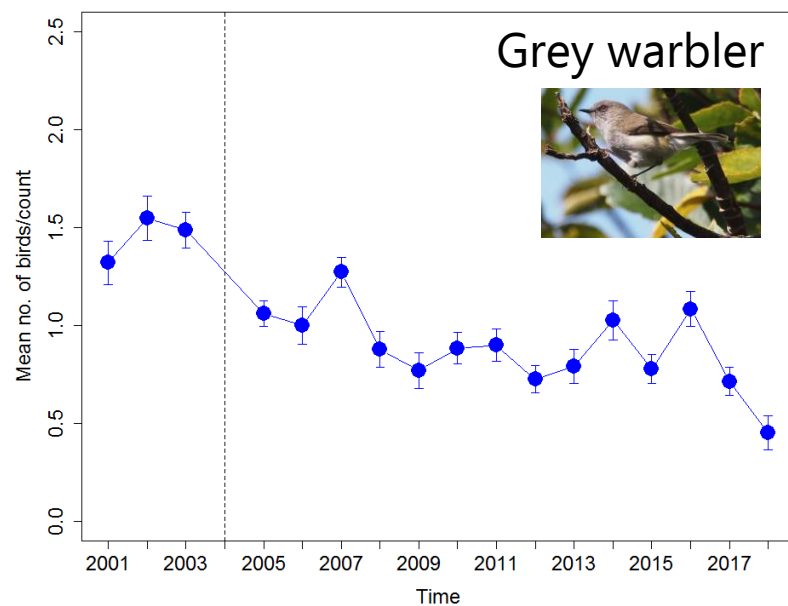
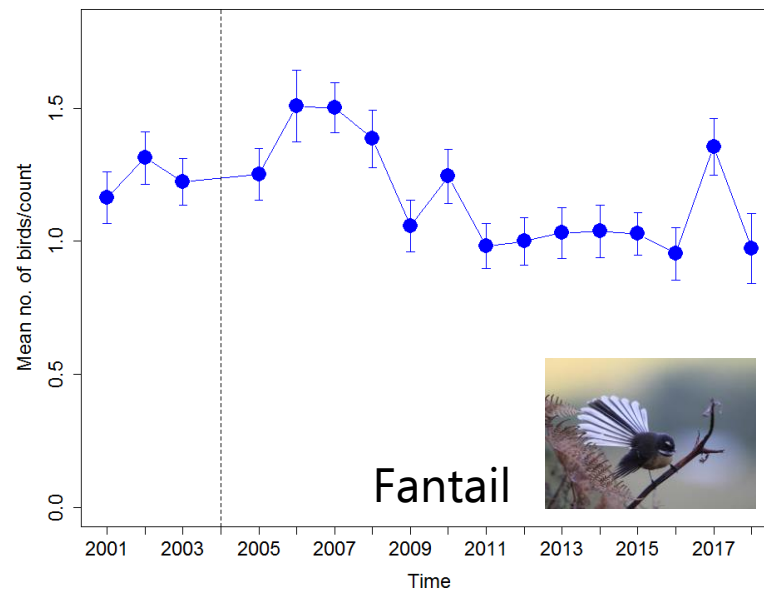
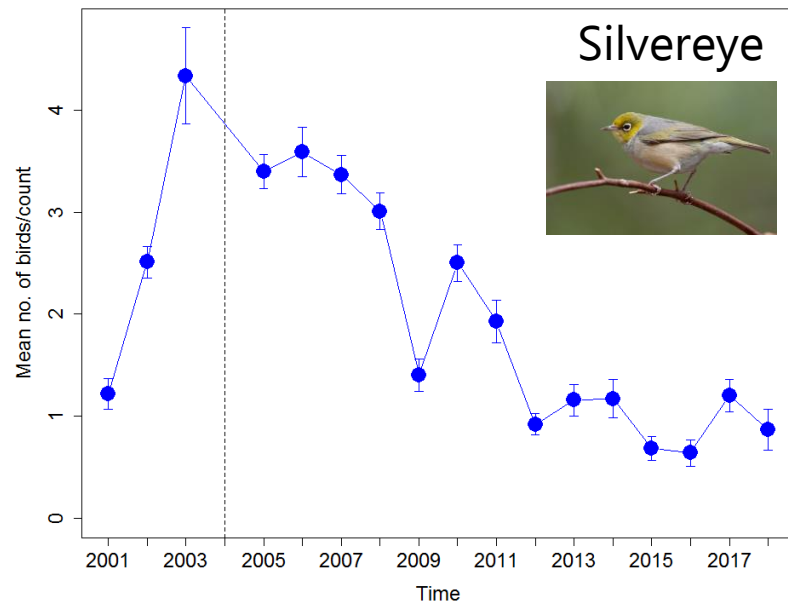
Fenced peninsulas



Fenced peninsula – Tawharanui Open Sanctuary



Fenced peninsula – Tawharanui Open Sanctuary

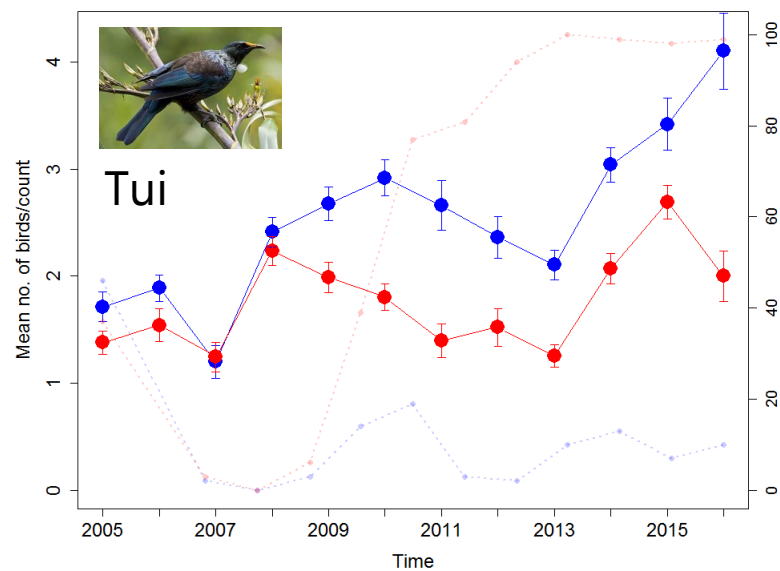
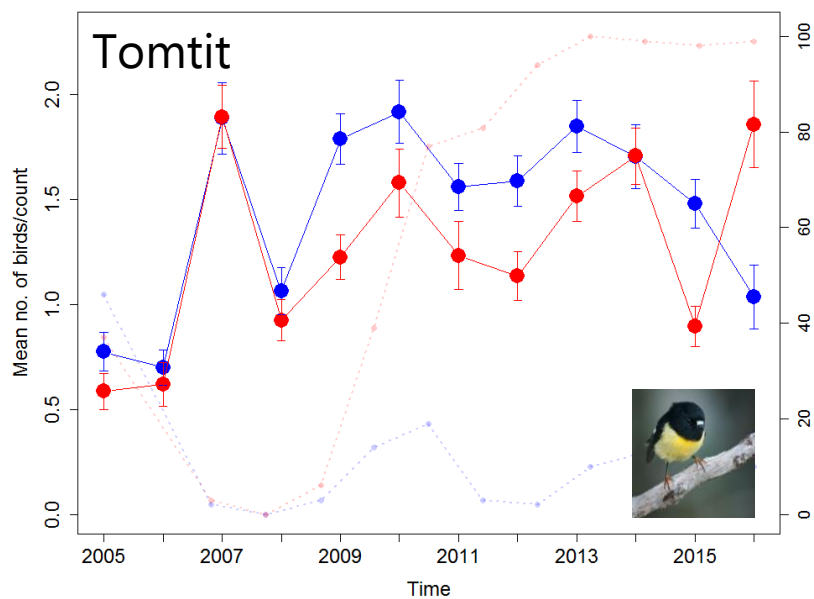
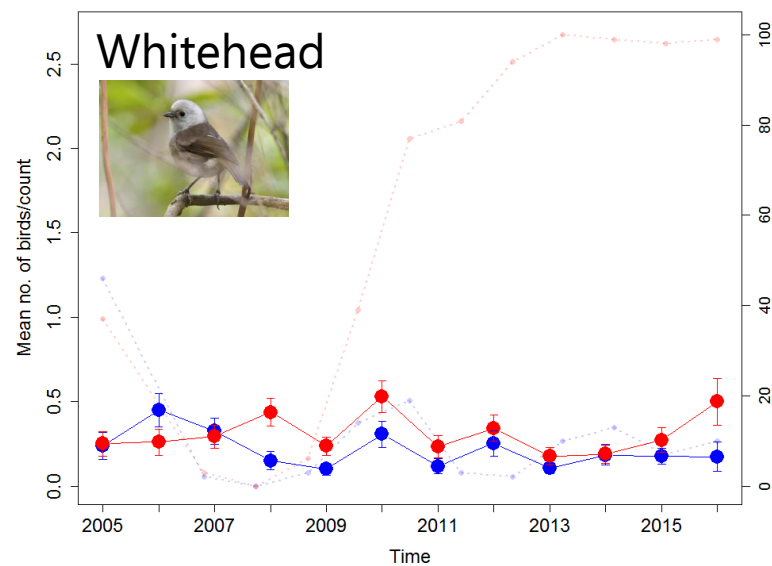
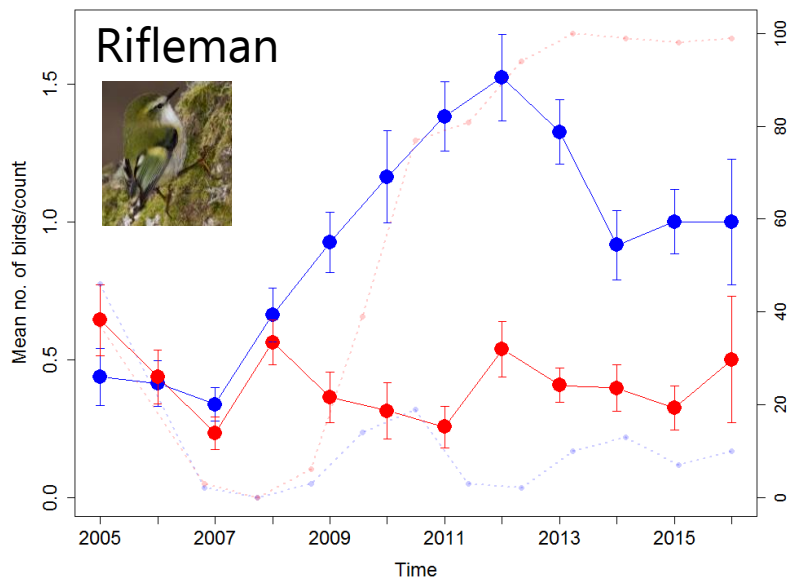


Mainland Islands



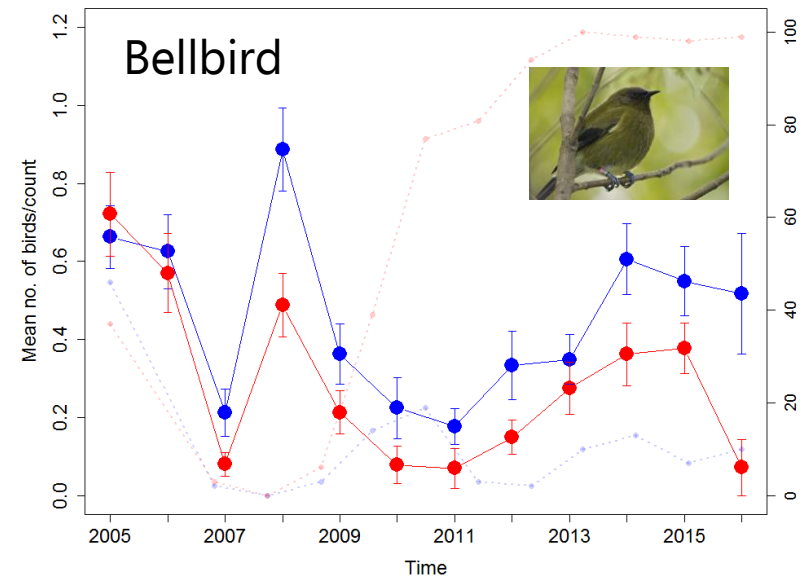
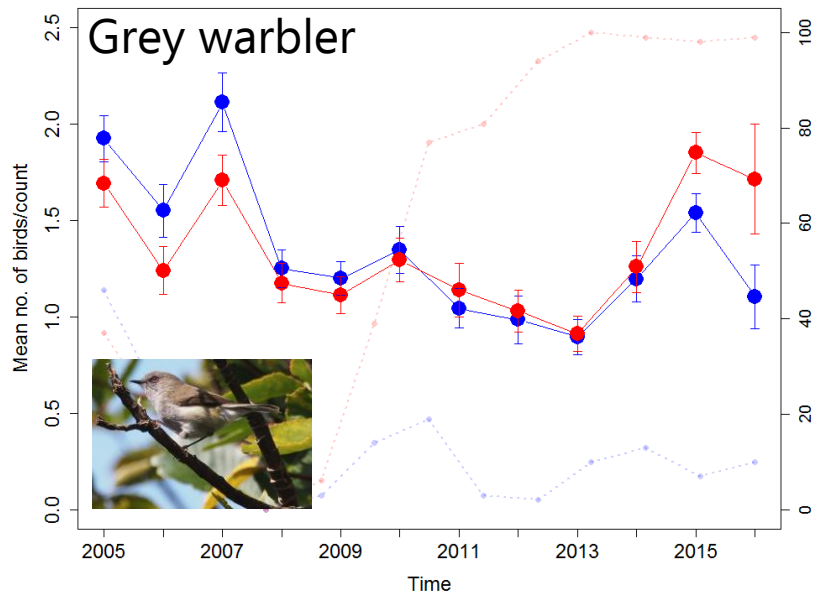
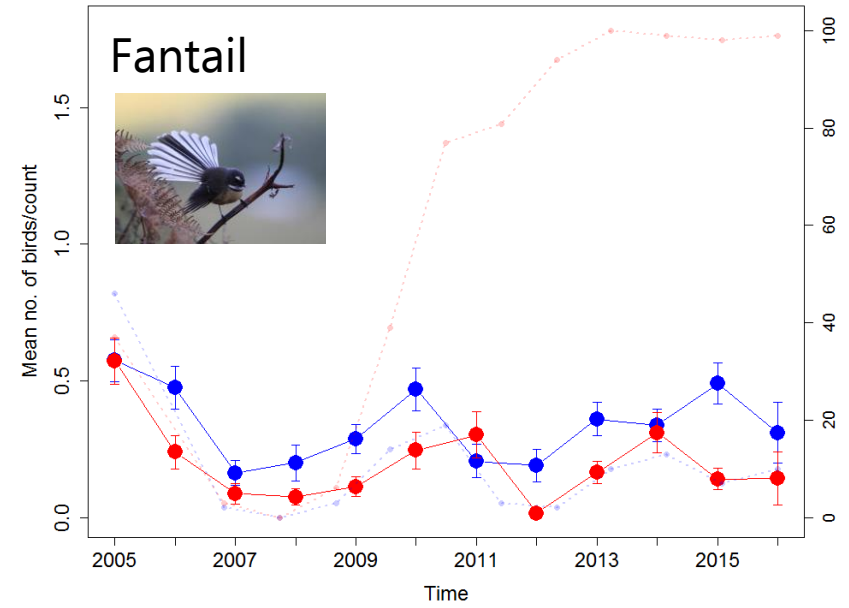
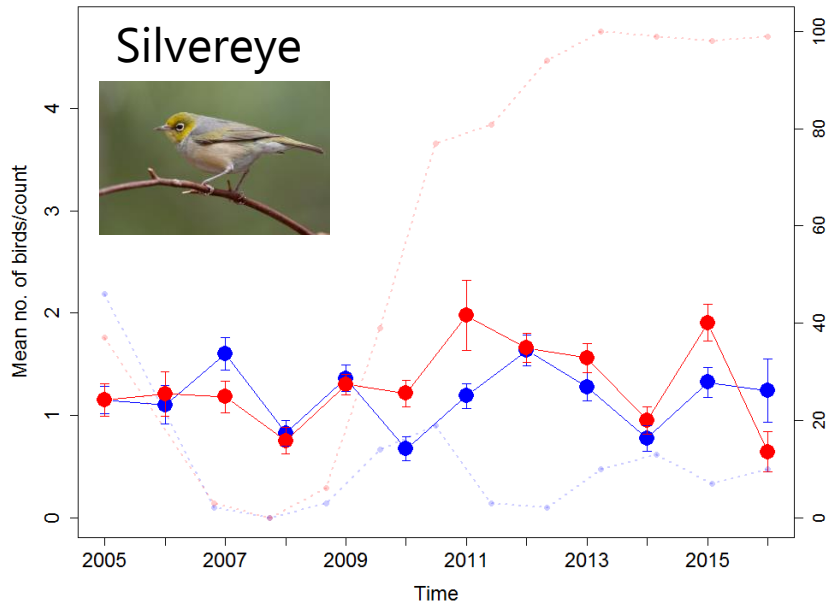
Mainland Islands – Wainuiomata MI

Treatment
Non-treatment



Mainland Islands – Wainuiomata MI

Treatment
Non-treatment





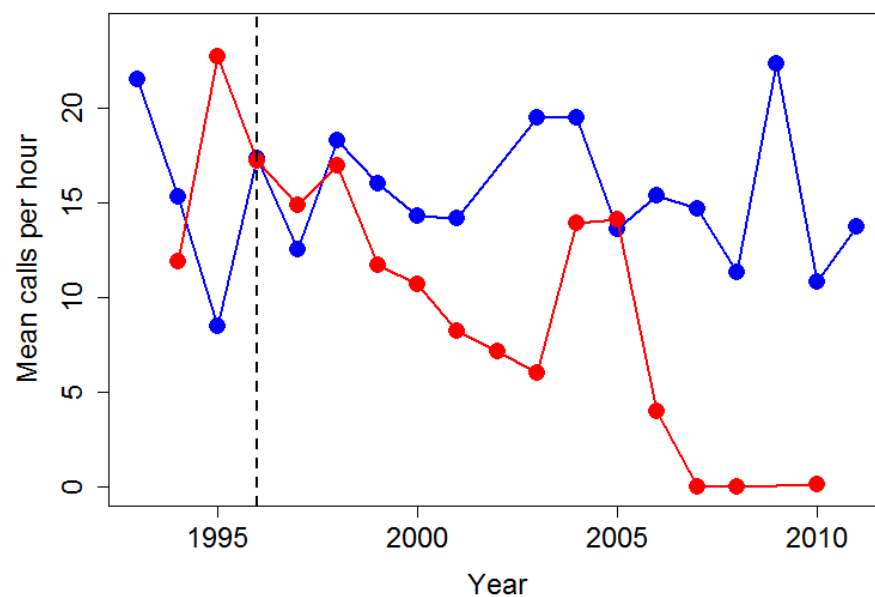
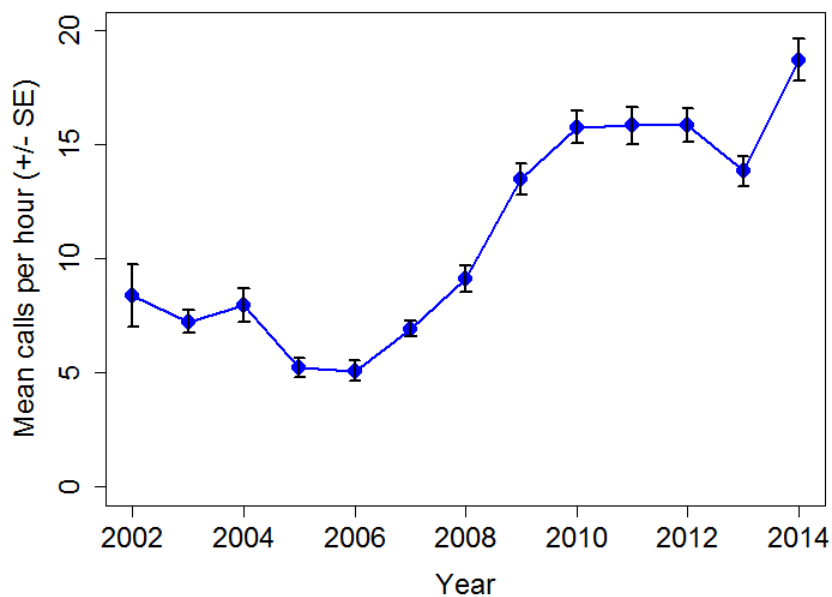
Kiwi – fenced vs. mainland islands



Little spotted kiwi
Zealandia



NI brown kiwi
Trounson Kauri Park



Treatment
Non-treatment



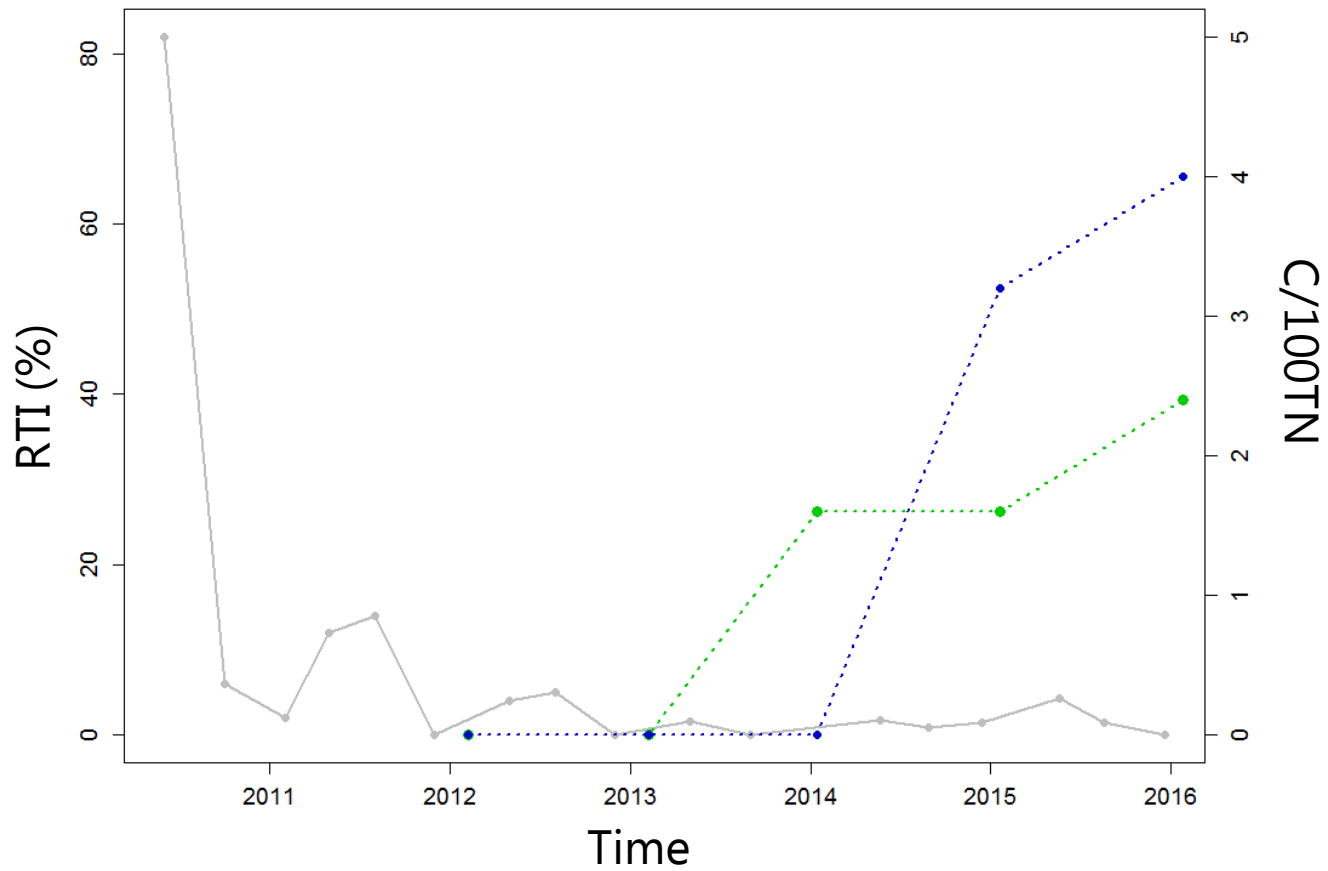
Skinks – Bream Head Scenic Reserve



Oligosoma ornatum



Oligosoma whirinaki





Skinks – Rotoiti Nature Recovery Project



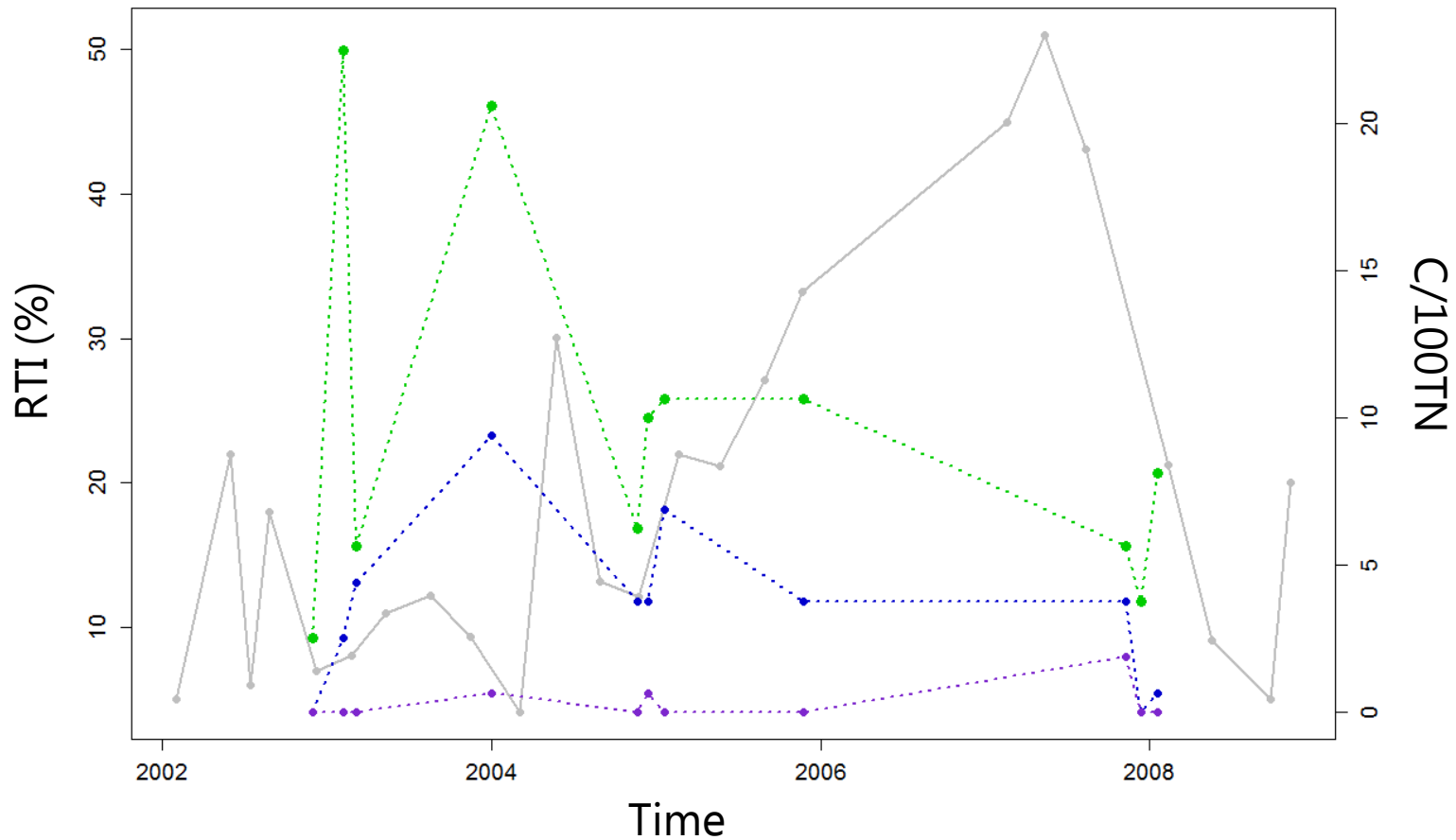
Common skink



Speckled skink



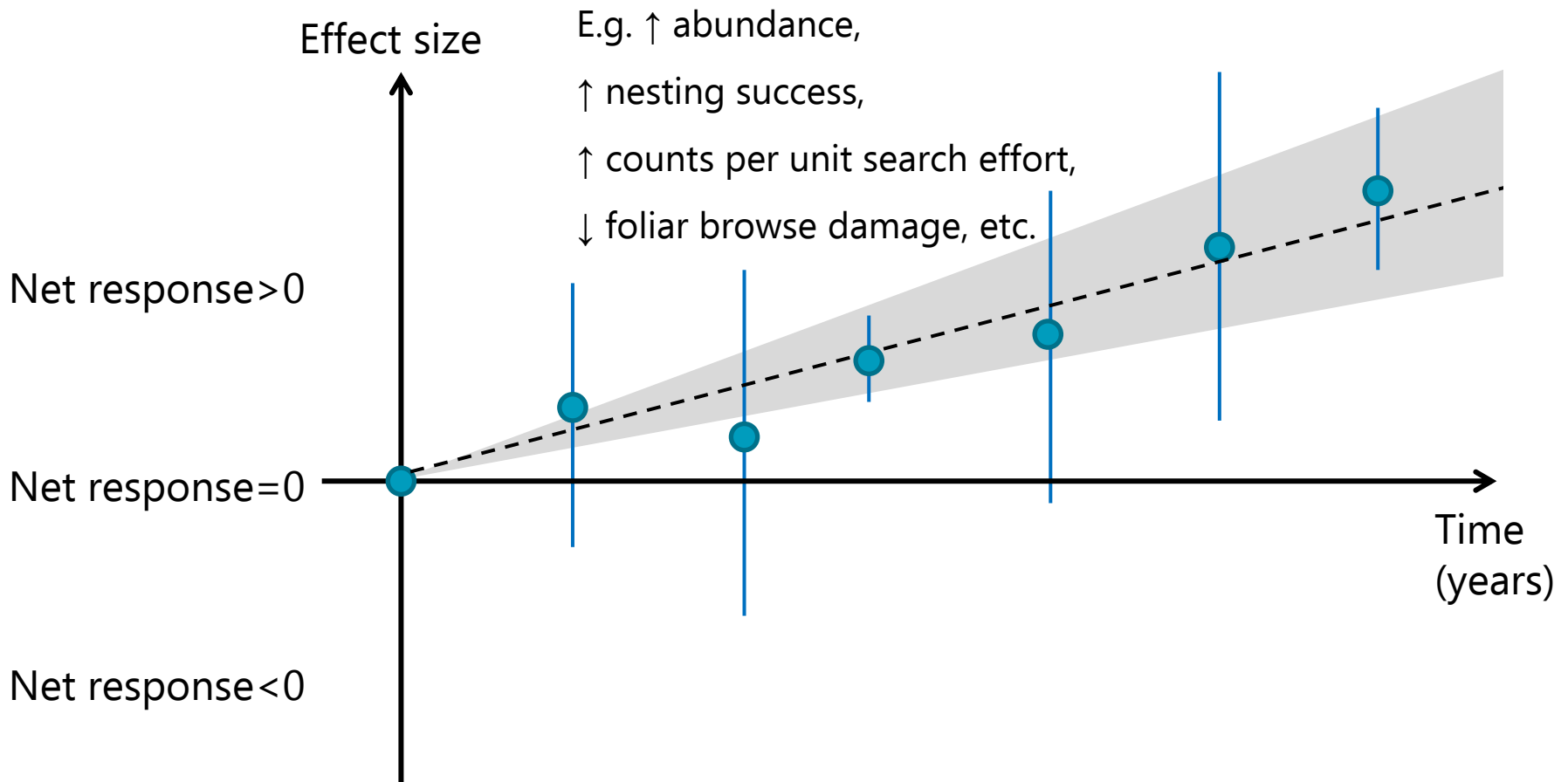
Spotted skink



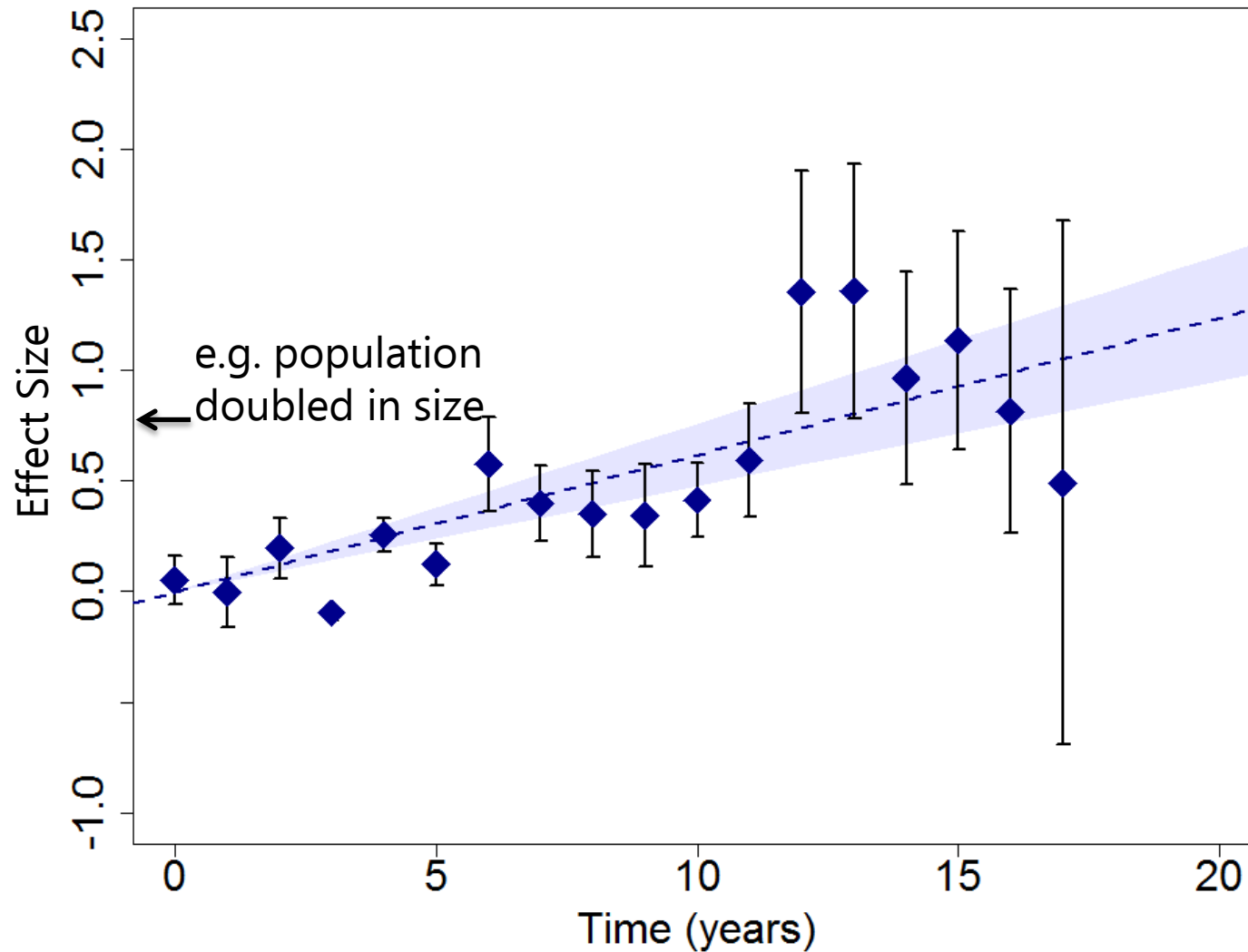
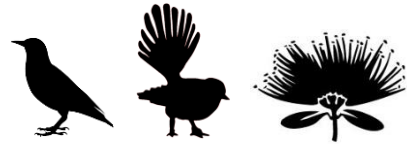


Regime comparison: meta-analysis

"Effect size": measures the average effect on biodiversity of conducting pest control, relative to the effect of not conducting pest control



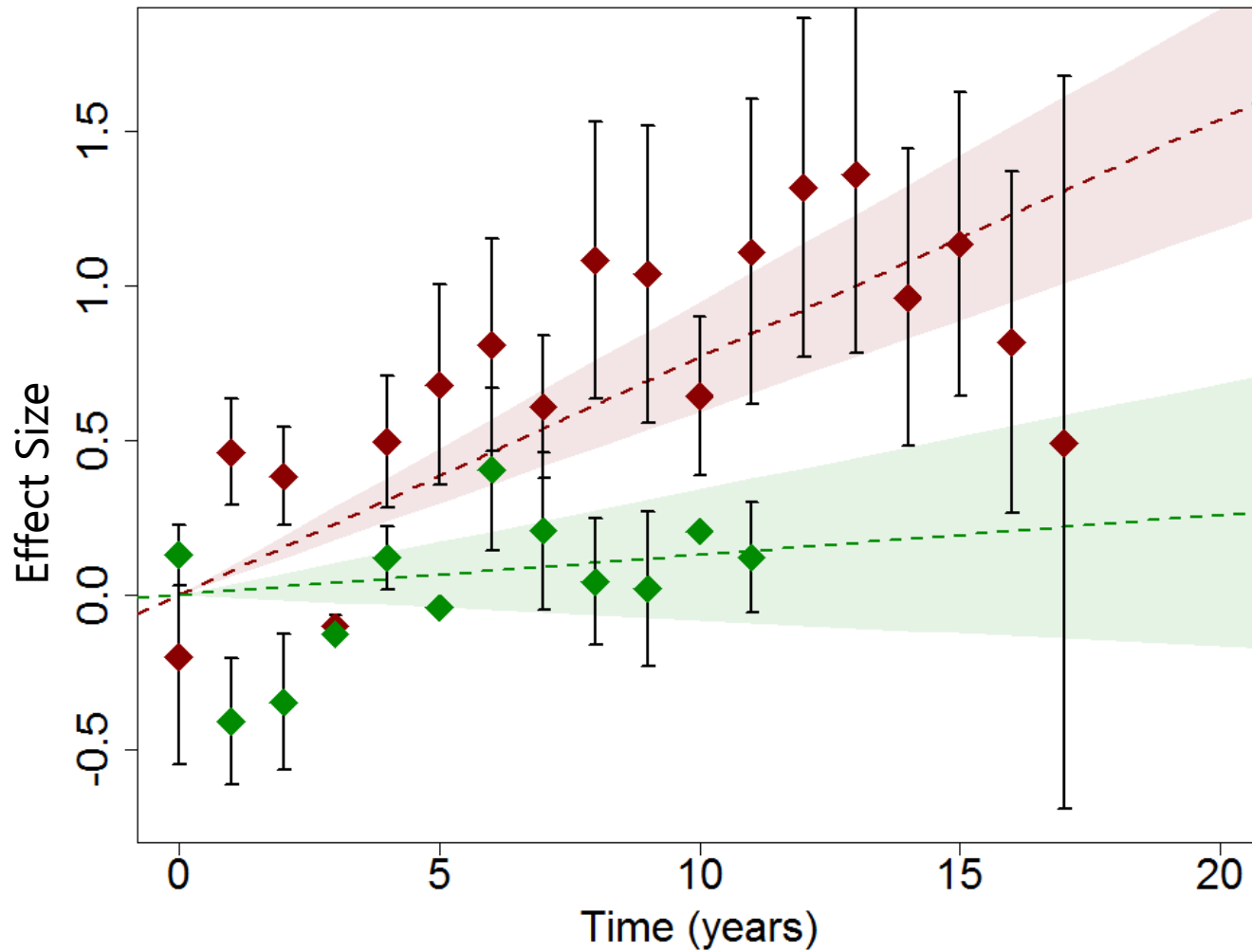
Fenced & mainland island combined



Fenced vs. mainland island



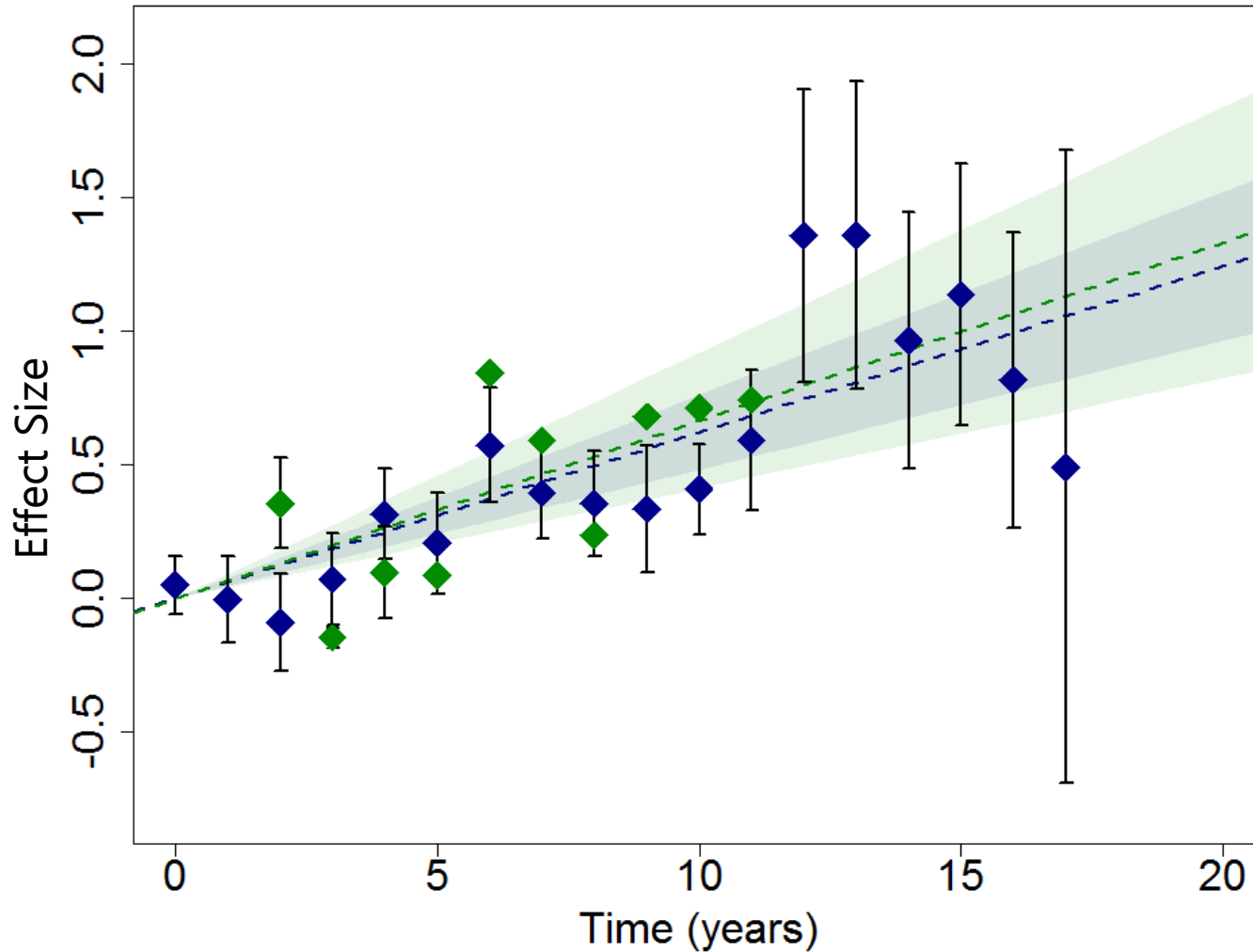
Fenced
Mainland island



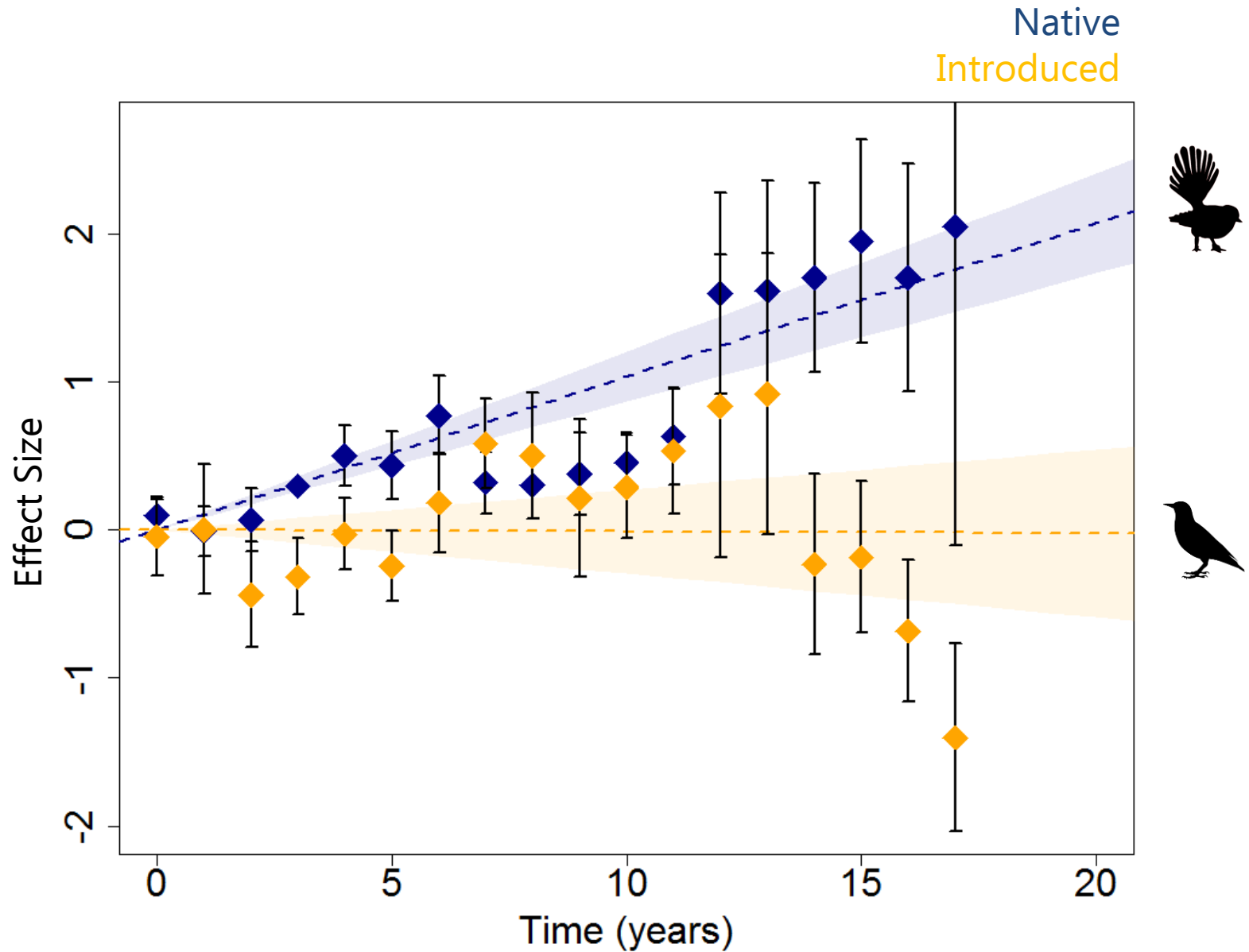
Birds vs. vegetation



Birds
Vegetation

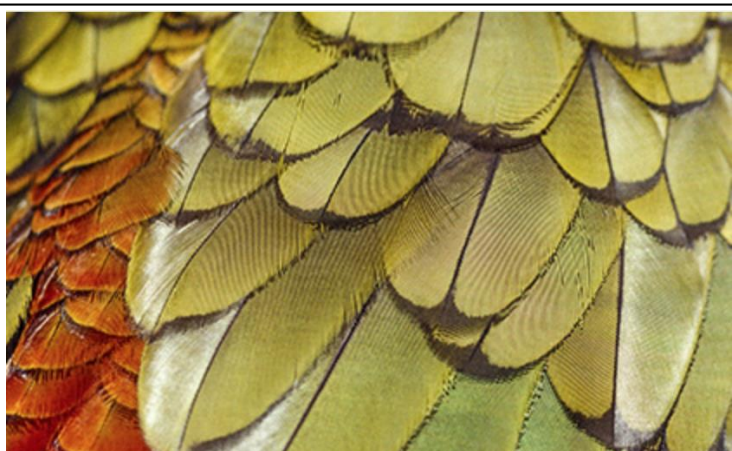


Birds: native vs. introduced





Endemicity levels for NZ bird species

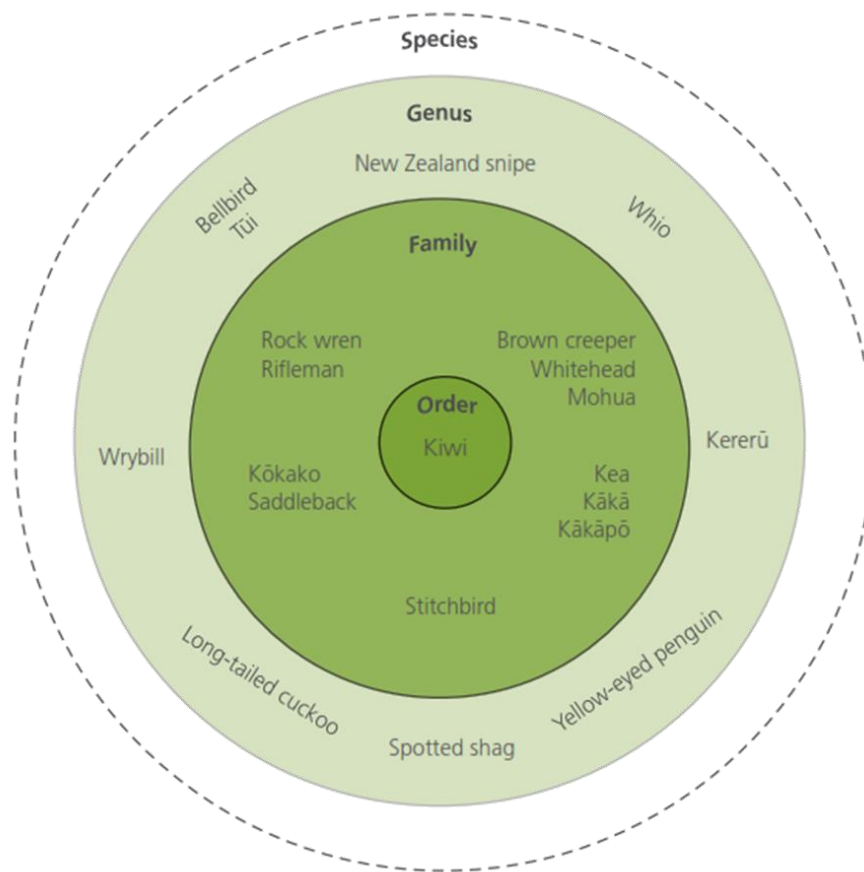


Taonga of an island nation:
Saving New Zealand's birds

May 2017

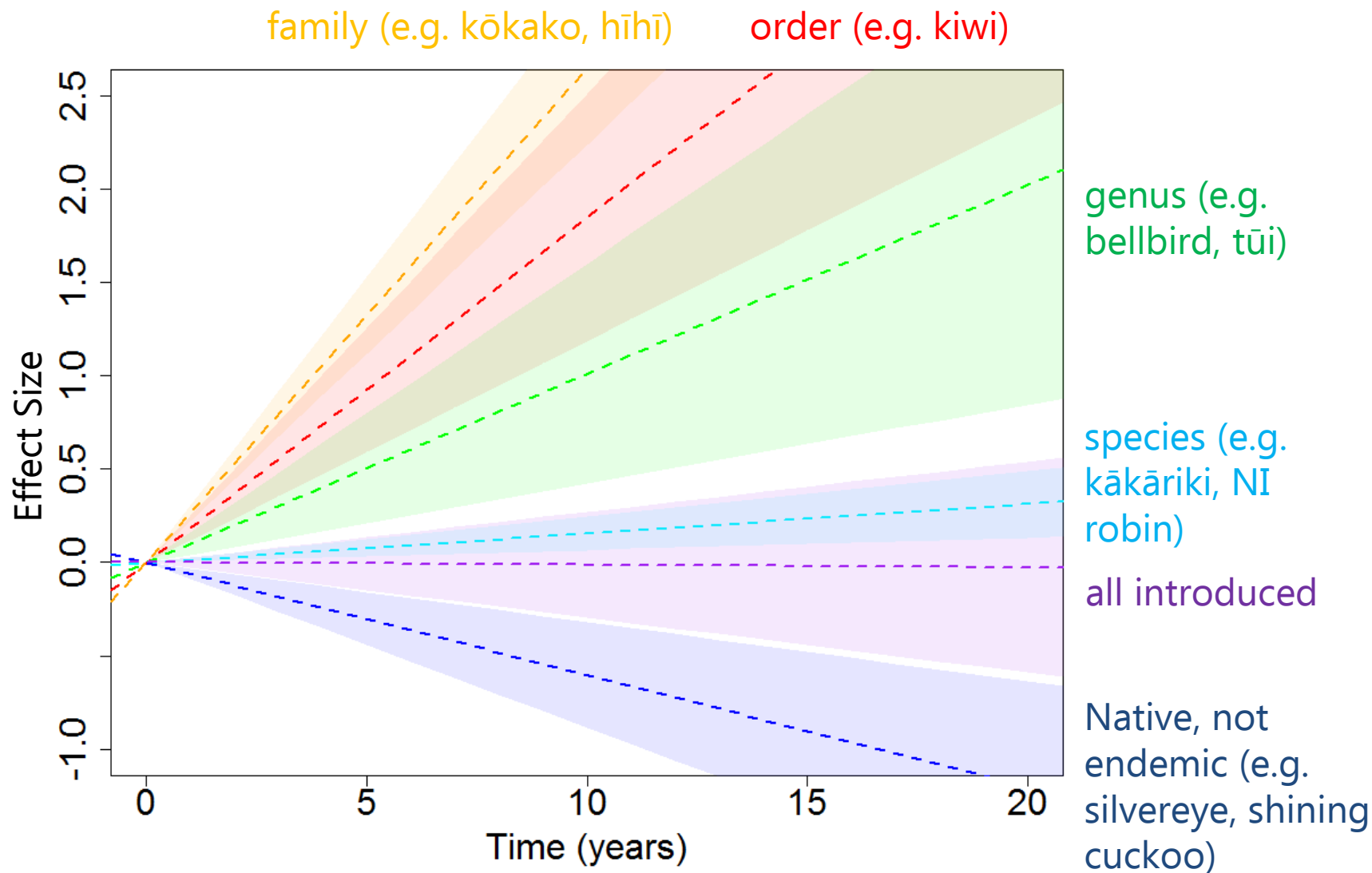


Parliamentary Commissioner
for the **Environment**
Te Kaitiaki Taiao a Te Whare Pāremata



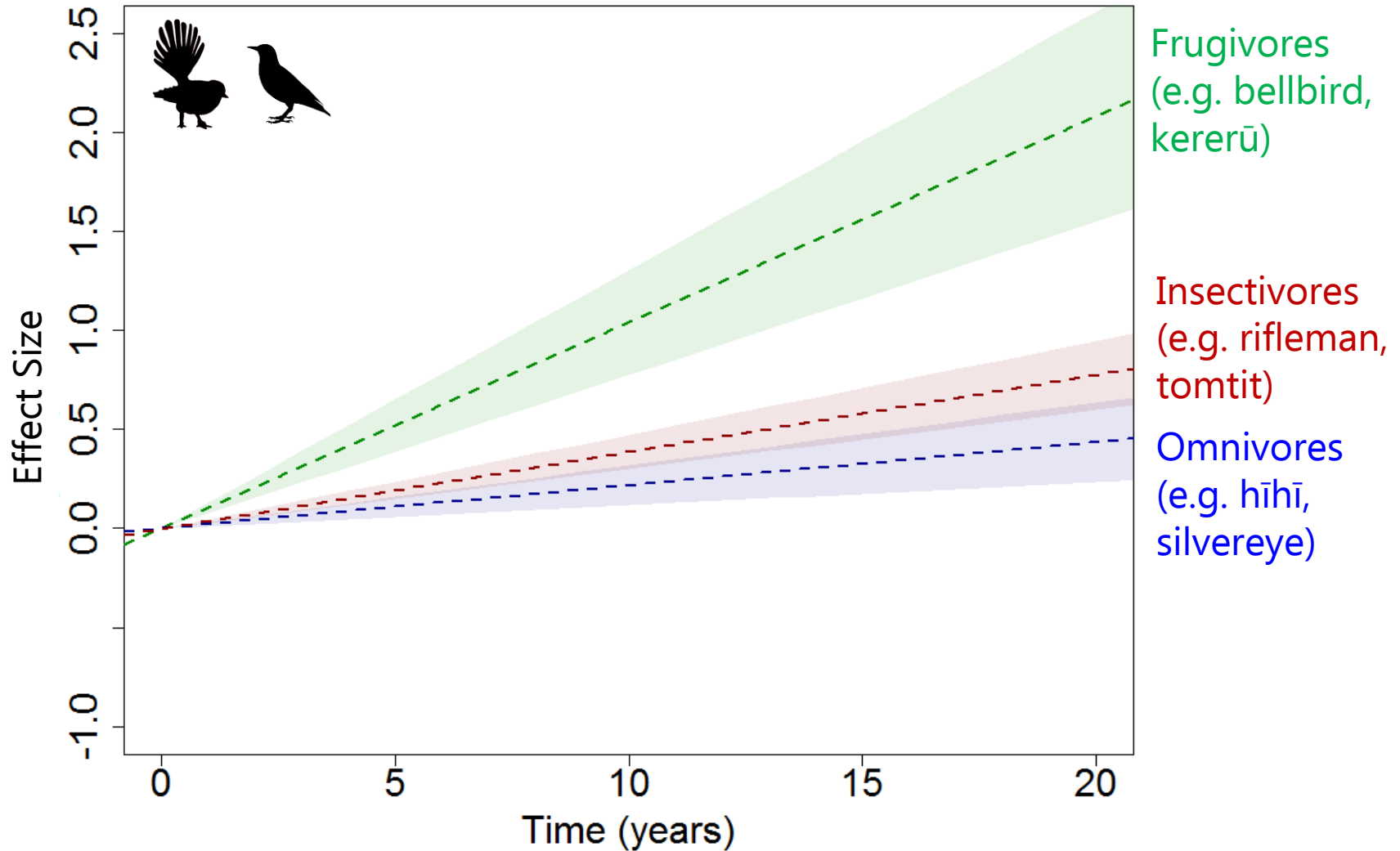


Birds: endemcity





Birds: primary guild



Room for improvement?



- Need consistent and long-term monitoring of biodiversity outcomes and residual pest abundance
 - Standardised monitoring methods and measures ✓
 - Data sharing & reuse
 - Data management





Summary

- Both increases and declines for species in sanctuaries
- How to measure success?
- Knowledge gaps: outcomes for communities and ecosystems
- Need **consistent** and **long-term** monitoring: diverse biodiversity measures and residual pest abundance using standardised indices





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- DOC MI staff for field data collection and reporting
- **Sanctuaries data:** Auckland Council (Shakespear Open Sanctuary, Tawharanui Open Sanctuary), Ark in the Park, Bluff Hill/Environment Southland, Bream Head Scenic Reserve, Bushy Point, Cape Sanctuary, Colin Miskelly (Te Papa), Corinne Watts (Manaaki Whenua), East Taranaki Environment Trust, Forest Lifeforce Environment Trust, Glenfern Sanctuary, Halfmoon Bay Habitat Restoration Project, Kaipupu Point Wildlife Sanctuary, Mainland Island Restoration Operation, Maungatautari, Orokonui, Pirongia, Pomona and Rona Islands, Puketi, Rotokare Scenic Reserve Trust, Horizons Regional Council (Totara Reserve), Wainuiomata Mainland Island, Windy Hill, Zealandia

