

# Strategic rat control for restoring native bird populations in forest fragments on private land

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# Strategic Management

- Experimentation to estimate effectiveness with respect to goal(s)
- Allocate management effort where most effective





# Native Forest Fragments on Rereahu Farms



*Y. Richard*



*R. Morris*



# Benneydale Project (2002-?)

A model system for understanding roles of local habitat quality vs metapopulation dynamics in fragmented landscapes

## Robins

- Fragment occupancy
- Survival surveys
- Reproduction
- Juvenile dispersal/survival
- Reintroductions
- Post-release dispersal

## Rats

- Tracking tunnels
- Artificial nests
- Experimental control

## Invertebrates

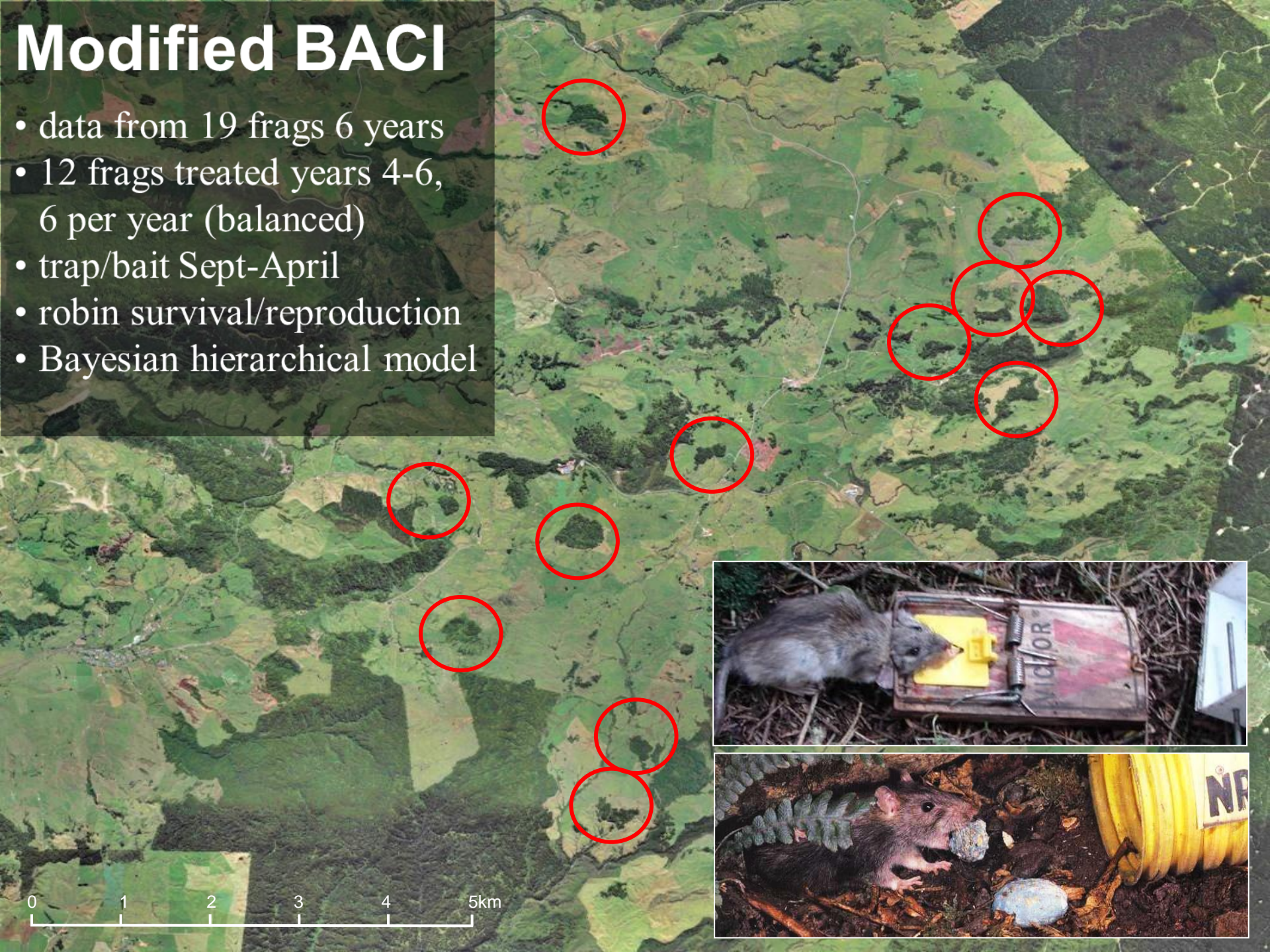
- Pitfall trapping





# Modified BACI

- data from 19 frags 6 years
- 12 frags treated years 4-6, 6 per year (balanced)
- trap/bait Sept-April
- robin survival/reproduction
- Bayesian hierarchical model



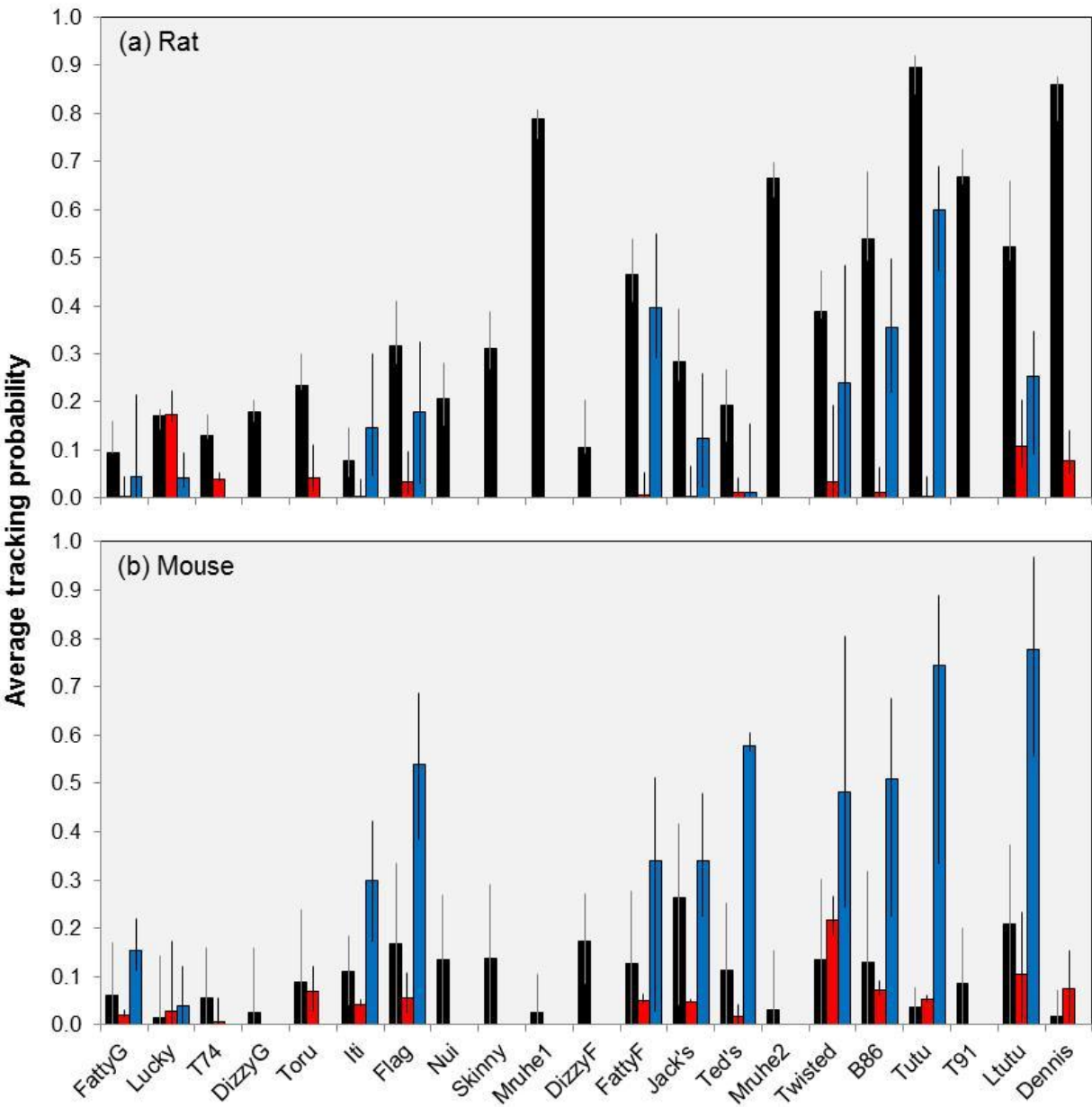
0 1 2 3 4 5km



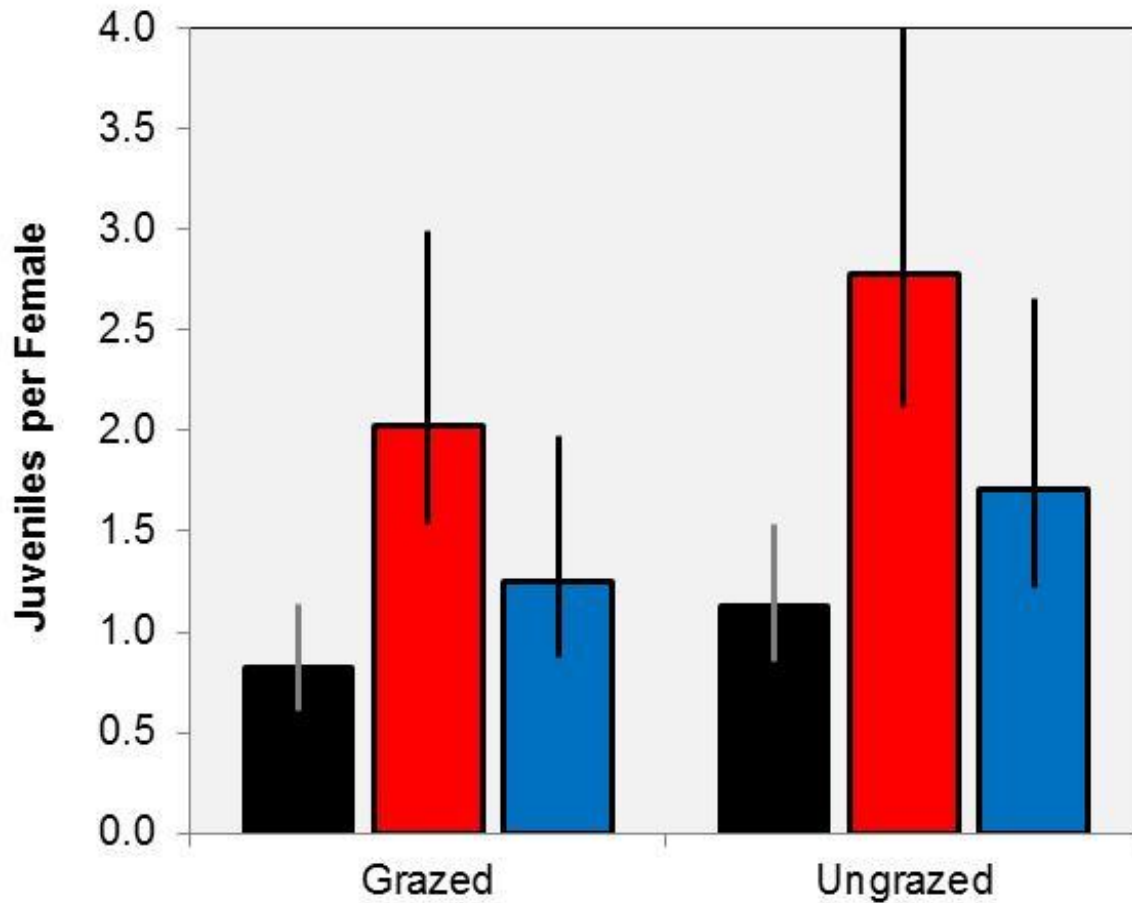
# Effectiveness of Rat Control



Understory density  
→

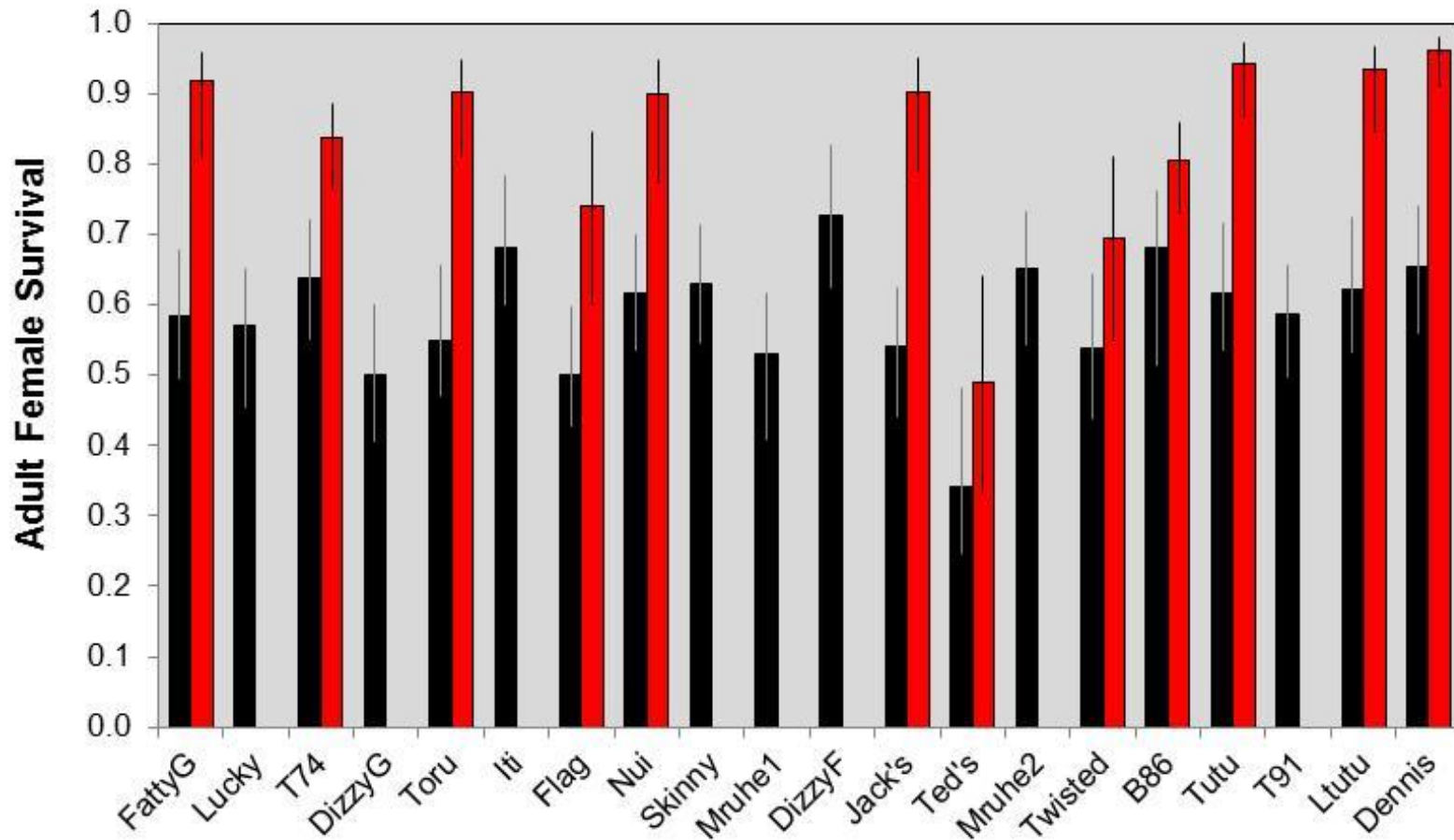


# Robin Reproductive Success



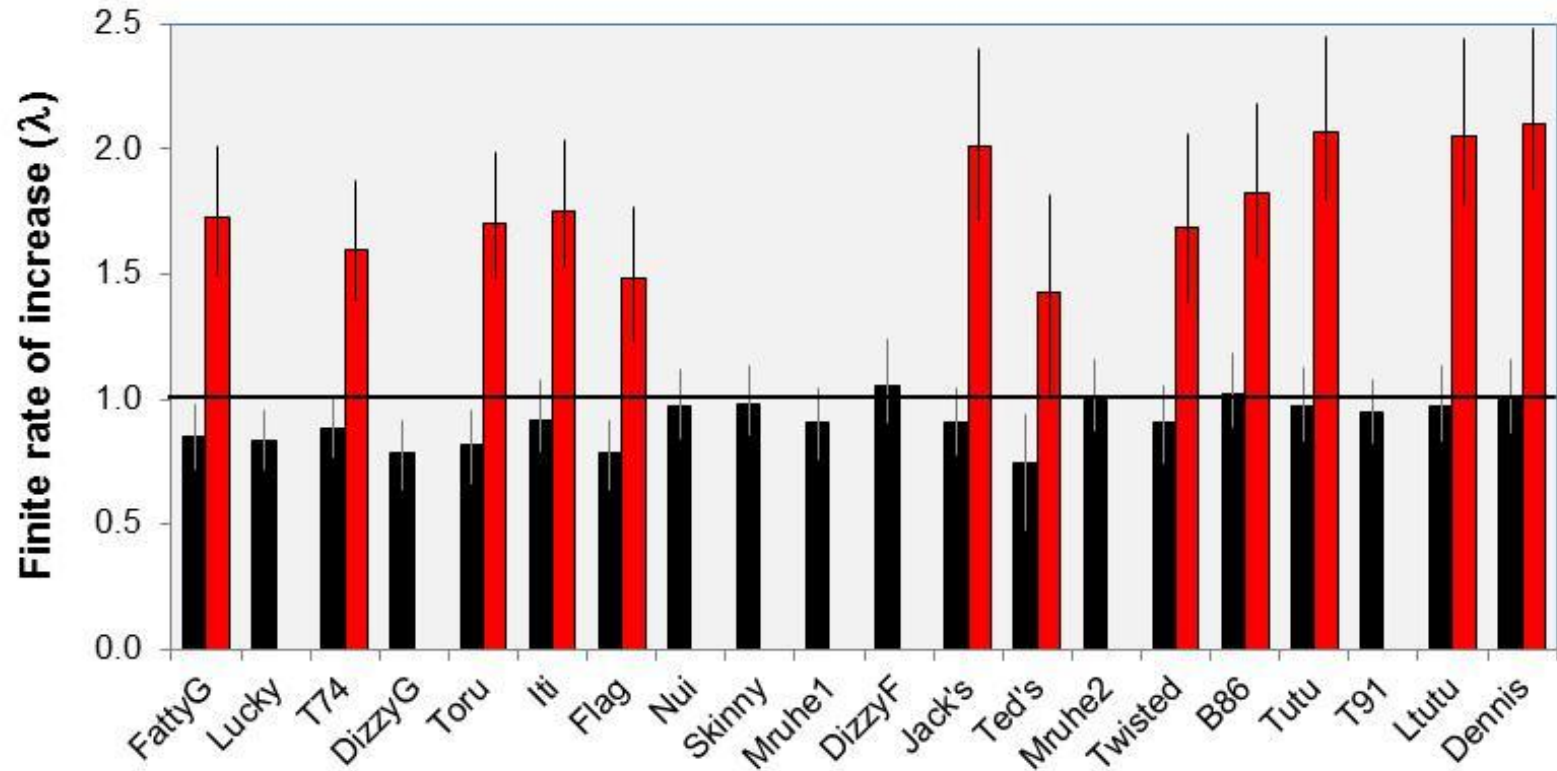


# Robin Survival



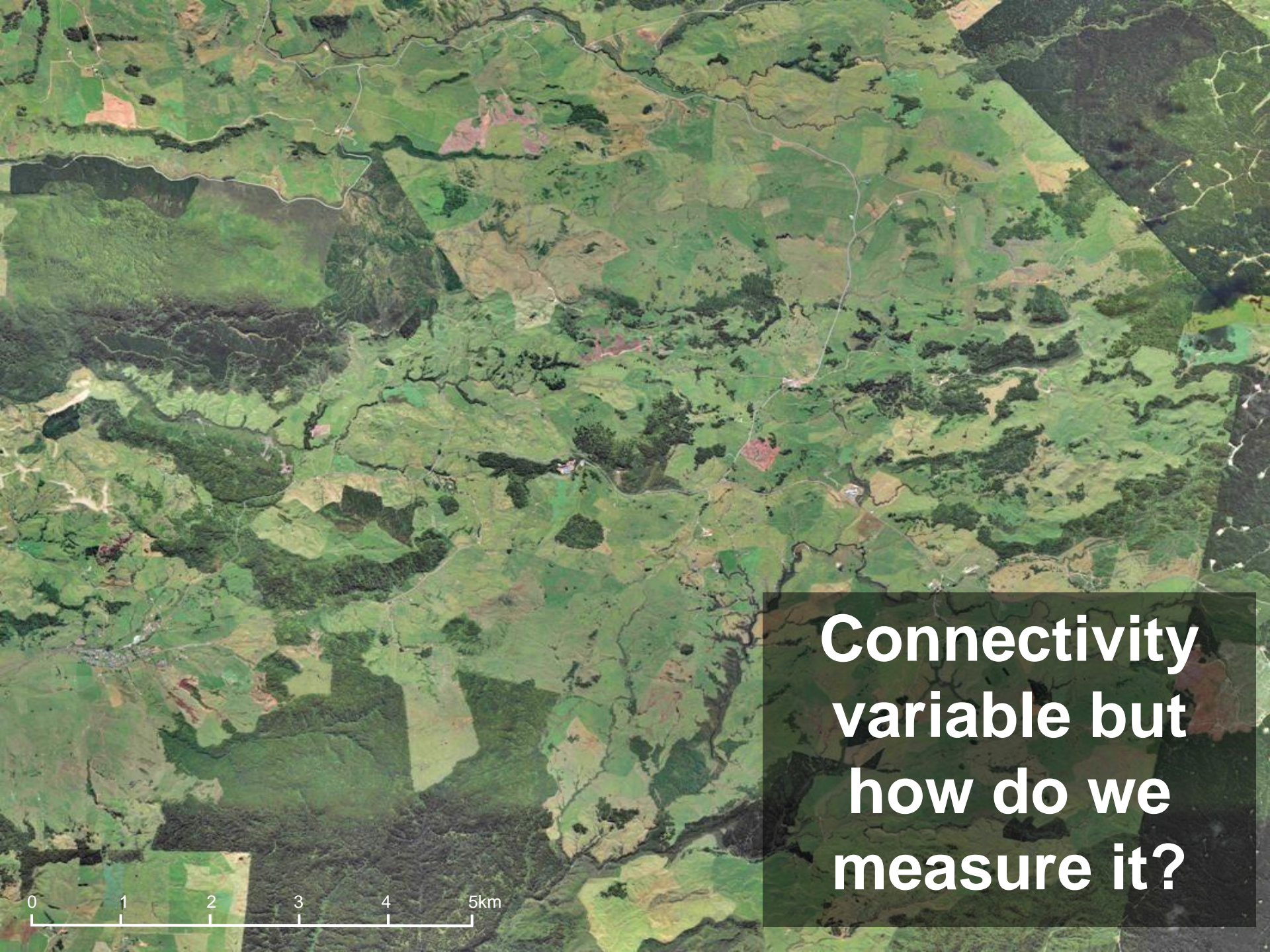


# Robin Population Growth



...but what about emigration?





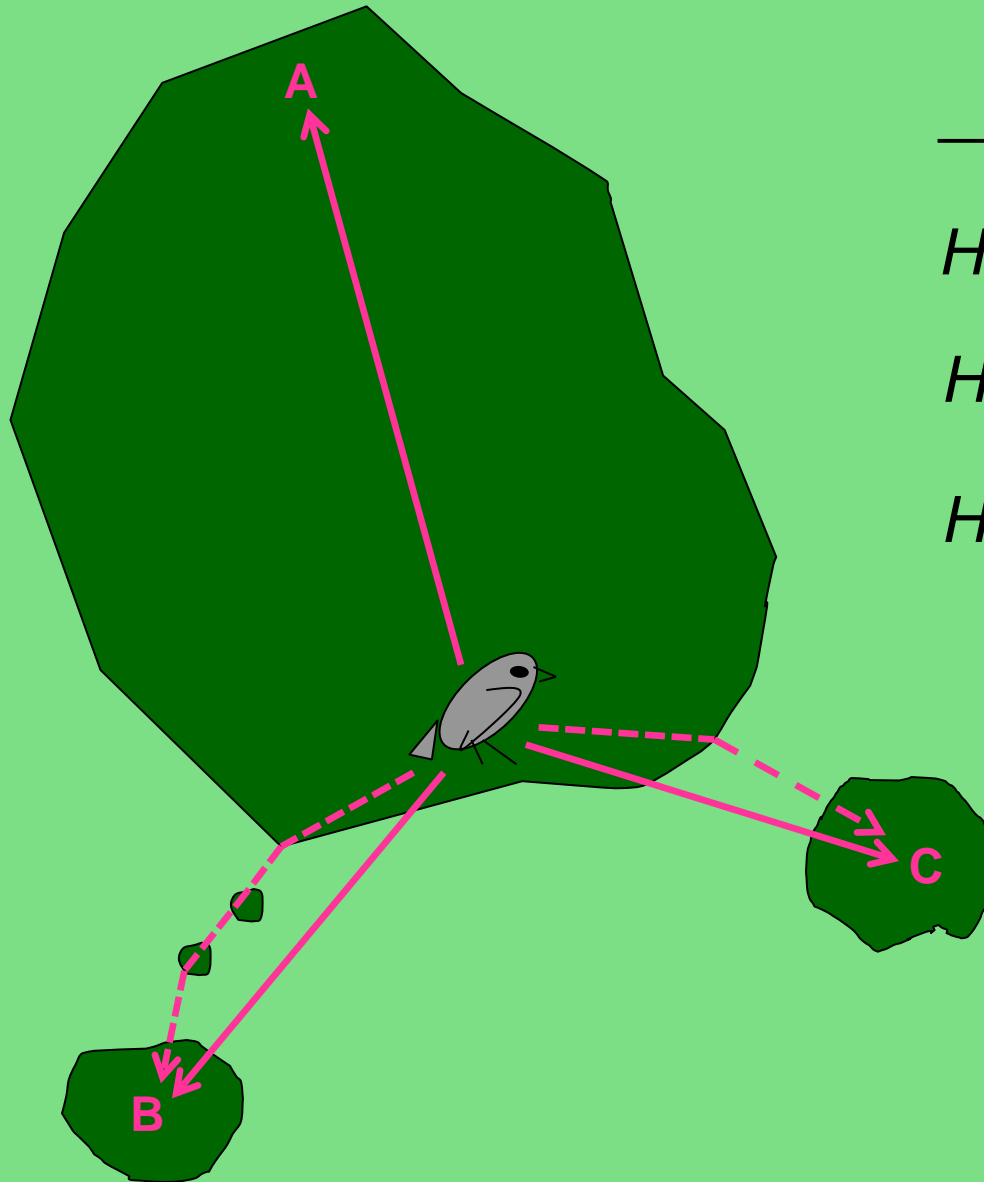
**Connectivity  
variable but  
how do we  
measure it?**

0 1 2 3 4 5km



0 500m

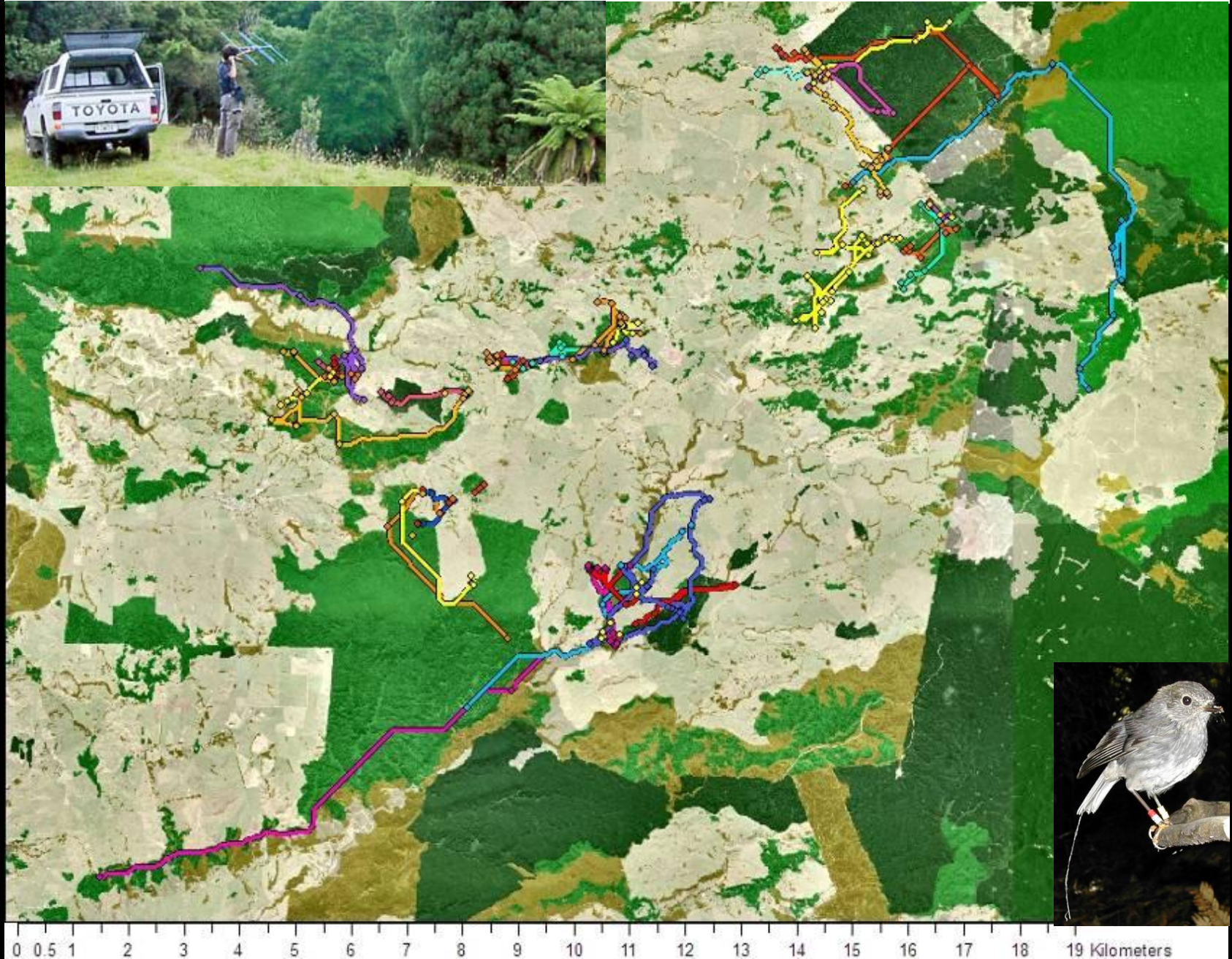
# Cost-Distance



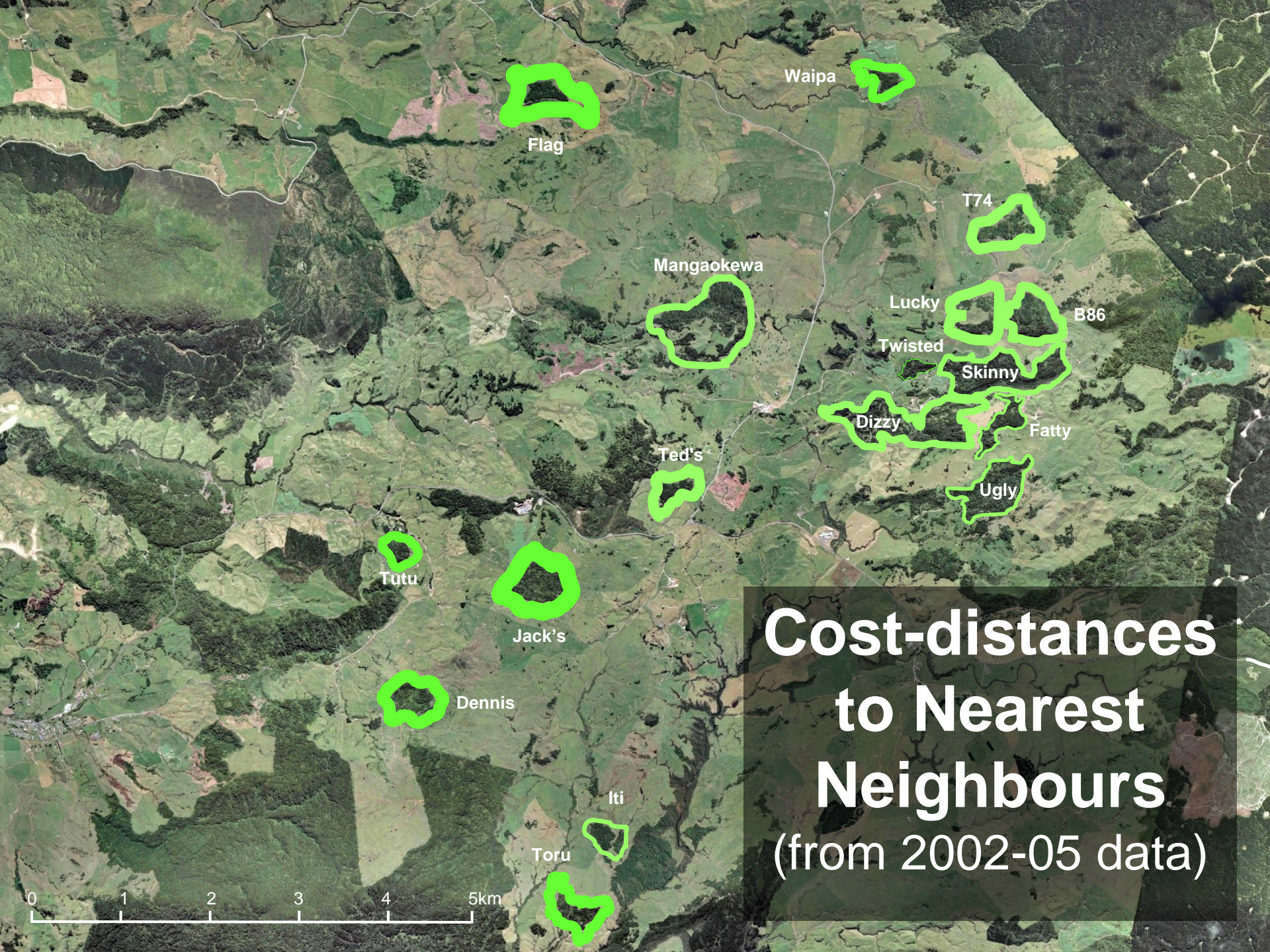
	A	B	C
$H_1$	900	650	600
$H_2$	900	1500	1250
$H_3$	900	1500	2000



# Radio-tracking Juvenile Dispersal

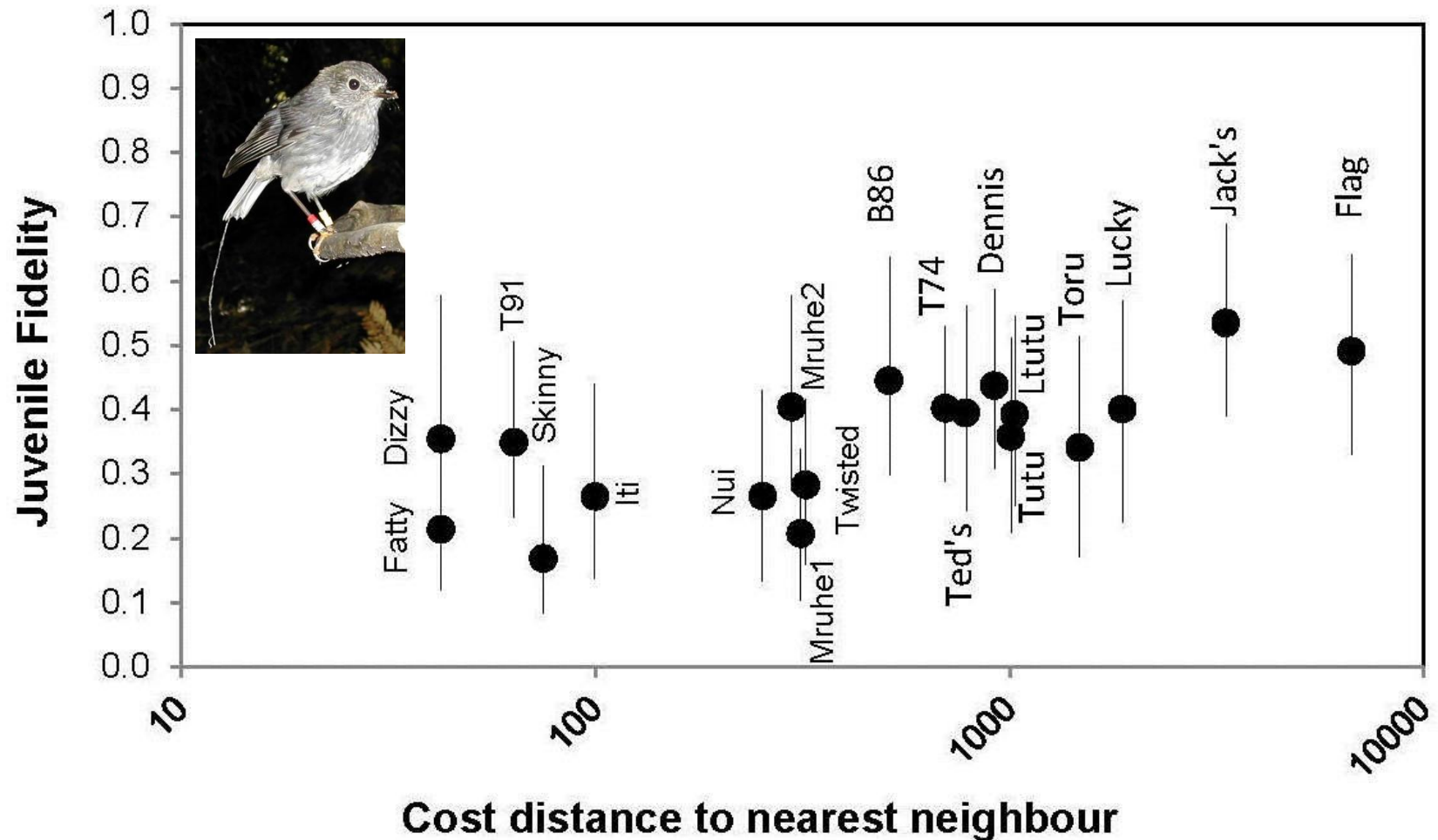






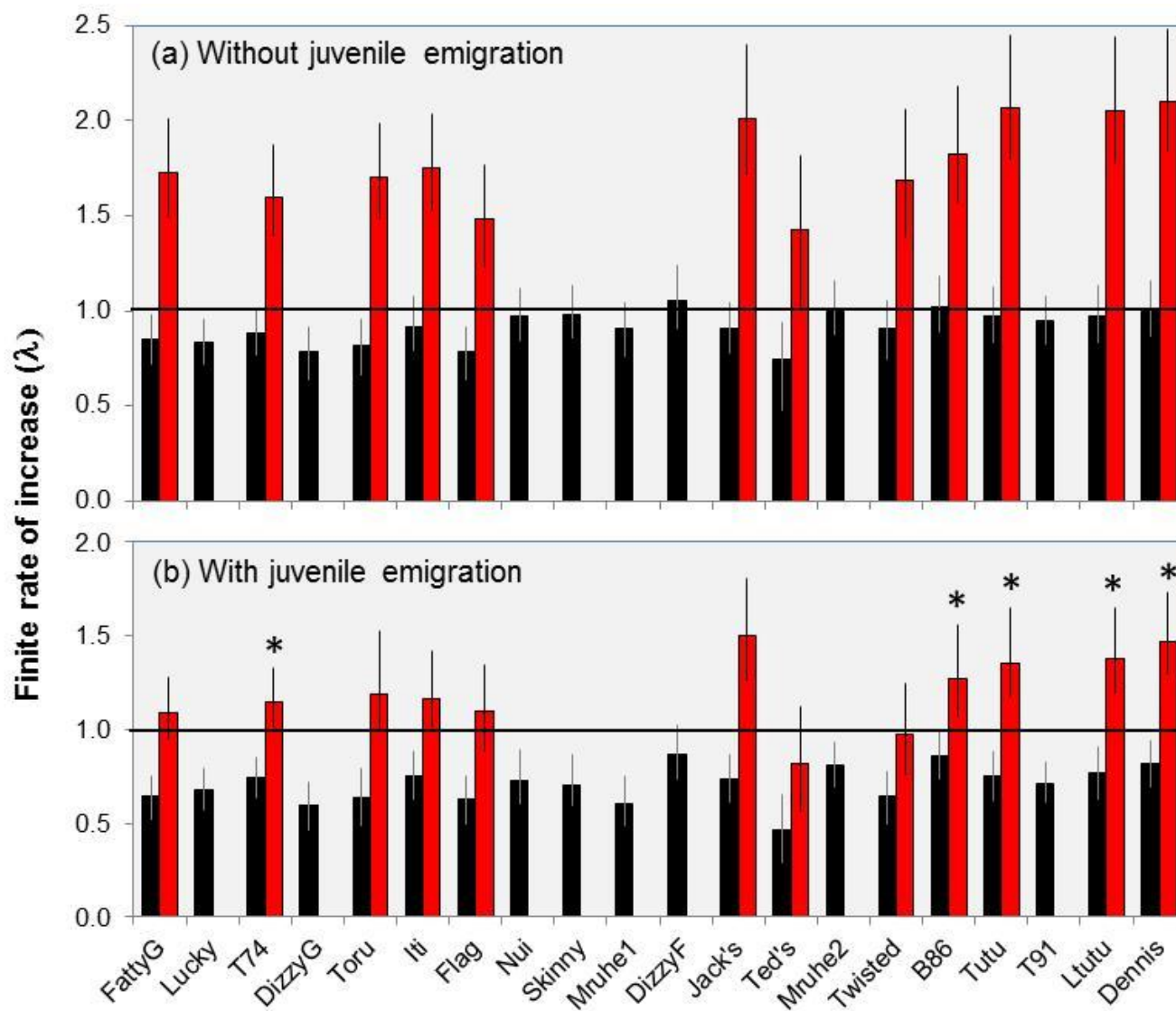


# Juvenile Fidelity vs Connectivity





# Robin Population Growth



# Summary

- Rat control (50 m grid) effective in most 5-20 ha fragments
- Robin reproductive success 2.5 x higher with rat control, and 40% higher in fenced fragments
- Robin adult survival also greatly increased, but fragments highly variable both in baseline survival and effect size
- $\lambda$  also strongly affected by juvenile fidelity, which can be predicted reasonably well by cost-distance to nearest neighbour
- Info can be used to select best fragments for rat control





# Acknowledgements



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