

North Island robin reintroductions to mainland and Great Barrier Island reserves



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“Restoration of single species of plants and animals
is becoming more frequent around the world.
Some succeed, many fail.”

(From IUCN Guidelines for Re-introductions, 1998)

Introduction

- Reintroductions of native bird species are increasingly being undertaken as part of restoration projects in New Zealand
- Until quite recently, most restoration and species recovery programmes targeted at offshore islands where mammalian predators could be eradicated

Introduction

- Now many projects aimed at restoring damaged ecosystems on New Zealand's mainland



Photo: Rod Morris

- Often involve comprehensive pest management regimes

Introduction

- Creates opportunities to reintroduce locally extirpated species



Photo: Graham Parker

- Reintroductions popular because they signify clear progress towards ecosystem restoration

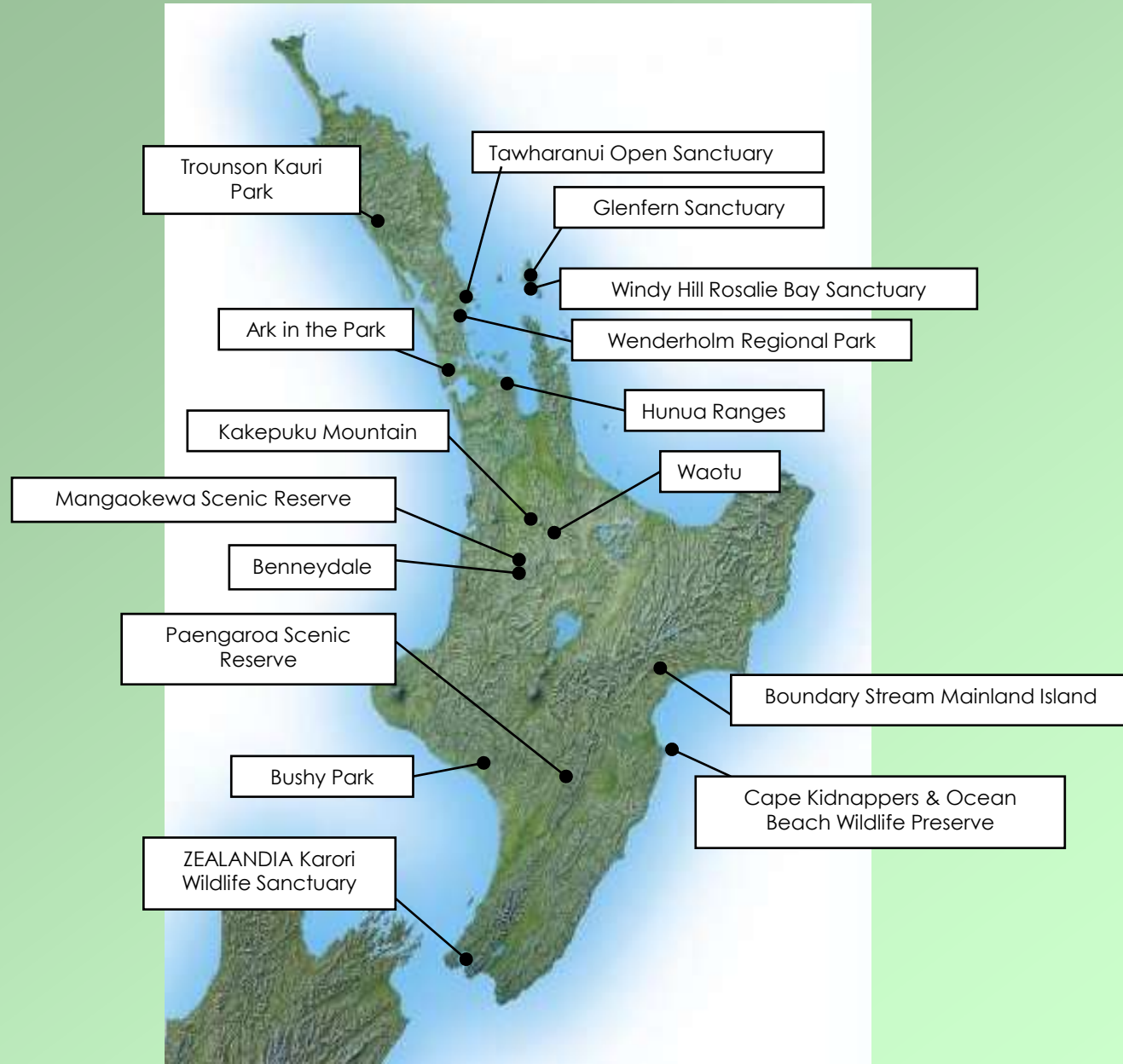
Introduction

- Most reintroductions to mainland sites have involved the North Island robin (*Petroica longipes*)
- Reintroduced to 16 different sites between 1997 and 2007



Photo: Rebecca Boulton

Mainland and Great Barrier Island sites where North Island robins have been reintroduced from 1997-2007



Introduction



Photo: Doug Armstrong

North Island robin reintroductions to mainland sites have had mixed fates, with populations:

- Growing in size
- Fluctuating
- Declining

Aim

Evaluate the outcomes of past robin reintroductions to identify key factors influencing reintroduction success

➤ Outcome of any reintroduction is dependent on two main phases:



Photo: Doug Armstrong

- Initial establishment phase
- Ongoing dynamics of the established population

Initial population establishment phase



Photo: Rebecca Boulton

- Objective: To investigate important factors influencing population establishment for mainland reintroductions of North Island robins

Methods

- Compiled available data for the mainland and GBI sites where North Island robins have been reintroduced:
 - Site characteristics (e.g. area)
 - Reintroduction process (e.g. number of birds released)

Methods

- Issue: Variation in data quantity and quality
- Response variable
 - Proportion of reintroduced robins known to have established territories in the managed area
(estimated from minimum number of birds present at the start of the first breeding season post-release)

Methods

- Explanatory variables included in analysis:

Release site characteristics

- Site area (ha)
- Presence/absence of rodents and mustelids at release site
- Connectivity index

Reintroduction process

- Number of birds released
- Time from release to the start of the first breeding season
- Presence/absence of mammalian predators at the source site
- Vegetation type at source site (pine/native forest)

Other

- Search effort

Methods – Site connectivity

- Robin dispersal out of core management areas has been recorded for a number of sites
- Research indicates that robin movements are impeded by gaps in vegetation cover
- Connectedness may have implications for population establishment
- Used previous research and GIS techniques to calculate a connectivity index for each site, based on habitat within 2 km of site boundaries

Image © 2009 DigitalGlobe

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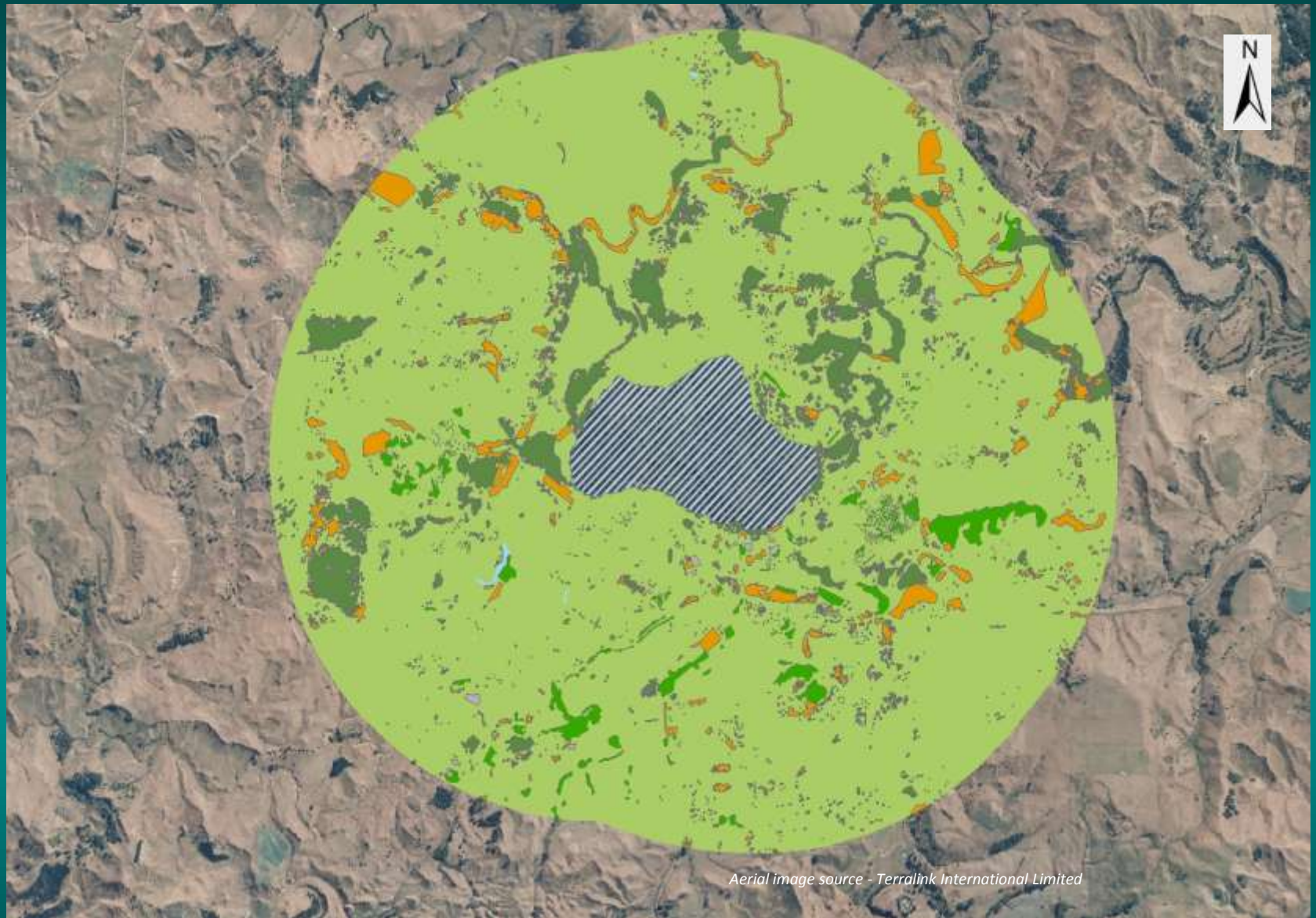


Figure 1. Landcover map of 2 km buffer region around Paengaroa Scenic Reserve.

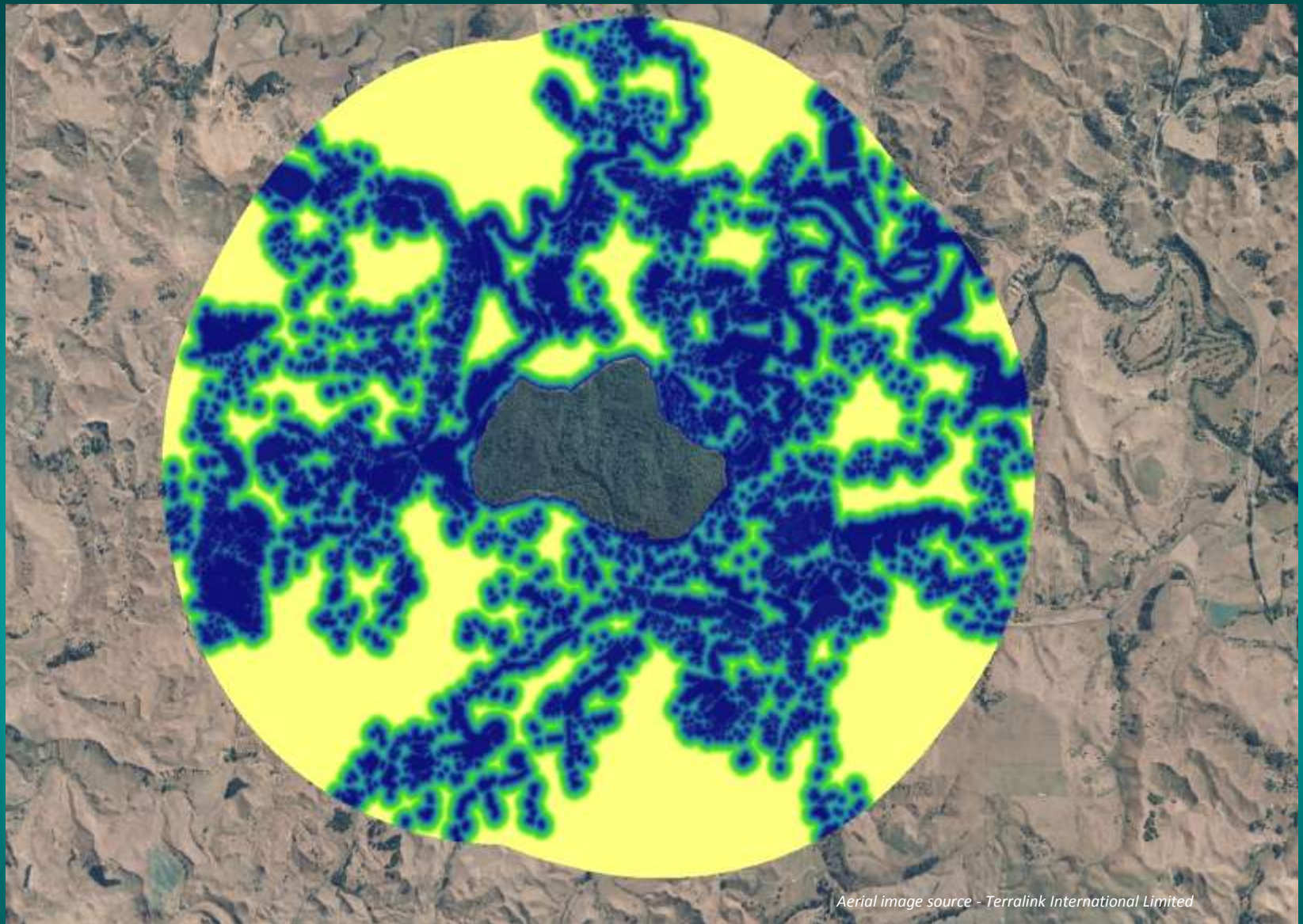


Figure 2. Landscape connectivity map of 2 km buffer region around Paengaroa Scenic Reserve.

Methods

- Global model fitted to data
- Most parsimonious model obtained by backward selection

Results

The proportion of robins known to establish was significantly associated with:

- Connectivity
- Site area
- Presence/absence of rodents at release site
- Presence/absence of mammalian predators at the source site
- Search effort

Results

➤ Site connectivity found to have a significant influence on robin population establishment

⇒ more connected sites associated with a lower proportion of released birds establishing

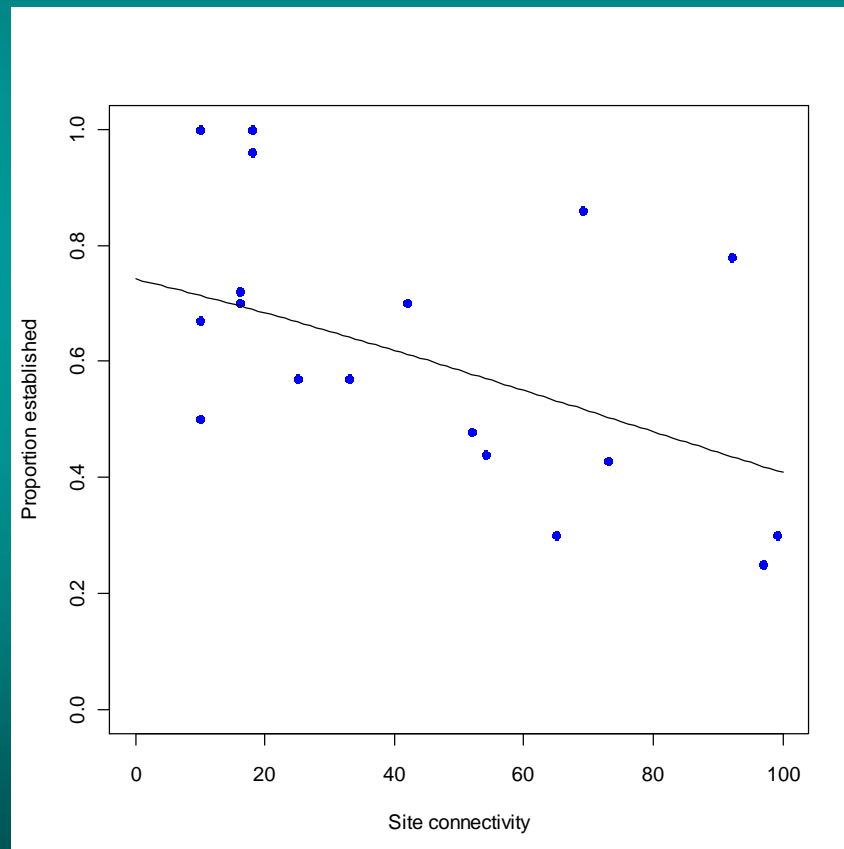


Figure 3: Relationship between site connectivity and the proportion of reintroduced robins known to establish at release sites

Results



- Smaller sites also associated with a lower proportion of robins known to establish
- May reflect post-release dispersal levels out of release sites
⇒ proportionately more robins dispersing from both more connected and smaller sites.
- Connectivity and site area can also affect habitat quality (e.g. abundance/availability of resources or predator density/behaviour).

Results

- Results indicate presence of rodents associated with lower proportion of robins known to establish at release sites

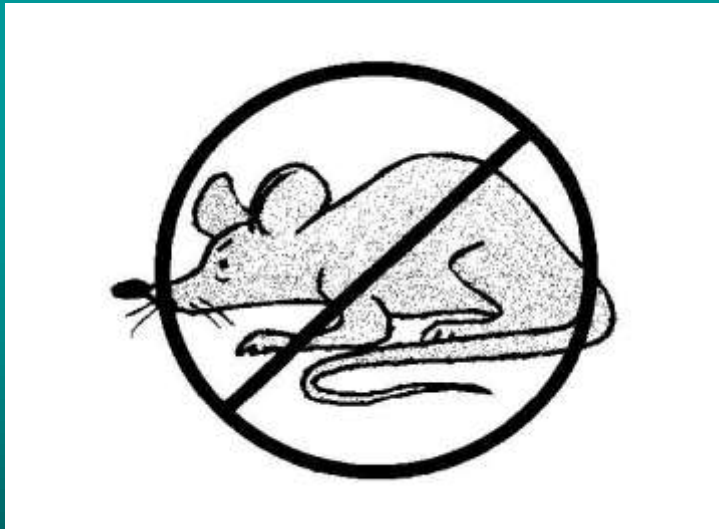


Photo: Nga Manu Images

- Rats more commonly known to affect populations through predation of nests and nesting females
- May be related to post-release stress or abundance of food supply

Results

- Absence of mammalian predators at source sites was found to be associated with lower proportion of robins establishing



- Could be related to predator naivety

Results

- Greater search effort resulted in a higher proportion of robins known to establish



- Highlights that “apparent” population size estimates (not taking into account monitoring effort or resighting rates) are likely to be misleading.

Population vital rates

- Estimated vital rates
- Compiled available information on:
 - Nest success (probability of a nest fledging one or more young)
 - Fecundity (number of fledglings per female per breeding season)
 - Adult survival
 - Juvenile survival

Photo: Doug Armstrong

Population vital rates

- Modelled vital rate estimates with variables I considered might be important for explaining differences between sites and years.
- Substantial evidence that predator control can improve survival and reproduction of native bird species in mainland reserves.
- Rat tracking rates monitored at a number of sites, and these were included in analyses where available.

Nest success

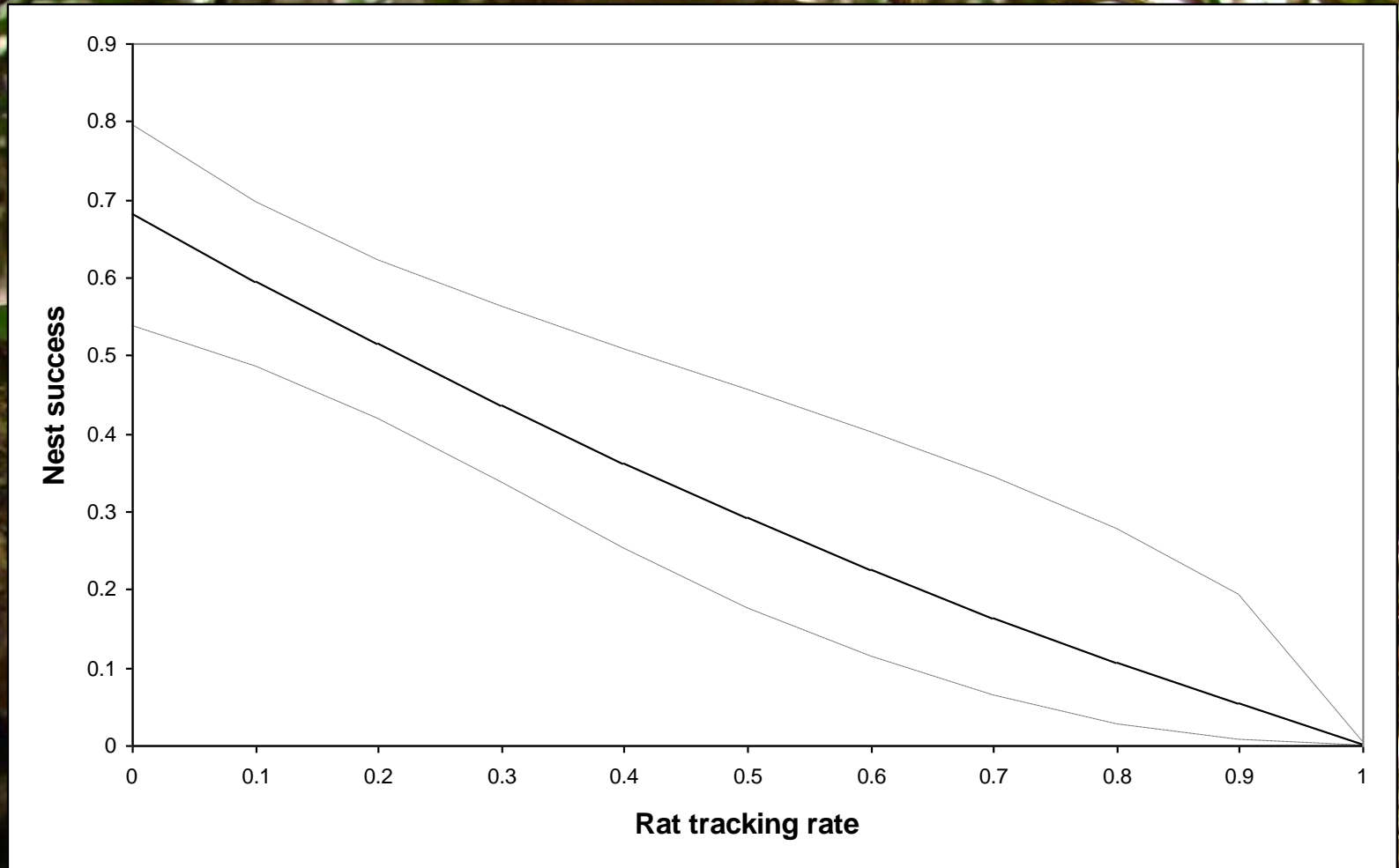


Figure 4: Relationship between nest success and rat tracking rates during the breeding

Photo: Doug Asa

Fecundity

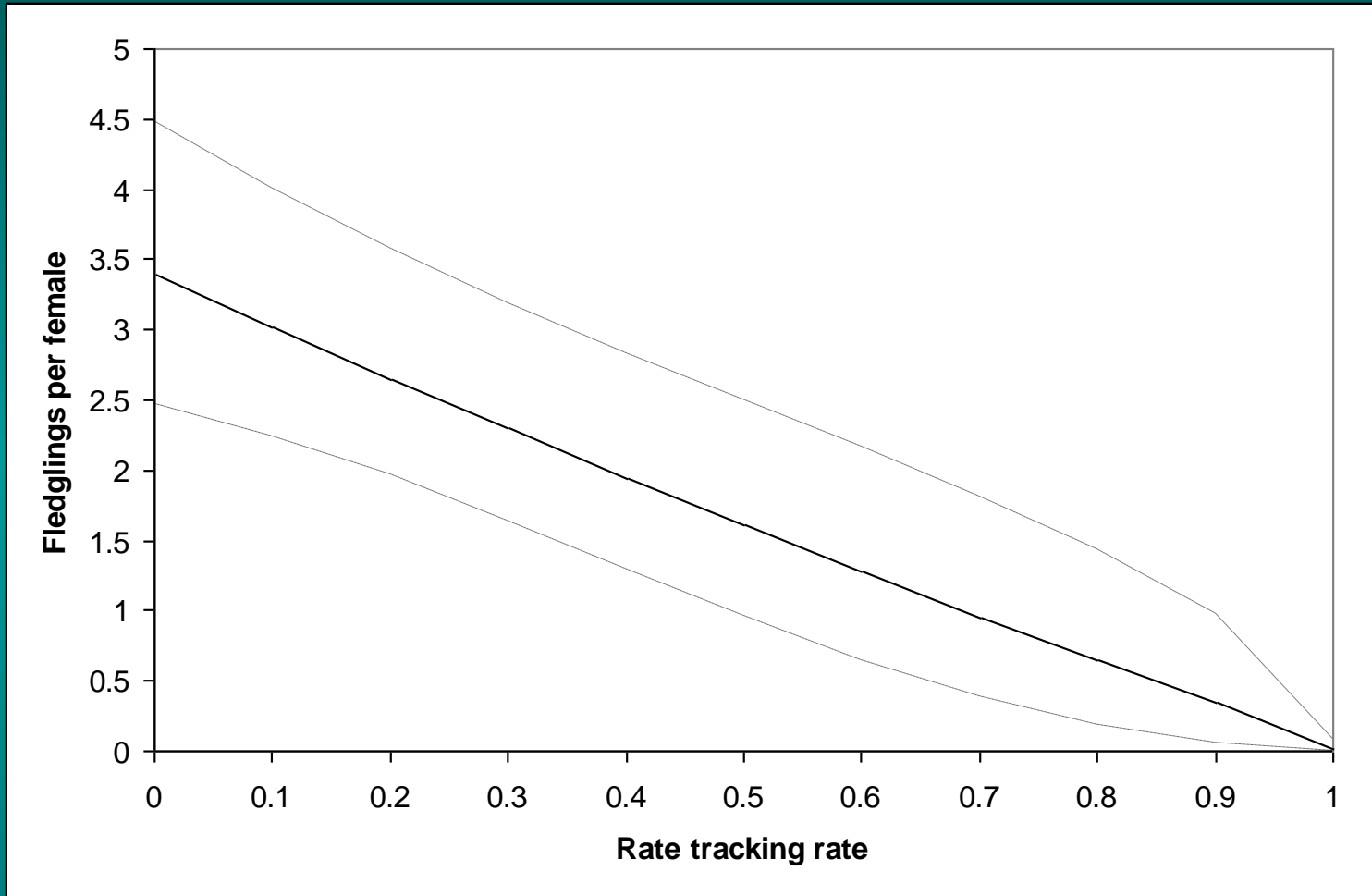


Figure 5: Relationship between fecundity and rat tracking rates during the breeding season

Fecundity

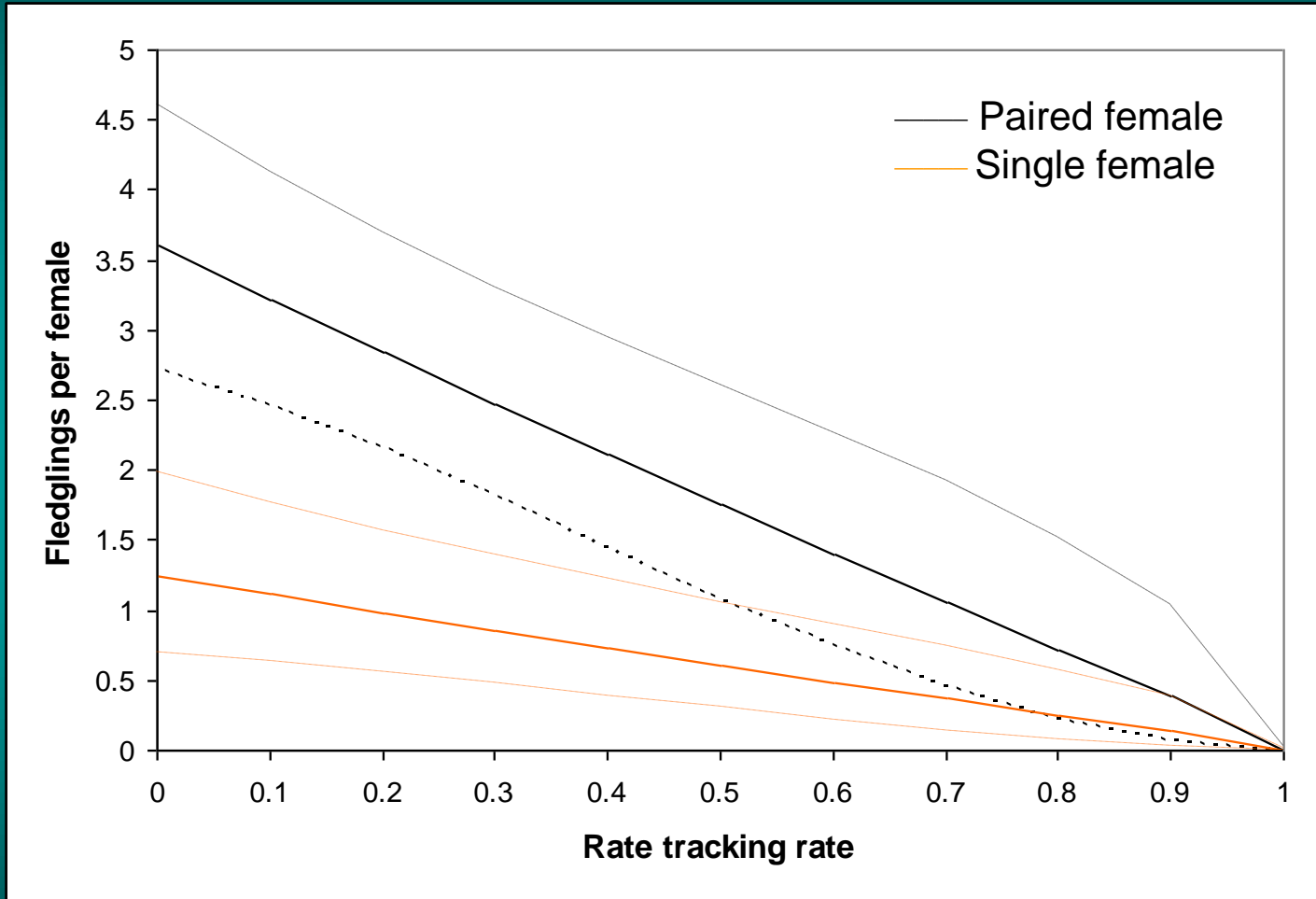


Figure 6: Relationship between fecundity for paired and single female robins versus rate tracking rates during the breeding season

Fecundity



Female survival



Photo: Doug Armstrong

Figure 7. Annual female survival probability versus rat tracking rates during the breeding season

Juvenile survival

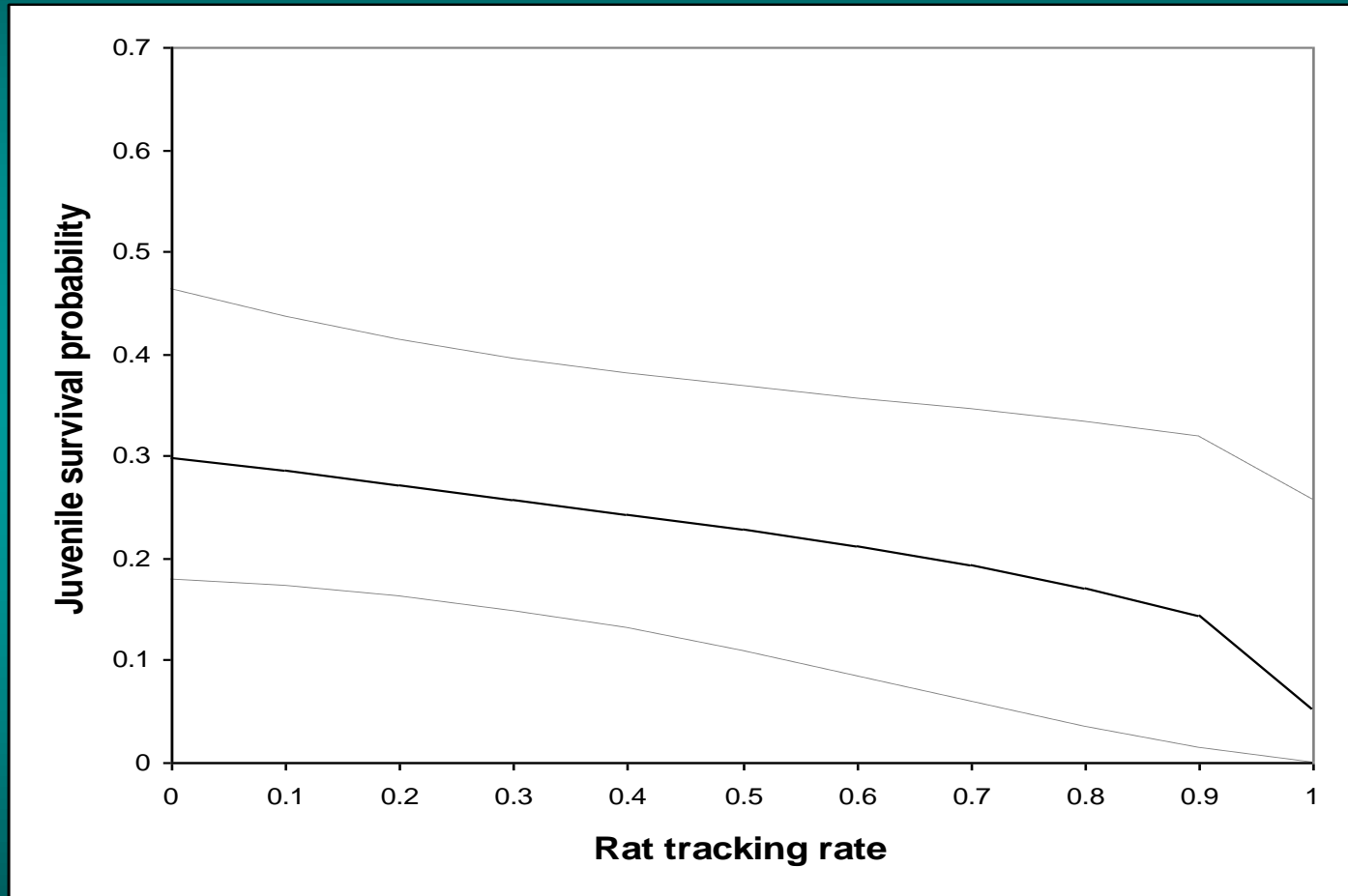


Figure 8: Relationship between juvenile survival probability and rat tracking rates

Juvenile survival

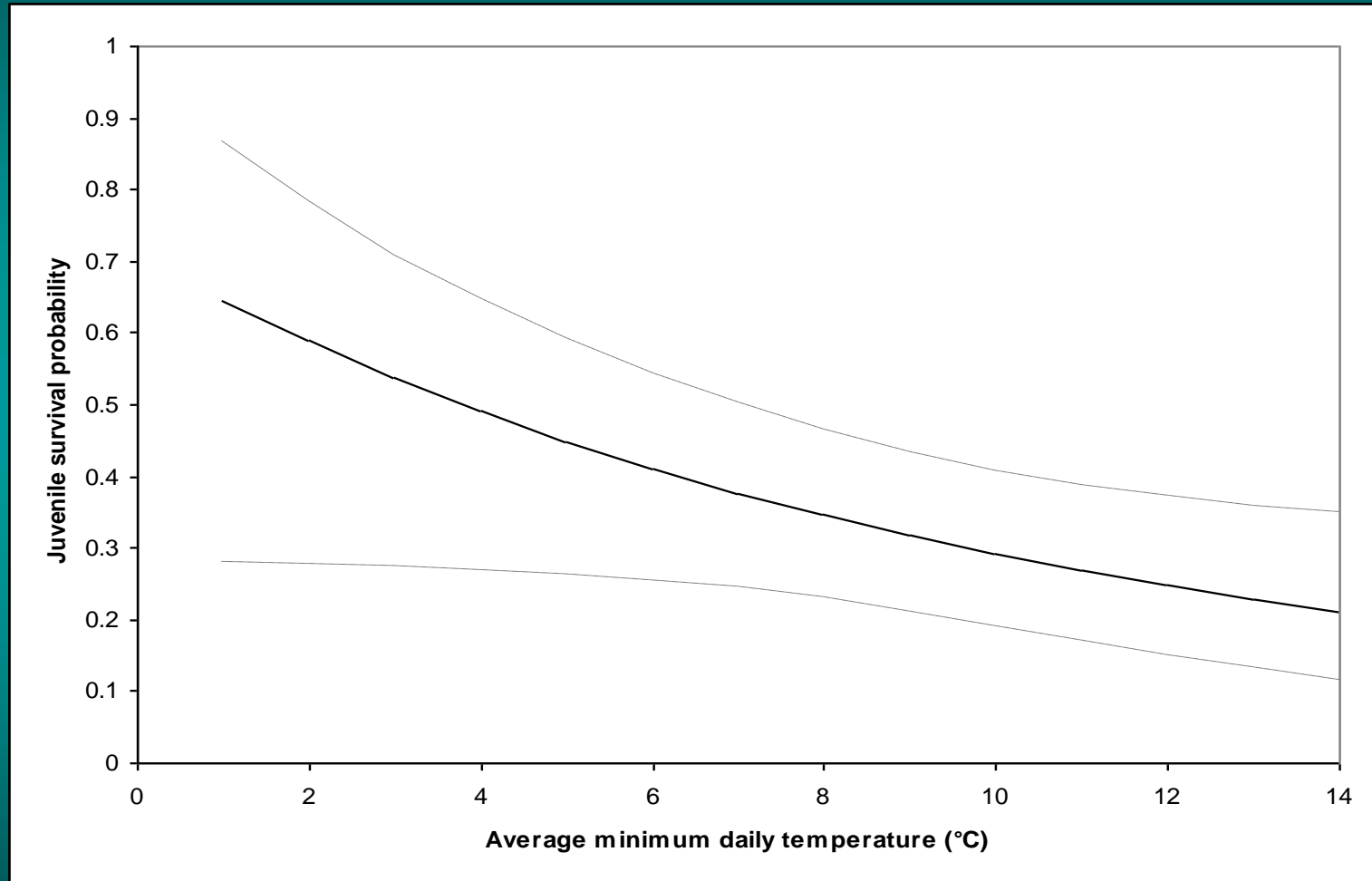


Figure 9: Relationship between juvenile survival probability and temperature (at 5% rat tracking)

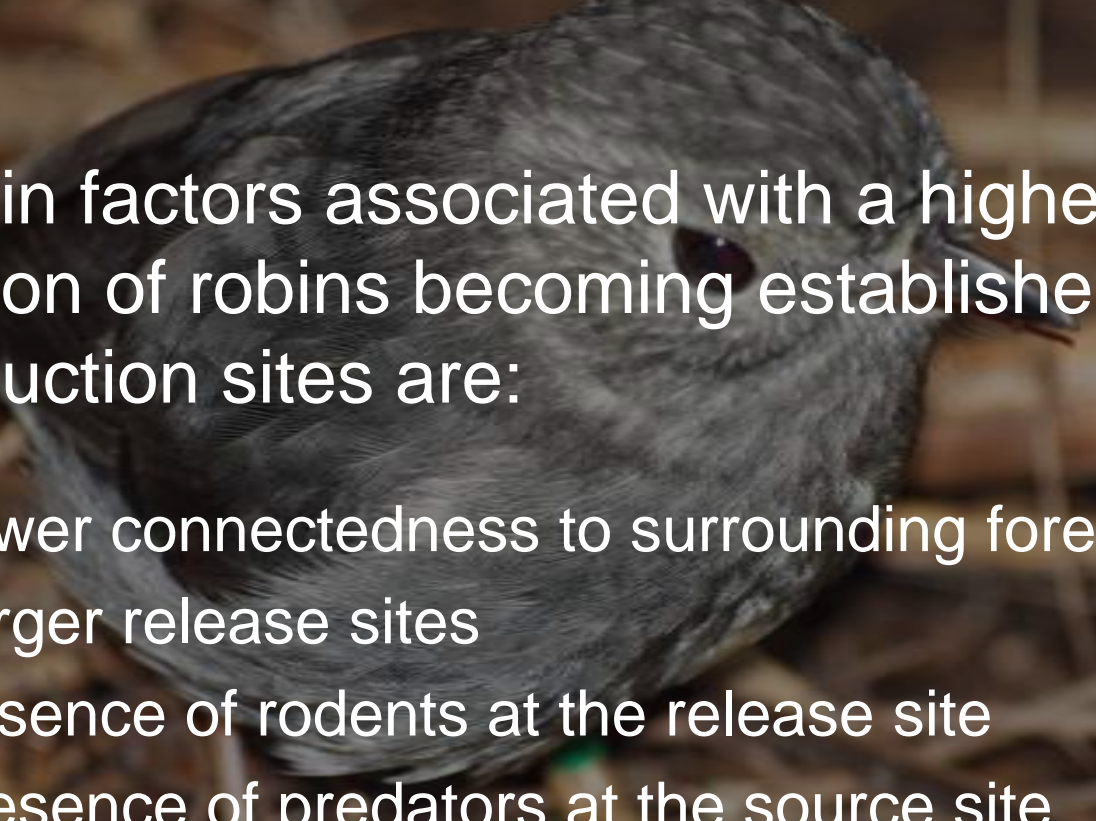
Conclusions – vital rates

- Rat tracking rates found to be an important influence on all vital rates

In addition:

- Pairing status of female robins is important for fecundity
- Temperature also found to influence juvenile survival

Conclusions

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- The main factors associated with a higher known proportion of robins becoming established at reintroduction sites are:
 - Lower connectedness to surrounding forest habitat
 - Larger release sites
 - Absence of rodents at the release site
 - Presence of predators at the source site
 - Higher search effort

Conclusions

- The importance of site connectedness and area for initial establishment has interesting complications from a management perspective
- Well-connected management areas surrounded by forest are often considered to be of higher ecological value, but may prove an ongoing challenge with respect to getting birds to “stick”. However...
- With much restorative effort focused on increasing the size of forested areas and reducing/eliminating rodents
⇒ positive implications for robin reintroductions
- In terms of search effort, as the ancient Greek proverb says...

“If you seek well you will find”



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