



# **Lizard Surveying and Monitoring in Biodiversity Sanctuaries**

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# **First things first...**

**I am profoundly deaf**

**I have a “Deaf Accent”**

**Some of you may struggle to understand me**

**That’s OK**

**Just follow the text in this slideshow**

**Approach me in a free moment, or e-mail us**

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# Purpose of this talk

## **I am giving this talk on behalf of the North Island Skink Recovery Group**

Alison Pickett, the NISRG Leader, was unable to attend

We want to encourage Sanctuaries to undertake proper surveying and monitoring of lizards

## **I will cover the following topics:**

- Why are lizards so important?
- What are the issues?
- Why should we survey and monitor?
- What should the questions be?
- What tools can we use?
- How can we analyse the information?
- What resources are out there?



# Importance of Lizards

- **Lizards are NZ's largest terrestrial vertebrate group (103+ spp.)**
- **Occupy almost all available ecosystems from the coastal shore platform to rocky mountain peaks**
- **Critical for ecosystem processes and function**
  - predator, pollinator, frugivore and seed disperser
- **More than half of this fauna is threatened**
  - many have reduced ranges or are extinct on mainland
  - causes of decline are mammal predators, habitat loss and fragmentation

- **Can be exceptionally abundant when released from mammalian predation pressure**
  - densities can reach up to 3000+ per hectare on offshore islands and at some mainland locations
- **Lizards are only now emerging as iconic flagship and indicator species for conservation and ecological restoration**
  - resident species as indicator species for long-term ecosystem health
  - translocation possibilities for many e.g. flagship species

# Issues

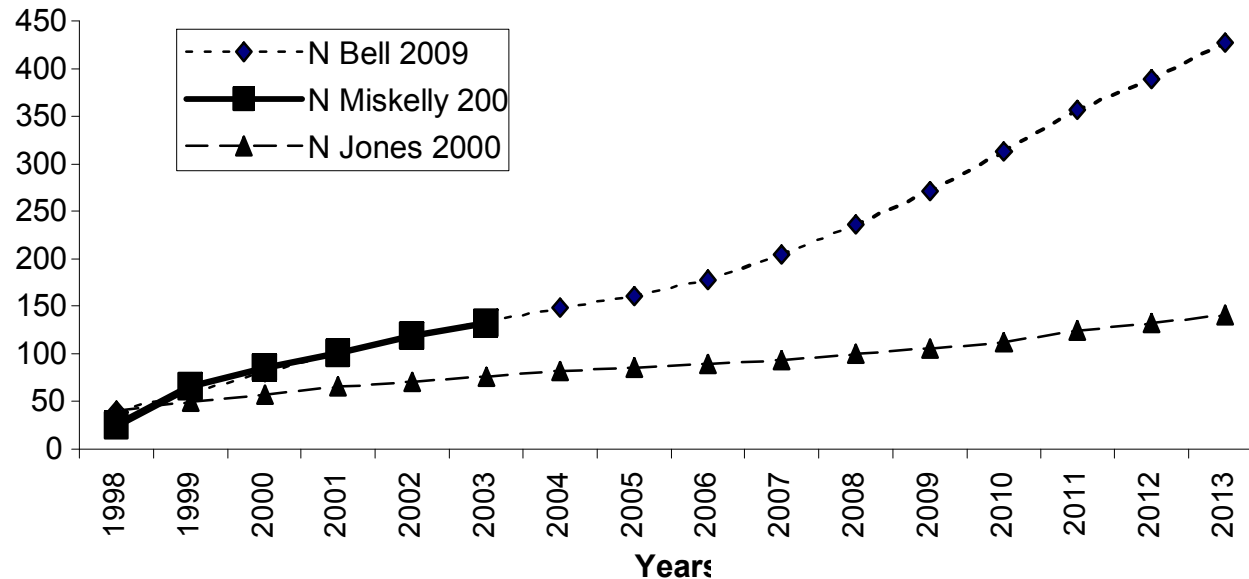
- **Lizards can be extremely hard to find on mainland New Zealand.** This is because of:
  - introduced predator pressure
  - habitat fragmentation
  - cryptic nature of lizards in complex habitats
  - weather and seasonal nature of lizard activity
- **Surveying and monitoring lizards can be challenging**
  - but not impossible if done correctly

# Why should we survey and monitor lizards?

- **Lizards are important medium-to-long term indicator species for ecosystem restoration** (Years 5+)
- highly susceptible to mammal predators
  - are relictual mammals (eg, mice) still having an impact?
- slow to recover (low fecundity, delayed maturity)
  - 2.6-12% annual population increase in translocated populations, some up to 28%
  - some species can remain undetectable for many years after predator management
- long life history
  - some species live up to 36+ years in the wild
  - may lead more certainty in recognizing trends
    - e.g population crashes



# Translocated Duvaucel's Gecko Population Projection in VORTEX



40 geckos translocated to Mana Island in 1999  
2.6-12% rate of population growth predicted in VORTEX  
By 2013, there may be ~130 to 430 geckos





# Surveying

- **Basically, to survey is to answer the questions:**
  - what have we got here?
  - what habitats are they occupying?
  - where are they in the area?
- **Before you can think about monitoring lizards:**
  - you need to find out what species are present; and,
  - determine how they can be monitored
- **Before you can think about translocating lizards:**
  - you need to determine if that species is not already there
  - whether the non-detection of a species is a true absence  
(some species may start to show up 10+ years after predator control has initiated)



- **The following requirements for lizard surveying are suggested:**
- experienced surveyors are used
  - observer skills
  - species identification
- a wide range of techniques are used
- a wide range of potential habitat are surveyed
- surveys are done at the right time of the year, in the right weather conditions

# Monitoring

- **Determine the aim of the study**
  - What do you want to monitor, and why?
- **Some primary questions may be:**
  - how large is the population (abundance, density)?
  - is the population stable, increasing or decreasing?
  - How many animals survive to the next year?
  - what factors are influencing survival?
- **Setting up an Experimental Design:**
  - laying out and size of sampling plots
  - sample size = number of traps, number of replications, frequency of occasions
  - standardising the work over sites, time and people

- **The following requirements for lizard monitoring in Sanctuaries are suggested:**
  - ease of monitoring set up (sampling units should be quick to set, standardised at all sites, and at future new sites)
  - it is quick to check many traps/covers per session to enable single day sampling of all units
  - it is simple for volunteers to count/process animals if/when required
- **Be realistic what can be done with the time and data**
  - But be persistent and consistent



# Tools of the Trade

- **There are a number of surveying and monitoring techniques**
- Each has advantages and disadvantages for sampling different species of lizard
- Utilization of a particular technique depends on the species, their habits and habitats and what kind of data is required for
- Some techniques are still under development
- I will cover the leading techniques now



# Direct Searching

- **Day Searching**—consists of scanning habitat for basking or foraging lizards, and checking refugia during the daytime.
- **Spotlighting**—consists of scanning habitat for foraging lizards at night, using torches mounted on binoculars, or torches alone. This method is most effective for geckos, whose eyes reflect the spotlight.
- These methods have high biases involved
  - Observer skill, Environmental, Weather
  - Hard to compare results over time

Whitaker (1994) outlines the standard procedures for undertaking such searches.



# Pitfall Traps



- Excellent for terrestrial skinks, but are not effective with geckos
- Weather dependent, since to trap lizards, they need to be foraging during the time the trap is open.
- Traps need to be checked daily when set



# Onduline ACO's

- Good in open areas for both gecko and skink populations
- In forests, limited to terrestrial skinks
- Less weather dependent than traps
- Less bias than search methods
- Do not need to be checked daily





# Closed-Cell Foam Covers



- Recently developed method for arboreal species of lizard
- Do not need to be checked daily
- Less weather dependent than traps
- Less bias than search methods

# G-minnow Traps

- An effective trap for a wide range of species, some of which are highly cryptic
- Traps may be utilized in areas where pitfall traps are difficult to implement
- Weather dependent, as only active lizards are trapped
- Traps need to be checked daily when set
- Expensive and need to be imported





# Tracking Tunnels

- Another new technique, useful for sampling terrestrial lizards
- Species may be identified
- May be limited in areas of very low lizard abundance



Photo: Dylan Van Winkel

Technique	Arboreal	Terrestrial	Diurnal	Nocturnal
Day Searching	✓	✓	✓	
Spotlighting	✓	✓	✓ †	✓ ‡
Pitfall Traps¥		✓	✓	✓
Onduline ACO's		✓	✓	✓
Foam Covers	✓			✓
G-minnow Traps		✓	✓	✓
Tracking Tunnels		✓	✓	✓

† Diurnal geckos can be spotlighted

‡ Mostly geckos

¥ Skinks only



<b>Technique</b>	<b>Survey</b>	<b>Monitoring</b>	<b>Cost</b>	<b>Time</b>	<b>Achievability</b>
Day Searching	✓		Low	High	Med
Spotlighting	✓		Low	High	Med
Pitfall Traps	✓	✓	Med	High	High
Onduline ACO's	✓	✓	Med	Low	Med-High
Foam Covers	✓	✓	Low	Low	Med-High
G-minnow Traps	✓	✓	High	High	High
Tracking Tunnels	✓	✓	Low	Low	Med

# Analysis Techniques

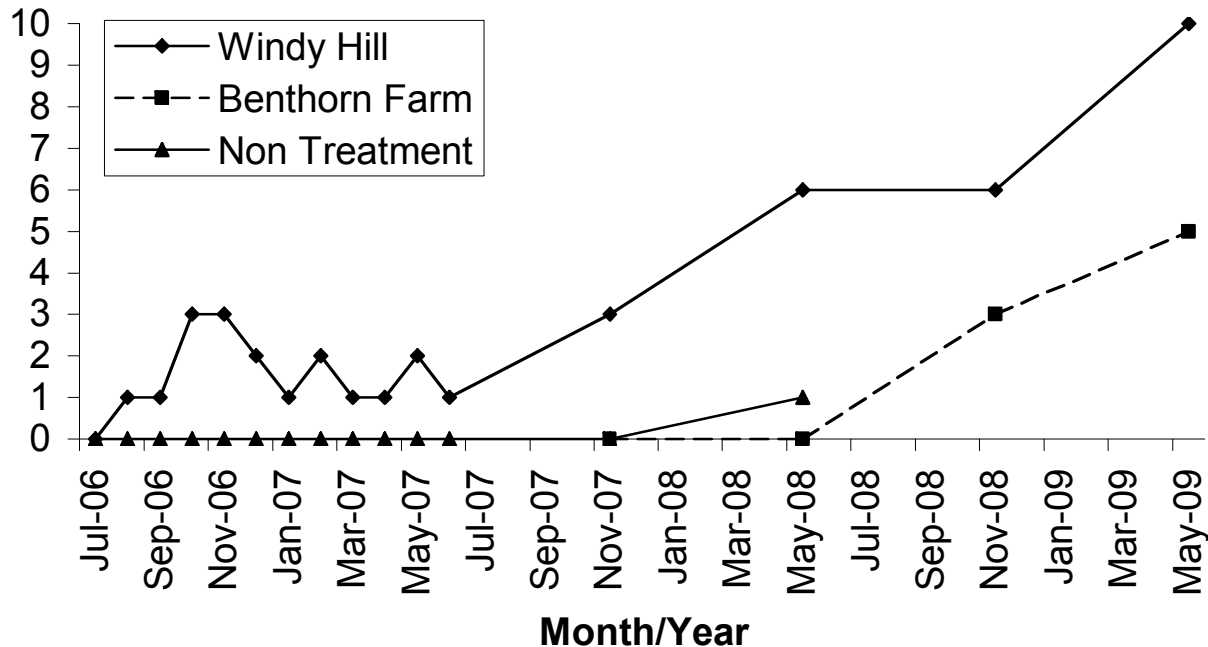
- **There are two main types of analysis.** These are:
  - Indexes
    - Ideal for sanctuary monitoring
      - “cheap, quick and dirty!”
  - Statistical Estimators\*
    - Closed Population Models
    - Open Population Models
    - Robust Design
    - Occupancy Models
- \*Should not be attempted by children or politicians.  
Seek expert advice

# Indices

- **An index of relative abundance measures change in animal populations over time without estimating population size.**
- **Count-based**
- **Assumption:** Index is directly proportional to the true population size
- **Disadvantages:** An index may show changes in conspicuousness completely unrelated to abundance, due to weather, observer bias etc (need large sample sizes or frequent sampling sessions to detect population trends)
- Therefore lots of biases may be involved



# Windy Hill ornate skink indice data from Onduline ACO's





# Estimators

- **Population estimate obtained from statistical models by recording 'capture histories' of animals marked or animals present/absent**
- Estimators involve the estimation of **capture probability** and using this to extrapolate population size
- Estimation procedures are divided among '**closed**' (no BIDE) and '**open**' population study designs (allowing BIDE)
- A combination of the closed and open population design has led to the **Robust Design** which can estimate survival, as well as population size
- Another method is to count the presence or absence of a species across sampling units over time. This is analysed using **Occupancy Models**



- **Assumptions:** There are different assumptions or requirements for each model, eg.
  - no births, deaths, immigration or emigration for closed populations, or,
  - capture probabilities are the same for Jolly Seber model, etc
- **Disadvantages:** Data collection is more expensive and intensive. A reasonable number of animals or a reasonable recapture rate is required. Expertise is required to analyse the data.
- Biases, such as capture differences (**heterogeneity**) due to an factor or covariate, such as trap response, weather, or other can be accounted for
- Statistical estimators are more robust and should be used over indexes **wherever possible**



# Useful New Resources Coming

- **NZ Lizards Database**

- Comprehensive in-depth species information and searchable bibliography
- Useful for learning about every species of lizard in NZ
- Online August 2009

- **Conservation Toolkit for Lizards**

- This resource provides advice on surveying, monitoring and management
- In-depth information on each technique and analysis method
- Useful for designing survey and monitoring programmes
- Online June 2010

Both resources will be given links from the Sanctuaries NZ website



# I have a dream...

...of a **National Lizard Monitoring Programme**, where:

- multiple sanctuaries are involved
- effort is standardized across all sanctuaries
  - same techniques, same effort, same number of replications, stratified sampling
  - set-up so that even volunteers can collect data
- Indexes the bare minimum, but advanced estimator analyses done by an external agency, where possible
- Correlations are made with predator abundance and lizard abundances at different stages of restoration
- Ideally funded at a national level (e.g FRST), but most likely a mixture of local, regional and national funding sources



# Thank You

**Any questions, comments?**

**Contact us....**

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