THE ISSUE OF MICE IN MAINLAND ISLANDS: CURRENT RESEARCH AT TAWHARANUI OPEN SANCTUARY

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Background.

- Up until recently the impacts of mice on New Zealand fauna and flora has largely been ignored.
- Controlling the feral house mice is proving to be an increasingly difficult challenge.
- Attempts to eradicate mice from fenced mainland islands have proved fruitless, despite successes on offshore islands.

Background

1. …but now there is growing evidence that mice are having major impacts, particularly on native invertebrates. This, together with selective seed predation, may adversely affect ecosystem function in ways we may never know.

The big questions.

What happens to mice when other mammals are removed?

What can be done to control mice in a predator-free environment?

The study site.

Tawharanui Open Sanctuary

- ARC's northernmost Regional Park
- Recreational, agricultural and conservation uses
- Predator-proof fence constructed in 2004
- Most mammals eradicated in Oct 2004

Most mammals - cats, mustelids and rats. Obviously mice are still there; hedgehogs are present in small numbers, and rabbits are still persist despite best efforts to get rid of them.

Research objectives.

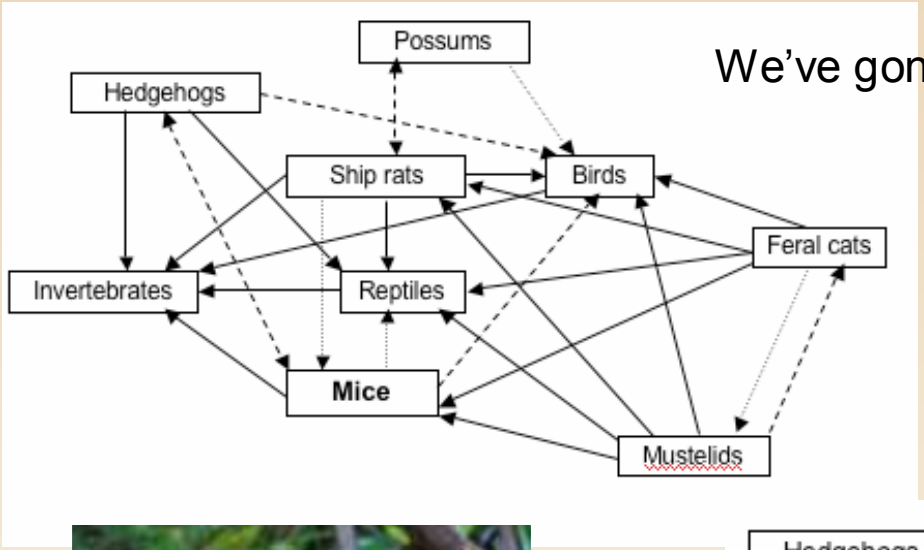
To provide managers at Tawharanui with information pertaining to:

- Potentially significant changes in feral house mouse ecology following the construction of the fence and removal of other mammals
- The impacts of sustained poisoning on the population dynamics of mice within an isolated forest fragment (and the densities mice can attain in uncontrolled forest habitat)
- The effectiveness of the fence at repelling mice
- Areas of the sanctuary in which mice pose the greatest threats to biodiversity

Point one: this will include estimates of density in four key habitats, gender ratio, body weight, fecundity measured seasonally.

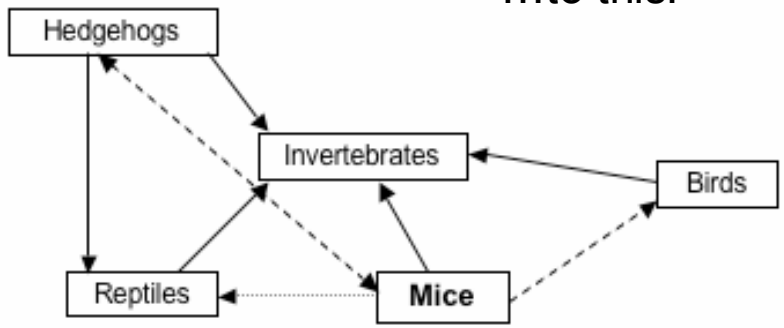
The Tawharanui 'experiment'.

What has changed?



We've gone from this…

…to this.



Methods: trapping.

Snap-trapping

- Focusing on four distinct habitats - repeating Barwell (2001):
  - pasture
  - rank grass
  - regenerating coastal forest
  - supralittoral/hind-beach beach vegetation

- Two control lines established at Waikauri Bay - one in rank grass; one in coastal forest

I basically repeated what Ezra Barwell did in 2001 - that is to say, trapping mice in the same habitat at the same times of year.

Methods: trapping.

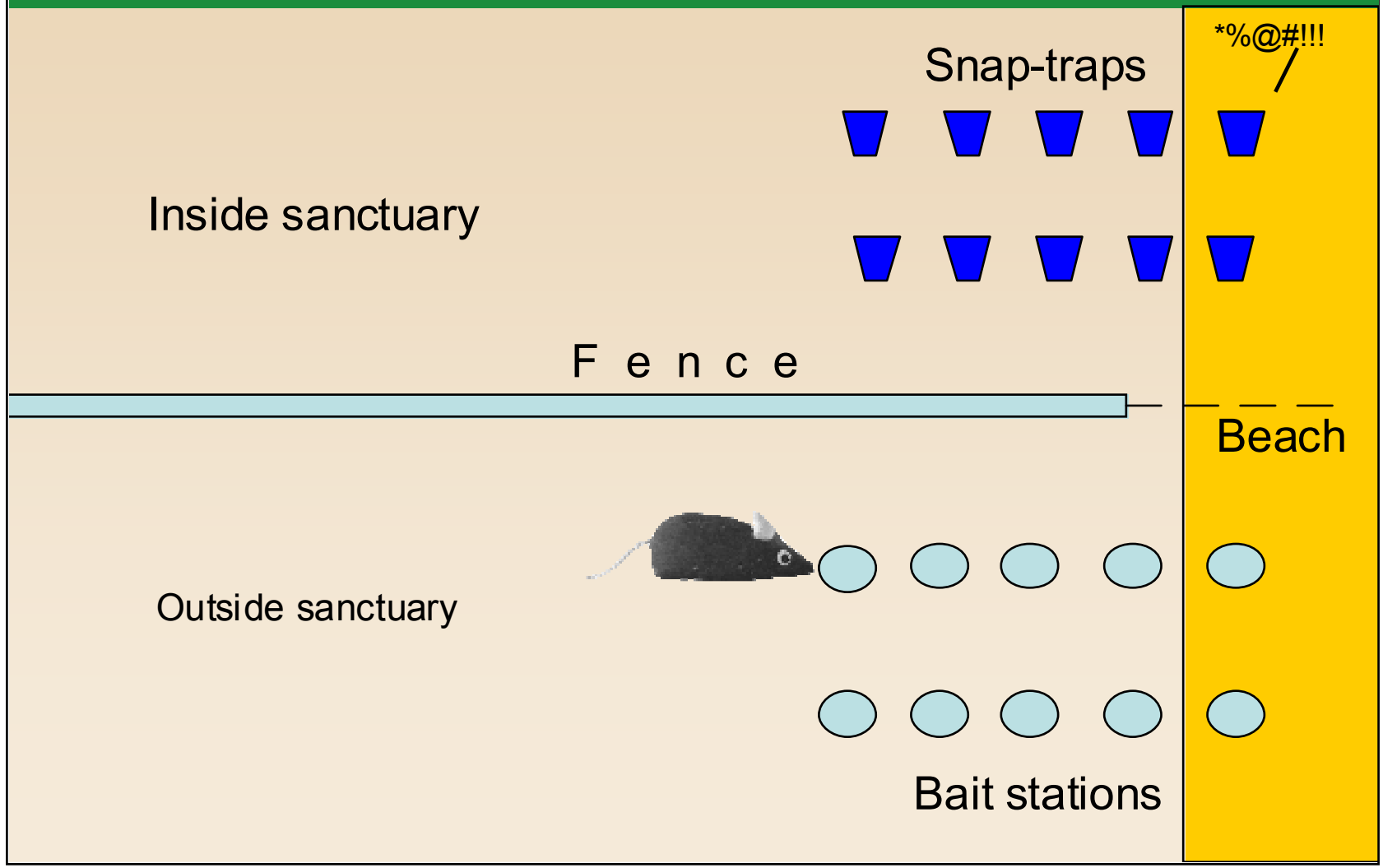
Live-trapping

Two grids, each consisting of 30 live-traps, established in two forested areas of the sanctuary

Possum Gully - under sustained poisoning programme - gecko conservation

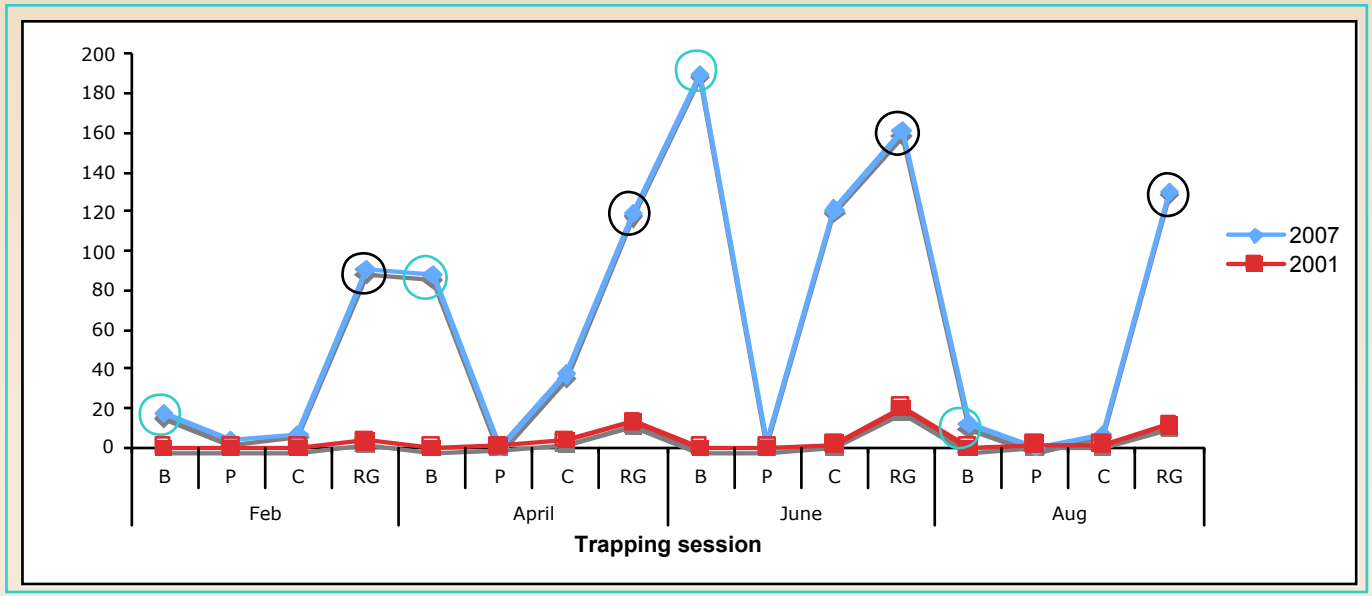
M16 - control site

Detecting movements around the fence.



Results so far...

1. Relative densities and habitat:
   - Mice now in forests at high densities
     - Barwell (2001) did not trap any mice in forests
     - no mice trapped or tracked in Waikauri Bay forest - full of ship rats
   - Consistently high densities in rank grass



Effects of predator/competitor release

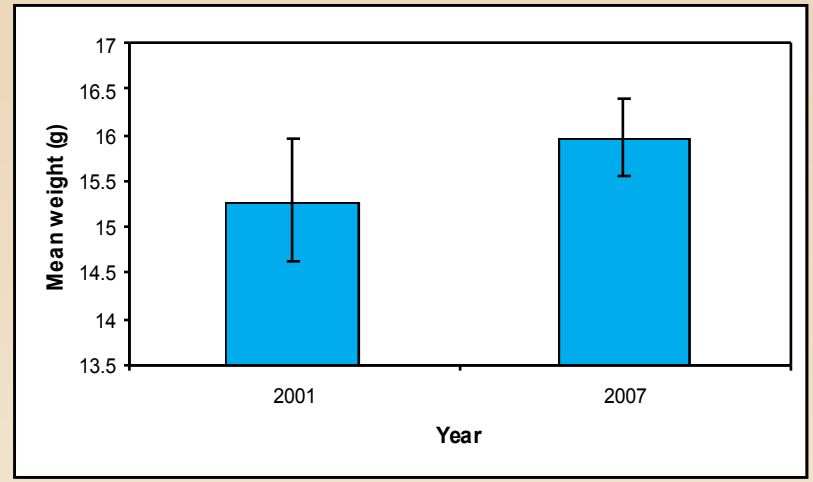
•Mice at high densities in kikuyu all year round

- acting as a reservoir for dispersing mice
- kikuyu rich in food; provides good shelter

Results so far...

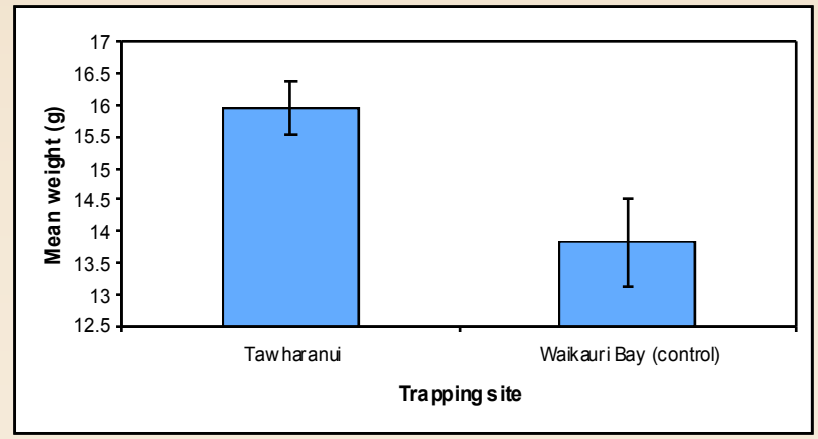
2. Body weight

- Mice caught in 2007 heavier than mice caught in 2001- but not sig difference (so far)
- Sig heavier than mice caught at Waikauri Bay
- Males vs females – no sig difference
- Heaviest mouse - 35g female trapped in rank grass



3. Breeding

- Given the right conditions mice can breed all year round
- Juveniles trapped in early Oct - spring breeding; food scarce in winter



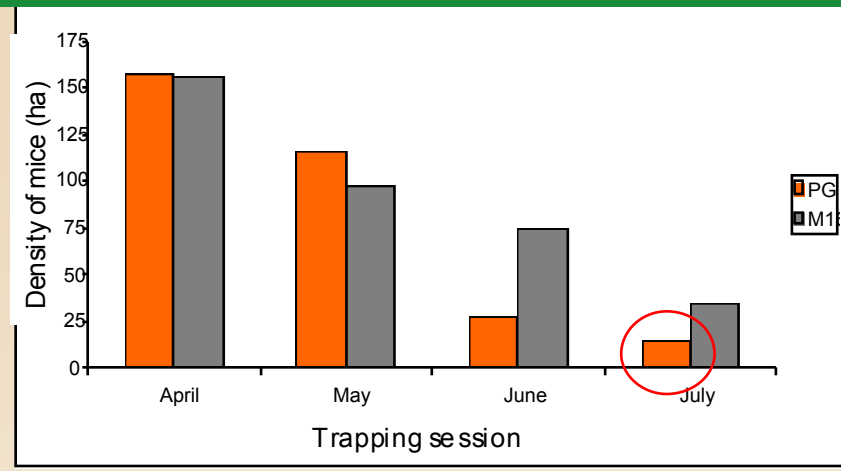
•surprising, given the conditions - most likely limited by availability of food, especially in winter (pending August necropsies).

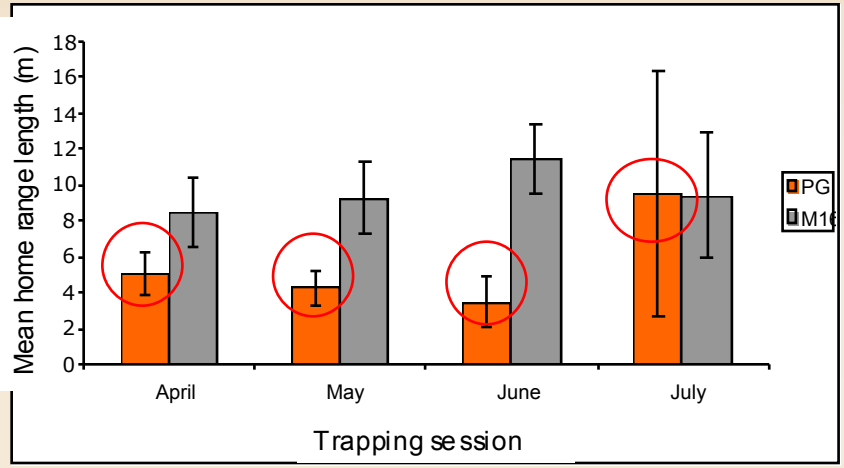
Results so far...

4. Impacts of sustained poisoning

Key points:

- Max density approx 160 per ha
- Apart from July session, no differences in densities between the two sites during majority of trapping sessions.
- Poisoning ineffective
  - grid size
  - food availability
- Home range - sig differences
- Weight – M16 mice sig heavier





Size of grid

Home range - overall mice aren't covering large distances are PG mice smarter? Or have wider ranging mice (i.e., males) been poisoned or may have moved beyond trapping area? More territorial? More food; don't need to travel so far.

Cold weather - less food - stressed mice may be more likely to visit bait stations

Results so far...

5. Effectiveness of the fence end

Key points:

Two mice trapped with signs of RB dye ingestion

Categorical proof that mice are able to move around fence end

Mice trapped in June

Peninsulas: a mixed blessing

- Value in terms of length of fence vs area protected
- Problem of exposed ends - risks of reinvasion, constant monitoring required
- Problem exacerbated by mice - a veritable banquet on offer for mustelids and cats - populations could feasibly re-establish if invaders not detected

- Many instances of predated mice in snap-traps (particularly in June)
- Mustelid predation confirmed by discovery of stoat scat
- Ship rat caught in mouse trap - South coast

Mention that majority of instances of predated mice have occurred in kikuyu - very productive food resource for mammal carnivores - a one stop shop. This is the predicament faced by managers at Tawharanui.

I was getting pretty tired of my data being stolen by pests.

Mention that managers regularly trap intruders

Conclusions.

Long-term outlook at Tawharanui Open Sanctuary:

- looks like mice are here to stay

- what are the impacts on biodiversity?
  - shore skinks in decline; impact on geckos difficult to measure
  - competition with birds
  - are mice likely to diet-switch? e.g., ground-nesting seabirds
  - overall ecosystem effects - difficult to quantify without further research

- prospects for further reintroductions
  - insects and lizards most at risk
  - birds seem to be doing OK

Forests - seed predation, threat to lizards and inverts, competing with birds

Diet-switching - Gough Island albatross.

Overall, Tawharanui is better off now with mice than with the whole suite of mammal pests. Would reintroductions take place with mice at such at high densities? Time will tell - may need some more research.

Conclusions.

Tentative recommendations:

- removing mouse 'reservoirs', e.g., kikuyu (easier said than done). What about *Muehlenbeckia* in dunelands?
- discontinue monthly poisoning regime in Possum Gully - reduce to 2-3 pulses throughout the year; increase density of bait stations
- remove rank grass adjacent to forested sites
- creating mouse-proof areas - research potential
- consider redesigning fence ends

My research:

- live-trapping completed; snap-trapping Oct and Dec
- aim to finish MSc by Feb 2008

Muehlenbeckia is native habitat for shore skinks and helps bind the sand.

PG - in fact the use of toxins in the entire sanctuary (including PG) has recently been discontinued - will now only be used as a response to incursions.

Concentrate effort on fewer sessions - better use of time and labour

Pulsing - winter - coldest time of year and when food is scarce (July); before bird breeding season

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