



Manaaki Whenua  
Landcare Research

# Our Land, Our Future

Tō tātou whenua, mō āpōpō



Manaaki Whenua  
Landcare Research

# **Kiwi, People, Dogs, and Dollars**

**Social Science and Economics under the  
MBIE Kiwi Rescue Programme**

LINK Seminar

July 31, 2019

Patrick Walsh

Manaaki Whenua Auckland



1. Dog Registration Randomised Control Trial (RCT)
2. Kiwi Community Groups Survey
3. Novel Pest Control Survey





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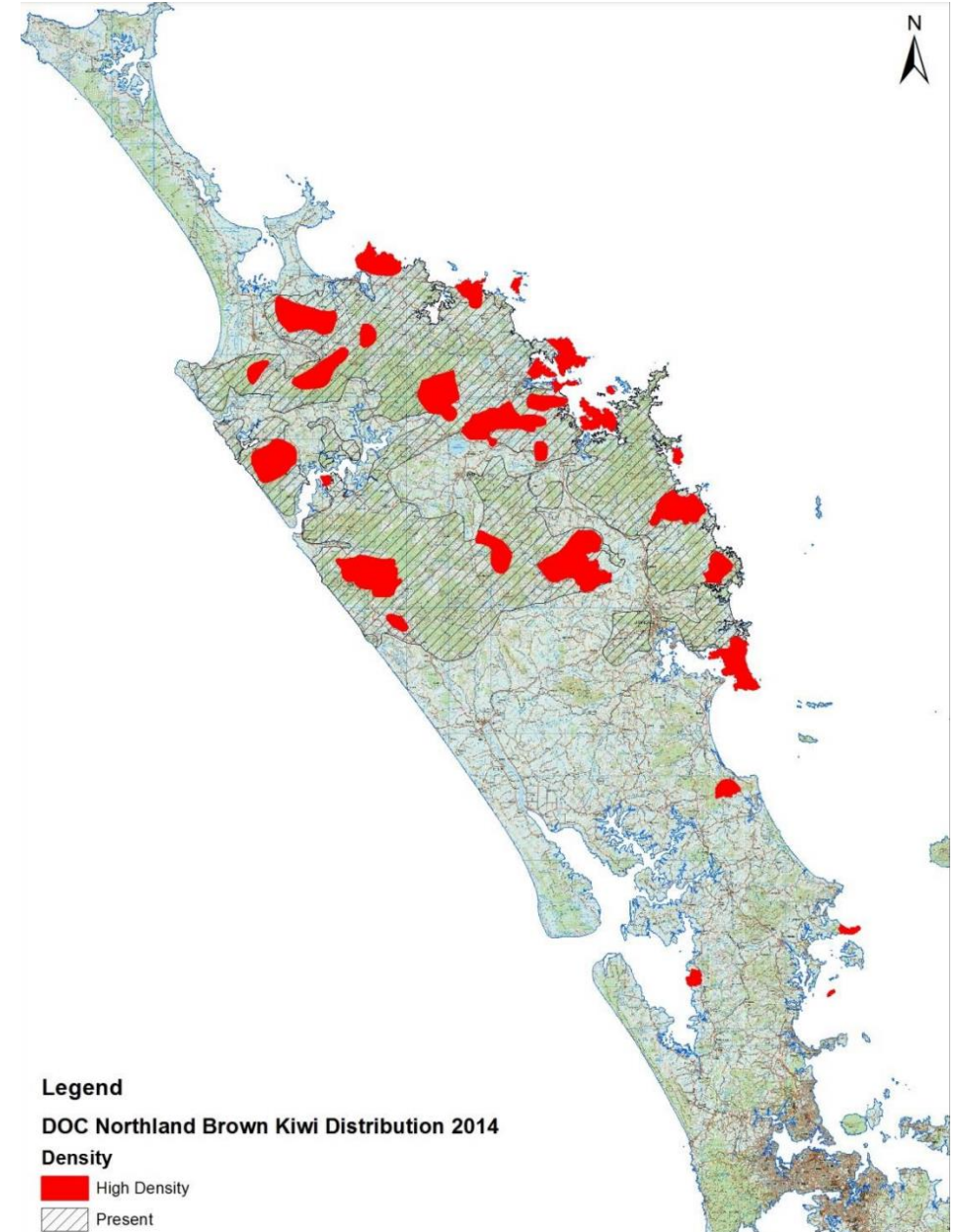
# Dog Registration Project



# Kiwi and Dogs

Northland: life expectancy for Brown Kiwi - **half** national average.

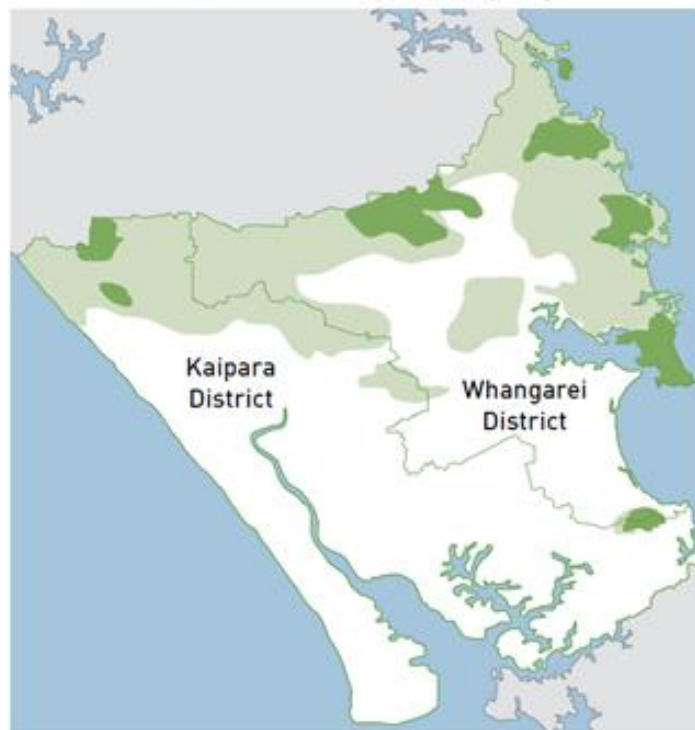
Several sources pointing to threat of dogs.



## Recent LINK seminar on other parts of MBIE programme



Kiwi that have been killed by dogs



Kiwi Distribution ■ High Density ■ Present

Northland brown kiwi live in some surprising places! They prefer damp gullies in native forest and dense shrubland, but they are also found in forestry blocks, rough pastures, and around wetlands. You might even find one on the edges of our roads.

Kiwi populations in Northland have declined greatly due to predation. The good news is that thanks to the efforts of our communities doing predator control, managed populations of Northland brown kiwi are increasing.

You can check out all the good work being done in your area and how you can get involved on the Kiwi Coast website [www.kiwicoast.org.nz](http://www.kiwicoast.org.nz) or by contacting your local DOC office.

Pet free subdivisions are becoming more common in Northland, particularly in the Whangarei District. Dog and cat free subdivisions are created primarily to help protect kiwi and other native animals. If you think pet free conditions in such areas are not being complied with, identify the likely property and contact Amourguard or your council.

# Common conservation tactic – spread awareness



Messaging, signs





# Do these signs work?



Endangered dotterel nest 100 m

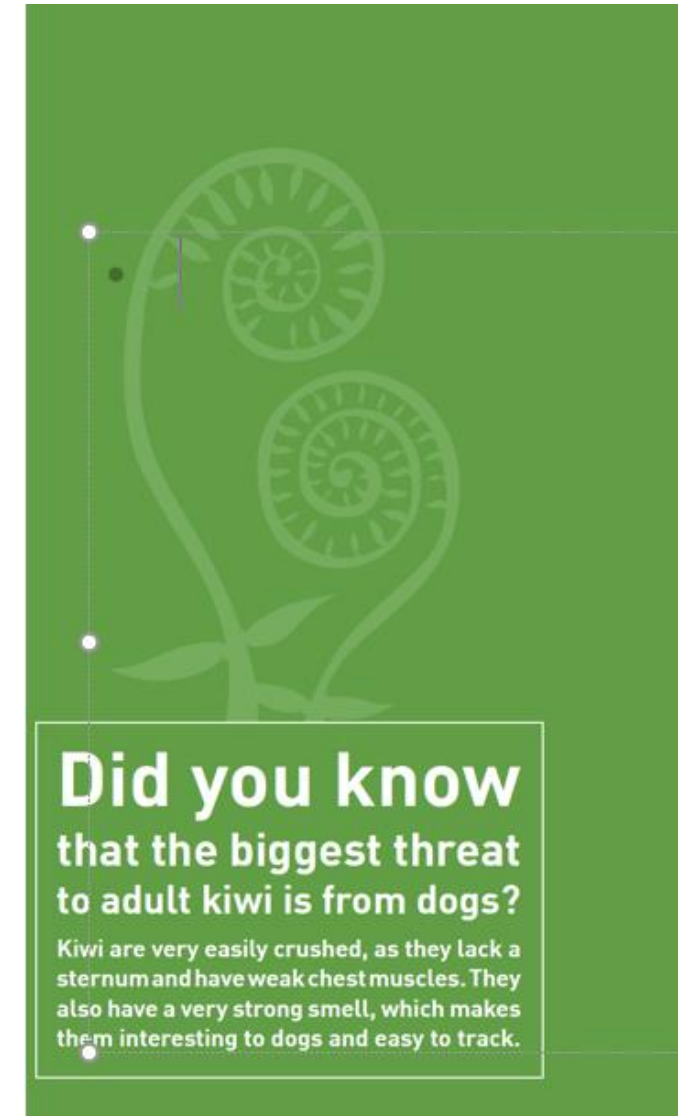


# What kind of messages motivate dog owners?



**Research Goal:** test actual behavioural response to different messages.

Want to focus on dog owners





# Previous NZ Study

Edith MacDonald's (DoC) cat research (widely cited).

- Survey of cat owners in Wellington
- Cats kill local birds. How to keep them inside?





# Previous NZ Study

Messages about peers, and from veterinarians, were much more effective than messages about bird impacts.

Veterinarians recommend  
keeping cats inside

vs

Cats can affect bird populations so  
should be kept inside

- **No actual follow up.**
- Want to **observe** behavioural responses to messages



# Randomised Control Trial

Similar to medical trial –

Randomly assign participants into treatment and control groups, compare outcomes.

Need outcome that **can be measured**.

Need Something **to randomise over**.



# Behavioural Interventions

How to change behaviour, using messages, and evaluate the impact?

Early example – want to reduce electricity usage.

- tell people the average electricity consumption of their neighbourhood.



...Continued from the previous page

	Usage (kWh)	Charge	Amount
<b>30 Jan 18 - 14 Mar 18 (44 days): energy plan change plus price change</b>			
<b>Charges</b>			
Peak Usage	761	28.47 c/kWh	\$216.66
Controlled Load Off-Peak 2	596	20.52 c/kWh	\$122.30
Supply Charge Controlled Load2		13.50 c/Day	\$5.94
Supply Charge		141.01 c/Day	\$62.04
<b>Discounts and Rebates</b>			
Guaranteed usage discount (25%)			\$84.75 CR
NSW Gvt Household Rebate (44 days)			\$34.36 CR
NSW Medical Energy Rebate (44 days)			\$34.36 CR
<b>15 Mar 18 - 22 Mar 18 (8 days)</b>			
<b>Charges</b>			
Peak Usage	273.7	28.47 c/kWh	\$77.92
Supply Charge Controlled Load2		13.50 c/Day	\$1.08
Supply Charge		141.01 c/Day	\$11.28
<b>Discounts and Rebates</b>			
Guaranteed usage discount (25%)			\$19.48 CR
NSW Gvt Household Rebate (8 days)			\$6.25 CR
NSW Medical Energy Rebate (8 days)			\$6.25 CR
<b>Total for period 15 Dec 17 - 22 Mar 18 (excl GST)</b>			<b>\$664.89</b>

**Account number**  
200 000 000 000

**Tax invoice**  
100 000 000 000

**Issue date**  
6 Apr 18

**Electricity**

**YOUR SITE DETAILS**

**Supply address**  
10 SAMPLE STREET SAMPLETOWN  
NSW 2000

**National Meter Identifier (NMI)**  
4000000000

**Meter read**  
Actual

**Next billing date**  
3 month(s)

<b>Total electricity charges</b>	
Charges less discounts and rebates	\$664.89
GST	\$66.49
<b>Your total electricity charges (incl GST)</b>	<b>\$731.38</b>

**YOUR USAGE BREAKDOWN**

Average cost per day	\$7.38
Average daily usage	31.10 kWh
Same time last year	14.72 kWh

**Your indicative greenhouse gas emissions**

Total for this bill	2.9 tonnes
Same time last year	1.2 tonnes
Saved with GreenPower	N/A

For more information on greenhouse gas emissions visit [originenergy.com.au](http://originenergy.com.au).

**HOW YOU COMPARE**

Using the table on the right, you can compare your average daily electricity consumption to other households in your area. Note the different usage bands for summer and winter, and be aware that these comparisons relate to households without a pool. For more information on electricity usage and energy efficiency visit [energymadeeasy.gov.au](http://energymadeeasy.gov.au)

Usage Band	Summer (kWh)	Winter (kWh)
1	~10	~10
2	~15	~15
3	~20	~20
4	~25	~25
<b>Your usage</b>	<b>31.10</b>	<b>14.72</b>

**Important Information**

We changed our electricity charges for most customers on 1 July 2017 (excludes Predictable Plan). You'll see any new charges on this bill. Find out more at [originenergy.com.au](http://originenergy.com.au)

Origin Energy Electricity Ltd ABN 33 071 052 287



# Collaboration on dog registration

Partnered with **Far North District Council**.

Annual dog registration reminders

- Mailed out to previous dog owners, new dog owners, suspected dog owners.
- Randomly insert messages, one based on kiwi



Far North  
District Council



# Collaboration on dog registration

**Randomise** over people.

**Measure** actual registration results



Far North  
District Council

# Randomise messages

Design 4 different messages, in cooperation with FNDC.

- -Dog attacks
- -Kiwi
- -Social Pressure/Nudge
- Loyalty/Dog Focused

You live near an area  
inhabited by kiwi.

Knowing the number of nearby  
dogs will help to plan kiwi  
protection activities.

Please register your dog(s)  
using the enclosed form to  
help with kiwi protection.





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Dog attacks are a concern for our community, especially in areas with children, elderly residents, and vulnerable wildlife.

Knowing where dogs are helps prevent attacks and improves council planning efforts.

**Please register your dog(s) using the enclosed form.**



# Dog attacks












# Social Pressure / Nudge

## Usage comparison

Average daily consumption in litres per day\*

 The droplet shows you where your household falls

Household size	Lower limit of band	Upper limit of band
	0	224
	225	401
	402	555
	556	687
	688	797
	798	884

\* these figures are based on average usage according to the 2008 BRANZ Water Use in Auckland Households Study and are indicative only. If your usage puts you into a household bracket with more people than are currently residing in your household your usage is more than average. Outdoor usage, for example an irrigation system, will influence your consumption towards the upper end of the band.



**Please register your dog(s)  
using the enclosed form.**

Nearly 8 out of 10 dogs in  
the Far North District whose  
owners receive this form are  
registered before penalties  
are applied.



Your dog is loyal to you.

Please register and microchip  
it to return the same loyalty.

If lost, your registered and  
microchipped dog will be  
returned to you much quicker.

**Please register your dog(s)  
using the enclosed form.**



# Loyalty





# 2018 Registration Data

6,271 Owner-level observations

Anonymised – Lawyers denied anything connecting to owner



## Most Popular Dog Names

Max

Bella

Jess

Jack

Poppy

Sam

Molly

Buddy



# Controls

- Different effect across groups?
- Don't have Census data. Limited dog data.
- Previous Year Registration Rates (Income?)
- Look at average 2018 registration rate of zip code (generic 1-40)
- Split into fourths. Use econometric regressions to detect significance



# Kiwi Messages: Differences in Probability of Registration

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Zip Code		
Quartile	Kiwi Message	Predicted Percent
1	No	60.30
1	Yes	64.97



# Kiwi Messages: Differences in Probability of Registration

Zip Code			
Quartile	Kiwi Message	Predicted Percent	
1	No	60.30	
1	Yes	64.97	
2	No	73.25	
2	Yes	73.65	
3	No	75.00	
3	Yes	79.61	
4	No	81.96	
4	Yes	75.40	



# Dog Attack

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Zip Code Quartile	Dog Attack Message	Predicted Percent
1	No	60.55
1	Yes	63.66
2	No	73.28
2	Yes	73.49
3	No	75.03
3	Yes	79.43
4	No	82.19
4	Yes	74.29

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# Dog Control Bylaw? Misinformation?

Bay of Islands Dog Owners Group

LOBBYING FOR DOG OWNERS AND OUR FURRY FRIENDS

ABOUT

NEWS

EVENTS

RESO

## About

Started in August, 2017, to protest against a hostile Dog Control By-law being promoted by the Far North District Council.

The Group began as a spontaneous Facebook group called The BOI WatchDog, in response to a threat to phase out pets in the Russell Peninsular and forbid dog exercise anywhere on public land or beaches on the Russell side of the Waikare Inlet.

The campaign was immediately widened to include groups from Opuia, Paihia and Kerikeri and within a few weeks had attracted many hundreds of members from all over the Far North District.



# 'Draconian' dog controls anger canine lovers

Bayley Moor · 08:56, Aug 11 2017



BAYLEY MOOR/STUFF

Jan Graham says the community should have been more involved during changes to the proposed Dog Control Bylaw. She is pictured at the Waitotara Reserve with her five-year-old blue heeler named Pearl.



# Pig Dog Owners

Message	Number	Mean
<b>Control</b>	<b>52</b>	<b>50.0</b>
Dog Attack	27	55.6
Kiwi	27	77.8
Social Nudge	29	55.2
Loyalty	36	55.6



# Working Dogs

Message	Number	Mean
<b>Control</b>	<b>348</b>	<b>81.3</b>
Dog Attack	193	85.0
Kiwi	221	79.6
Social Nudge	210	81.4
Loyalty	218	80.7



# Discussion

- Still find a significant response to kiwi message, *on average*.
- Behavioural response to policy and policy discussion.
  - What other behaviours correlated? Signage?
- Find significant differences across message effectiveness
- Kiwi and dog attack messages most successful
- Importance of targeting – pig dog owners, working dog owners, income(?)
- Impacts of local policy – bylaw discussion and misinformation



# Next Wave – June 2019

- New wave of reminders just went out.
  - Simplified messages.
- Dog control bylaw just passed. Less contentious.
- FNDC zip codes
- New Format.



<sup>1</sup> For the purposes of the Dog Control Act 1996, you are the owner of a dog if: you own the dog; OR you have the dog in your possession (otherwise than for a period not exceeding 72 hours for the purposes of preventing the dog causing injury, or damage or distress or for the sole purpose of restoring a lost dog to its owner); OR you are the parent or guardian of a person under 16 who is the owner of the dog who is a member of your household living with and dependent on you.

<<Owner name>>  
<<Owner Address>>

**OWNER'S PARTICULARS**

**Physical address**  
(where dog is kept)

**Home phone** <<Home Phone>> **Work phone** <<Work Phone>> **Mobile** <<Mobile>>

**Owner's date of birth**  
(MUST be older than 16) (Day) / (Month) / (Year) **Email** <<Email>>

<sup>2</sup> Your date of birth is required to enable you to be distinguished from other persons with the same name. Certainty of Identification is required in the enforcement of the provisions of the Dog Control Act 1996.

**DOG PARTICULARS**

Animal ref	Tag #	Dog name	Age	Sex	Breed	Colour	Microchip	Class	Fee
20122400		Impounded	5	M	Kelpie	Black/white		Pet (entire)	

If these details are incorrect or need updating – please make the appropriate corrections

**PAYMENT DETAILS**

**GST Number: 52-004-526** **Fee Payable (Total due)** \$ **00.00**  
(This becomes a tax invoice when paid) (If paid BETWEEN 1st July to 31st July 2018)

It is an offence, when applying for the registration of a dog, to make any written statement knowing that statement to be false. On conviction, a court may impose a fine of up to \$3,000.

I confirm that the information above relating to dog (s) in my care is true and correct:

**Signed** \_\_\_\_\_ **Date** \_\_\_\_\_

Office use only				
Receipt Number	Date	Total Paid	\$	

Nearly 8 out of 10 dogs in the Far North District are registered each year. Please help the community and register your dog.



**FURTHER INFORMATION**

Registration Fee (01/07/18-31/07/18)	Registration Fee (01/08/18-30/06/19)				
Dog Class	Neutered	Entire	Dog Class	Neutered	Entire
Normal Pet	\$52	\$62	Normal Pet	\$77	\$87
Menacing/Dangerous	\$62	\$92	Menacing/Dangerous	\$121	\$131
Working/Pig Dog	\$40	\$50	Working/Pig Dog	\$60	\$70

Full fee, penalty and debt recovery costs are incurred 1st September 2018 – 30th June 2019

**PAYMENT OPTIONS**

**BY POST:** Send a cheque (NOT cash) to: Animal Management Department, Far North District Council, Private Bag 752, Kawakawa 0440  
**IN PERSON:** Pay by cheque, cash or **Debit** at a FNDC office. Located in **Kawakawa**, **Kawakawa**, **Urua** (i-SITE), Kerikeri (John Butler Centre), **Opunga** (i-SITE), **Opunga** (i-SITE) or **Opunga**. Pay in person during normal office hours.  
**IN PERSON BANKING:** Account Name: Far North District Council; Bank: ASB Bank; Account Number: 12-3044-0322509-00  
Dog ID: 20122400 as a reference.

**Note:** The above information will be kept by the Far North District Council but may be used only for lawful official purposes and will not be generally available to the public. However, section 36 of the Dog Control Act 1996 allows the name and address of the owner of any specified dog to be made available to any person who has made a written application for that information. Before supplying the information, the Far North District Council must be satisfied of the identity of the applicant and that the information is requested for one of a limited number of specified purposes, such as returning a lost dog to its owner or seeking compensation for damages.  
**Note:** Failure to supply any of the information requested in this form that is relevant to your application may prevent registration of your dog. You are encouraged to request the Far North District Council to correct or amend any of these details if you discover a mistake or if the relevant circumstances change. You are required to notify the Far North District Council of any change of address or change in the ownership of the dog.

**NOTES ON REGISTRATION**

All dog owners with dogs ordinarily kept in the Far North District Council district must register their dogs with the Far North District Council. All dogs over the age of 3 months must be registered.  
It is an offence to keep a dog older than 3 months which is unregistered. On conviction, a Court may impose a fine of up to \$3,000.  
On completing the form properly, a dog owner may pay the form, together with the appropriate fees payable, to the Dog Registrar at Far North District Council, Private Bag 752, Memorial Avenue, Kawakawa or deliver these items to the office of the Far North District Council.  
It is an offence, when applying for the registration of a dog, to make any written statement knowing that statement to be false. On conviction, a court may impose a fine of up to \$3,000.  
Replacement discs and collars may be obtained from the Far North District Council if the current disc or collar has been lost or stolen.  
Any dog not wearing a collar having a current registration label or disc attached will, until the contrary is proved, be treated as unregistered.  
On change of ownership of any registered dog, both the previous owner and the new owner must, within 14 days, give written notice to the Far North District Council, of the change of ownership and the residential address of the new owner and the address at which the dog will be kept. It is an offence not to comply with this requirement. On conviction, a court may impose a fine of up to \$500.  
If the owner's address is changed within the district, the owner must, within 14 days, give written notice of the change to the Far North District Council.  
If the dog is transferred to and kept in the district of another territorial authority, other than the one in which it has been kept, for 1 month or more, the owner must, within 6 weeks of the transfer, give written notice of the transfer to both territorial authorities, setting out the address at which the dog will be kept. It is an offence not to comply with this requirement. On conviction, a court may impose a fine of up to \$500.  
If the fee for the registration of a dog is paid and the dog dies, a refund will be made on request as follows:  
• Where a dog dies before the commencement of the year, the full fee will be refunded.  
• Where the dog dies during the year, 1/12<sup>th</sup> of the annual fee for each complete month remaining in the registration year after the date of application for a refund will be refunded.  
If any dog is first required to be registered after 1 August in any registration year, the fee shall be 1/12<sup>th</sup> of the annual fee for each complete month remaining in the registration year after the date of such registration.  
The registration fees include goods and services tax.  
Owners wishing to claim a reduced fee for neutered dogs must produce a certificate from a registered veterinarian certifying that the dog has been neutered.  
If any dog over the age of 3 months is found not wearing a collar with a current registration label or disc attached, on land or premises other than its owner's land or premises, or in any public place, the dog may be seized and impounded.

**CONTROL OF DOGS - SECTION 52, 53 AND 54A, DOG CONTROL ACT 1996**

The owner of a dog must keep the dog under control at all times and, when in a public place with the dog, must use or carry a leash at all times. A dog will be treated as not under control –  
• if it is found at large on any land or premises other than a public place or a private way without the consent (express or implied) of the occupier or person in charge of the land or premises; or  
• if it is found at large in any public place or in any private way in contravention of any regulations or bylaw.  
You will commit an offence and be liable on conviction to a fine not exceeding \$3,000 if you fail to comply with this provision.

**OBLIGATIONS OF DOG OWNERS GENERALLY - SECTION 54, DOG CONTROL ACT 1996**

The owner of a dog must –  
• ensure that the dog receives proper care and attention and is supplied with proper and sufficient food, water, and shelter, and  
• ensure that the dog receives adequate exercise.  
You will commit an offence and be liable on conviction to imprisonment for up to 3 months or to a fine not exceeding \$5,000 if you fail to comply with this provision.

**OBLIGATIONS OF DOG OWNERS ON OWNERS' PROPERTY - SECTION 52A, DOG CONTROL ACT 1996**

The owner of a dog must ensure, when the dog is on land or premises occupied by the owner, –  
• that the dog is under the direct control of a person; or  
• that the dog is confined within the land or premises in such a way that it cannot freely leave the land or premises.  
You will commit an offence and be liable on conviction to a fine of \$3,000 if you fail to comply with this provision. In addition, a dog control officer or dog ranger may seize and impound the dog.

**PARTICULARS OF LAST REGISTRATION**

Dog ID	Dog name	Year	Tag	Authority





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# Kiwi Community Survey

Partnership with Kiwis for Kiwi



# Motivation

Need more information about kiwi conservation costs

Project impacts on kiwi and costs

Especially from community groups





# Partner with Kiwis for Kiwi

- Connected to community groups
- Design online survey to ask community groups about several important factors





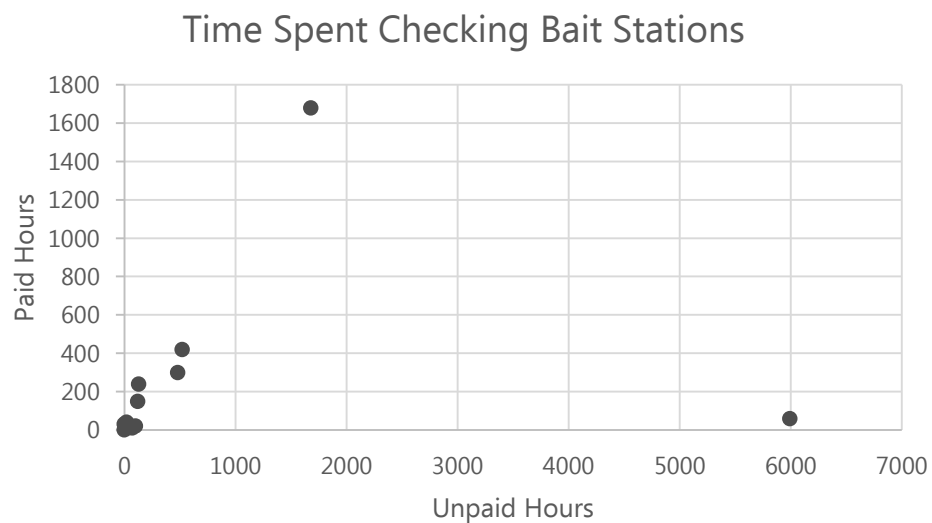
# Survey

- Trapping
- Baiting
- Monitoring
- Labour – paid vs unpaid
- Other costs
- Kiwi
- Land size
- Advocacy

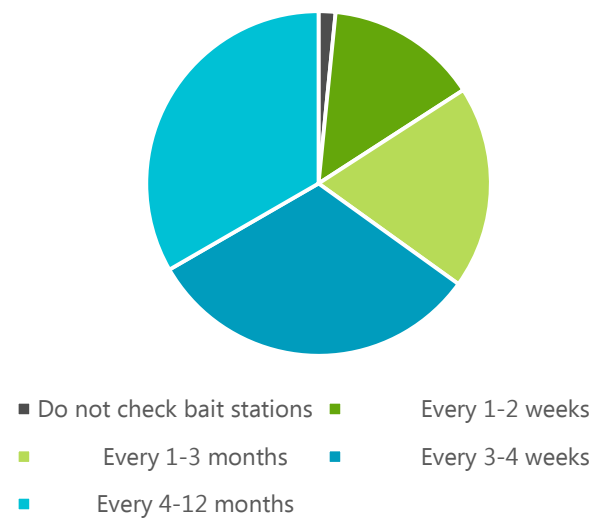
Type	# Groups
Coromandel brown	4
Eastern brown	4
Great spotted	3
National focus	1
Northland brown	26
Tokoeka Haast	2
Western brown	5



# Example Responses: Bait Stations



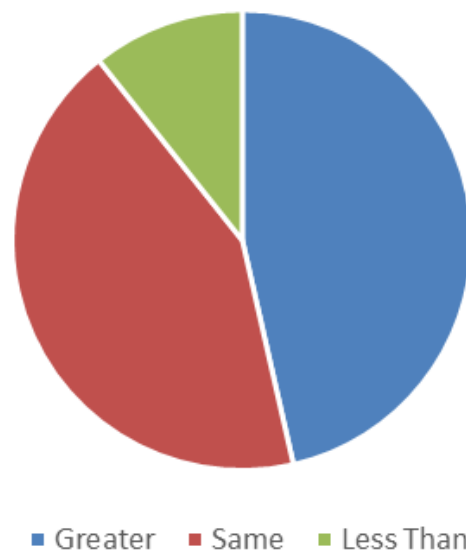
How Frequently do you Check Bait Stations when Toxin is Applied?



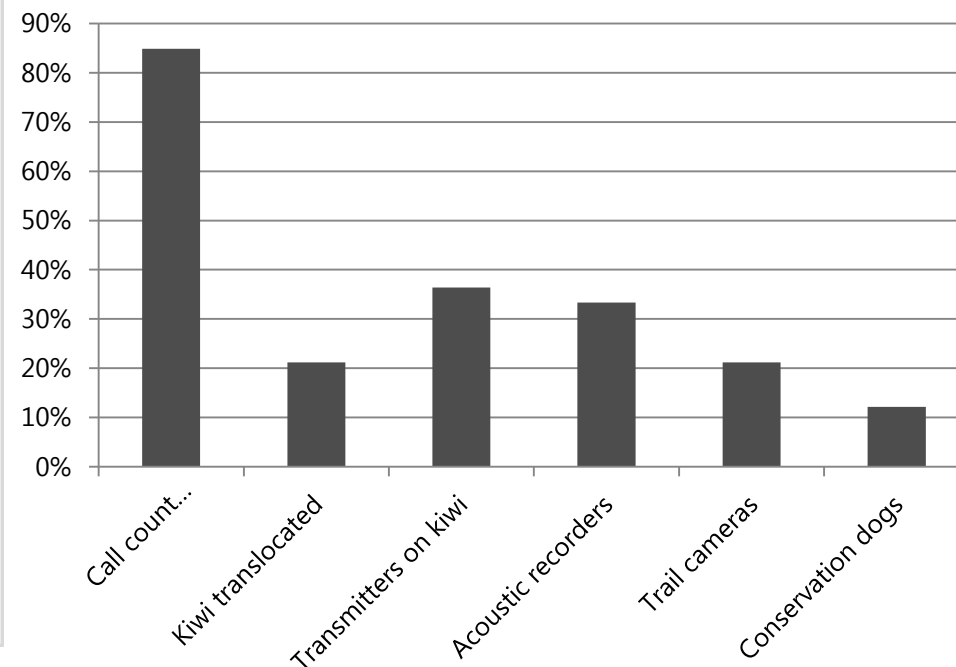


# Monitoring

Kiwi Groups Reporting Changes in Kiwi Numbers They Monitor (since 2017)

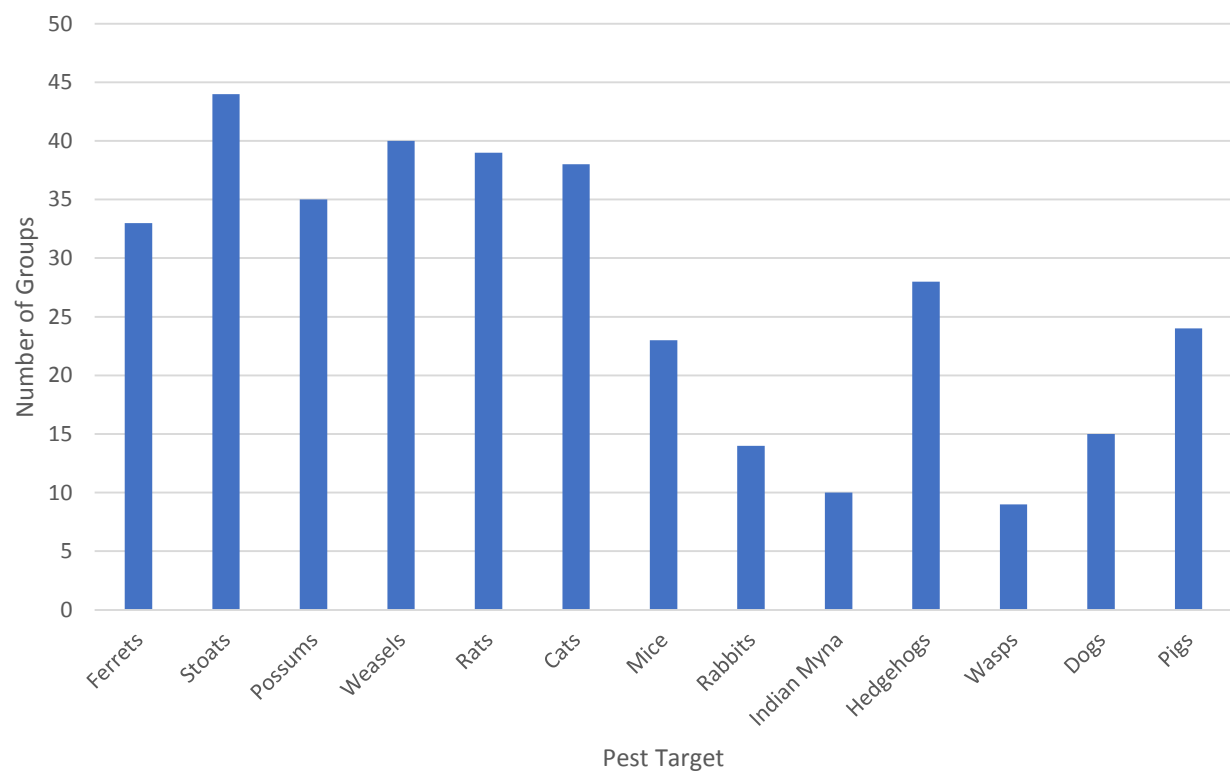


How Groups Monitor Their Kiwi

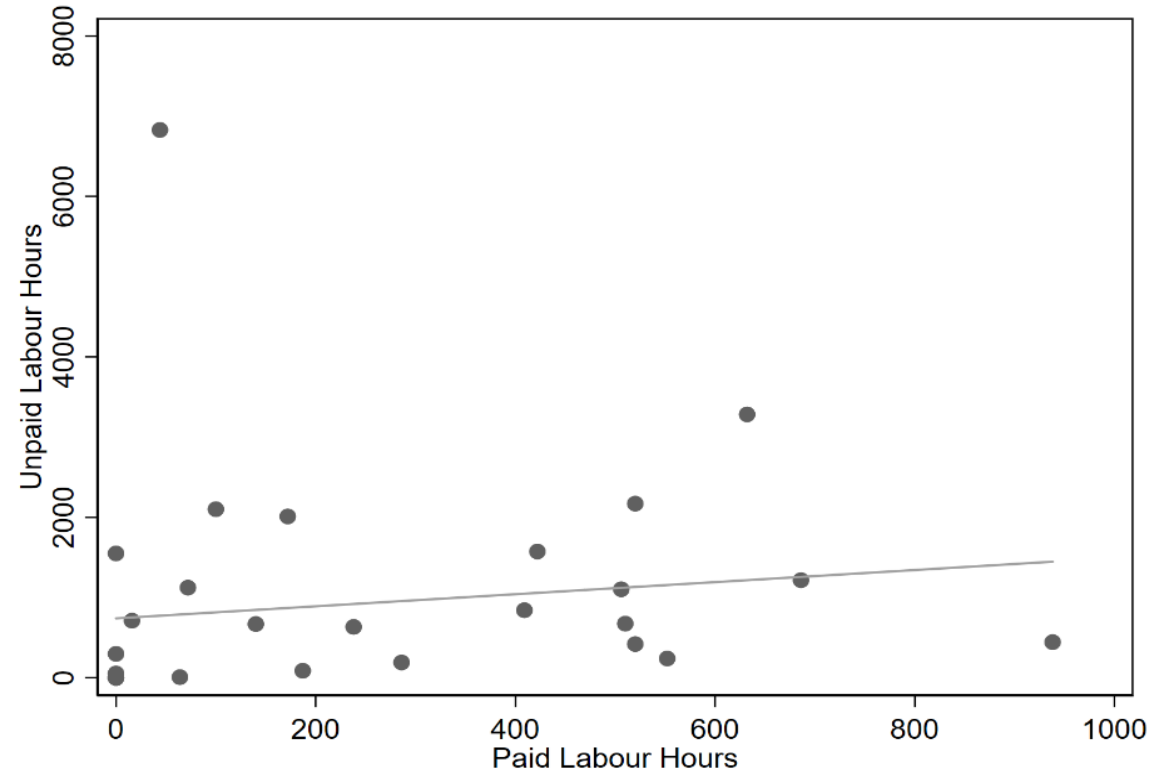
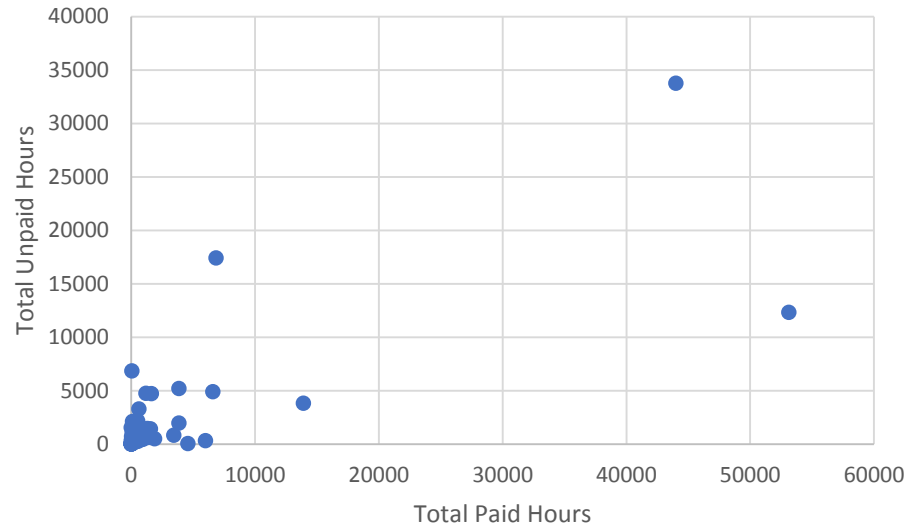




# Pest Control Targets



# Paid vs unpaid hours







# Labour

<b>Activity</b>	<b>Obs</b>	<b>Mean Labour Ratio</b>
<b>Bait</b>	21	7.3
<b>Pest Trapping</b>	34	2.3
<b>Pests</b>	20	0.4
<b>Call Count Monitor</b>	27	0.1
<b>Recorders</b>	10	0.5
<b>Transmitters</b>	13	2.0
<b>Kiwi Aversion</b>	12	0.4
<b>Kiwi Advocacy</b>	24	0.3
<b>Administration</b>	31	3.3



# Labour and Non-Labour Costs (per ha) by Primary Kiwi

	Average Non-Labour Costs (per ha)	Average Labour Costs (per Ha)
Coromandel brown	18.88	20.23
Eastern brown	29.44	28.95
Great spotted	6.75	4.70
Northland brown	37.94	50.49
Western brown	77.44	49.48



# Average Costs per Kiwi (Brown Kiwi Groups)

	Non-Labour Costs (per Kiwi)	Labour Costs (per Kiwi)	Total Costs (per Kiwi)	Land Area
Small	1,426.74	359.96	1,786.71	457
Medium	511.26	577.83	1,089.09	1,828
Large	174.96	602.74	777.70	9,018



# Next Steps

Apply these costs to simulated scenarios, in coordination with other parts of Kiwi Rescue Programme





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# Novel Pest Control Survey



# Novel Pest Control Survey

- Bioheritage National Science Challenge
- Over 8,000 people surveyed nationally
- General survey with questions around:
  - Novel pest control methods
  - Respondent backgrounds
- One component – Economic Choice Experiment.





# Economic Choice Experiment

- Choice experiment designed and implemented by Colmar Brunton and Manaaki Whenua
- Have people choose between policies with different attributes.
- Trade-offs





In the following questions, you will be asked choose between two different options. The set of circumstances for each option will vary. They will include:

The new pest control <b>technique</b>	<ul style="list-style-type: none"><li>• New Toxin,</li><li>• Trojan female</li><li>• Gene Drive</li></ul>
The <b>animal</b> the new technique would control	<ul style="list-style-type: none"><li>• Rats,</li><li>• Wasps</li><li>• Stoats</li></ul>
How the technique will be <b>delivered</b>	<ul style="list-style-type: none"><li>• On the ground</li><li>• From the air</li></ul>
What happens to the animal who interacts with the new method	<ul style="list-style-type: none"><li>• Infertility</li><li>• Death</li></ul>

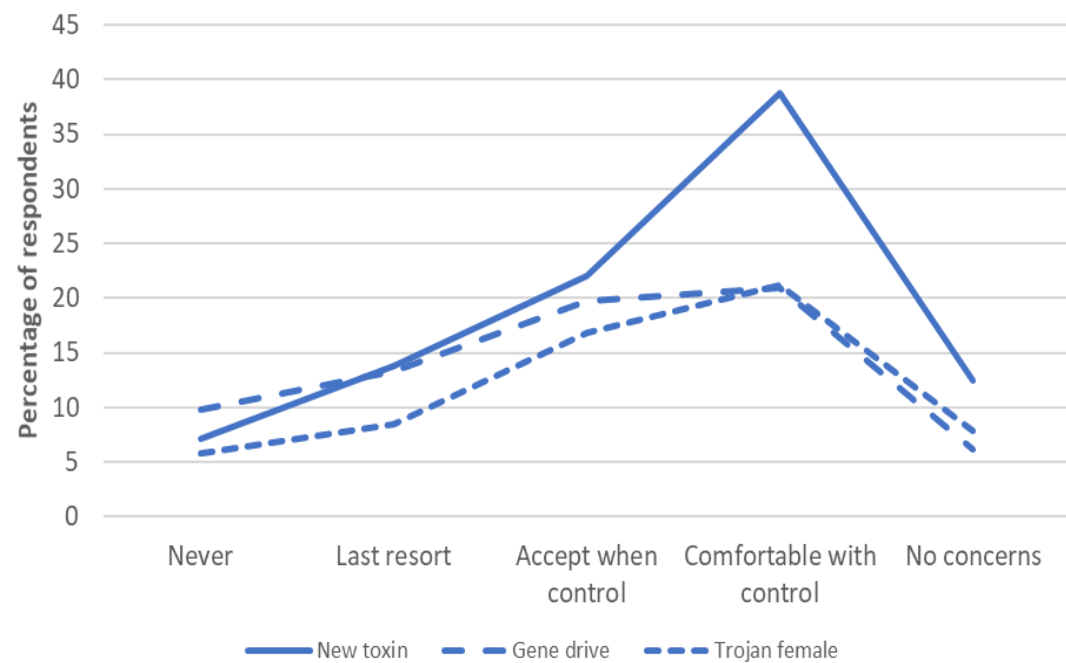




	OPTION 1	OPTION 2
The new pest control <b>technique</b>		
The <b>animal</b> the new technique would control		
How the technique will be <b>delivered</b>		
What happens to the animal who interacts with the new method		
	<b>RADAR BUTTON</b>	<b>RADAR BUTTON</b>

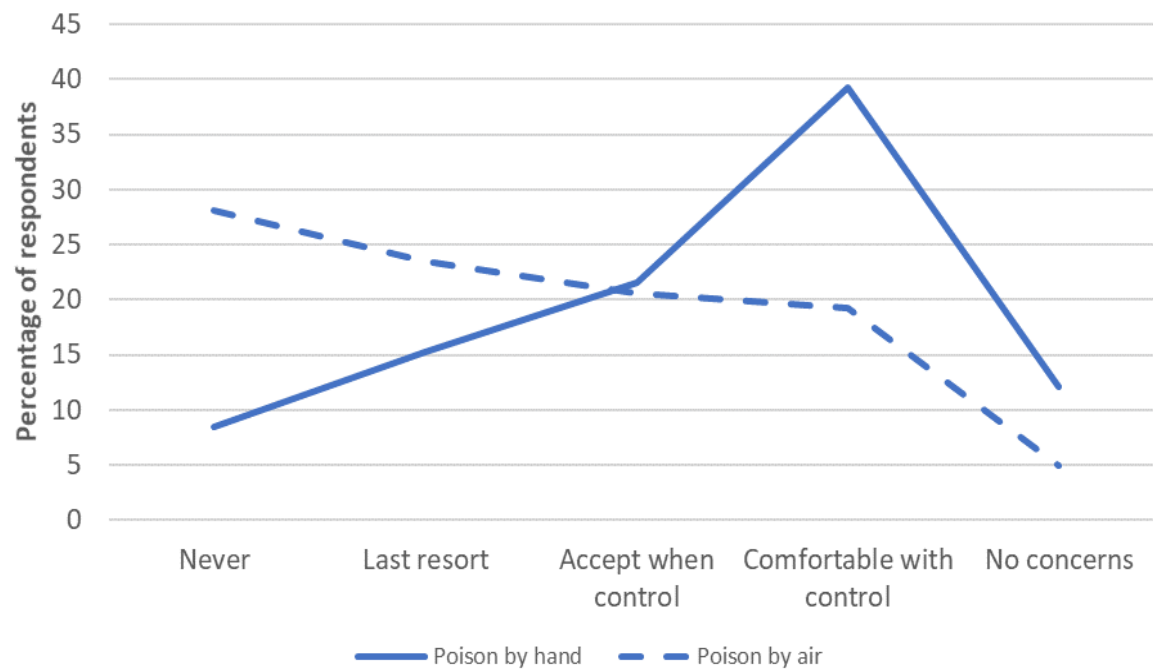


# Results – control techniques





# Results – ground or air?





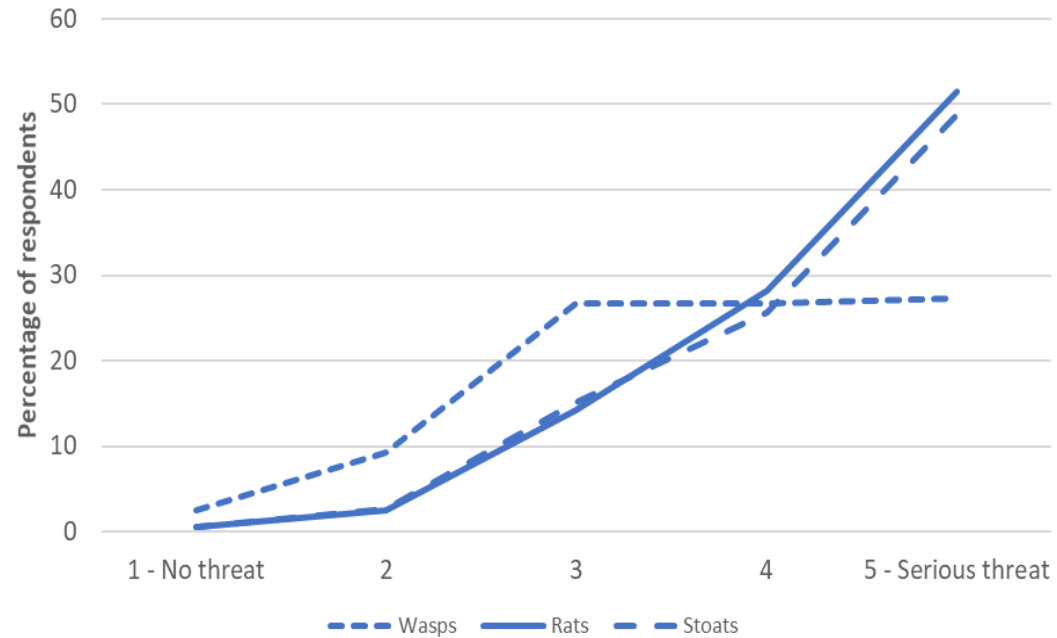
# Econometric models

- Multinomial Logit models and Mixed Logit Models applied
- Both models indicate that:
- respondents were more likely to **choose the trojan female option over a new toxin.**
  - less likely to **choose the gene drive option over the new toxin option**, with both effects statistically significant
- **Rats, stoats preferred targets to wasps**





# Perceived threat of rats, stoats, wasps





# Demographic interactions

Respondents that **trust scientists** more,

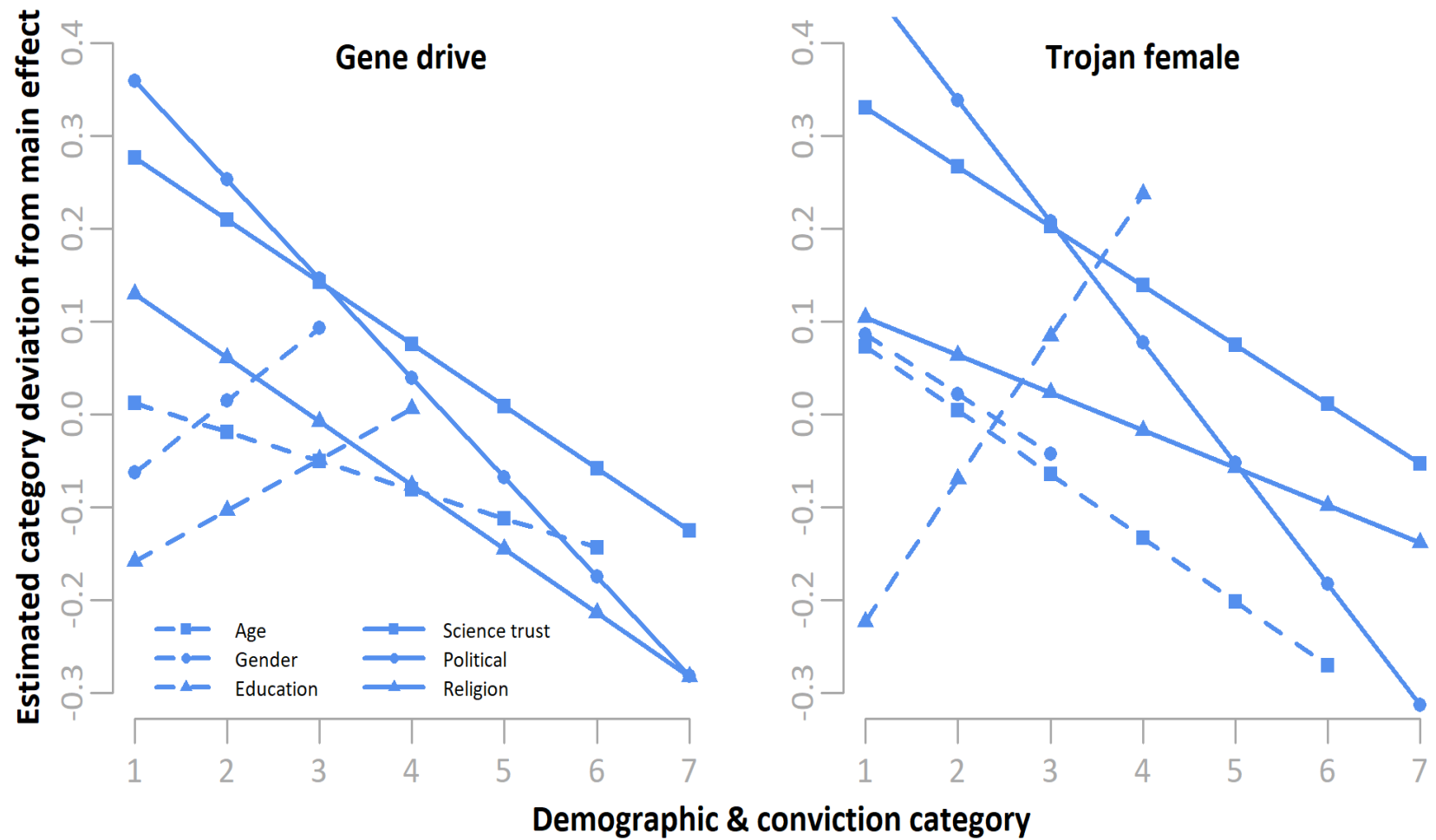
- are **more secular**
- or **liberal**,
- and have attained **higher education**
- **have stronger preferences for genetics-based pest control**

but

- **higher age** tends to have the opposite effect.

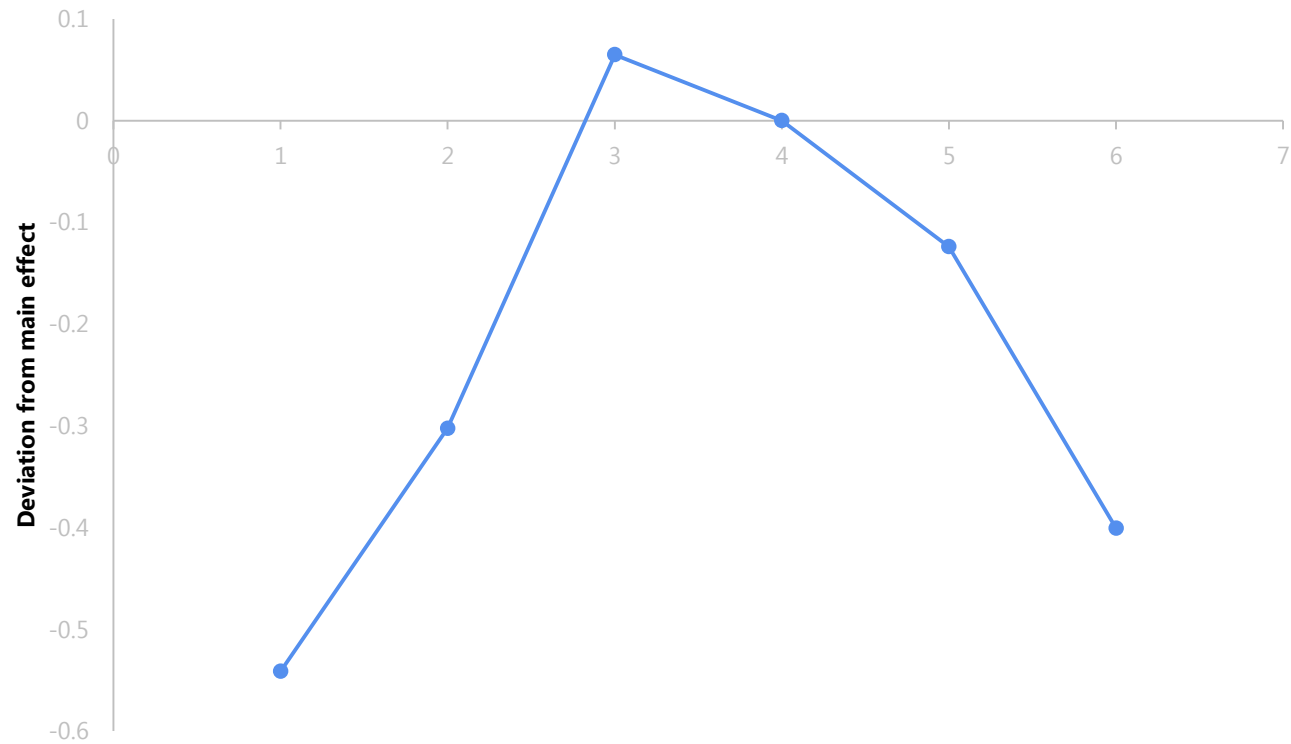


# Deviations from the average effect





# Relative preference for ground-based deployment of pest control for age groups







# Conclusions

- When given different policy scenarios, Trojan female *Preferred* over new toxin *Preferred* over gene drive
- Need to revisit/analyse phrasing – gene drives were described as requiring the release of **large numbers of organisms** as compared to a **small number of organisms** released using trojan females
- Strong preference for rats and stoats over wasps
- Strong preference for ground based delivery
- Demographics/background play important roles – engagement activities could be mindful.
- Future research into underlying motivations.



Manaaki Whenua  
Landcare Research

**Thanks! To FNDC, other participants in MBIE Kiwi Rescue Program, DOC, Kiwis  
for Kiwi, Community groups**

[walshp@landcareresearch.co.nz](mailto:walshp@landcareresearch.co.nz)