Kiwi – plight to flight

Kiwi rescue

John Innes
Manaaki Whenua – Landcare Research

Save our iconic kiwi

Jo Ledington
Department of Conservation

Manaaki Whenua
Landcare Research

Department of Conservation
Te Papa Atawhai

Morgan Rothwell

LINK seminar, Wgtn, 19 Feb. 2019

Manaaki Whenua
Landcare Research

Kiwi rescue – CO9X1609

John Innes

Al Glen, Ben Wiercinski, Daniel White, Danielle Middleton, Dean Anderson, Florian Eppink, Hester Roberts, Kiri Reihana, Pablo Garcia Diaz, Patrick Walsh, Robyn Kannemeyer, Talia Brav-Cubitt

With DOC, Kiwis for kiwi, Massey Univ, Canterbury Museum

1 Oct. 2016 to 30 Sept. 2020

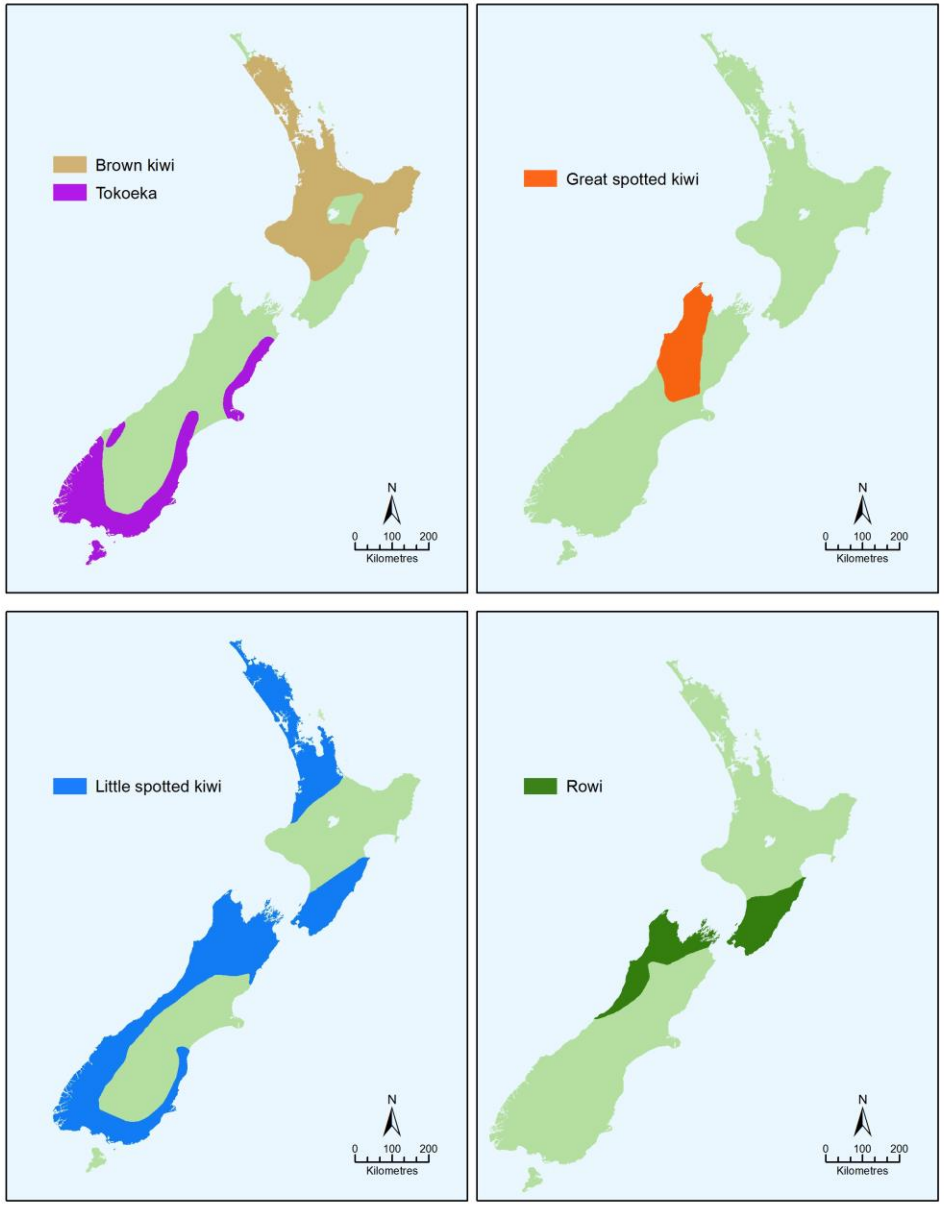
MANAAKI WHENUA – LANDCARE RESEARCH

Kiwi recovery

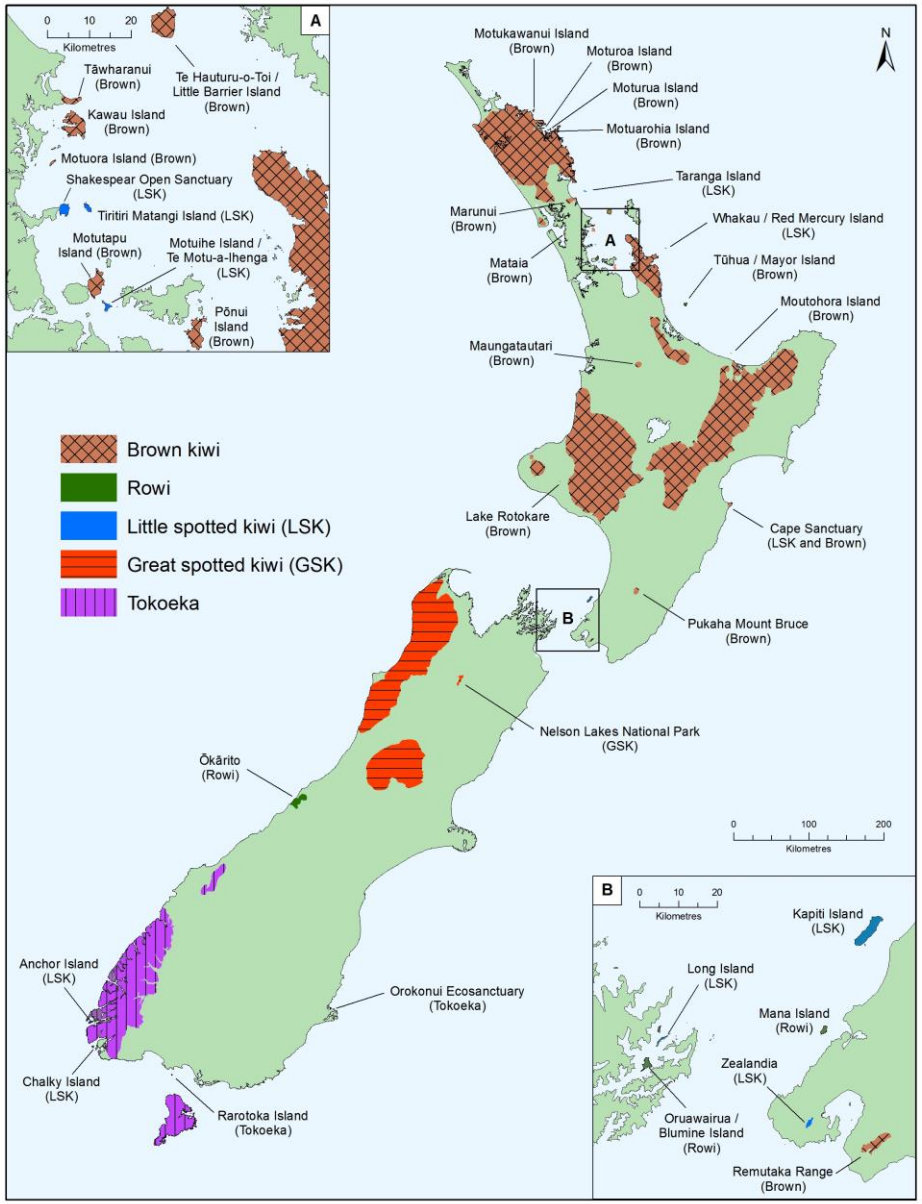
DOC	Kiwis for kiwi	Universities /museums	Iwi	Manaaki Whenua
Legally responsible Govt agency	National charity/Trust	Research, collections	Ngai Tahu on Rec. Group. Annual hui. Growing roles.	2% cost report (July 2015). Kohanga report (May 2016)
1st Plan 1991	Est. 2012	Many years	Many years	
New 2018–2028 plan out now	New strategy out now			Kiwi rescue bid (Submitted March 2016)
Hugh Robertson Rogan Colbourne Jo Ledington	Michelle Impey Morgan Cox [Wendy Sporle]	Paul Scofield Isabel Castro		Us!

2014 Govt budget
Turn 2% p.a. decline into 2% increase, across all taxa = 'Save Our Iconic Kiwi'
Extra $11.2m over 2015 – 2019, plus $6.8m per year thereafter

ca 1300 AD



Current distribution



DOC

DOC

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Kiwi population estimates 2015: Total 68,000 ± 20,000

24% have some management; 76% unmanaged

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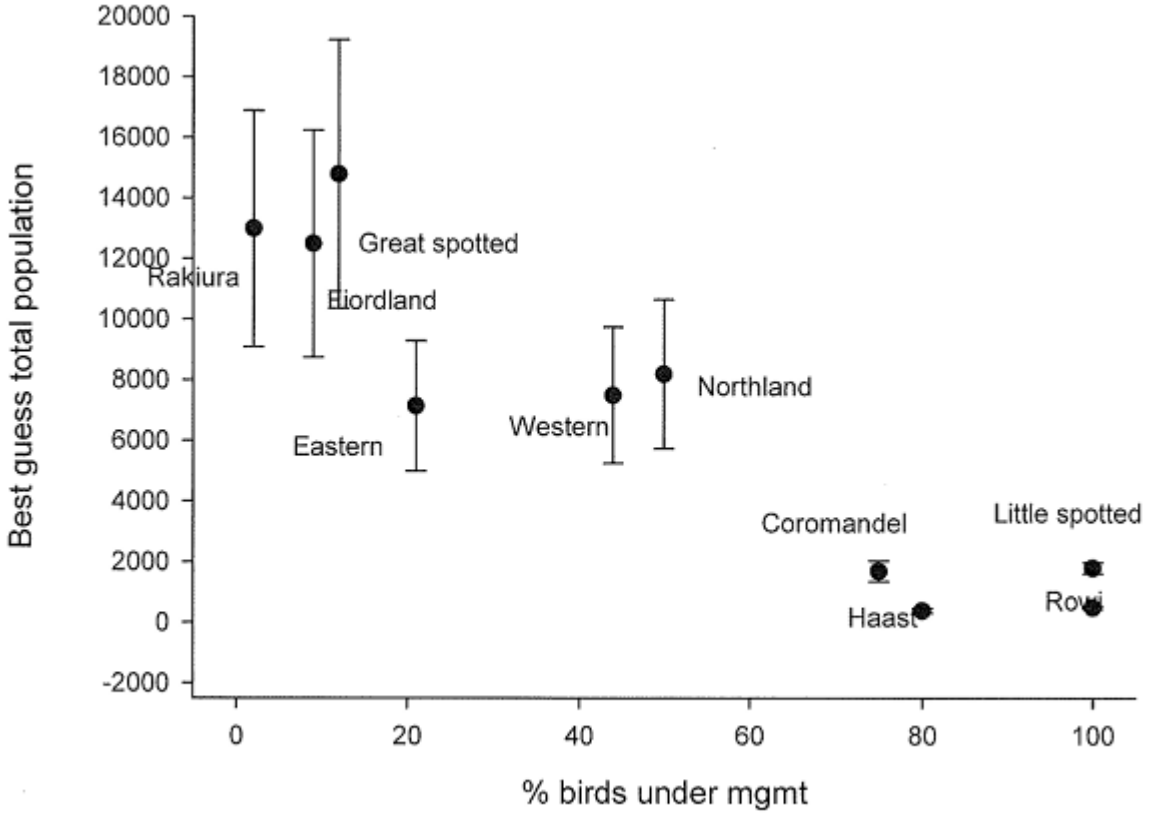

Innes et al. 2015 LC2136

Estimated 2018 kiwi population growth rates

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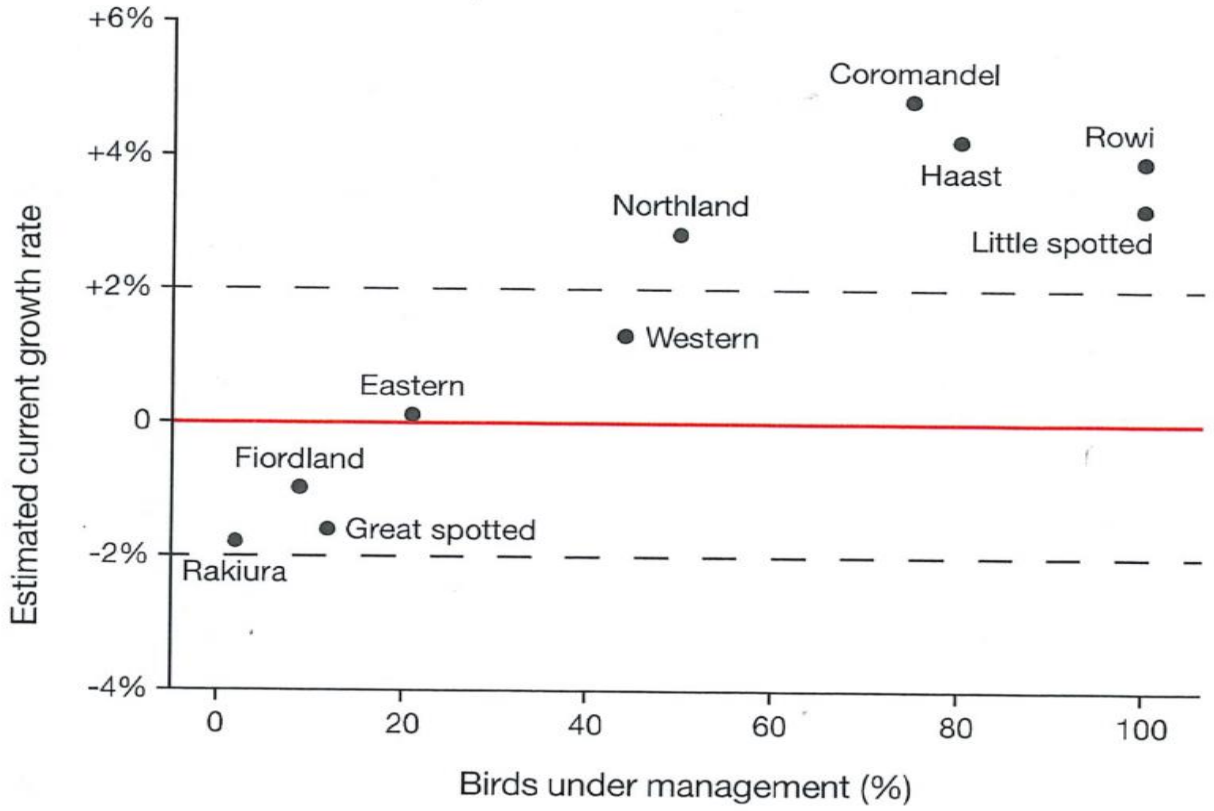


If current mgmt applied for 15 yrs → 0.1% p.a. decline

If all mgmt ceased → 2.0 % p.a. decline

Innes et al. 2015 LC2136

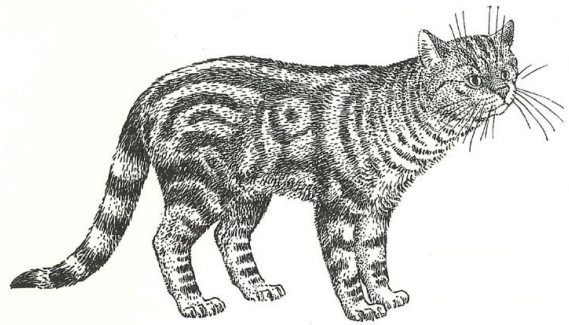
Key threats

Ferret √

Stoat √ √

~~Weasel~~

Dog √



Cat?

1. Kiwi taxonomy – Paul Scofield, Canterbury Museum, Christchurch

- Genetically distinctive, but cryptic, taxa within current species
- *Apteryx australis* type (Liverpool) sampled for DNA analysis

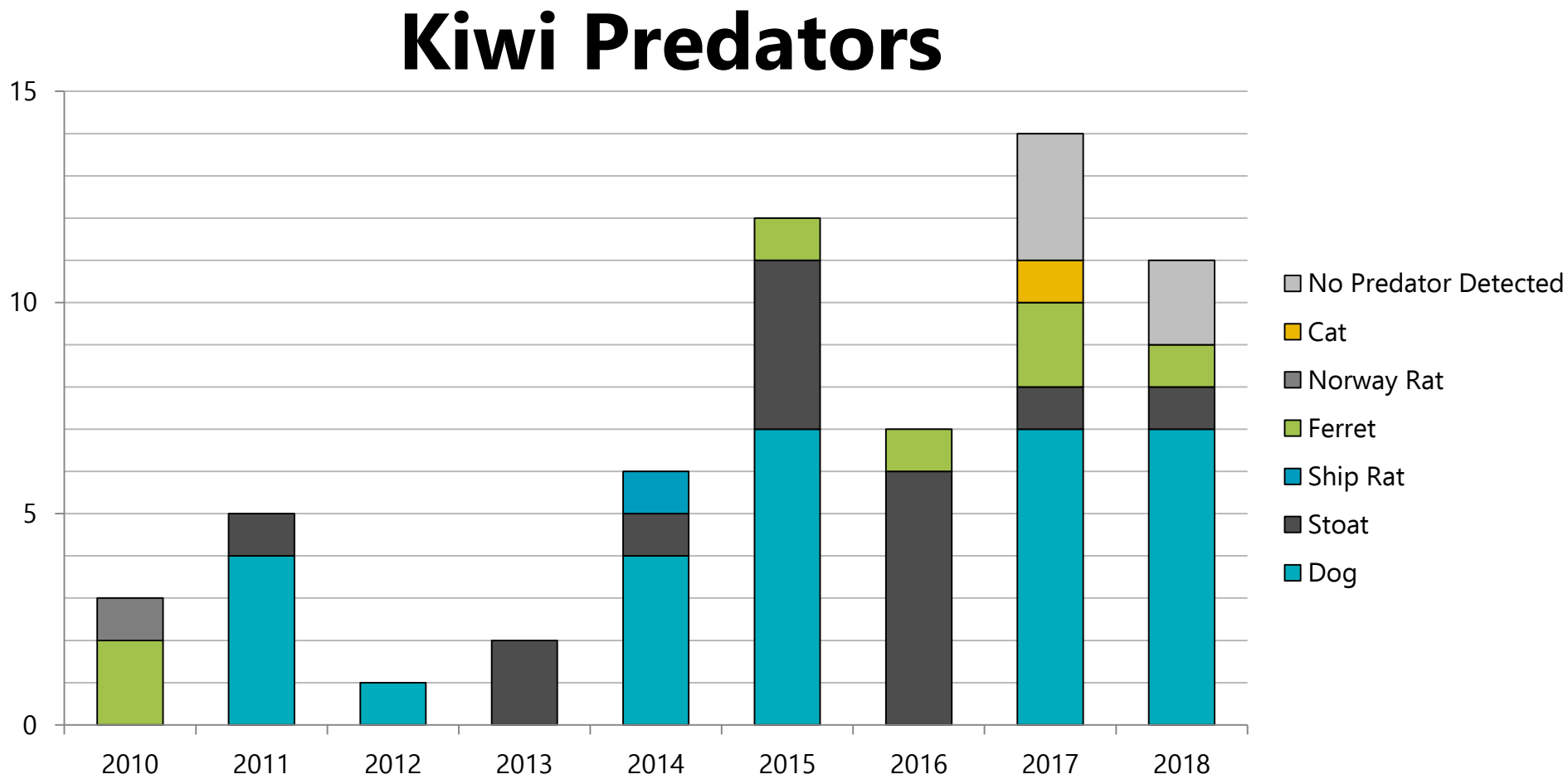
2. Matauranga and kiwi – Kiri Reihana (MWLR), Morgan Cox (K4k)

- Supporting whānau, hapū and iwi to meet their kiwi conservation aspirations
- Working with Ngāti Rangi, Maakawhio, Te Roroa

3. Social research – Patrick Walsh, Robyn Kannemeyer, Wendy Sporle, Florian Eppink

- Have identified viewpoints held on 'dogs preying on kiwi' in Northland
- Different issues between east (visitors with dogs) and west (wandering dogs)
- "Need shift in dog ownership culture" ⟶ responsible dog owner programme

4. Molecular studies – Hester Roberts, Danielle Middleton, Talia Brav-Cubit, Daniel White

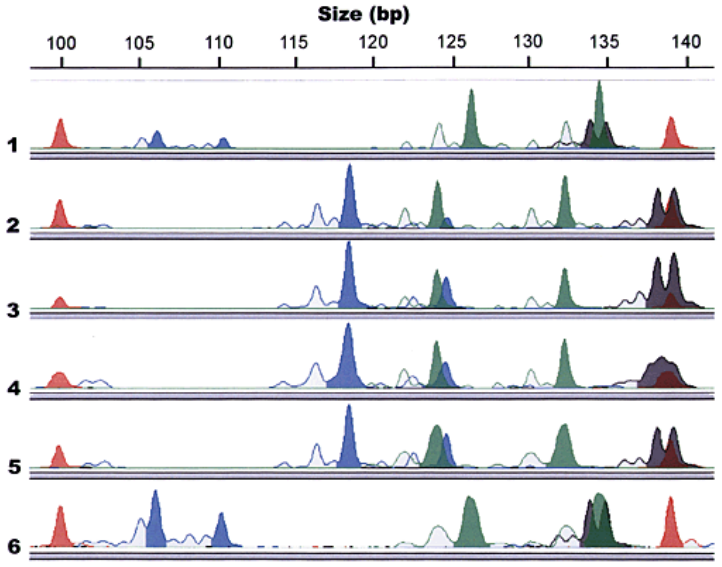


In the last 10 months, we have processed forensic DNA from attacks on kiwi by 14 dogs, 4 ferrets, 1 stoat.

CS1.1.5 Predator Dog Identification

DogFiler:

- A forensic tool for dog crimes in USA
- Kiwi Rescue introduced tool to USE in NZ
- Run by Ecogene®
- Use encouraged through DOC, Regional Councils, Kiwis for kiwi etc. to solve dog attacks, including predations



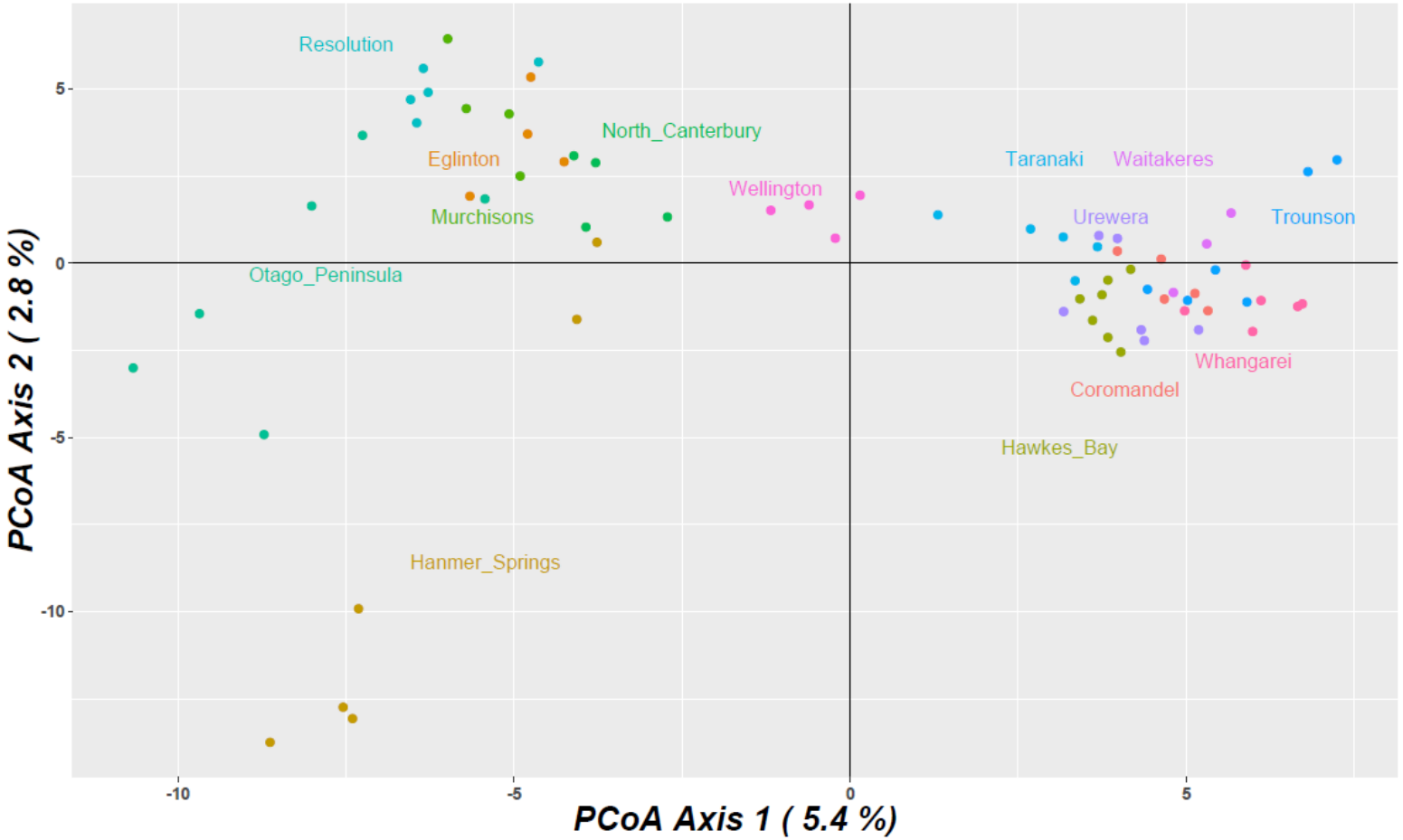
CS1.1.1 Genetic identification of individual mustelid predators

'**Ferretplex**' can identify individual ferrets.

- Started with ferrets as Tb-vector
- Kiwi Rescue is increasing test sensitivity to ID individuals (v. small diversity)
- Hunuas: verified one ferret killed at least two kiwi
- Mt Bruce: donating dead ferrets and swabs of killed kiwi

CS1.1.1 Genetic identification of individual stoats

- Have identified 50,000+ variable sites in the stoat genome, in 83 stoats from 15 populations.
- Now analysing which 100 of these sites (SNPs) are most informative
- Aim to identify origin region AND individual ID



Hester Roberts, Andrew Veale MWLR

5. Population monitoring – DNA, Isabel Castro, Emma Feenstra, Al Glen

- Danielle Middleton - DNA – validating molecular tool using DNA from scats and feathers against known, censused populations: Rakiura & Mt Bruce 2017-18, six others in 2018-19

- Isabel Castro – undertaking experiments with acoustic recorders vs humans, as steps towards a protocol for using recorders to index kiwi population size

- Emma Feenstra – PhD, Rakiura (Stewart Is.). Comparing invasive (dog/transmitter) versus non-invasive (acoustic recorders/trail cameras) monitoring of Rakiura tokoeka

- Al Glen - trail cameras

Emma Feenstra with Rakiura (Stewart Is.) tokoeka

Camera traps for monitoring kiwi and predators

- Motion-triggered cameras
- Photos or videos
- Widely used for wildlife monitoring and research
- Detect kiwi and also their predators

The problem

- Cameras readily detect target animals, but…
- Also triggered by branches, grass, livestock, etc.
- One session can produce many thousands of photos
- ~90% of these are livestock or ‘false triggers’ due to moving branches etc.
- Manual processing is ca. 1 hr /1000 photos = time and $$

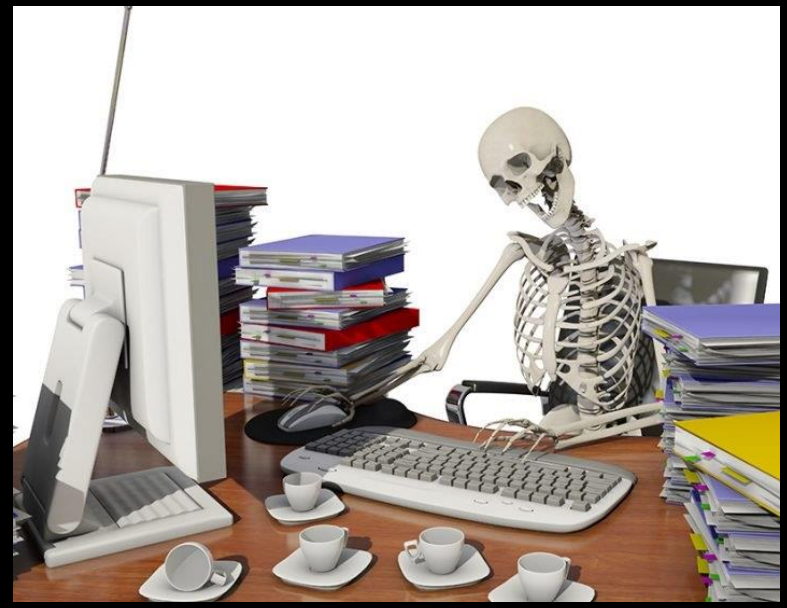
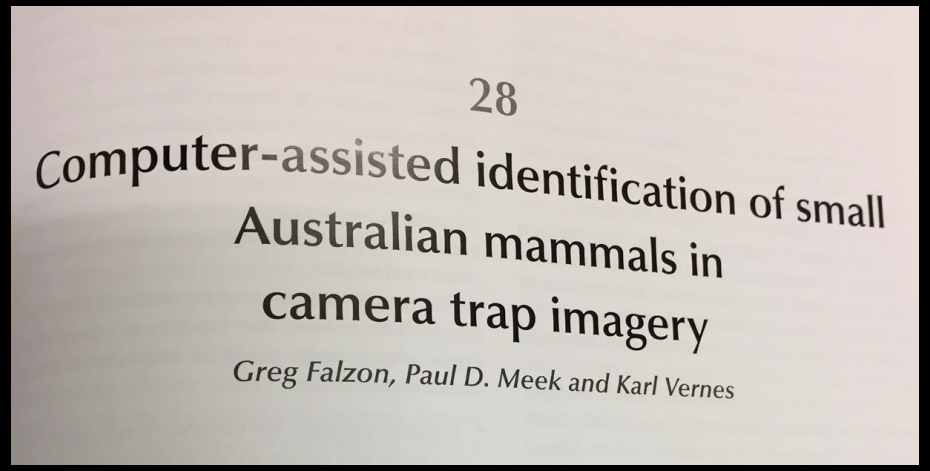


Image processing software

- Software has been developed to process camera trap images of some Australian species
- Greg Falzon (University of New England) is working with us to create similar software for NZ species
- Step 1: Filter out target animals (e.g. kiwi, stoat) from ‘junk’ (sheep, cattle, false triggers)
  - 85 – 99% accuracy achieved
- Step 2: Automatically identify species in photos
  - 68 – 75% accuracy in early testing
  - Now 82 – 91% accurate


28

Computer-assisted identification of small Australian mammals in camera trap imagery

Greg Falzon, Paul D. Meek and Karl Vernes

What next?

- NZ version of 'ClassifyMe' was launched December 2018 (AWMS)
  - Will run on a standard PC
  - Process 1000s of images / day
  - Legal issues
- Cloud-based service ('Kiwi Rescue') being developed for wider public
  - Users upload images to cloud
  - Returns a spreadsheet with ID of species in each image
  - Release June 2019?
  - Stoat, ferret, cat, rat, mouse, sheep, cow, kiwi, other bird, other
  - Easy to add dog

Cameras, stoats and Fiordland tokoeka

- DOC studying kiwi chick survival at Shy Lake, Fiordland
- Stoats are major threat to chick survival
- No good method to index stoat abundance

- Aims:
    1. Trial a protocol using camera traps to index stoat abundance
    2. Determine aerial 1080 impact on stoats (Sept 2019)
    3. Link stoat index with DOC's data on chick survival and stoats visiting kiwi nests

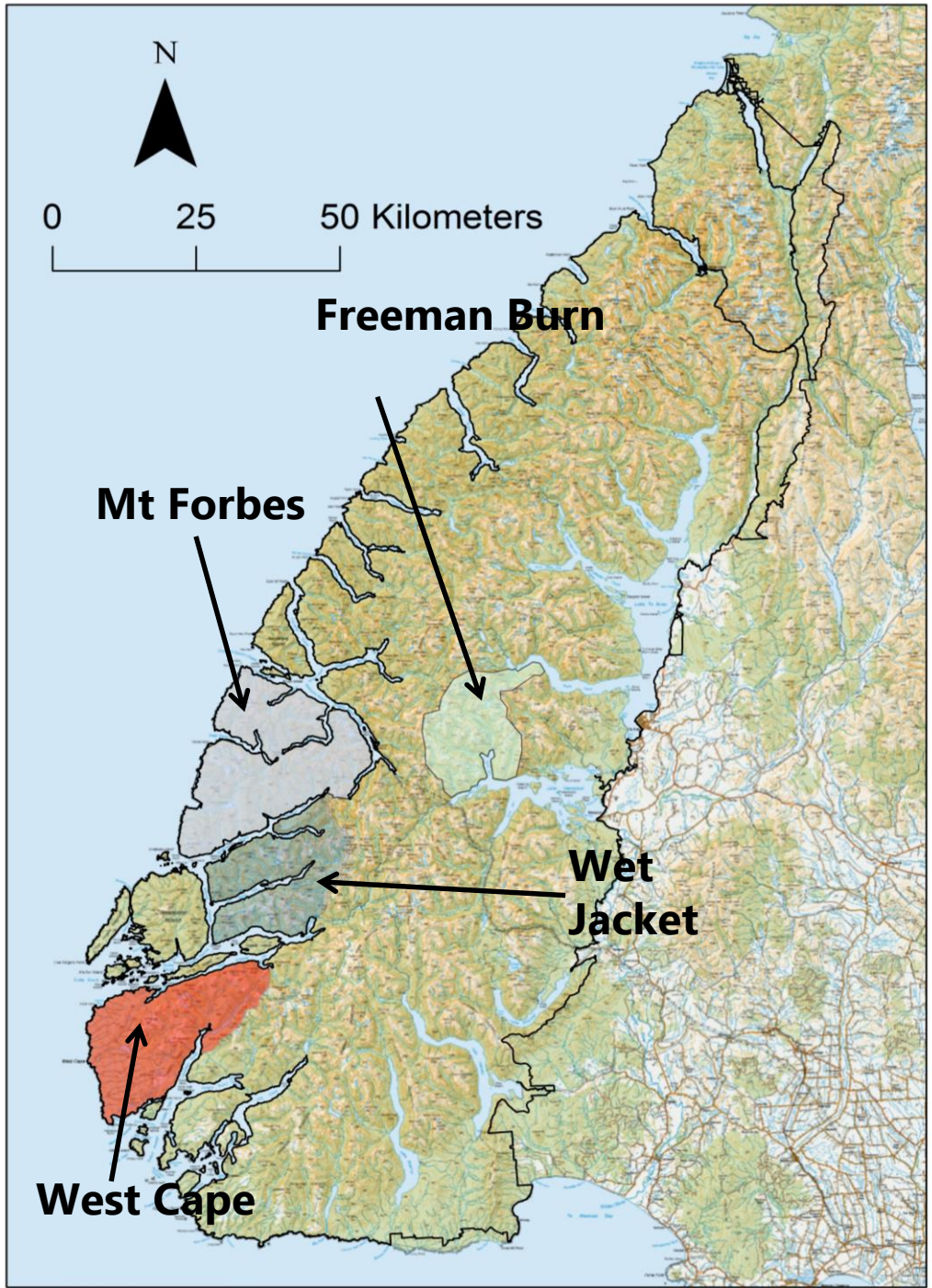
Shy Lake
Fiordland
February 2019

(photos Jamie McAulay DOC)

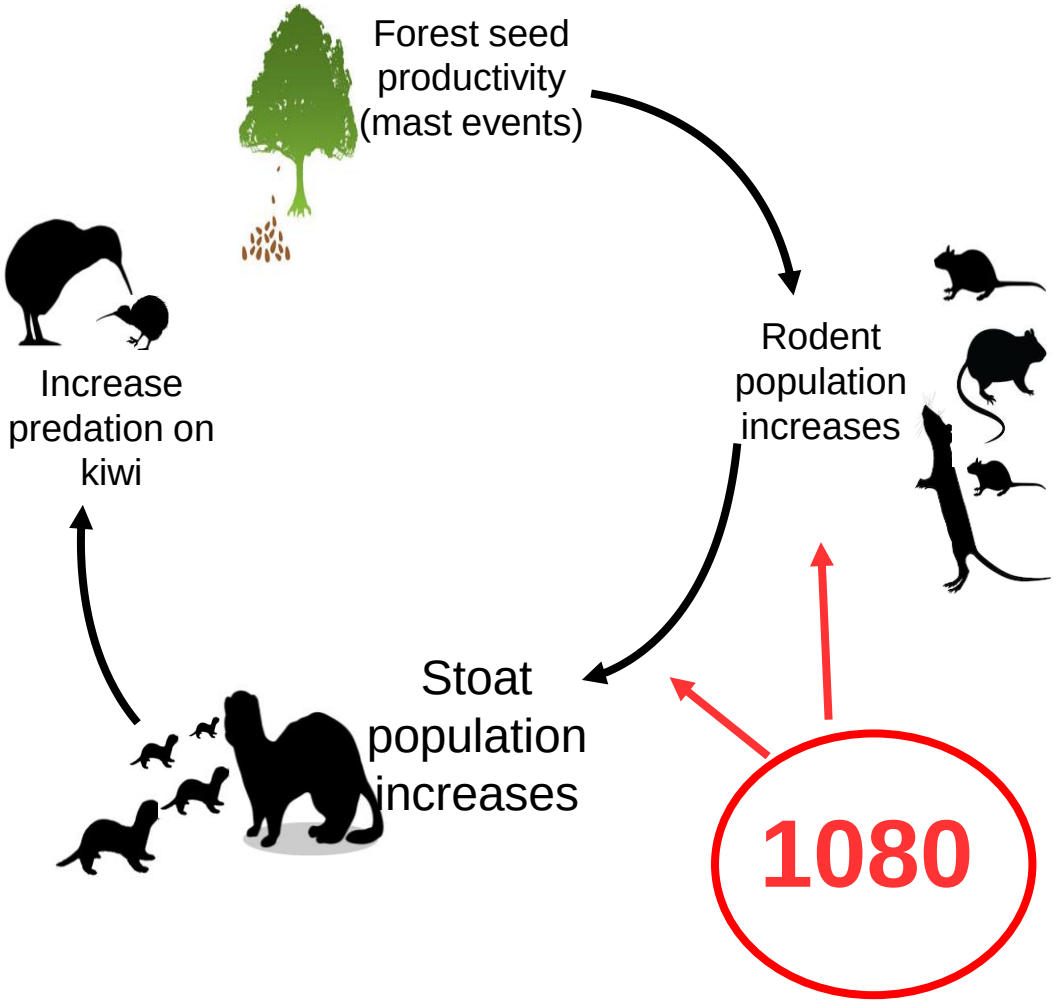
Al Glen

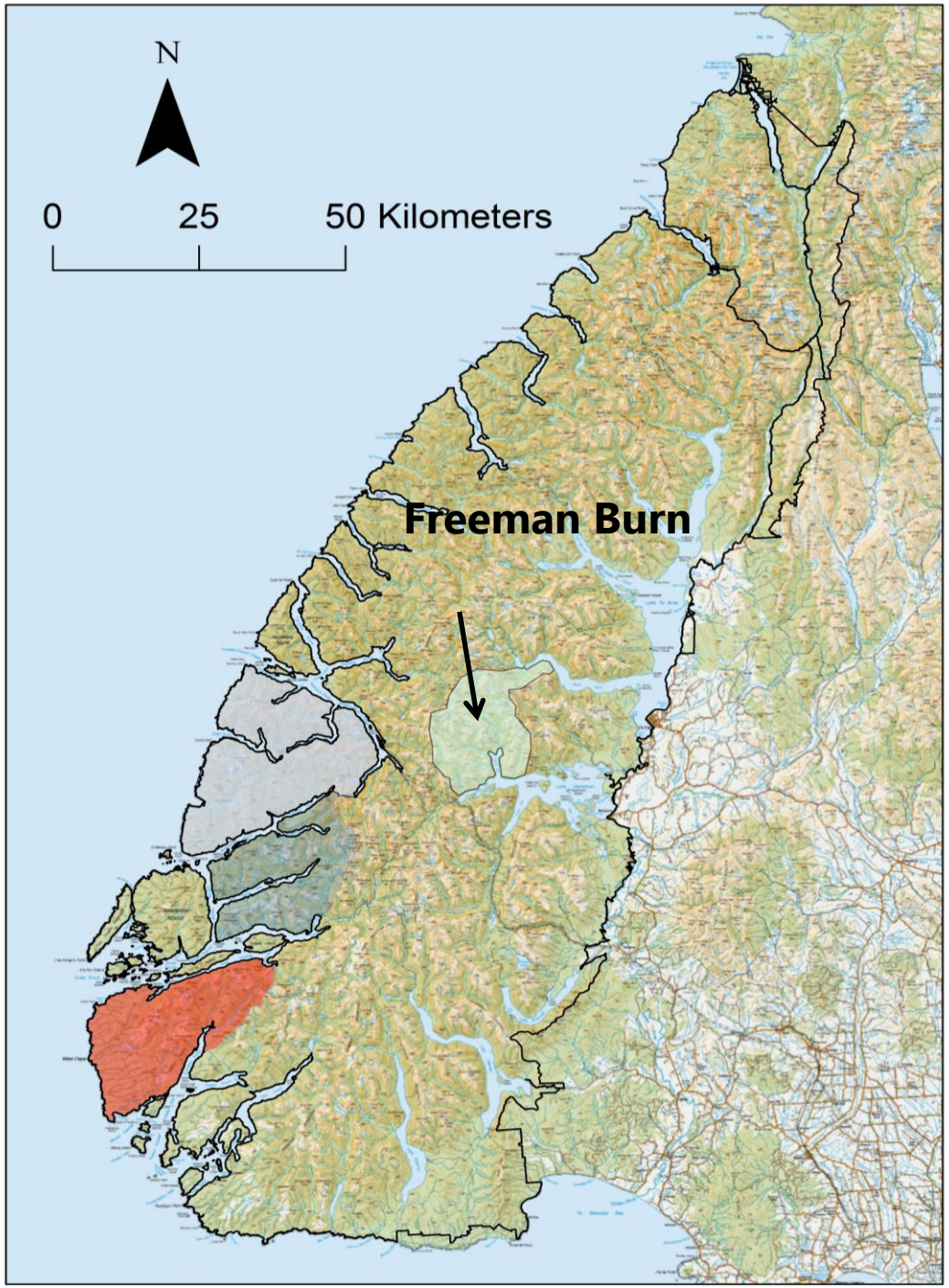
Tim Raemakers

Dean Anderson



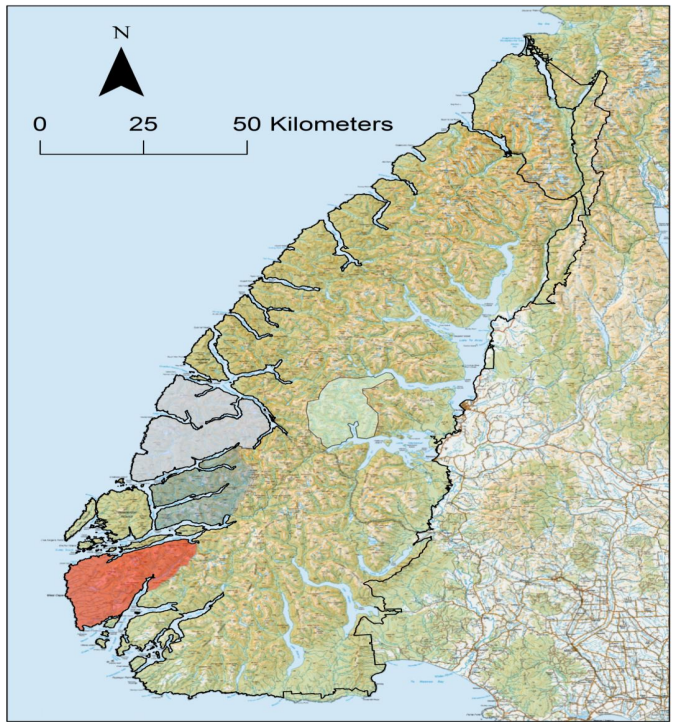
6. Modelling – Dean Anderson





Question:

How much will a kiwi population grow (or decrease) given a predator management strategy over a 20 year period?



Predator management strategies

1) **Prescriptive**
   - Rotate 1080 operations
   - 4 years
   - 3 years
2) **Reactive 1080**
   - 20% rat tracking tunnel rate
   - 50% of zone in mast

Proportional change in kiwi population over 20 years

Zone	Reactive	Prescriptive 4 year	Prescriptive 3 year
Freeman Burn	0.02	-0.01	0.02
Mt. Forbes	0.12	0.01	0.11
West Cape	0.12	-0.04	0.06
Wet Jacket	0.10	-0.04	0.04
All Fiordland	-0.15	-0.16	-0.15
Number of 1080 operations	29.36	20.00	26.00

- Save Our Iconic Kiwi goal of 2% growth per annum
  - perhaps unrealistic in Fiordland
  - but, population growth is possible in managed areas

Thanks! to:

- MBIE for Endeavour funding
- Mackenzie Nicol (MBIE) for assistance and interest
- Isabel Castro (Massey Univ.) for video sequences
- Hugh Robertson, Rogan Colbourne, Jen Germano, Jo Ledington, Fathima Ifticar (DOC)
- Kiwi Rescue members for updates: Emma Feenstra (Massey Univ.), Danielle Middleton, Al Glen, Dean Anderson, Kiri Reihana, Patrick Walsh, Robyn Kannemeyer, Hester Roberts (MWLR)
- Michelle Impey, Morgan Cox (Kiwis for kiwi)
- Wendy Sporle

Save Our Iconic Kiwi

Photo: Em Oyston / DOC

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Our goal:

To reverse the current decline and secure an increase in kiwi numbers and distribution - aiming for 2% growth

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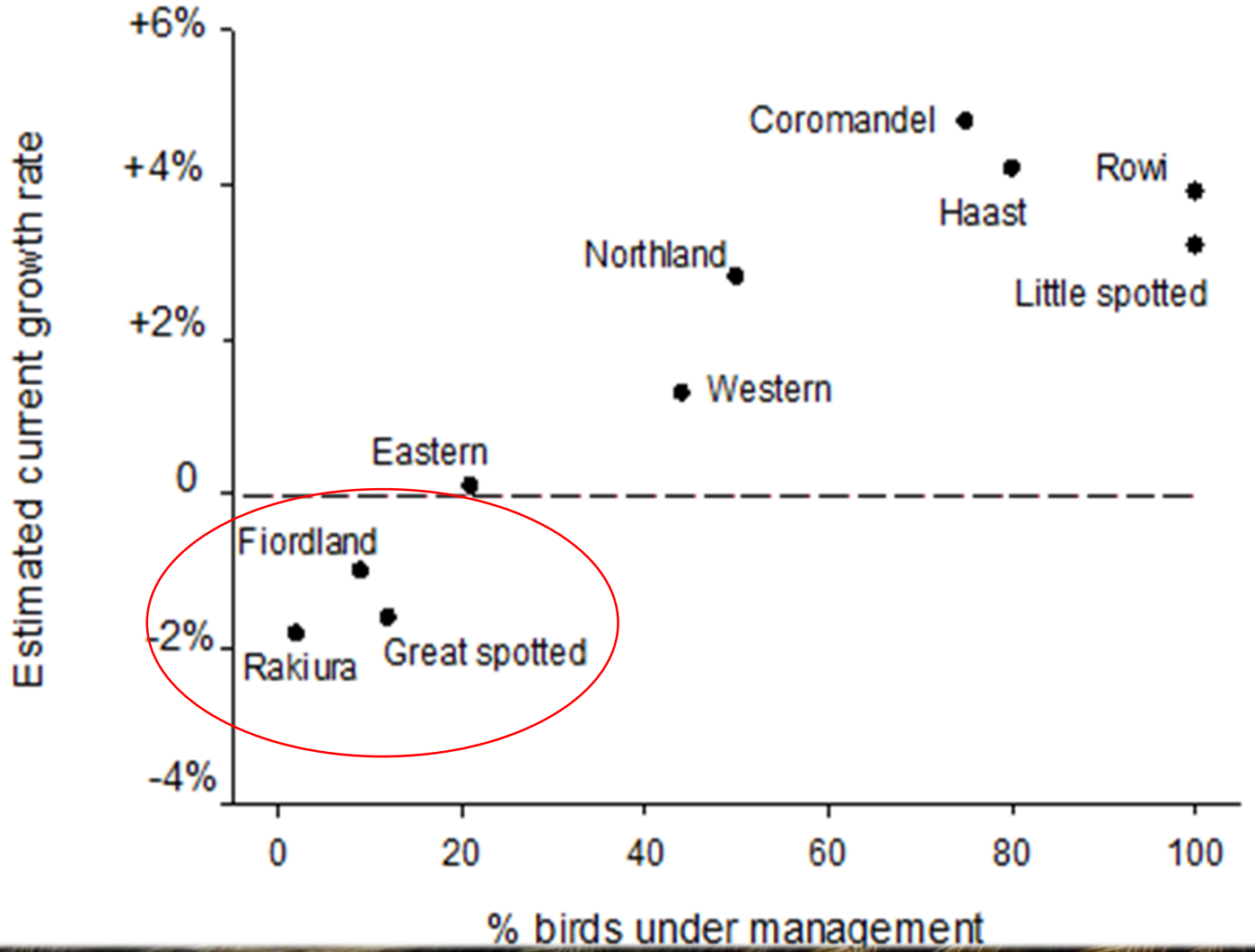
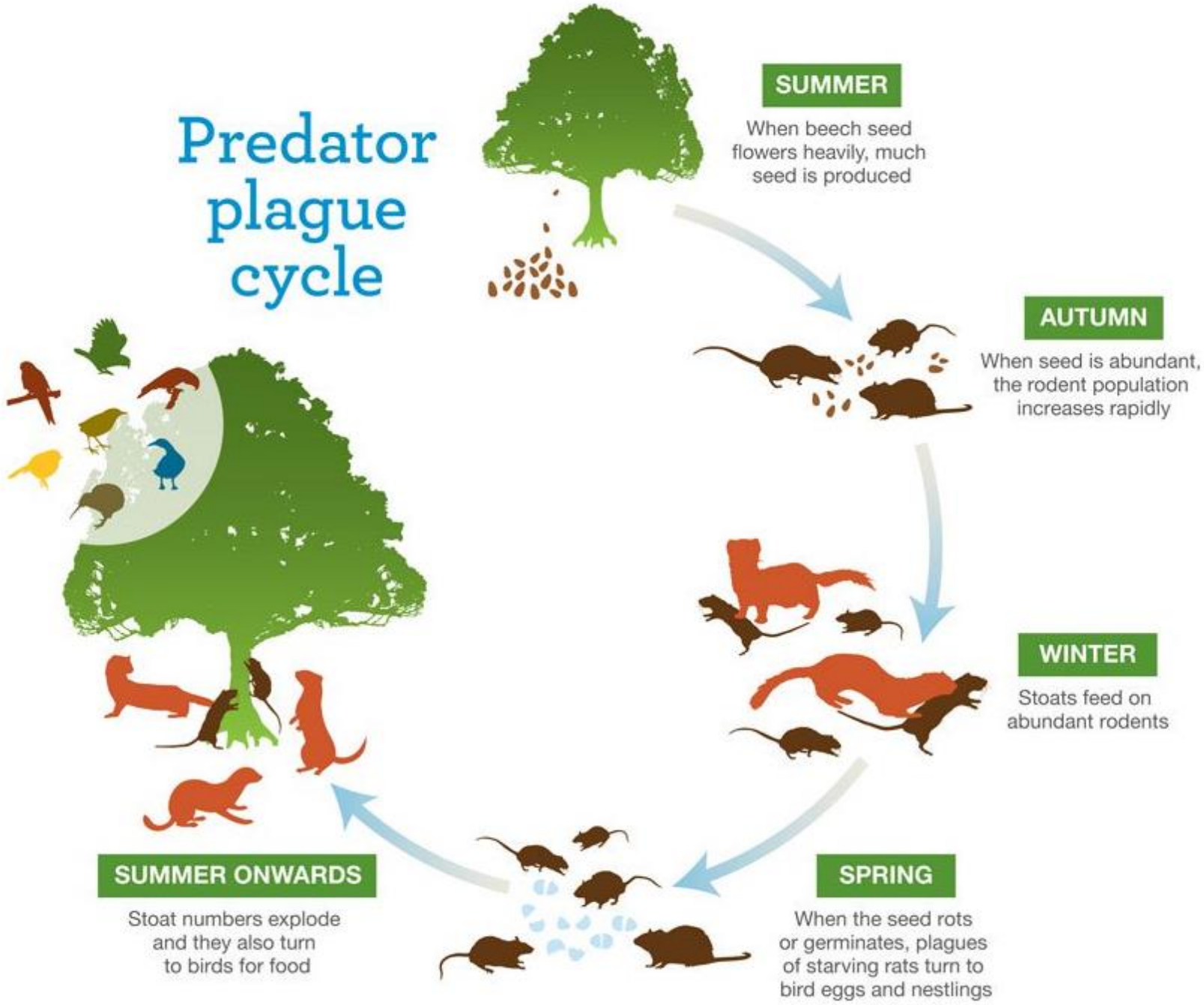

+6%
+4%
+2%
0
-2%
-4%
Estimated current growth rate
Coromandel
Rowi
Haast
Northland
Little spotted
Western
Eastern
Fiordland
Rakiura
Great spotted
0
20
40
60
80
100
% birds under management

Predator plague cycle



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Implementation Plan

Goal:
reverse the decline and secure an increase in kiwi numbers and distribution

- Research
- Predator control
- Outcome monitoring

- Is 1080 an effective tool for SI kiwi in mast years (reactive)?
- Is 1080 an effective tool for SI kiwi in non-mast years (prescriptive)?
- What is the current status quo for unmanaged populations of SI kiwi?
- What is the breeding biology of SFT? Can their management be synonymous with NFT?
- Is the management we're implementing, working?
- At what scale do we need to protect SI kiwi chicks from predation to achieve 2% population growth?

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Southern Fiordland tokoeka recruitment study

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Southern Fiordland tokoeka recruitment study

A Cousin
Reservation

15:36:10 01/10/2017 3℃ TREX1

08:42:06 24/11/2017 2℃ HOOK1

18:27:08 22/10/2017 -2℃ COMMAND01

17:15:58 25/01/2018 11℃ PEG_2

01:13:03 27/10/2017 -4℃ COMMAND01

18:35:04 18/10/2017 4℃ CAKE1

00:48:13 10/17/17 28.15inHg 4C SC

02:00:29 10/02/2018 5℃ SINB2

01:24:38 11/02/17 27.48inHg 9C CAMB_1

16:06:56 04/01/2018 9℃ CAKE1

20:26:18 15/12/2017 44 °F FIL2

16:53:09 18/11/2017 8℃ HOOK1

18:58:59 18/10/2017 3℃ CAKE1

17:59:37 24/08/2017 0℃ LJS

21:39:55 11/01/2015 -3℃ TREX1
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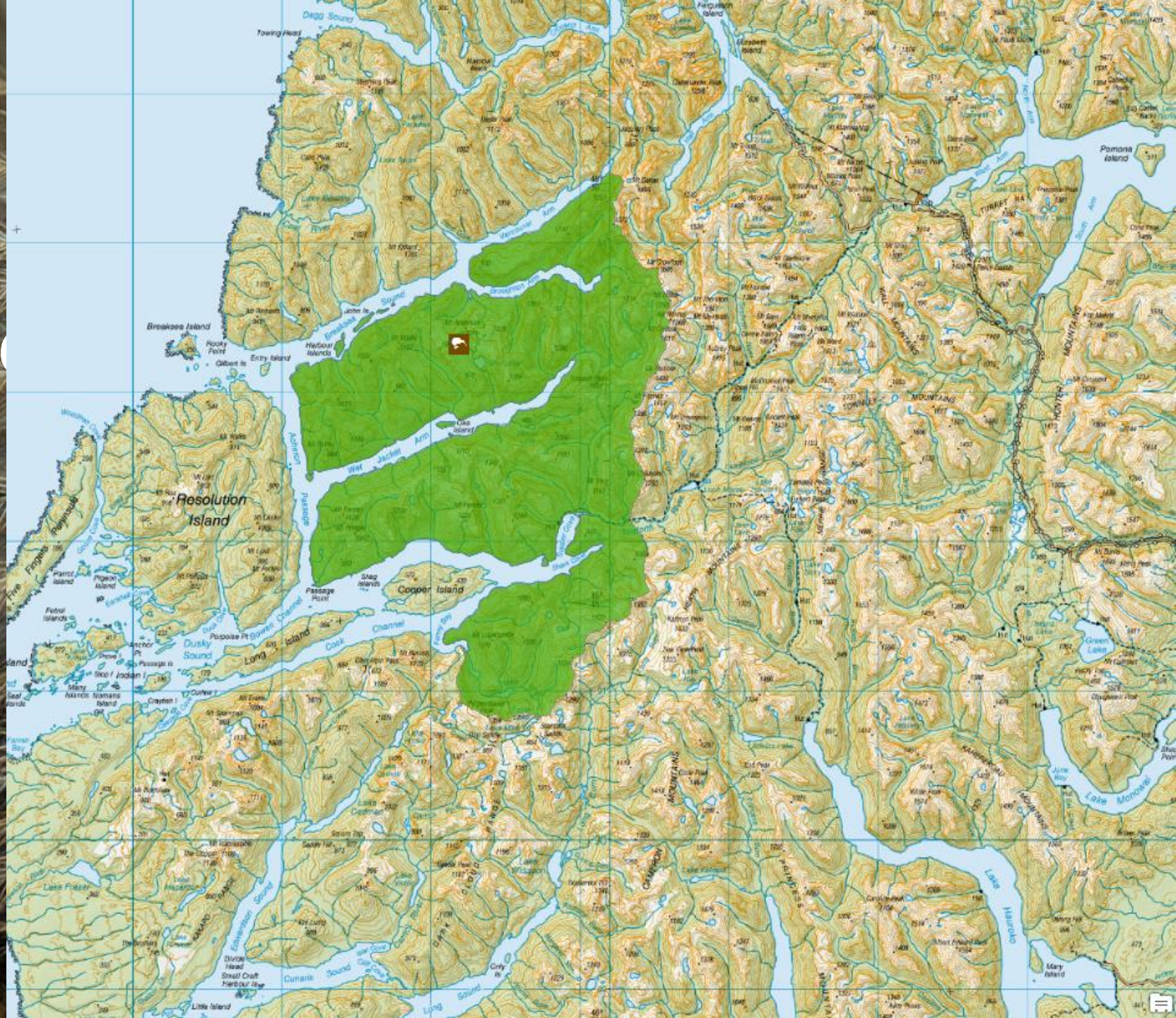
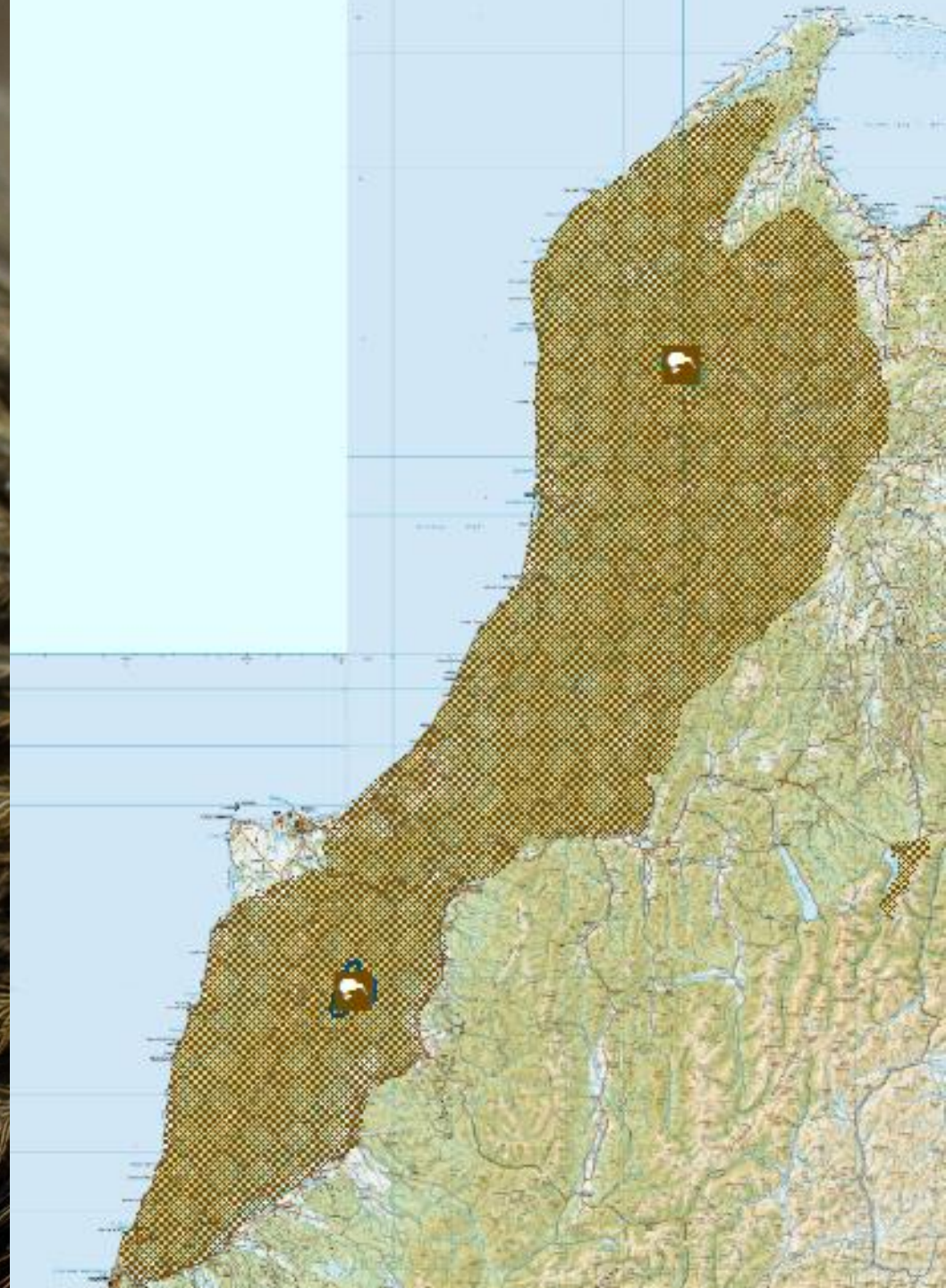
Fiordland tokoeka predator contr

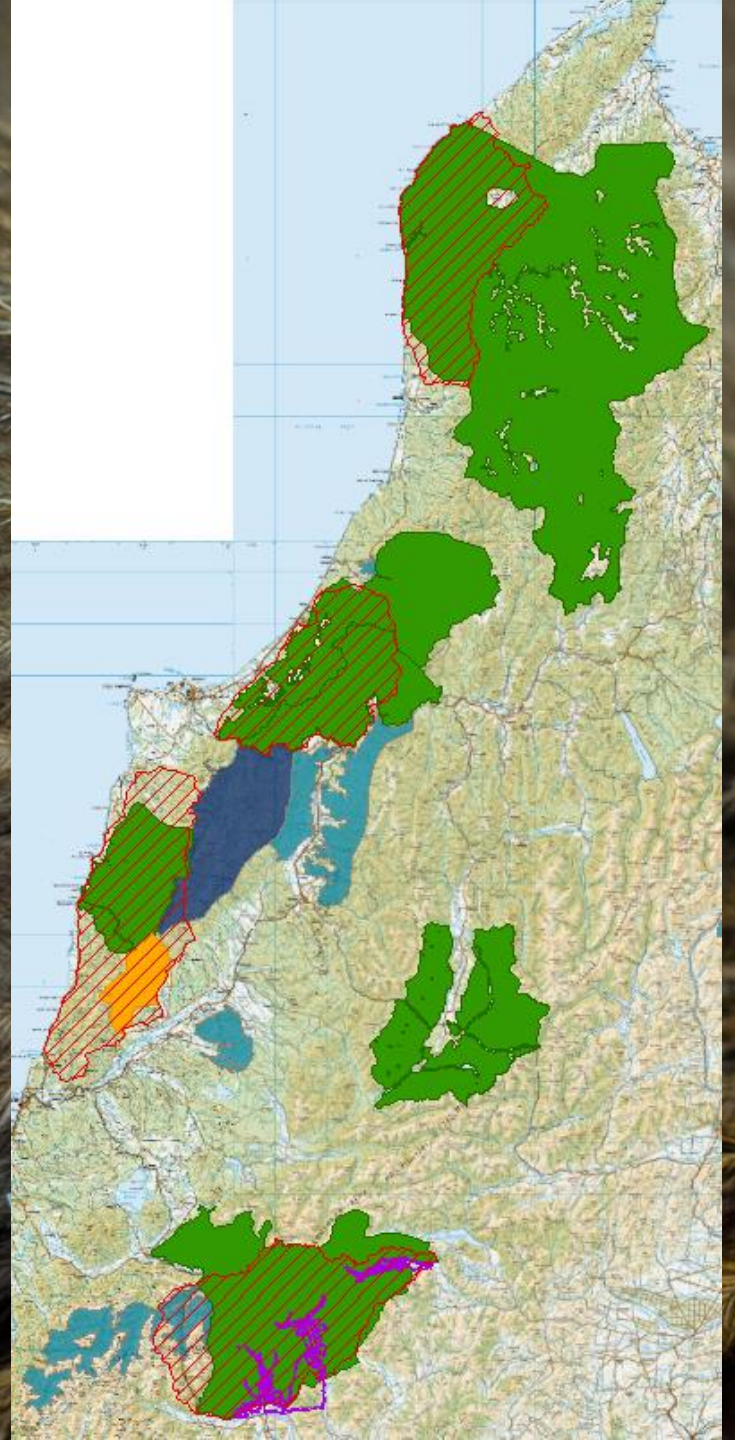


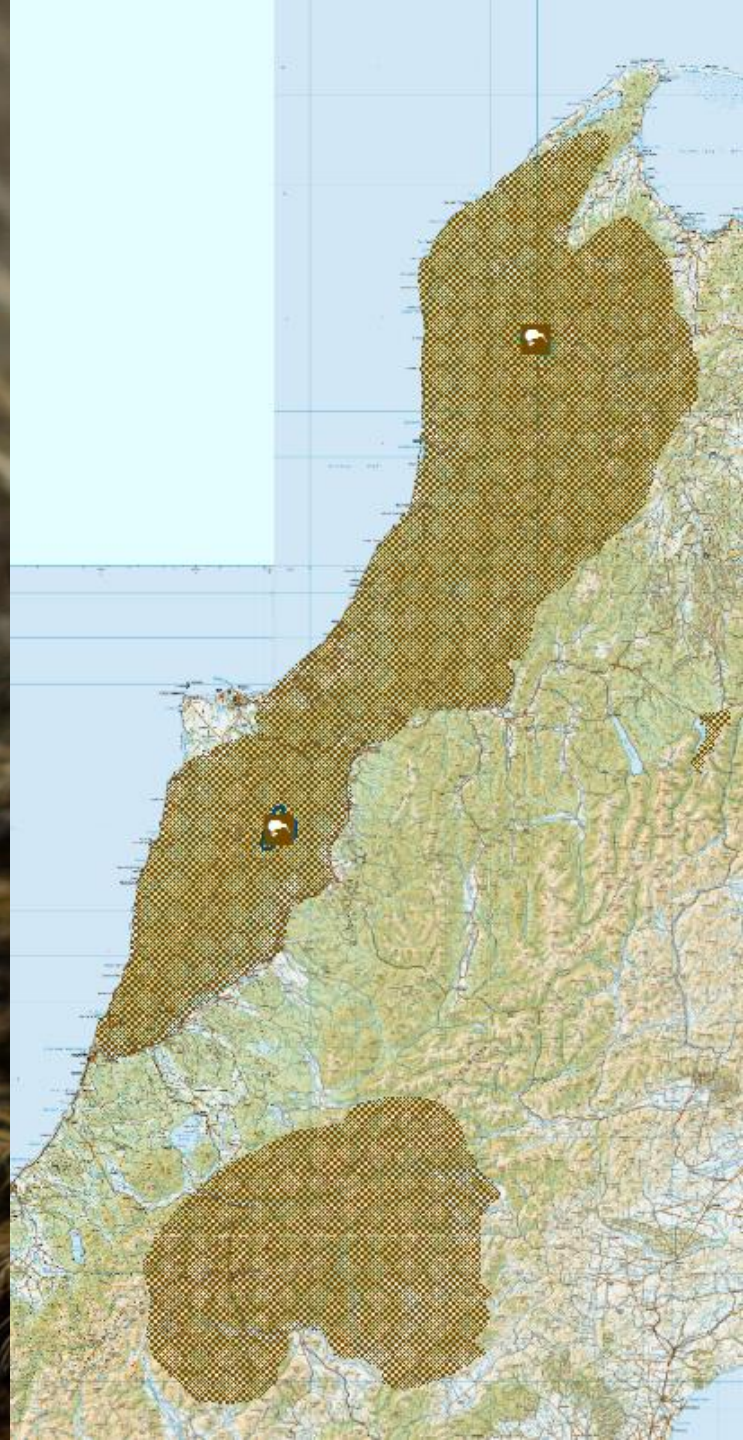
GSK studies

- Years 2 and 3 of 6 year chick recruitment studies at Te Wharau and Roaring Lion
- Spring 2018 aerial 1080 non-mast treatment at Te Wharau
- Spring 2019 aerial 1080 mast treatment at Roaring Lion



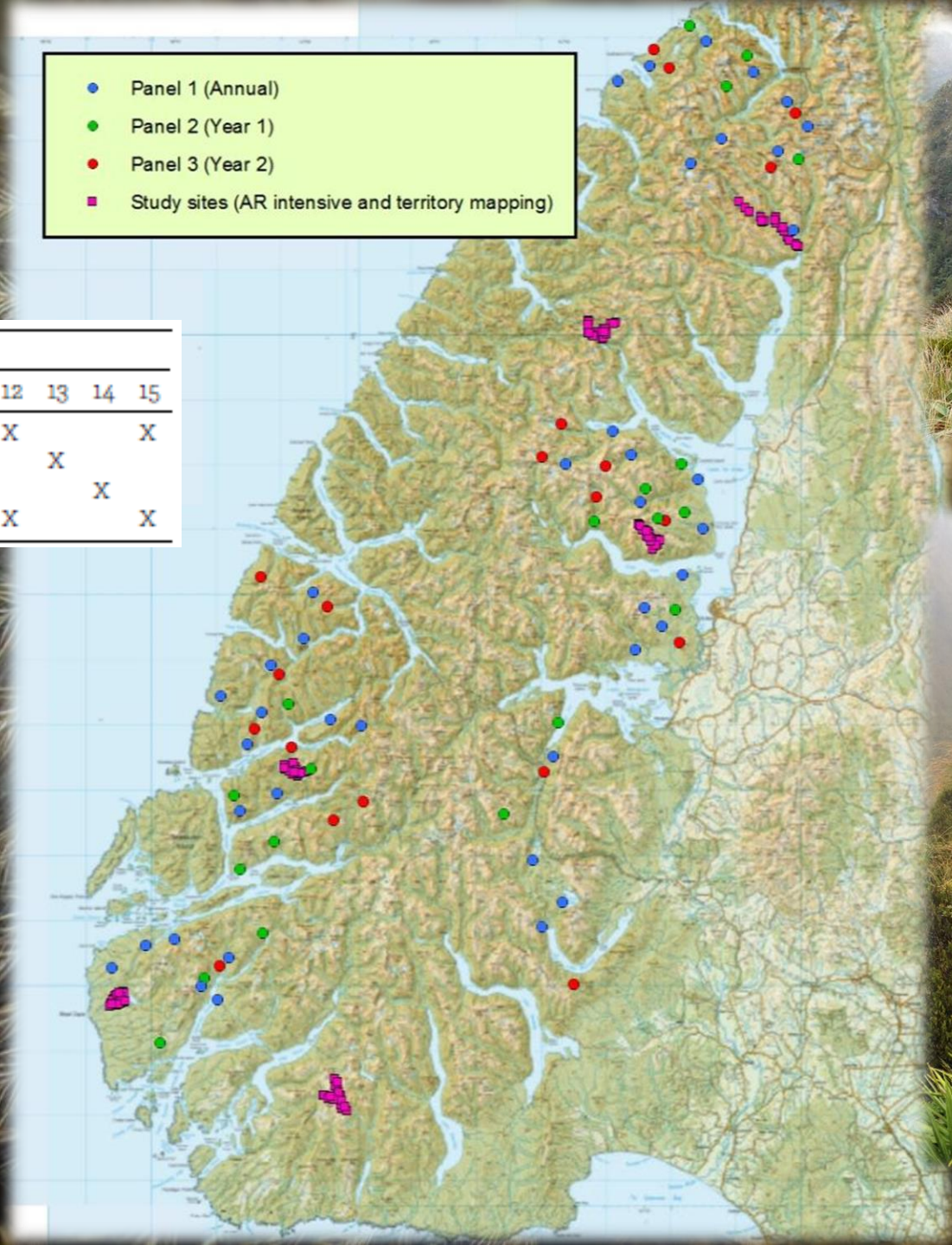
2019/20 GSK Predator Control Operations





Monitoring Plan pilot

Panel	k	k_1	Sample Year 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	1-30	1-20	X	X	X	X	X	X			X			X			X
2	31-45	21-30	X		X		X		X			X			X		
3	46-60	31-40		X		X		X		X			X			X	
Study site	1-20	1-20	X	X	X	X	X	X			X			X			X



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Acknowledgements

- Tim Raemaekers, Em Oyston, Jamie McAulay, Christine Hunter, Anja McDonald, Bex Jackson

- Hugh Robertson, Rogan Colbourne, Jess Scrimgeour, Ollie Gansell, Megan Willans

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Mat Goodman