

Resource Selection Of Pateke (*Anas chlorotis*) In Two North Island Locations



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Te Whare Wānanga o Ōtāgo
NEW ZEALAND

My Study: Part 1

- Habitat use – GPS units and VHF monitoring.
 - Difficult to fill information gaps with nocturnal behaviour in wetland areas.
 - To identify ideal farm management practices to best manage pateke habitat.



Mimiwhangata

My Study: Part 2

- Diet - Stable isotope analysis using both blood and feather samples.
 - Starvation second only to predation as cause of death for pateke at Okiwi (16 – 20% all mortality).
 - Traditional diet study methods provide incomplete information due to nocturnal behaviour and dabbling.
 - Identification of any difference in diet between locations.
 - A possible reason for juvenile starvation.



Okiwi Basin

Site 1: Mimiwhangata Coastal Reserve, Northland



- Reserve: 8.5 Km².
- Study area: 7.4 km².
- Forest clipped to 1.3 km from nearest GPS fix.
- Working cattle farm.
- Cats, stoats, harriers, pukeko, dogs.
- Population stable.

Site 2: Okiwi Basin, Great Barrier Island



- Working cattle farm.
- Study site: 23.7 km².
- Area clipped to 1.3km from nearest fix.
- Cats, harriers, dogs, pukeko.
- Predation, starvation (juvenile losses).
- Possible decline.

Habitat use: GPS tags

- Developed by the University of Otago Department of Physics.
- Several packaging designs trialled. Carbon fibre tags for final deployments.
- Weight $\sim 22 - 26\text{g}$
 - Inclusive of VHF and harness.
- Tags $< 4.5\%$ birds body weight.
- Fix every 7.5 hours.



Bird selection and trapping: Mimiwhangata

- Mimiwhangata birds trapped during day.
- Known / VHF tagged birds at roosting site.
- VHF and dogs used to pinpoint location, birds caught by hand, hand net or being flushed into set nets.

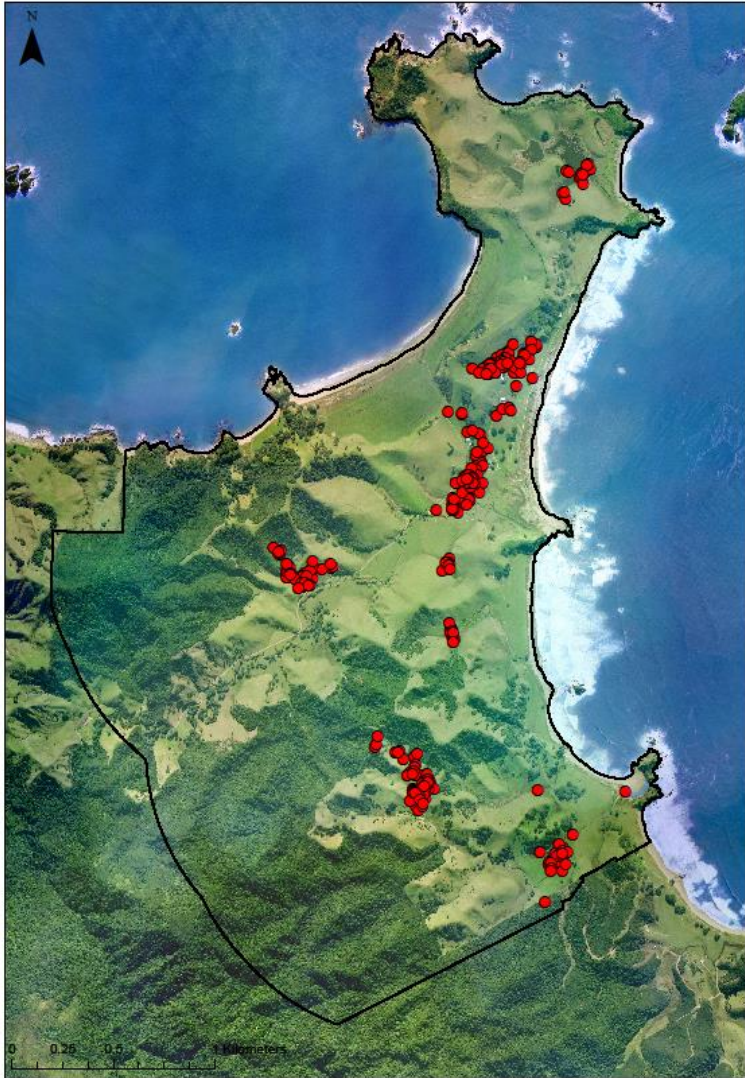


Bird selection and trapping: Okiwi

- Okiwi birds caught at night in foraging areas.
- Birds not already tagged with VHF transmitters.
- Dog used to track birds.
- Birds caught by hand or with hand nets.

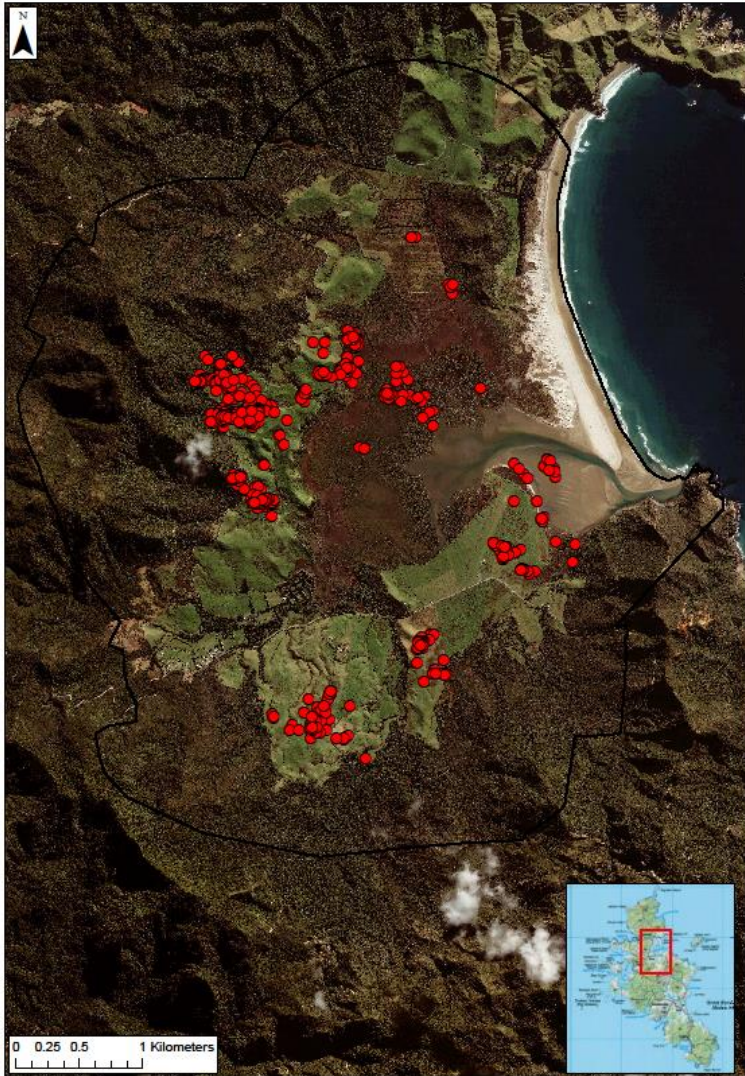


Mimiwhangata Data



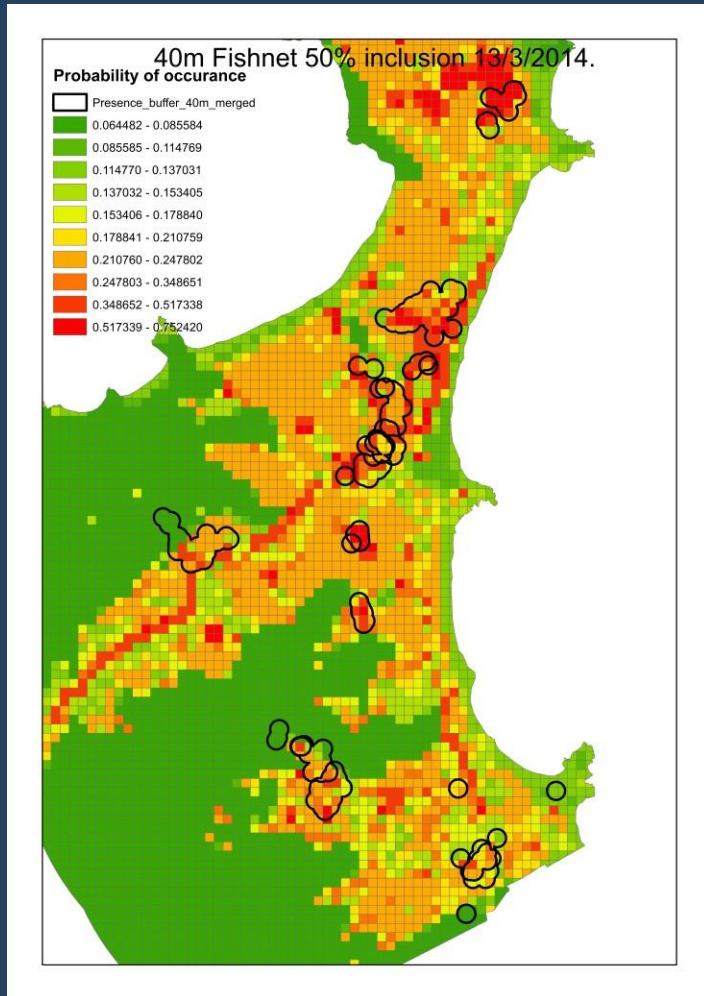
- 36 tags deployed.
- 2 trials (4 tags), 3 deployments (8, 6, 10 tags) from May 2011 – November 2012.
- 430 GPS locations recorded from 15 birds.

Okiwi Data

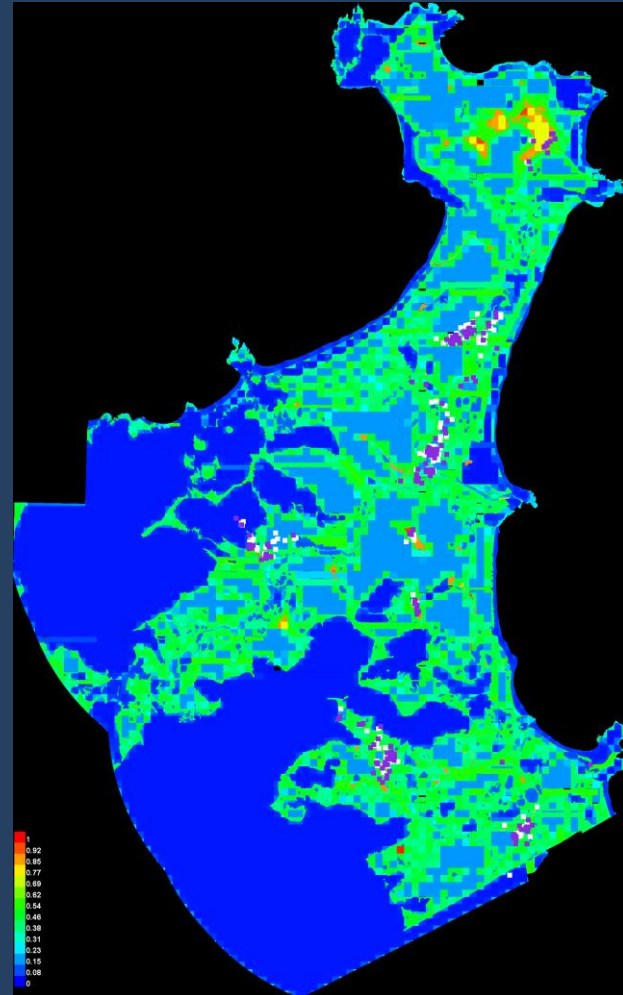


- 28 tags deployed.
- 2 deployments (18 and 10 tags) February 2012 and October 2012.
- 679 GPS and VHF locations.
- GPS locations from 17 birds.

Model results: Predictive maps



A: Random Forest 40m 50% AUC 0.96



B: Maxent 35 grid point 50%
AUC 0.85

Model results: Variable contribution

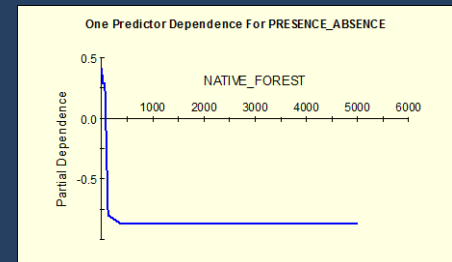
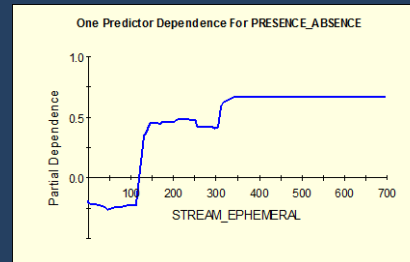
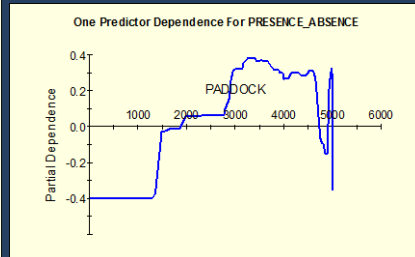
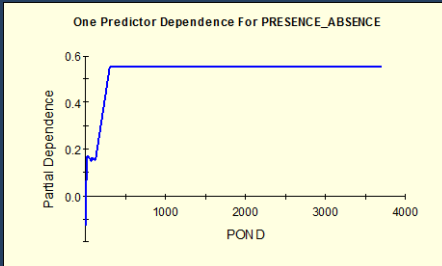
Variable	Score	
POND	100.00	
NATIVE_FOREST	88.01	
STREAM_EPHEMERAL	84.54	
PADDOCK	68.62	
EXOTIC_TREE	66.18	
ROAD	55.03	
WETLAND_VEG_2_	44.66	
WETLAND	43.43	
UNGRAZED_PLANTED_AREA	40.64	
BEACH_SAND	26.30	
STREAM	18.83	
TREE	17.73	
TREES	14.16	

A: Random forest 40m 50%

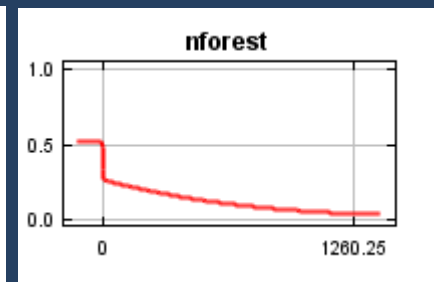
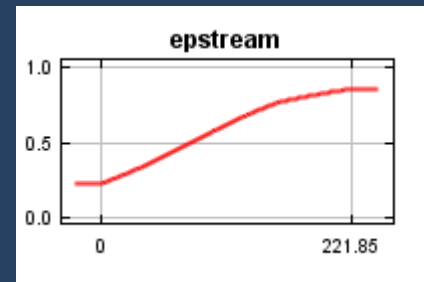
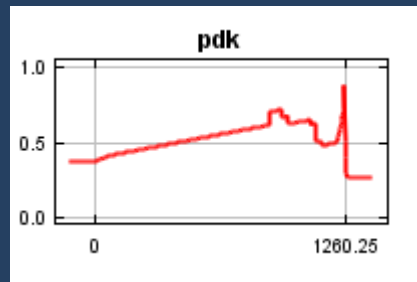
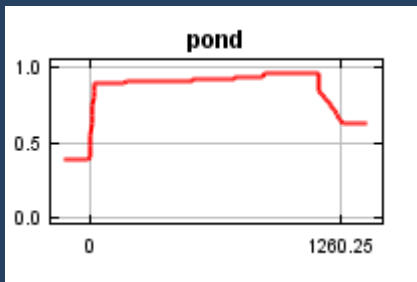
Variable	Percent contribution	Permutation importance
nforest	41.6	62.7
pond	21.1	0.8
pdk	20.6	19.6
epstream	6.1	0.3
upa	3.7	5.4
trees	3	4
tree	1.7	4.2
beachsand	1.5	1.8
rockyshore	0.2	0.3
famtrack	0.1	0.2
road	0.1	0.2
beach	0.1	0.2
cgrass	0.1	0.4
stream	0.1	0.1
delta	0	0
building	0	0
tussock	0	0

B: Maxent 35 grid point 50% AUC 0.85

Model results: Individual variable response curves



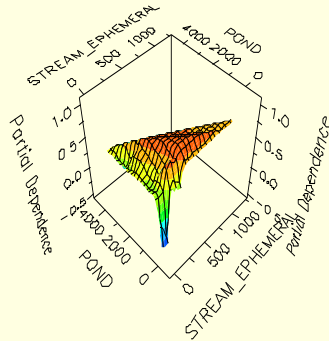
A: Random forest 40m 50%



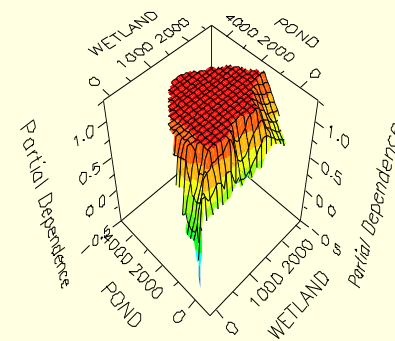
B: Maxent 35 grid point 50% AUC 0.85

Model results: Two Predictor Dependence

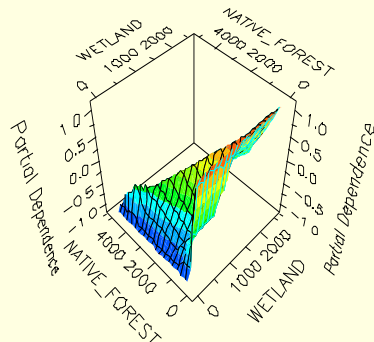
Two Predictor Dependence For
PRESENCE_ABSENCE



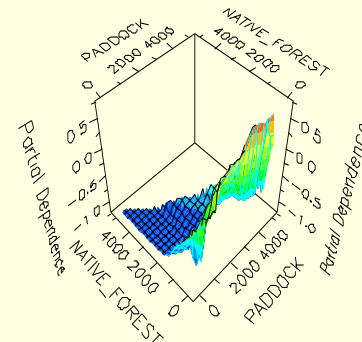
Two Predictor Dependence For
PRESENCE_ABSENCE



Two Predictor Dependence For
PRESENCE_ABSENCE



Two Predictor Dependence For
PRESENCE_ABSENCE

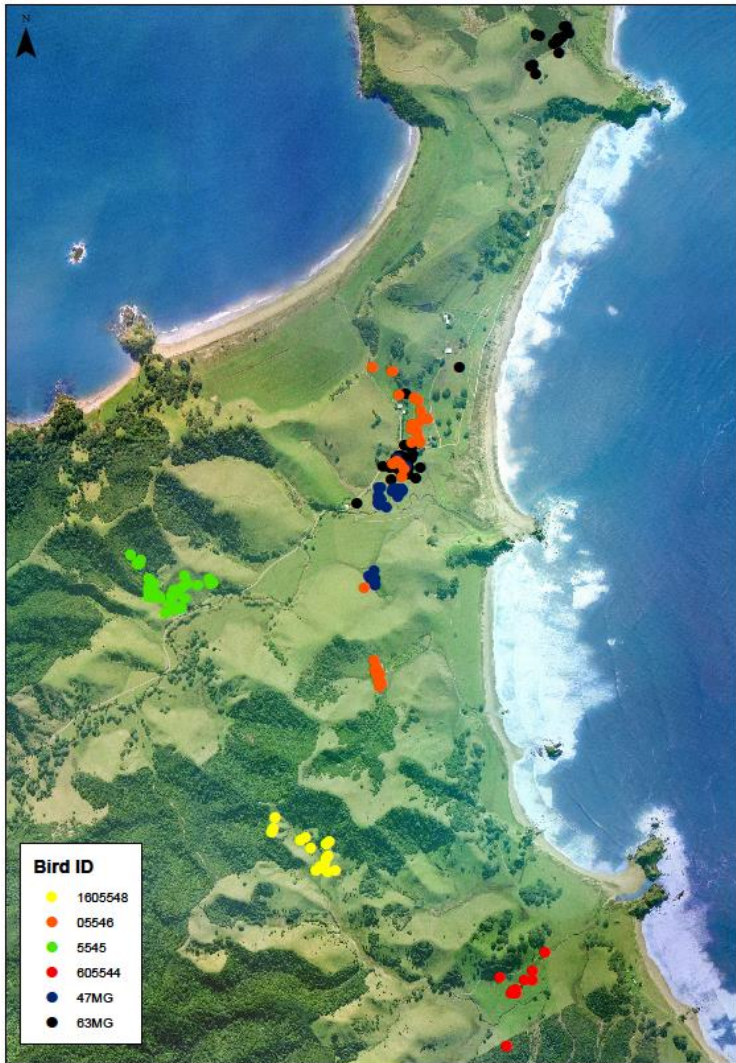


Forest use during this study

- Sampling effort focused on paddocks and farmland.
- No birds trapped in forest areas.
- Tag accuracy under canopy may have caused presence in forest to be underrepresented.

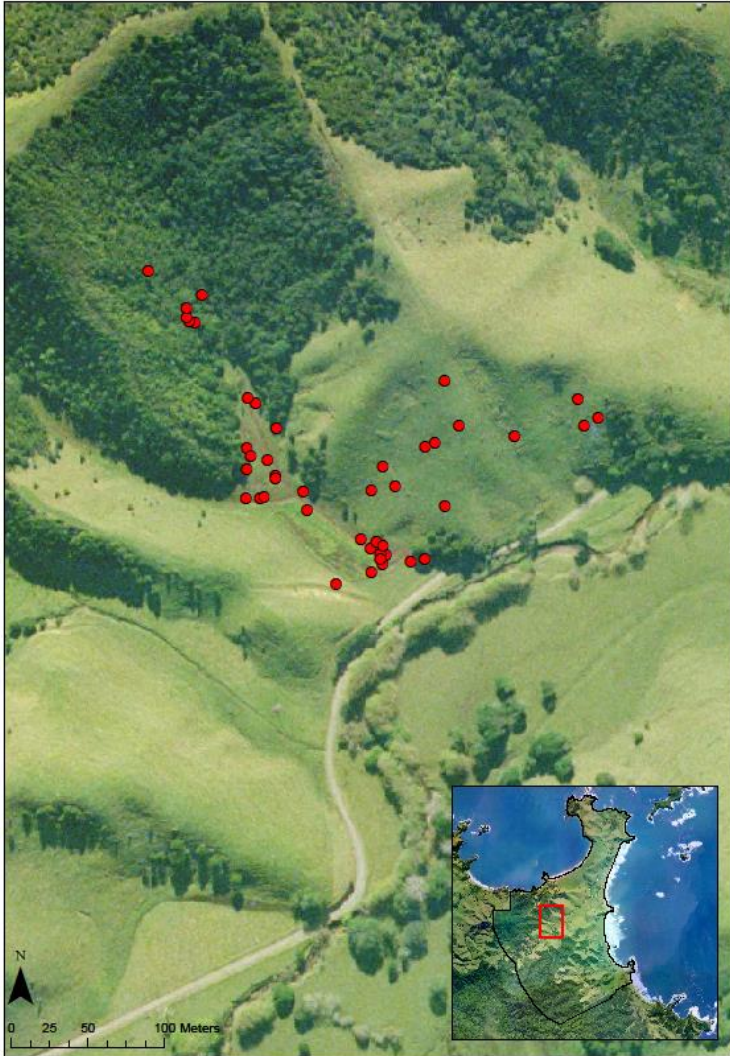


Forest use: Mimiwhangata



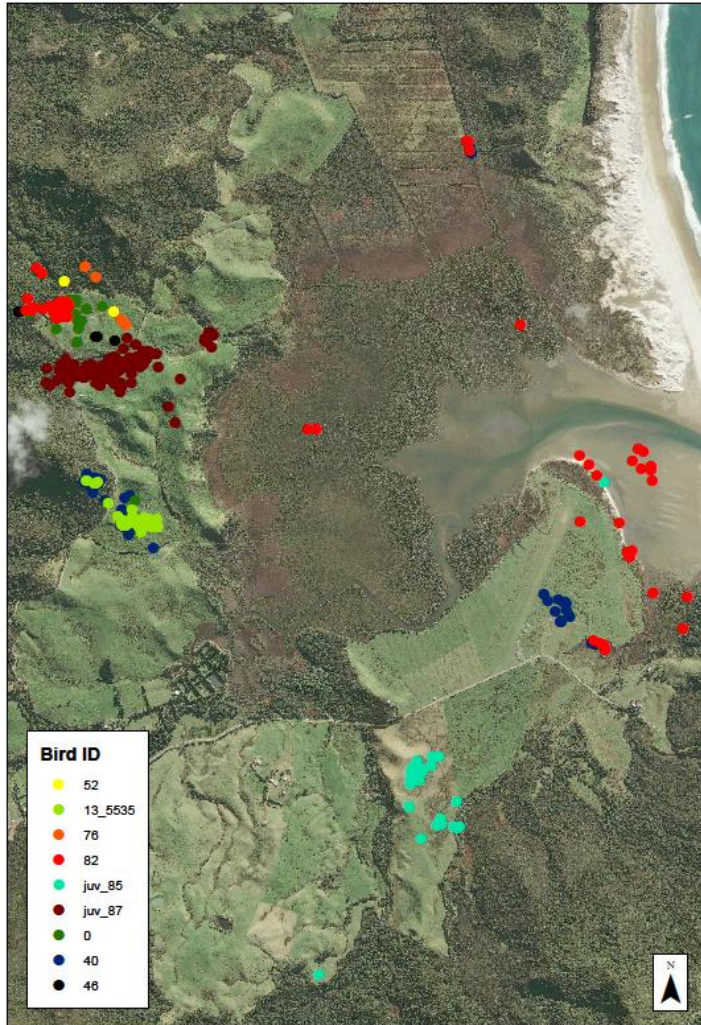
- Six of the tagged birds utilised trees or forest.
- Three of these had more than one fix in trees/forest.
- Most forest fixes from one bird was six.
- All studied birds foraged in paddocks or wetlands at night.

Forest use: Mimiwhangata



- Bird with most forest fixes: Adult male, caught in pond.
- 44 fixes total, six in forest.
- All forest fixes during daylight (07:57- 16:24).

Forest use: Okiwi



- Nine of the tagged birds utilised trees or forest.
- Between 1 – 56 forest locations per bird (56, 21, 10, 8, 5, 2, 2, 2, 1)
- All studied birds foraged in paddocks or wetlands at night.

Forest use: Okiwi



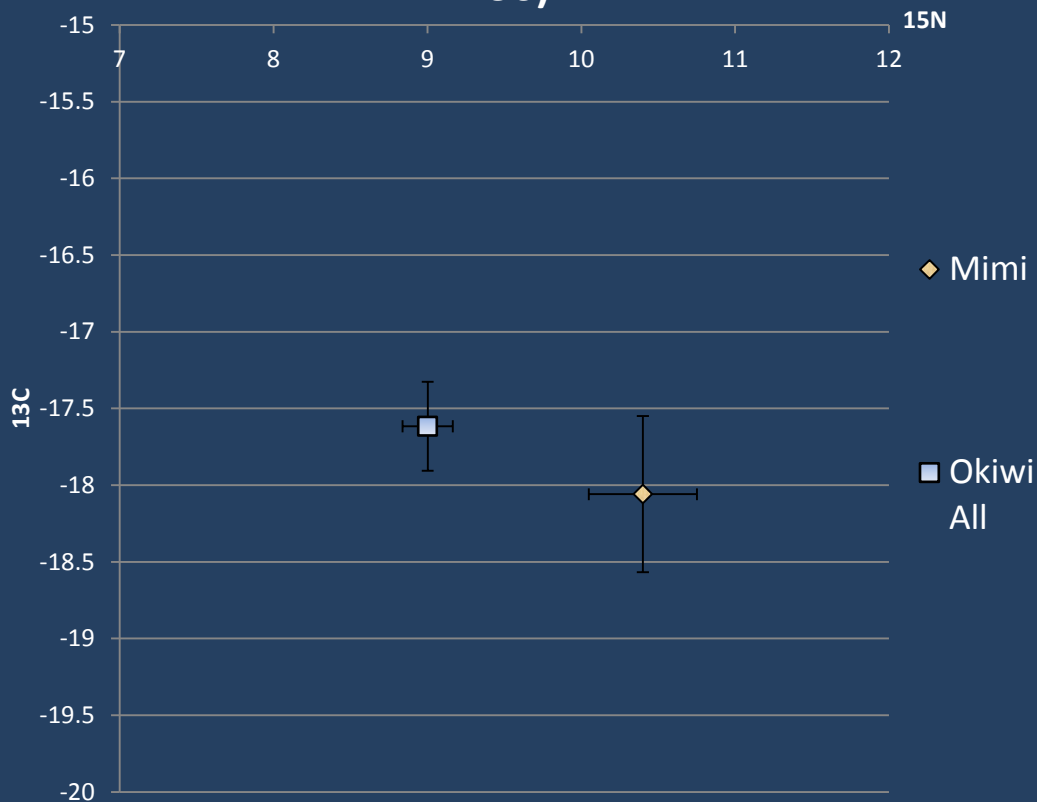
- Bird with most forest fixes: Juvenile, probably female, gained 25g during study.
- 202 fixes total, 56 in forest.
- All forest fixes during daylight.

Stable Isotope Analysis

- Samples collected at tag attachment or removal.
- Feather samples collected:
 - Feb, May, June and Sept 2012 at Okiwi (36 birds).
 - June and November 2012 at Mimiwhangata (16 birds).
- Blood was collected for 18 birds at Okiwi.
- Possible prey items were collected from each site, 12 from Mimiwhangata and 10 from Okiwi.

Stable Isotope Analysis

Combined Isotope Data for Both Sites
Feathers +SE (Mimiwhangata n=16, Okiwi n=36)



Mean ^{13}C and ^{15}N ratios between sites:

- Significant ($P < 0.00$) for ^{15}N .
- Not significant for ^{13}C ($P = 0.486$)
- No significant difference between genders when combining data from both sites.
- Significant difference in ^{13}C ratios between genders ($p = 0.024$) at Mimiwhangata ($n = 6$ F, 9 M). None at Okiwi ($n = 14$ F, 5 M). (poor sample sizes?)
- No significant difference between ages at Okiwi (collected from two different deployments).

Acknowledgements

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Rua



Manu



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Maddie



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