

# POP2015-02 Flesh-footed shearwater: Various locations population project



Mike Bell

# Rational for studies

- Ranked as nationally vulnerable
- Currently in decline
  - Very high risk commercial fishing
  - Moderate risk recreational fishing
  - Breeding biology of NZ populations poorly known
- Long-term population study required
- Little known about at-sea distribution of Northland populations
- Recent population estimates for Middle Island lacking



# Project Objectives

- 1. To estimate the population size of flesh-footed shearwater at Middle Island (Mercury Islands).
- 2. To estimate key demographic parameters of flesh-footed shearwater at Lady Alice Island/Mauimua and Ohinau Islands.
- 3. To describe the at-sea distribution of flesh-footed shearwater breeding at Northland breeding sites.



# Population monitoring Ohinau and Lady Alice Islands



# Project Objectives

- 1. To estimate the population size of flesh-footed shearwater at Middle Island (Mercury Islands).
- 2. To estimate key demographic parameters of flesh-footed shearwater at Lady Alice Island/Mauimua and Ohinau Islands.
- 3. To describe the at-sea distribution of flesh-footed shearwater breeding at Northland breeding sites.



# Study Site – Ohinau Island

- 43ha predator free Island off Coromandel owned by Ngati Hei
- Estimated 2,071 breeding burrows
- 8 colonies distributed over most of island
- Previous work by Te Papa (2012)
  - 50 marked burrows
  - 62 adults banded
- WMIL study started last season
  - 218 marked burrows
  - 357 banded birds (mostly chicks)



# Study Site – Lady Alice Island

- 155ha Island part of Hen & Chickens
- Predator free Nature Reserve
- Estimated 921 breeding burrows
- Previous work by Andrea Booth (DOC, 1999-2012)
  - 113 marked burrows
  - 789 birds banded
- First season's work in this study





# Methods

- 20 day trip December 2016
- Many study burrows established
  - Ohinau = 229
  - Lady Alice = 179
- $\geq 30$  burrows monitored by burrow scope only (control)
- Night catching and banding
- 5 day trip end of April 2017 to determine breeding success





# Results



- Solid banded population established
  - 661 banded Ohinau Island
  - 379 banded Lady Alice Island
  - Over 1000 have been banded on each island
- Both partners ID in 58% of study burrows Ohinau Island and 36% Lady Alice.
- One partner ID in further 33% Ohinau and 36% Lady Alice
- A total of 399 burrows with eggs monitored

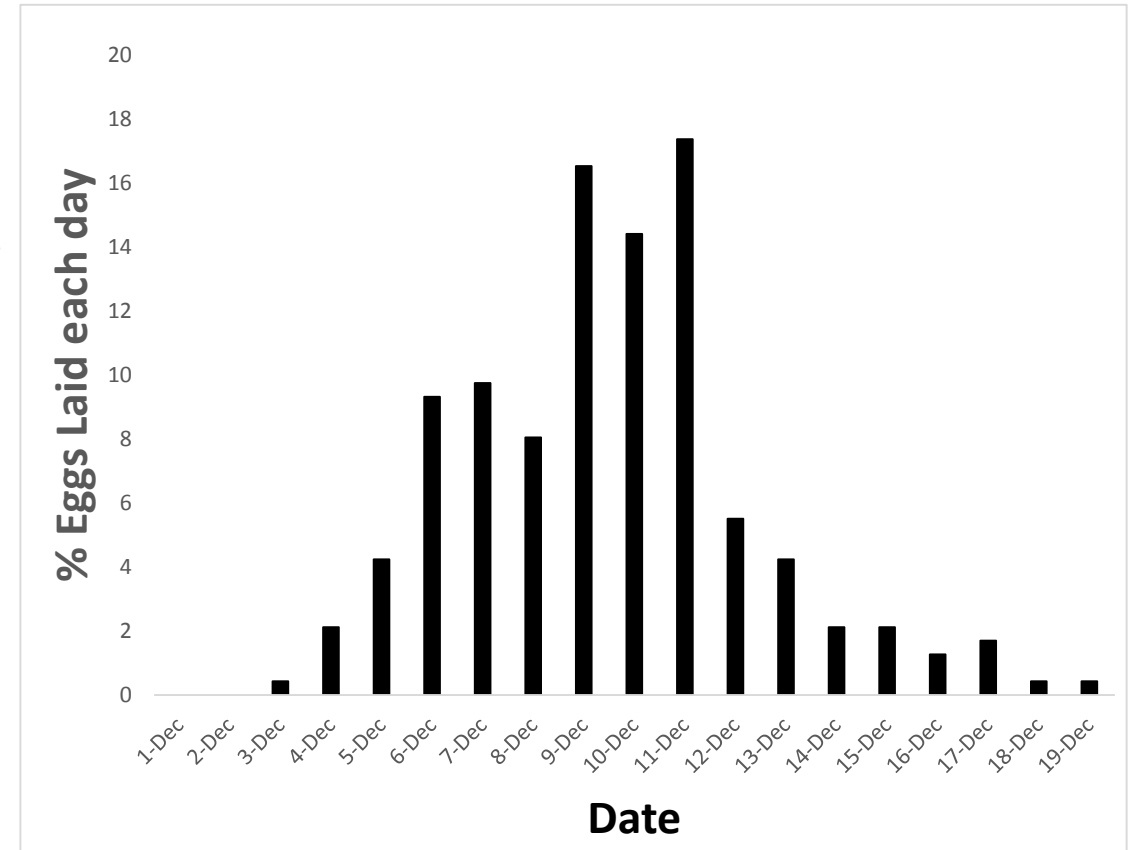
# Results

	Ohinau		Lady Alice	
	Study burrows (n = 228*)	Burrowscope (n = 35*)	Study burrows (n = 177*)	Burrowscope (n = 30)
Burrows with eggs	209 (91.7%)	32 (91.4%)	129 (72.9%)	29 (96.7%)
<b>Breeding success</b>	106 (50.7%)	13 (40.6%)	65 (50.4%)	12 (41.4%)
Pre-hatching failure	18 (8.6%)	0 (0%)	17 (13.2%)	0 (0%)
Post-hatching failure	7 (3.3%)	4 (12.5%)	5 (3.9%)	0 (0%)
Failed, unknown reason	78 (37.3%)	15 (46.9%)	42 (32.6%)	17 (58.6%)
*some burrows not included in analysis				

- Overall breeding success for season was 49.1% (n = 196)
- Burrowscope burrows had lower breeding success than study burrows
- Burrow failures could not be determined in many cases

# Egg laying of FFSW

- Arrived on Islands before first egg laid
- Determined egg laying date of 236 burrows over both islands
- Egg laying much later than previously thought
  - Mean lay date 10 December
  - ~1 week later than Australian populations





# Recapture Results

- High rate of occupancy in consecutive seasons
  - 90% of burrows with chicks 2015/16 bred again in 2016/17 (Ohinau Island)
  - Six of eight adults banded in study burrows in 2015/16 found breeding in same burrows (Ohinau Island)
- 78 banded birds recaptured on Lady Alice Island (of 789)
  - Five were adults banded in 2000

# Advocacy Work

- Working closely with Southern Seabird Solutions to educate commercial fishermen about FFSW
  - Day trip to Ohinau Island in April with three crew and Ann from Southern Seabirds
- Planned overnight trip to Lady Alice next season



# Discussion



- Study burrows established
- One of first measure of breeding success for NZ population of FFSW
- 49% breeding success lower than expected
  - Other studies on Australian islands with predators around 60%
  - Bethells Beach colony 75% this season
  - Cyclone Debbie/flooding burrows
  - Grey-faced petrels present in high numbers



# Middle Island Flesh-footed Shearwater Survey



Wildlife Management International Limited



# Project Objectives

- 1. To estimate the population size of flesh-footed shearwater at Middle Island (Mercury Islands).
- 2. To estimate key demographic parameters of flesh-footed shearwater at Lady Alice Island/Mauimua and Ohinau Islands.
- 3. To describe the at-sea distribution of flesh-footed shearwater breeding at Northland breeding sites.



# Middle Island Survey

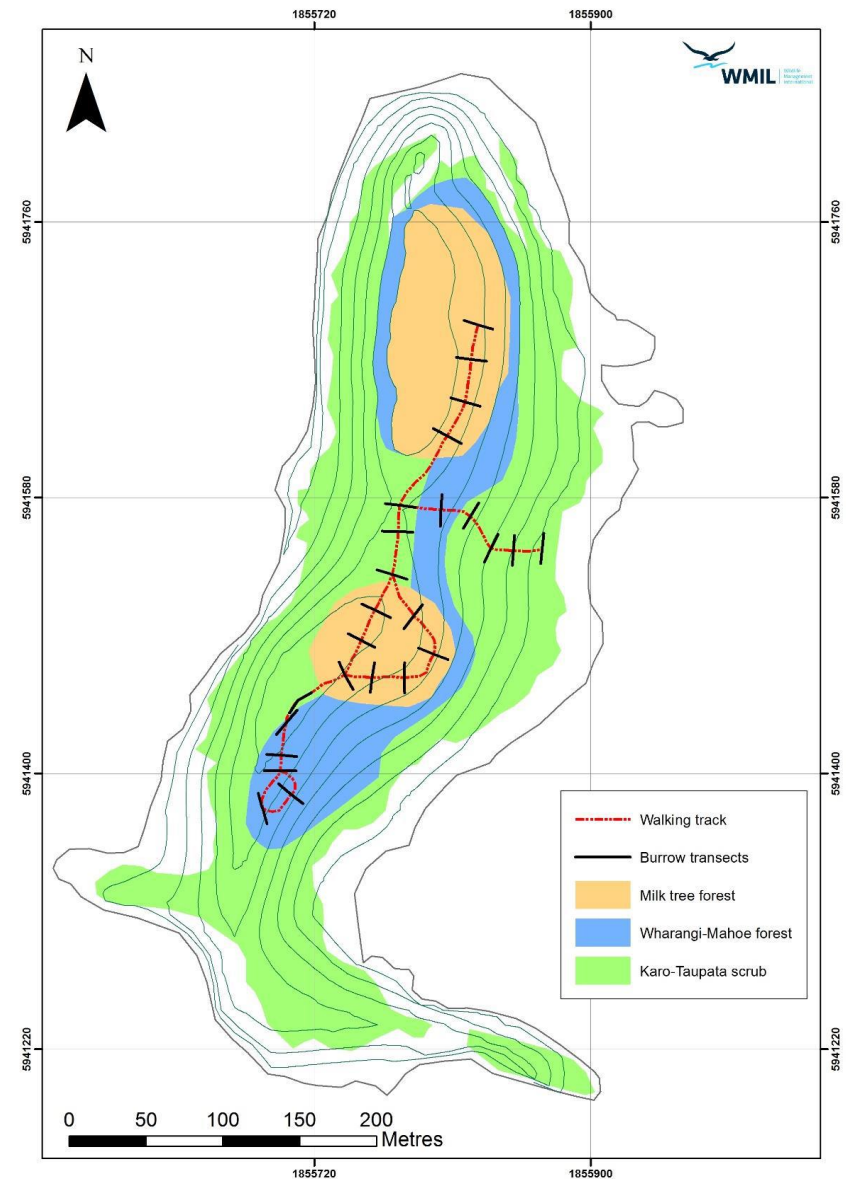
- 13ha Nature Reserve
- Part of the Mercury Island Group
- Only one previous estimate of population size from 2003
  - 3,000 breeding pairs (Waugh *et al.* 2013)





# Survey Design

- 6 – 10 January 2017
  - After all birds have laid, before most failures
- 25 transects
  - 20m x 2m
  - Across three habitat types
  - Contents of all burrows detected searched using burrowscope
- Burrow density calculated, habitat area calculated and occupancy data used to work out number of breeding burrows



# Survey Results

- Occupancy = 71.8%

Vegetation type	Burrow density (burrow/m <sup>2</sup> )	Area (m <sup>2</sup> )	Burrows	Population estimate (breeding pairs)	95% confidence interval
Karo-Taupata scrub	0.089	63,360	5,643	4,052	1,730 - 6,373
Wharangi-Mahoe forest	0.146	13,486	1,967	1,412	497 – 2,326
Milk tree forest	0.025	19,954	499	358	171-545
<b>Total</b>			8,109	<b>5,822</b>	2,400-9,244

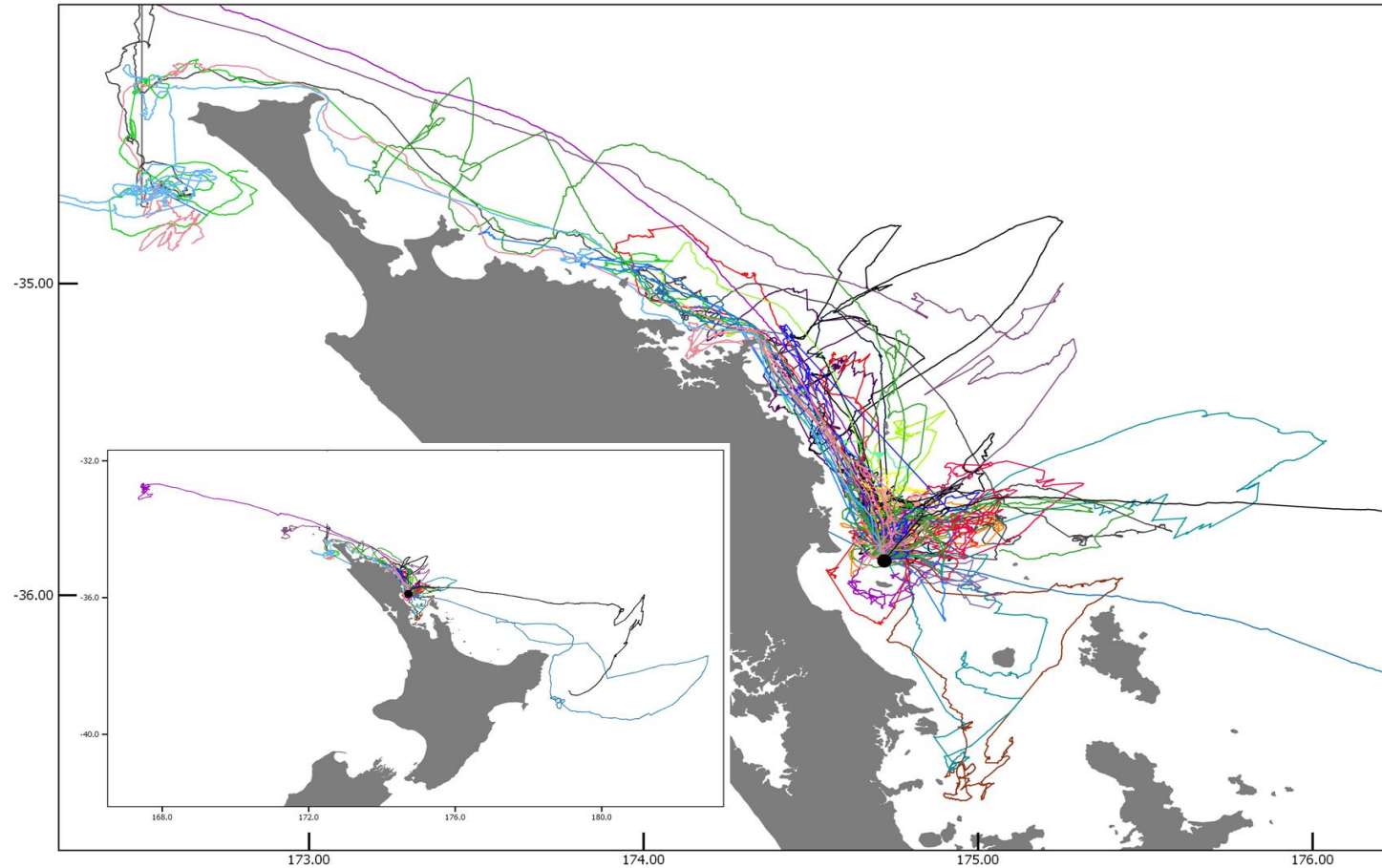
- New Zealand's largest population of FFSW

# Middle Island Conclusions

- Population much larger than previously thought
  - Although re-work of 2003 estimate puts this estimate higher (4,400 pairs)
- Timing of survey important (early January)
  - Occupancy close to its peak
- Previous surveys from other islands may have underestimated occupancy and therefore population size
  - Baker *et al.* (2010) recorded low (44.2%) occupancy rates
    - Many field trips much earlier, 10 – 16 December
  - Our measured occupancy = 71.8%
- Further work to re-census FFSW populations warranted



# GPS tracking, Lady Alice Island



# Project Objectives

- 1. To estimate the population size of flesh-footed shearwater at Middle Island (Mercury Islands).
- 2. To estimate key demographic parameters of flesh-footed shearwater at Lady Alice Island/Mauimua and Ohinau Islands.
- 3. To describe the at-sea distribution of flesh-footed shearwater breeding at Northland breeding sites.

# Methods



- 23 day trip in February during early-chick rearing
- Birds fitted with GPS and GLS (for saltwater-immersion)
- 43 individuals tracked

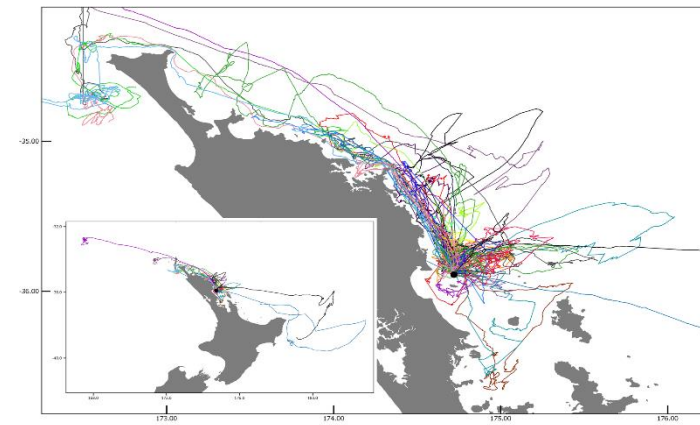


# Data Analysis

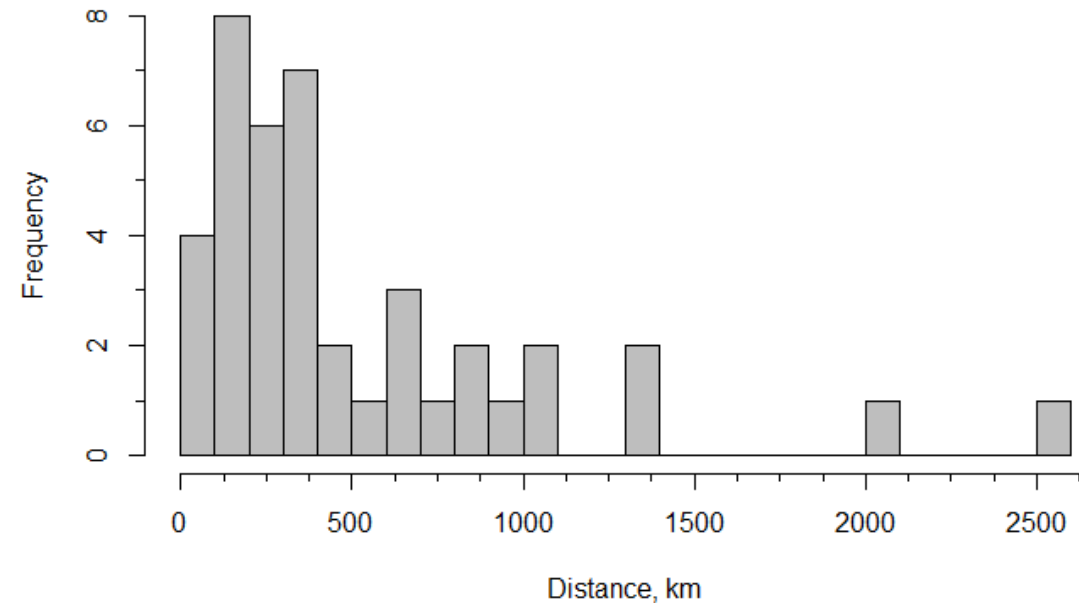
- Saltwater immersion data classified into three behaviour types
  1. **Flight** = low “wet count”, 0 or 1
  2. **Forage** = intermediate “wet count”, 2 – 8
  3. **Resting** = high “wet count”, 9 or 10
- GPS locations matched with corresponding saltwater immersion data

# Results

- 89 total tracks
- Trips 71km – 2262km (mean 488km)
  - Majority <500km
- Trips varied between and within individuals
- Individuals often alternated between long and short trips

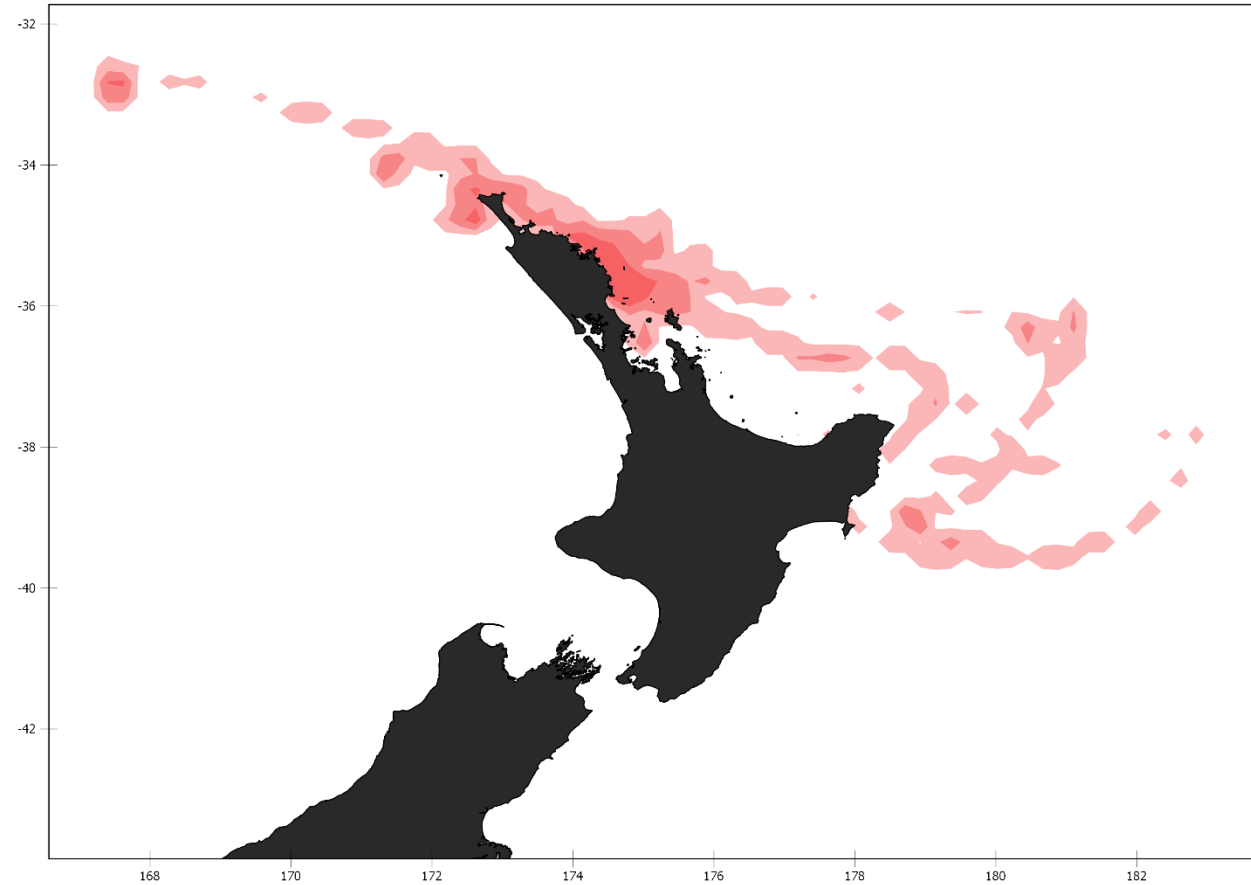


Histogram of distance travelled



# Flight

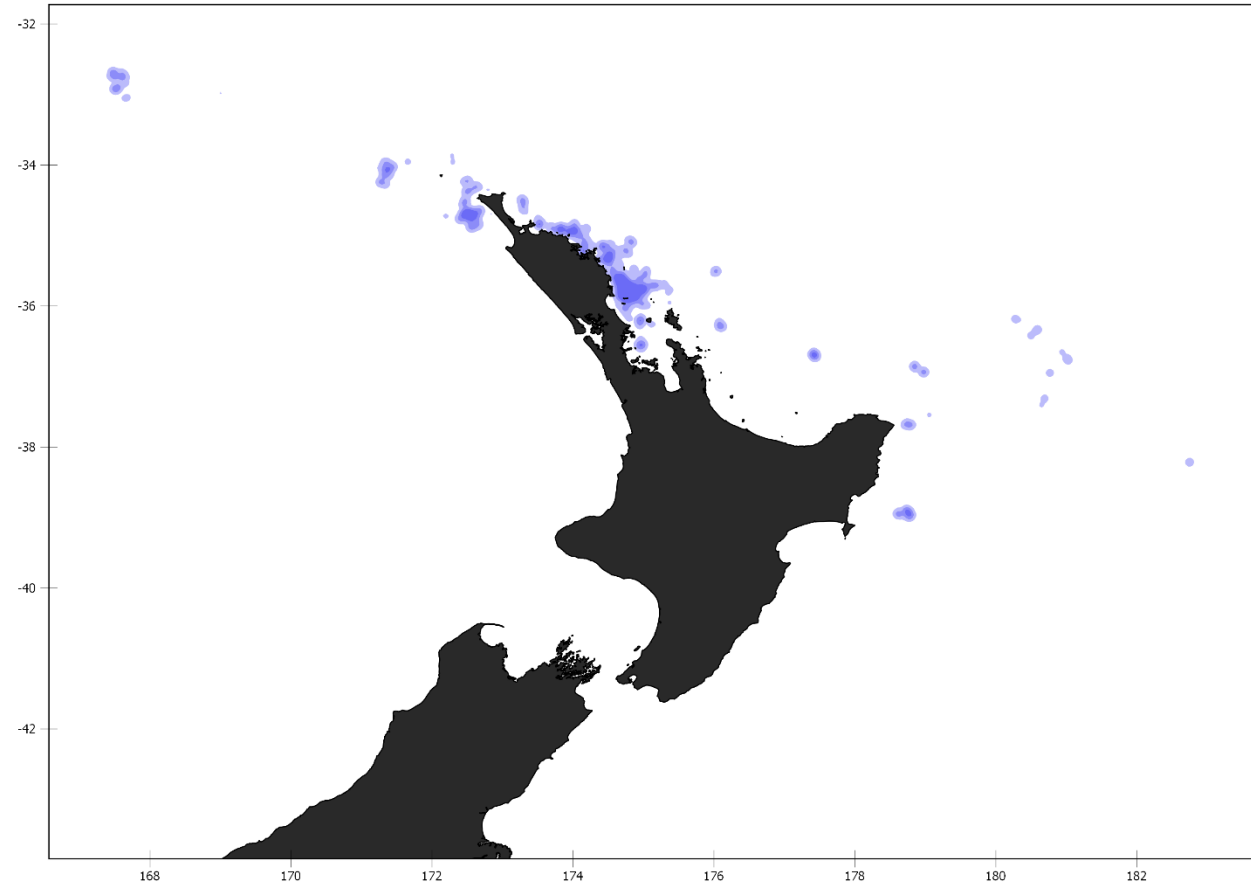
30%





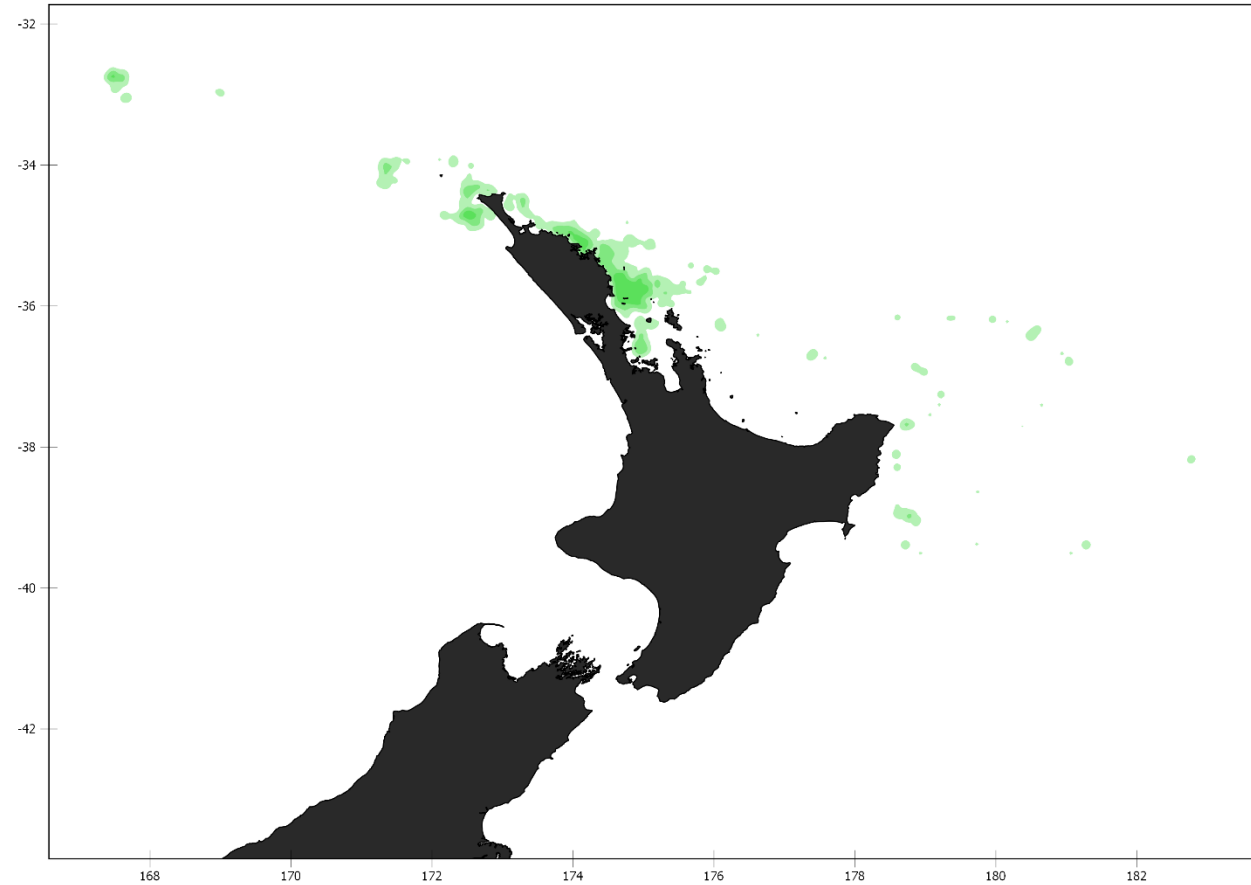
# Resting

50%

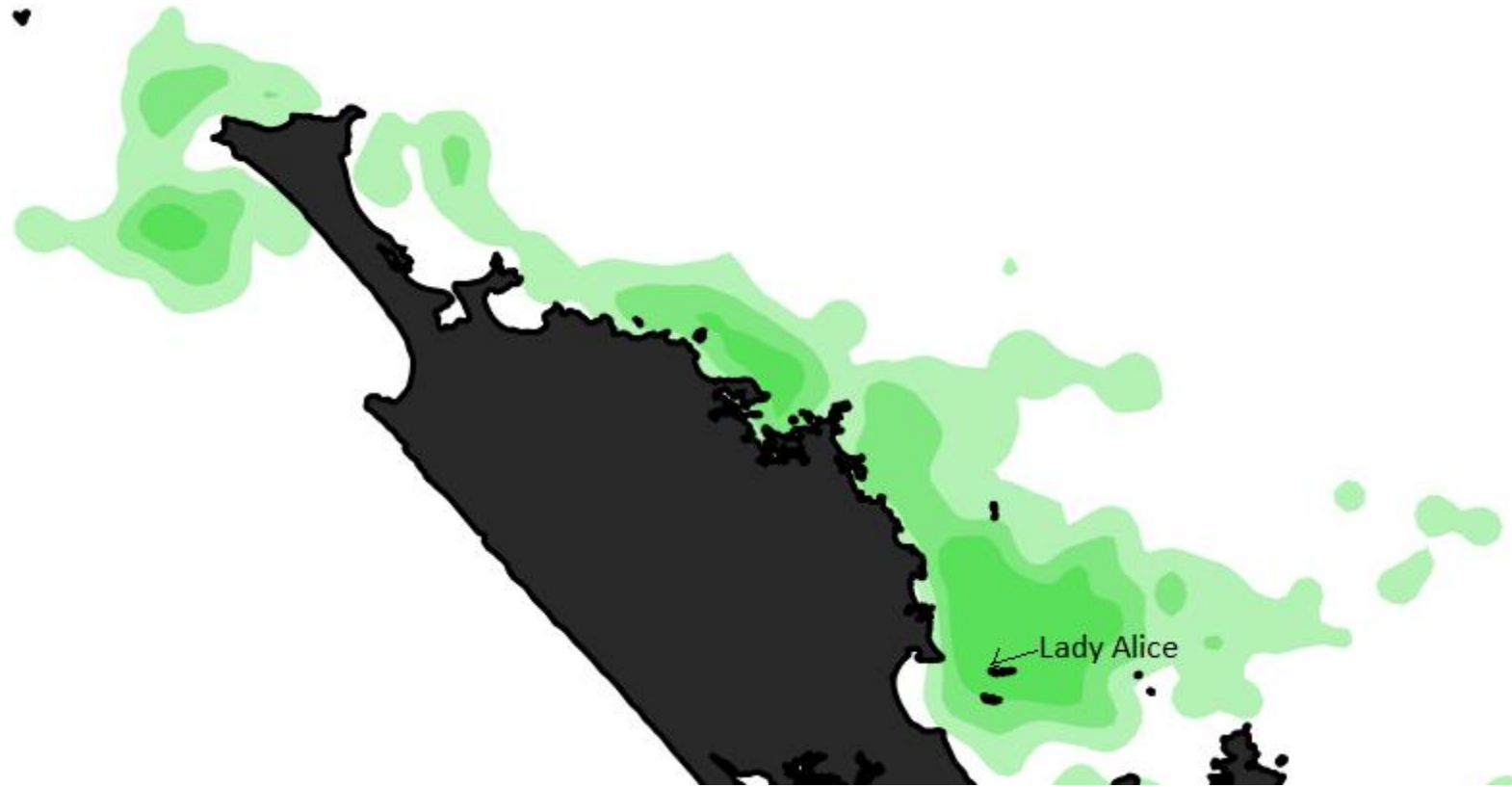


# Forage

20%



# Forage





# Discussion

- Individuals alternating between short and long trips
  - Similar behaviour observed in Ohinau Island population (Waugh *et al.* 2016)
- Lady Alice FFSW show a more northerly tendency
  - Ohinau Island birds generally off to the east
  - Discreet foraging areas for different colonies
- Tracking of Lady Alice FFSW during incubation planned for January 2018
  - Potential different foraging areas during different breeding stages

# Conclusion & Recommendations for Next Season

- Foundations for long-term study now established
  - Lady Alice and Ohinau Islands both suitable study islands
  - Focus effort on recapturing banded birds
- Occupancy of study burrows high
  - Repeated monitoring of same burrows
  - Gather data for multiple years and measure change of time
  - Band and ID as many more study burrow partners as possible
- GPS tracking of adults on Lady Alice during incubation stage
- Work on Middle Island completed
  - Island extremely fragile and not suitable for demographic work
  - Suggest re-survey in ca. 10 years



# Acknowledgements

This project was funded by the Conservation Services Programme, Department of Conservation project POP2015-02, partially through a levy on the quota owners of the relevant commercial fish stocks. **Special thanks to:**

- Patrick Crowe, Dave Boyle, Holly Kirk, Dan Burgin, Mike Detlaff and Kathryn Richards **for fieldwork**
- Graeme Taylor, Ian Angus, Neil Forrester, Heidi Weston, Nicki Miller, Rob Chapel all from **DOC for their various support**
- Ngatiwai and Ngati Hei **for access to the Islands**
- Trev Jackson and Gary Stirling **for transport to and from the Islands.**

