

# Māui Dolphin Abundance Estimate: 2020-2021

## Field Report 2021

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# Objectives

- To estimate the abundance of Māui dolphins using genotype capture-recapture surveys.
    - build on 2015-2016 estimate  
(1+ years old; 63 dolphins (95%CI 57, 75) Baker et al. 2016)
  - Undertake surveys that attempt to replicate the 2010-2011 & 2015-2016 effort (~late January – mid-March)
- ... both years now successfully completed...

# Tissue sampling

## Samples

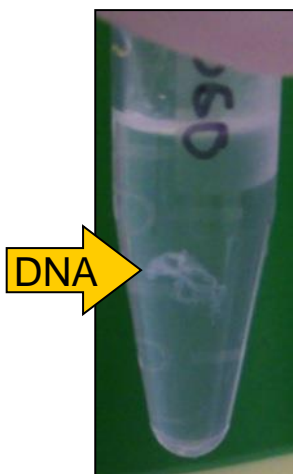


biopsy dart  
5mm



beachcast  
museum

## DNA Extraction



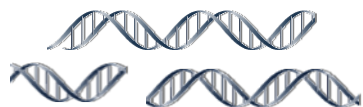
mtDNA

maternal  
inheritance



nuclear DNA

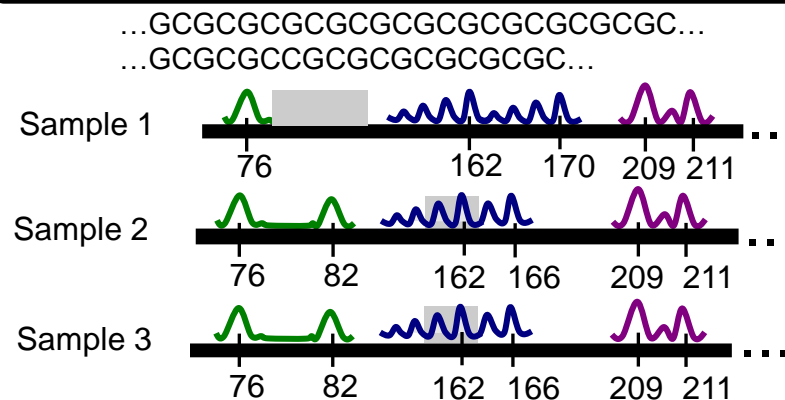
biparental inheritance



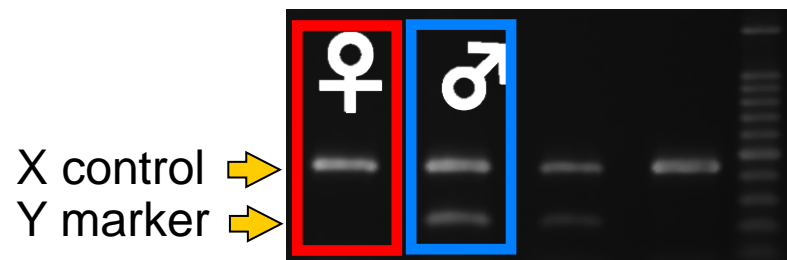
## mtDNA (576 bp)

	Sequence	Haplotype
ID 1	...AAGTTAAAGCC...	A
ID 2	...AAGTTAAAGCC...	A
ID 3	...AGTTAAAGTC...	B
ID 4	...AAGTCAAAGTC...	C

## 21 microsatellite genotypes



## genetic sex ID



## So far used for...

- Sub-species ID
- Sex-ID
- Genotyped 137 indiv.
- Abundance – genetic mark-recapture
- Residence patterns
- Relatedness – ddRADSeq
- Epigenetic aging
- Diet – stable isotopes
- Progesterone – reproductive status

# Boat surveys

## 2021

- 11 surveys
  - 13<sup>th</sup> February – 15<sup>th</sup> March
- 1,381 km travelled
  - average distance 123 km/day
- 93 hours of survey effort
  - average time on water 8hr 27min
- Māui dolphins sighted on 10/11 surveys *cf* 12/13 in 2016, 7/12 in 2015
- 3 lockdowns

## 2020

- 13 surveys
  - 10<sup>th</sup> February – 5<sup>th</sup> March
- 1,552 km travelled
  - average distance 119.4 km/day
- 108 hours of survey effort
  - average time on water 8hr 18min
- Māui dolphins sighted on 11/13 surveys *cf* 12/13 in 2016, 7/12 in 2015

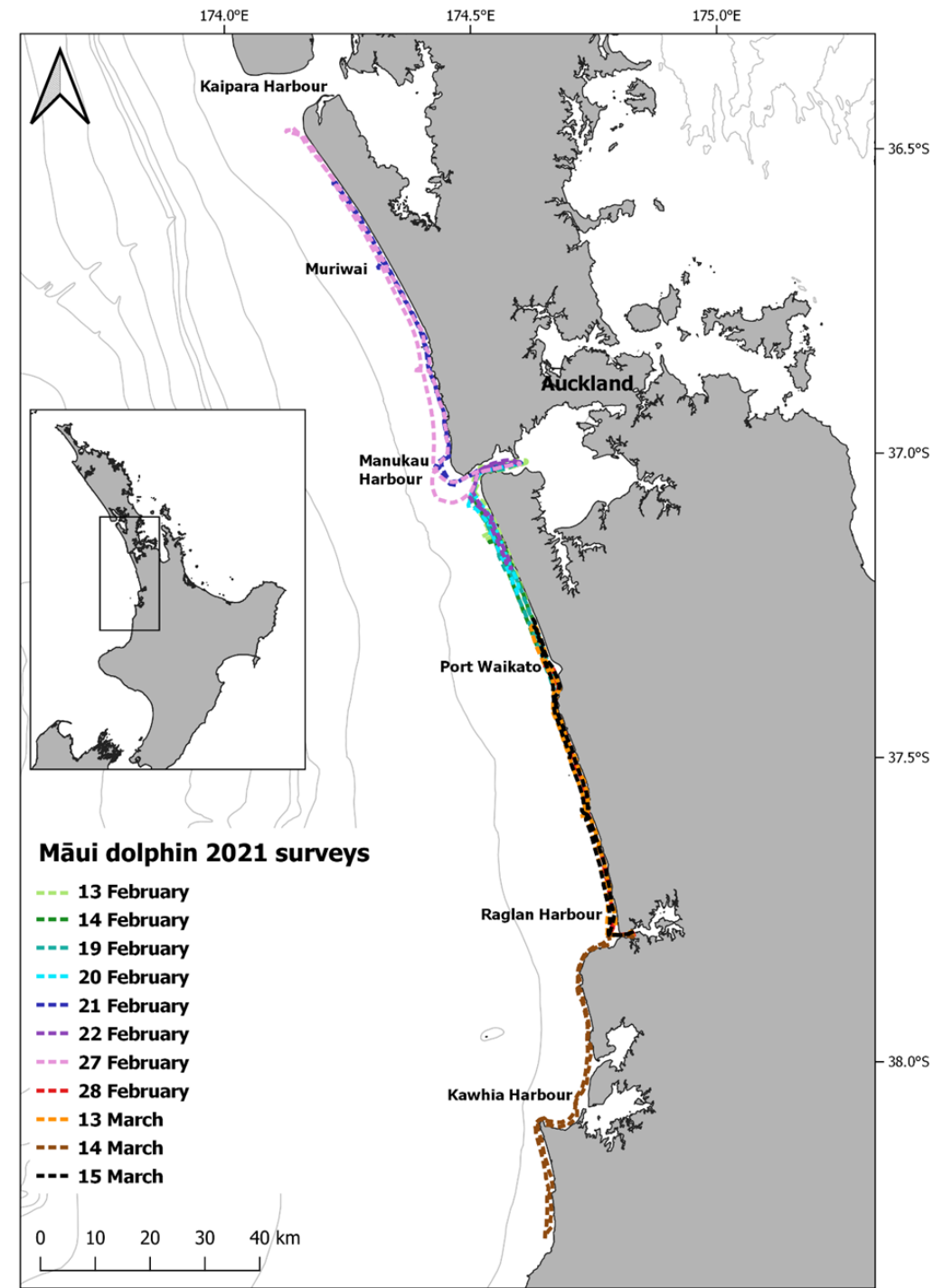


Out of 11 surveys:

- 4 out of Raglan (north & south)
- 2 north Manukau
- 5 south Manukau

Range:

south Kaipara Harbour to south of Kawhia Harbour







# Group data summary

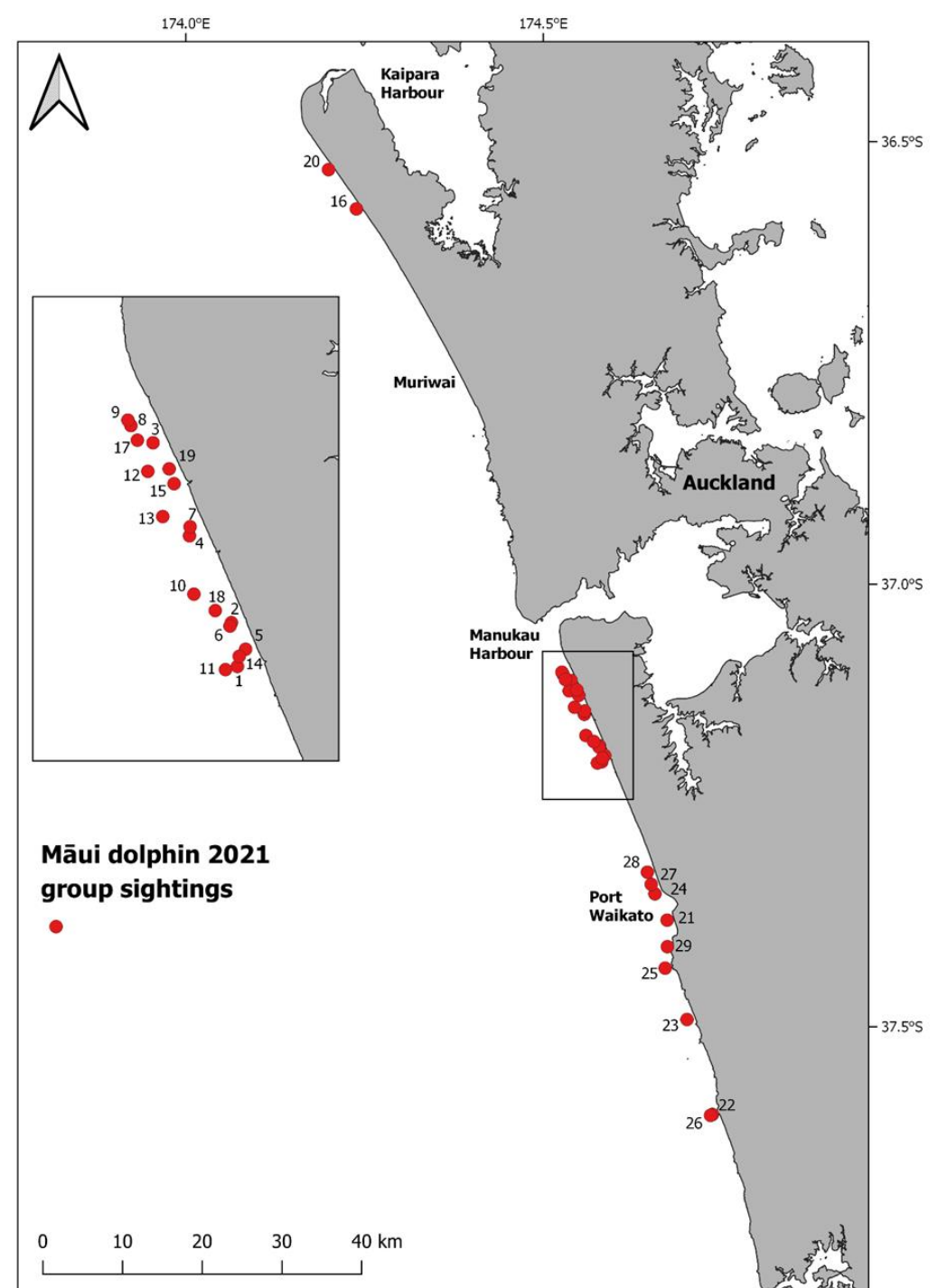
	2010	2011	2015	2016	2020	2021
N groups / survey	35 3.2	28 2.5	44 3.8	66 5.1	26 2.4	<b>29</b> <b>2.6</b>
Average group size	5-6	4	5-6	4-5	4	<b>4-5</b>
Calves in group	46%	4%	15%	14%	1%	<b>65%</b>
Juveniles in group %	28%	30%	5%	11%	11%	<b>5%</b>

Core range still centred south  
Manukau to Port Waikato

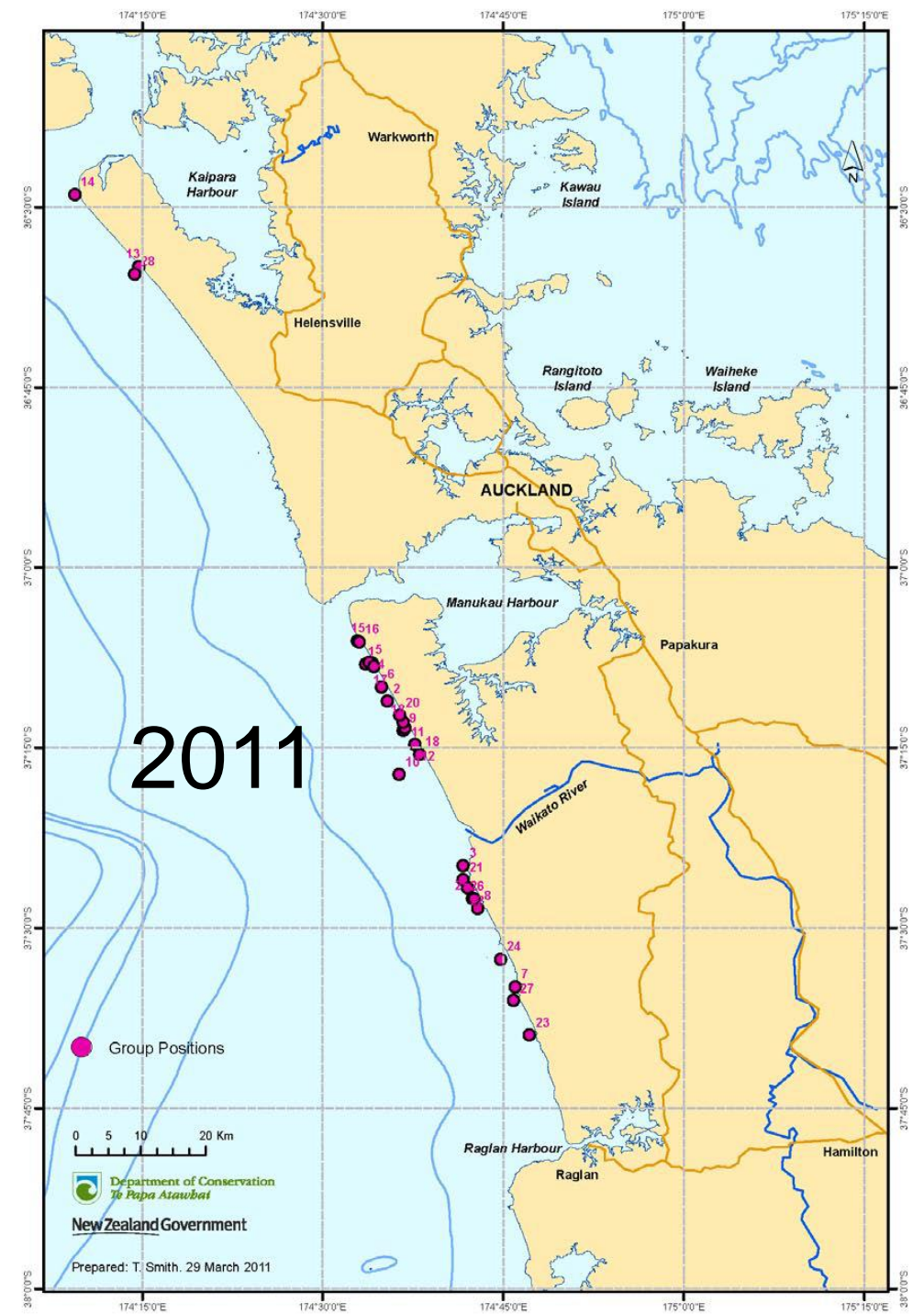
Consistent sightings south Kaipara  
Harbour

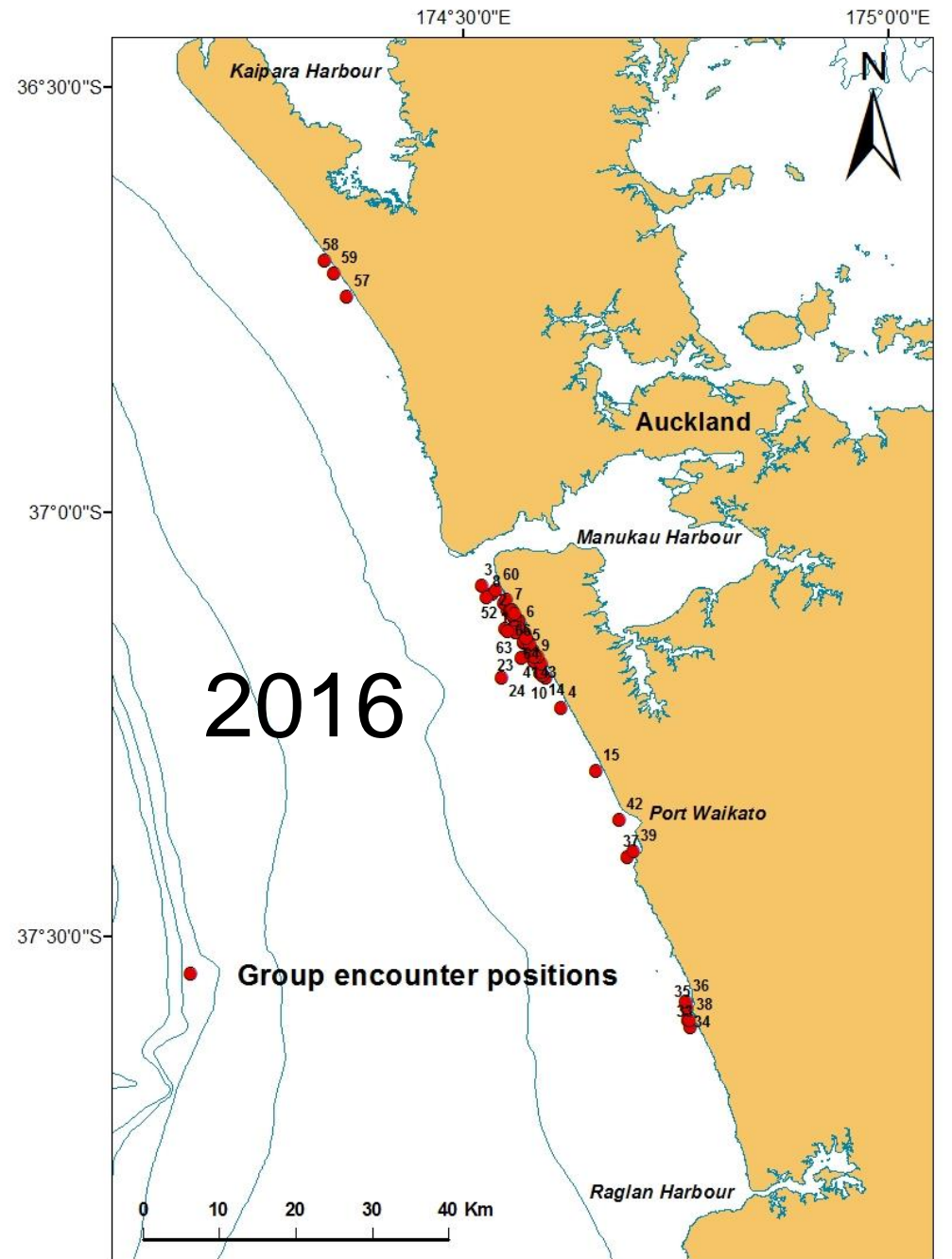
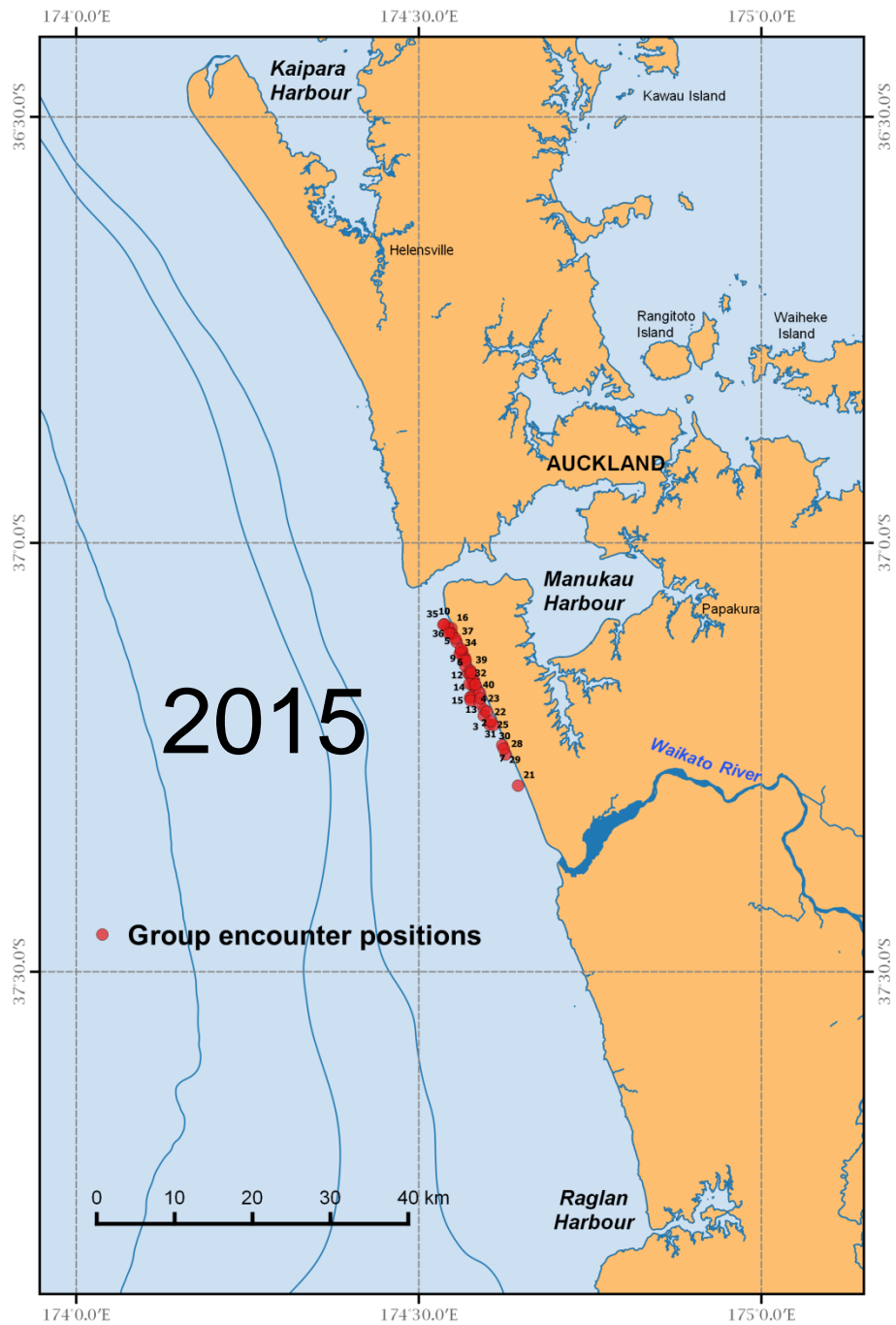
Typical spread of group sightings

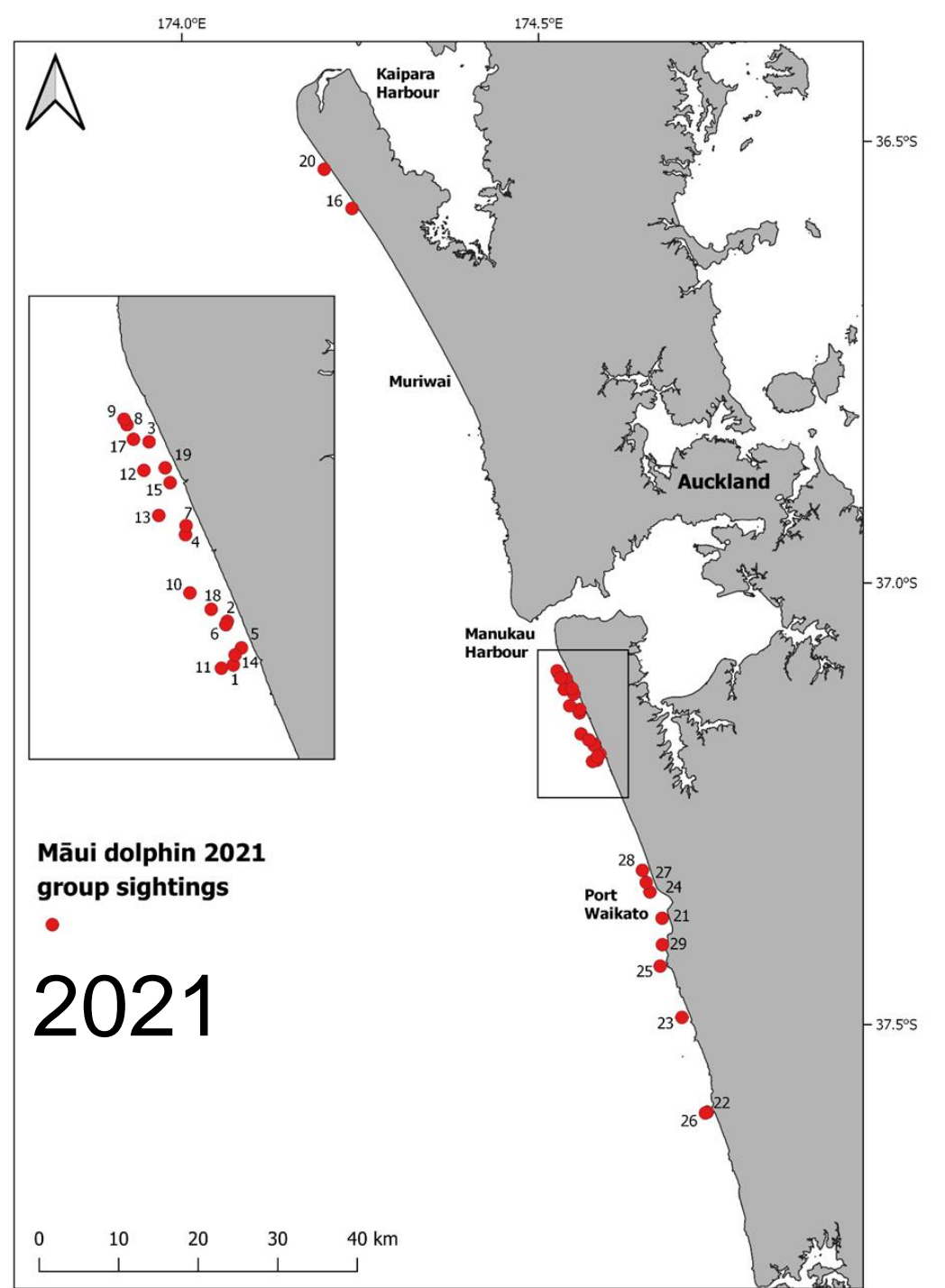
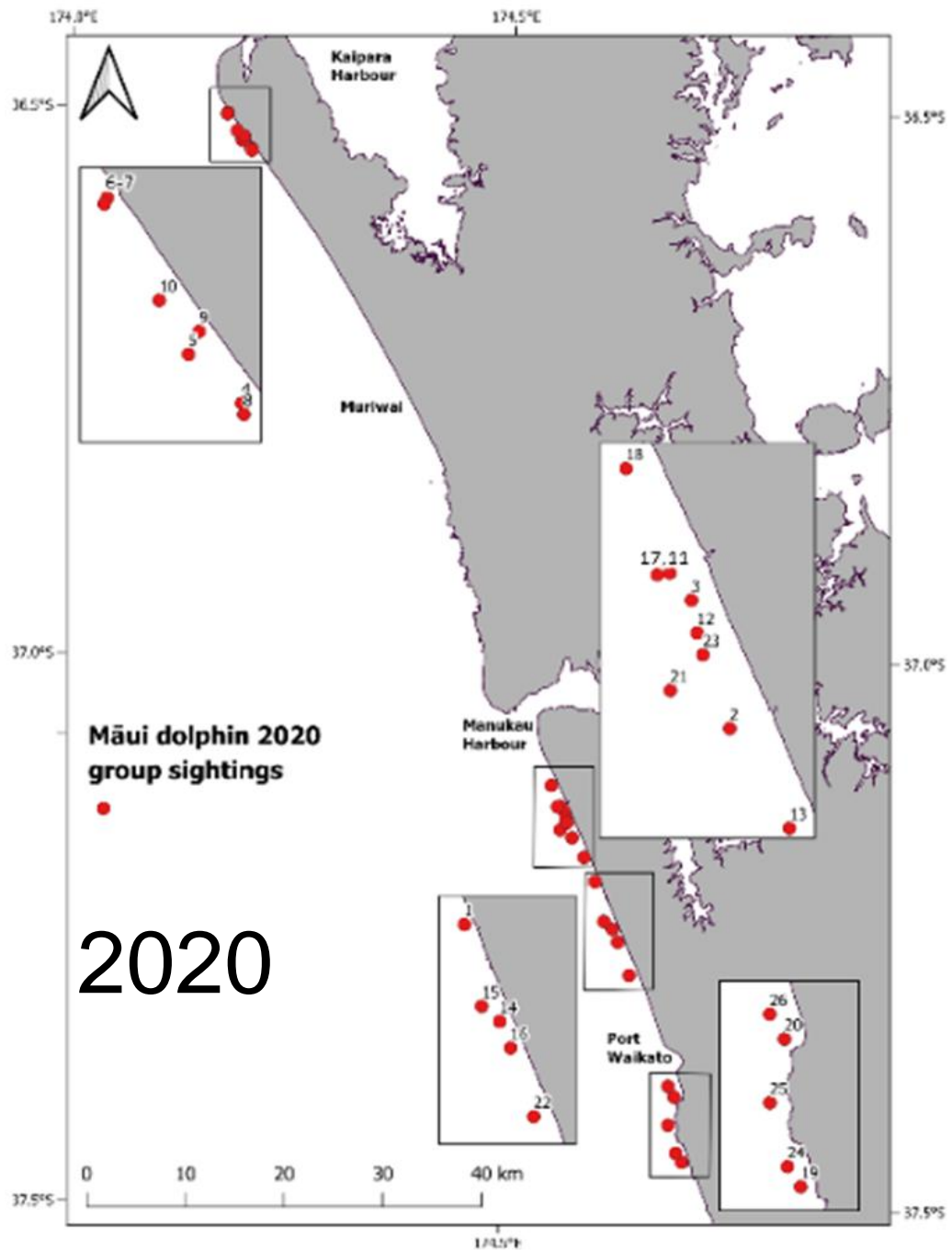
None south of Raglan (again)

















# Biopsy samples

- 34 tissue biopsy samples collected from 7/10 surveys dolphins were sighted  
(*cf.* 2010 = 37; 2011 = 36; 2015 = 48; 2016 = 44; 2020 = 50 samples)
- Also 1 x beachcast female Māui dolphin 25 Feb – north Muriwai Beach
- All 34 biopsy samples yielded sufficient DNA for mtDNA sequencing & sex-PCR
  - 24 individuals – all Māui dolphins
  - 11 females: 13 males

A photograph of two dolphins swimming in the water. The dolphins are seen from behind, with their dorsal fins visible above the surface. The water is a dark, rippling green. The text 'Hector's?' is overlaid in white on the left dolphin, and 'Māui?' is overlaid in white on the right dolphin.

Hector's?

Māui?

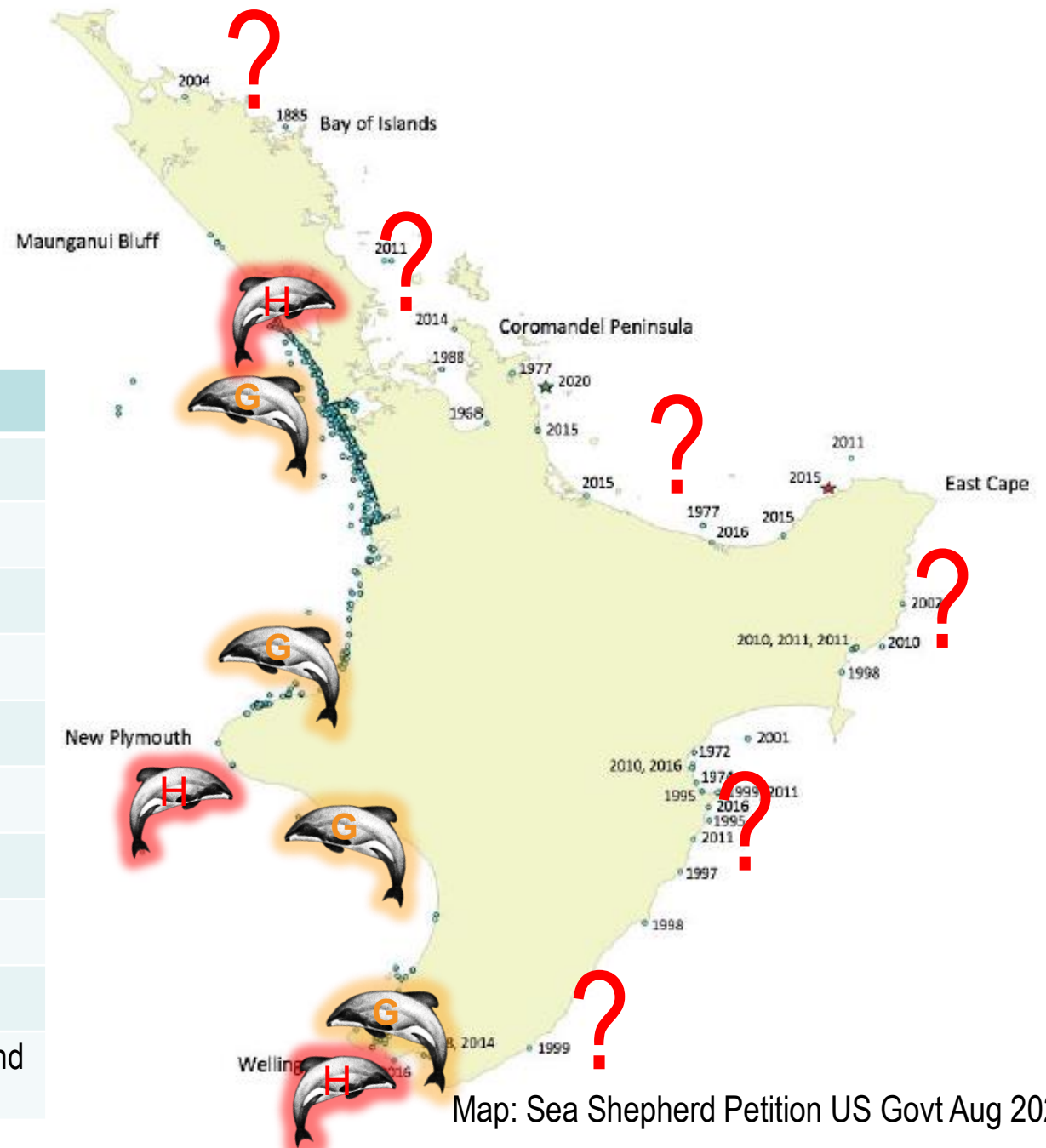


# Historical Māui range

Wellington to north of Kaipara

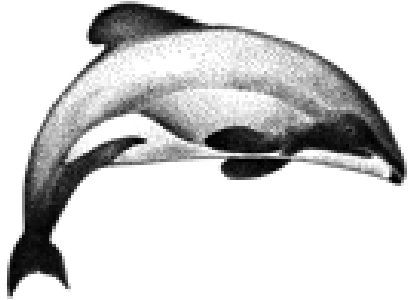
No 'G' haplotype from South Island or east coast, North Island

Year	Location
1870?	Wellington Harbour; Te Papa Tongarewa
1921	Whanganui; Stuffed in Museum
1974	Oakura, Taranaki
1979	Waiiti Beach, Taranaki; Museum
1988	Tongaporutu River, Taranaki
1989	Opunake Beach, Taranaki
1989	Urenui Beach, Taranaki
1993	Karekare Beach, Auckland
1995	Taharoa Beach, Auckland
1999	Manukau Harbour, seven gill shark bycatch; found in stomach



Map: Sea Shepherd Petition US Govt Aug 2020

# DNA profiles – Māui dolphins 2001 - 2021



Of the 137 Māui dolphins (G):

118 sampled alive

16 sampled beachcast (dead)

3 sampled alive then dead

- 4 June 2003 – male; 2001
- 24 Jan 2018 – male; 2001, 2003, 2004, 2018
- 30 Sept 2018 – female+foetus; 2010, 2013, 2015, 2016, 2017, 2018 (incl. photo-ID+genetics)

Minimum ages:

3 x males – at least 1 year old when sampled = minimum age

2001 – 2020 = 20 years old

2003 – 2021 = 19 years old

2004 – 2021 = 18 years old

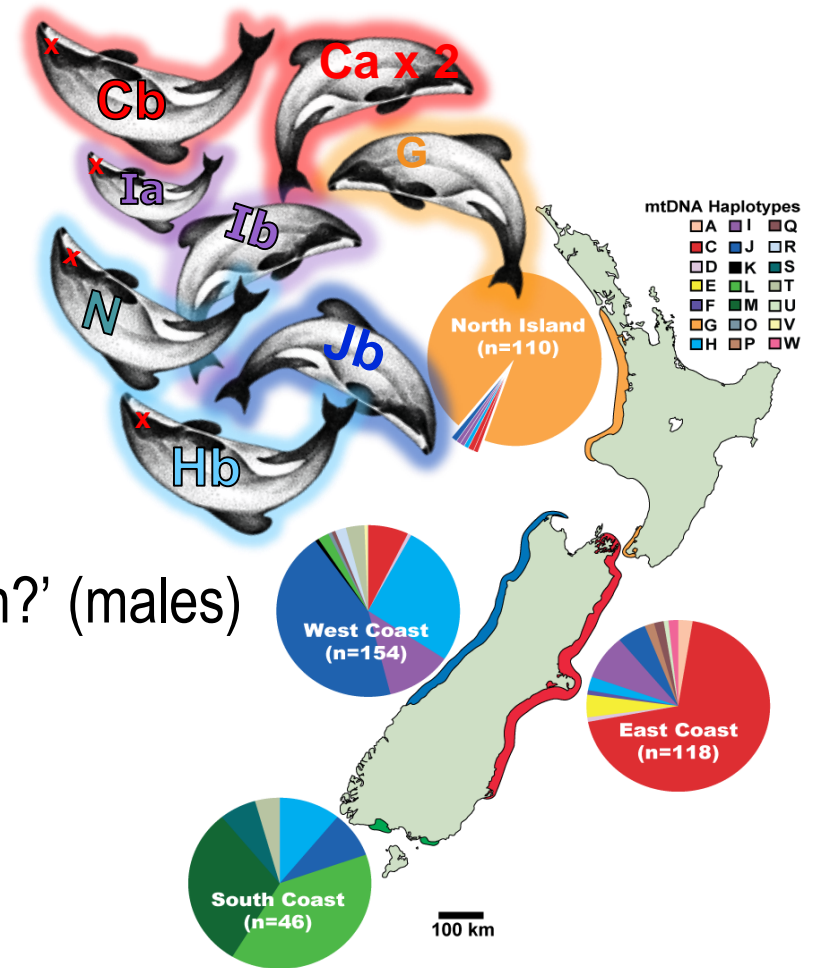


# Hector's dolphins in 'Māui-land'

8 Hector's dolphins sampled on the North Island

- 4 beachcast
  - 1 female 4 x over 11-year period
  - 1 male 2 x over 1-year period
- 4 alive in Māui aggregations
- 2 west coast South Island (females), 2 'top of the South?' (males)

To date, all individuals are diagnostic for subspecies, *i.e.*, no 'hybrids'  
No 'genetic rescue' by Hector's... yet?



# Summary

	2010	2011	2015	2016	2020	2021
# surveys	12	11	12	13	13	<b>11</b>
Distance travelled km	2,117	1,893	1,655	1,552	1,552	<b>1,381</b>
Samples	37*	36*	48*	44*	50*	<b>34</b>
# Māui individuals	24	26	38	26	30	<b>24</b>
Females	14	11	26	16	19	<b>11</b>
Males	10	11	12	10	13	<b>13</b>

\*Includes 11 samples representing 4 individual Hector's dolphins

2010 – 2 female (I & J)

2011 – 1 female (J)

2015 – 1 female (J) & 1 male (Ca)

2016 – 1 male (most likely Ca from 2015)

2020 – 1 female (J – 2010, 11, 15) & 1 male (new Ca)



# It still takes a village! Ngā mihi nui

DOC & MPI support

Chris Annandale, Cara Hansen, Kristina Hillock, Garry Hickman, Callum Lilley, Mike Ogle, Pearson Tukua, Anton van Helden (DOC)

Emma Carroll, Courtney Ogilvy, Leena Riekkola, Jess Ryder (University of Auckland)

Tangata whenua – especially those who came to the field in 2021