

POP2018-02

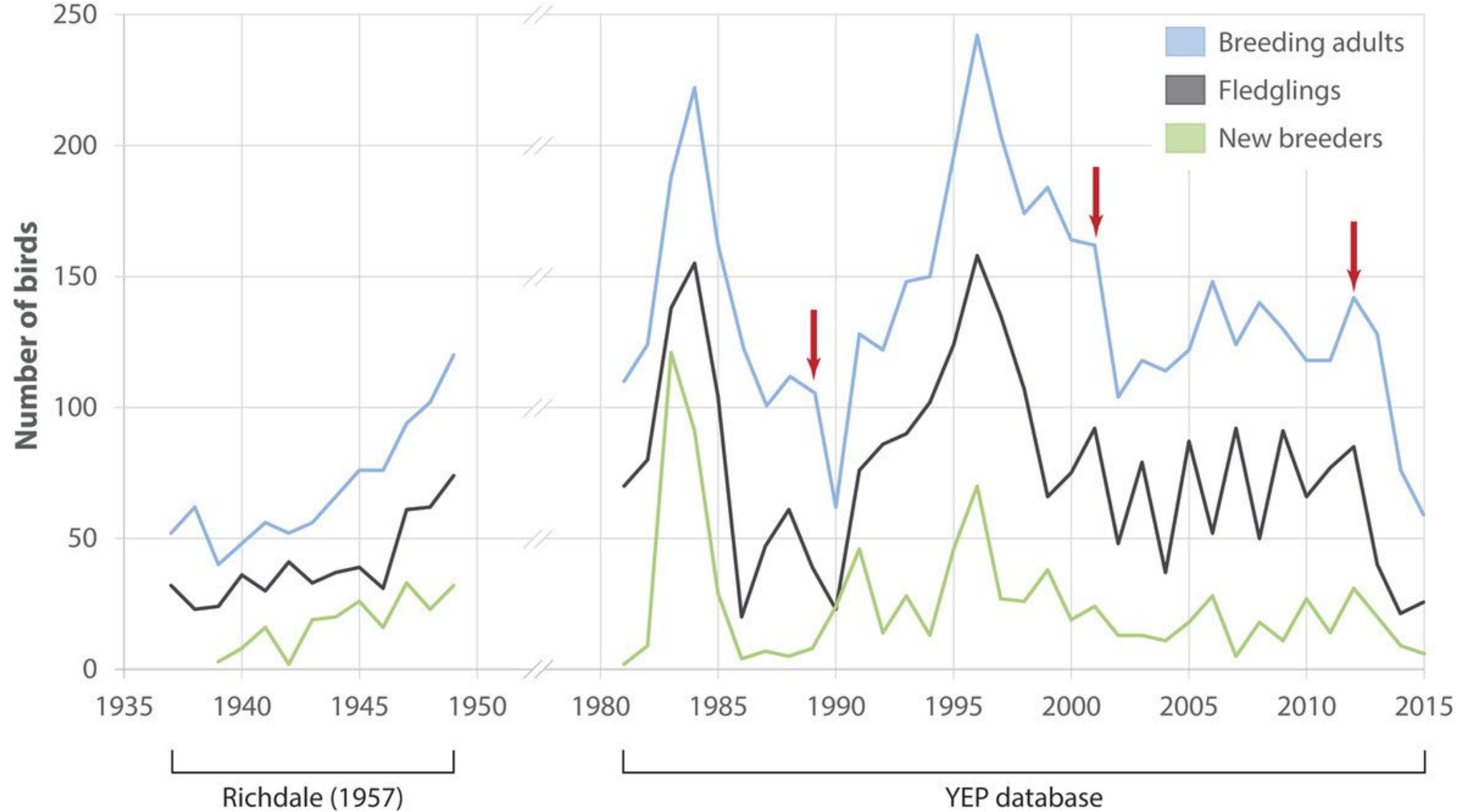
May 2019

# Hoiho population and tracking

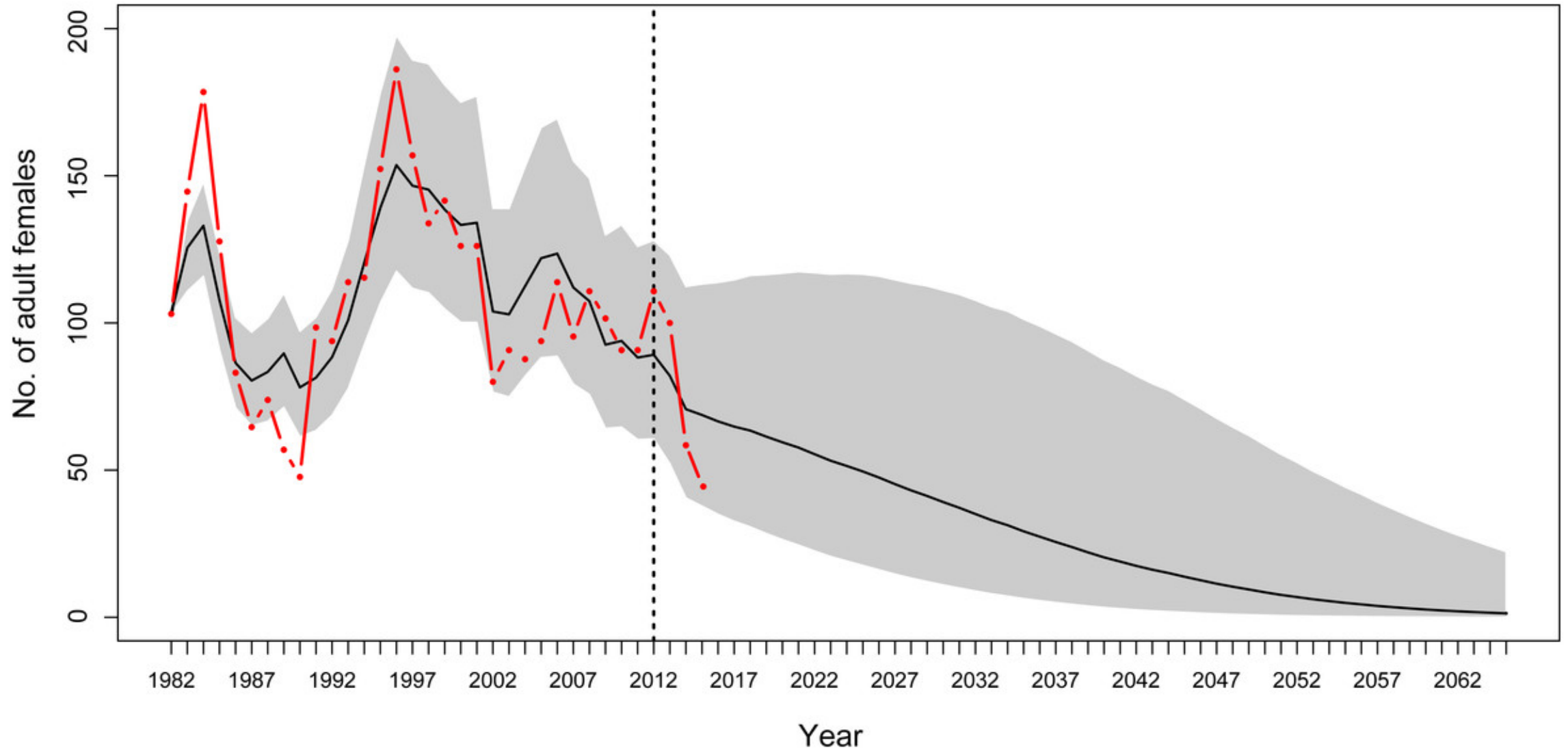
Thomas Mattern



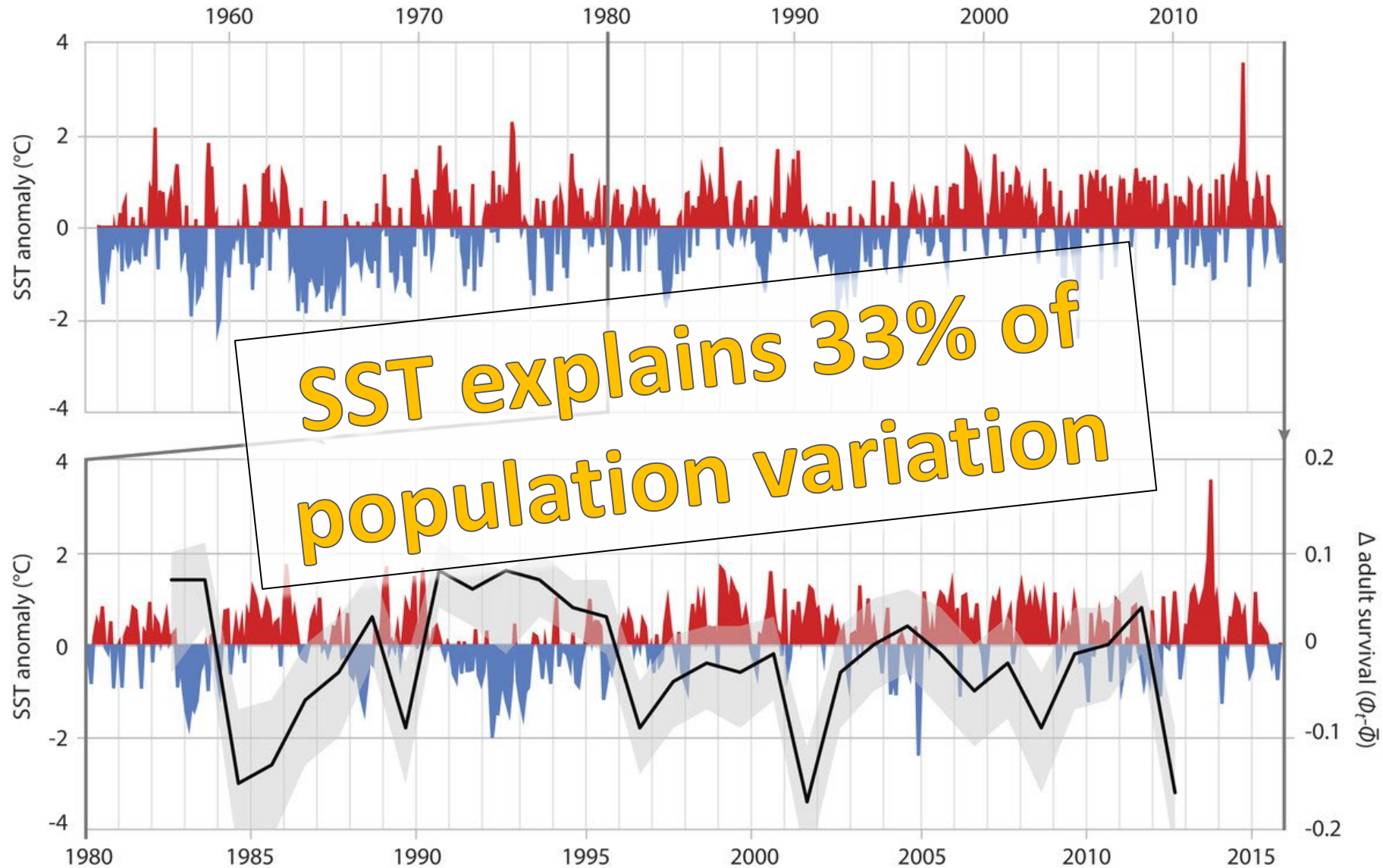
# Observed penguin numbers at Kumo Kumo Whero and Boulder Beach



# Population projections for hoiho at Boulder Beach



# Adult survival and SST anomalies



# Other factors impacting hoiho population



HUMAN DISTURBANCE



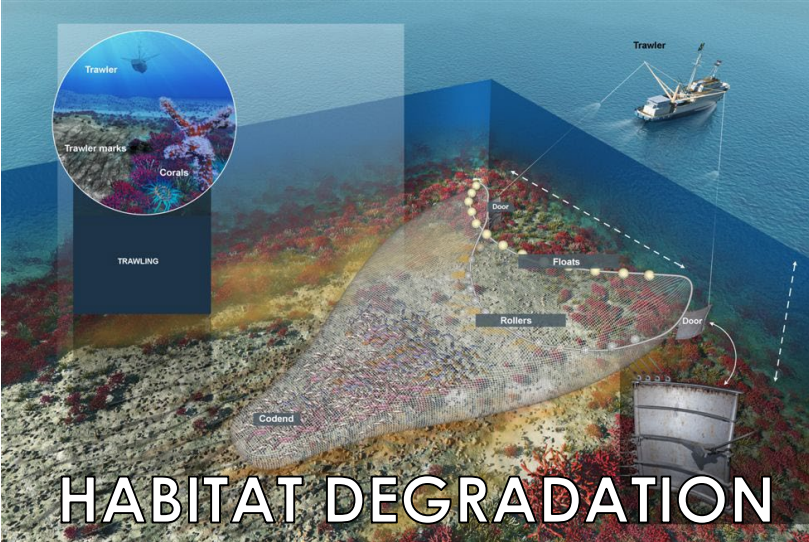
EXOTIC PREDATORS



DISEASE



POLLUTION



HABITAT DEGRADATION

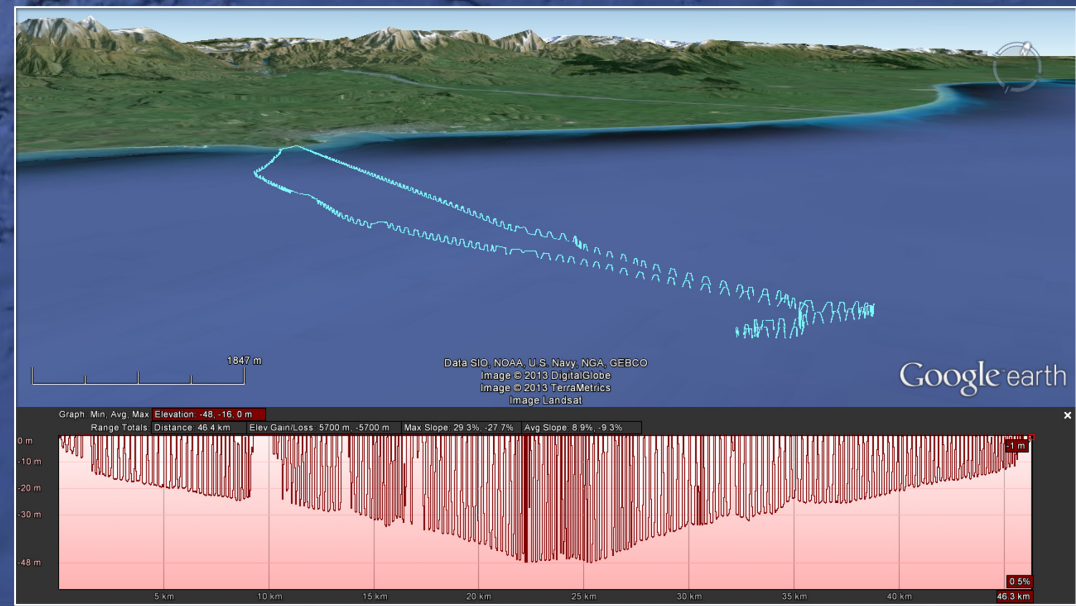


SET NET BYCATCH

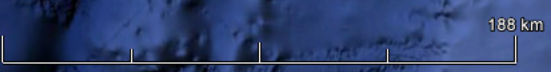
# Foraging movement & dive behaviour data 2003-2015



Data SIO, NOAA, U.S. Navy, NGA, GEBCO  
Image Landsat / Copernicus  
Data LDEO-Columbia, NSF, NOAA



# Locations of hoiho breeding sites



Data SIO, NOAA, U.S. Navy, NGA, GEBCO  
Image Landsat / Copernicus  
Data LDEO-Columbia, NSF, NOAA

Google earth

# Foraging data gaps

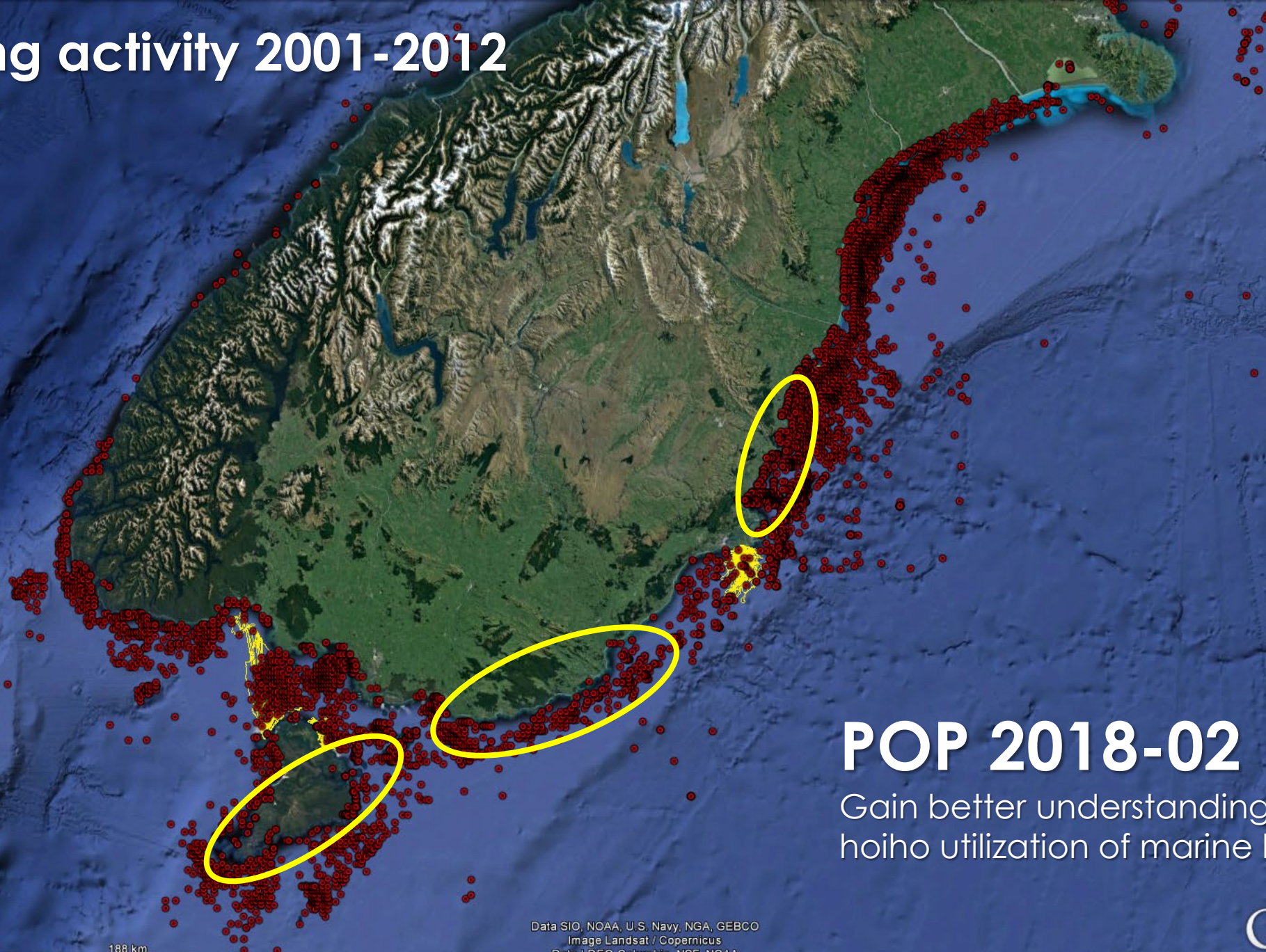


Data SIO, NOAA, U.S. Navy, NGA, GEBCO  
Image Landsat / Copernicus  
Data LDEO-Columbia, NSF, NOAA

Google earth



# Set netting activity 2001-2012



## POP 2018-02

Gain better understanding of  
hoiho utilization of marine habitat

Data SIO, NOAA, U.S. Navy, NGA, GEBCO  
Image Landsat / Copernicus  
Data LDEO-Columbia, NSF, NOAA

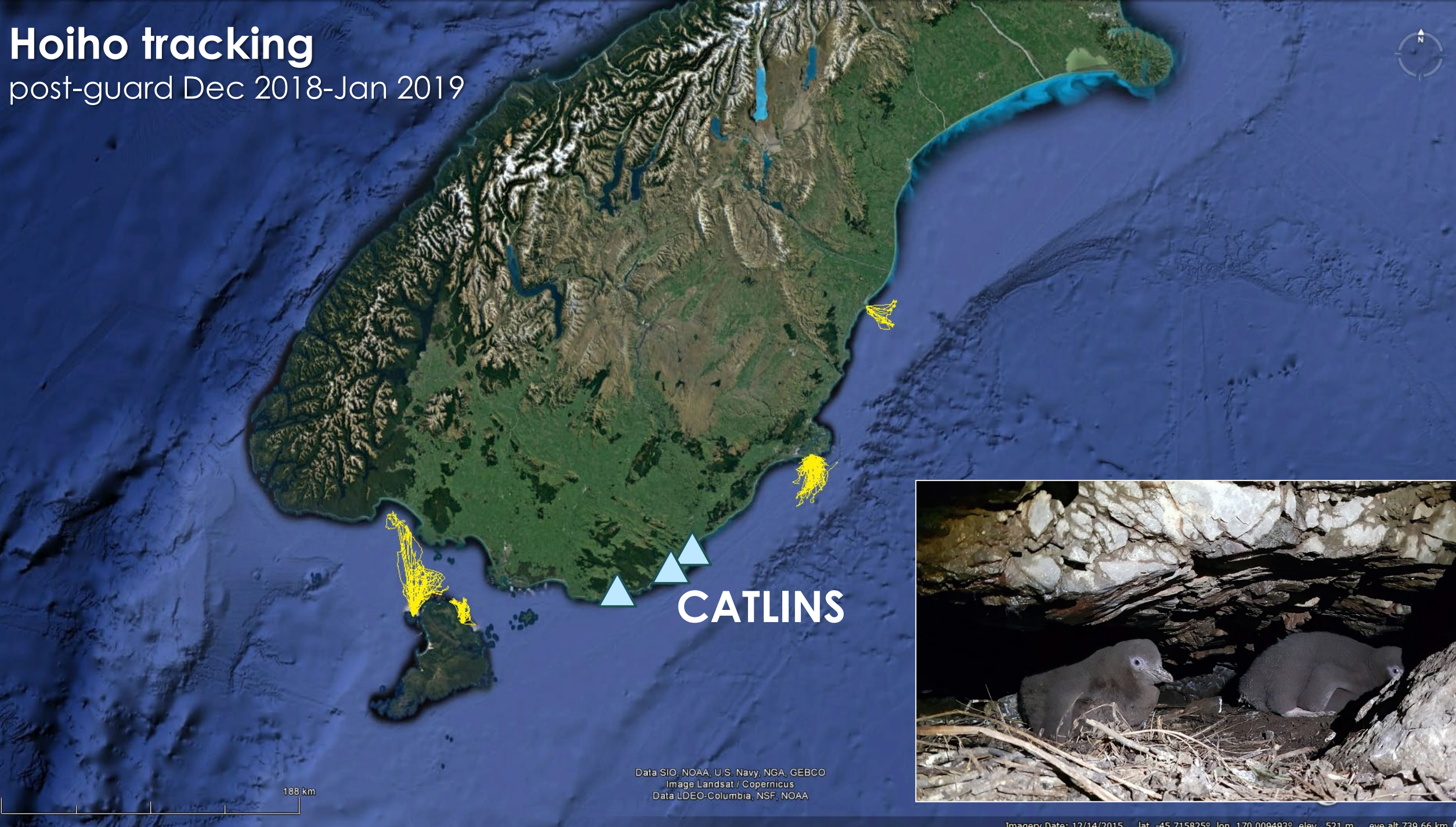
Google earth

188 km

lat -45.444139° lon 169.857868° elev 770 m eye alt 739.66 km

# Hoiho tracking

post-guard Dec 2018-Jan 2019



188 km

Data SIO, NOAA, U.S. Navy, NGA, GEBCO  
Image Landsat / Copernicus  
Data LDEO-Columbia, NSF, NOAA





▲ Te Rere

▲ Nugget Point  
▲ Penguin Bay  
▲ Hina Hina Cove





LE DROVER





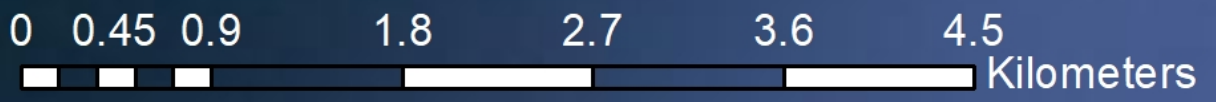
# Nugget Point

13 Dec 2018 - 4 Jan 2019

© 2019 Google



Deployments: **4 adult penguins**  
Recoveries: **1 device (destroyed)**



# Penguin Bay - 982 00 03659 99998

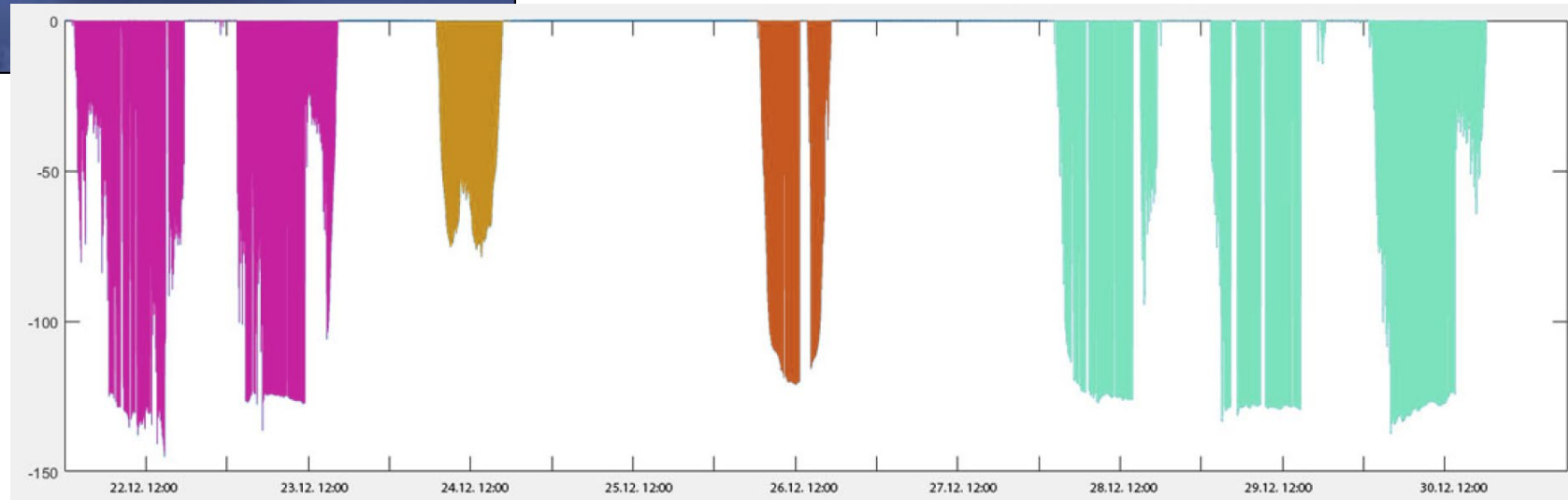
- Trip 1 - 22-24 Dec 2018
- Trip 2 - 26 Dec 2018
- Trip 3 - 28 Dec 2018
- Trip 4 (incomplete) - 29 Dec 2018

Deployments: **1** adult penguins  
Recoveries: **1** device



# Penguin Bay

21-31 Dec 2018



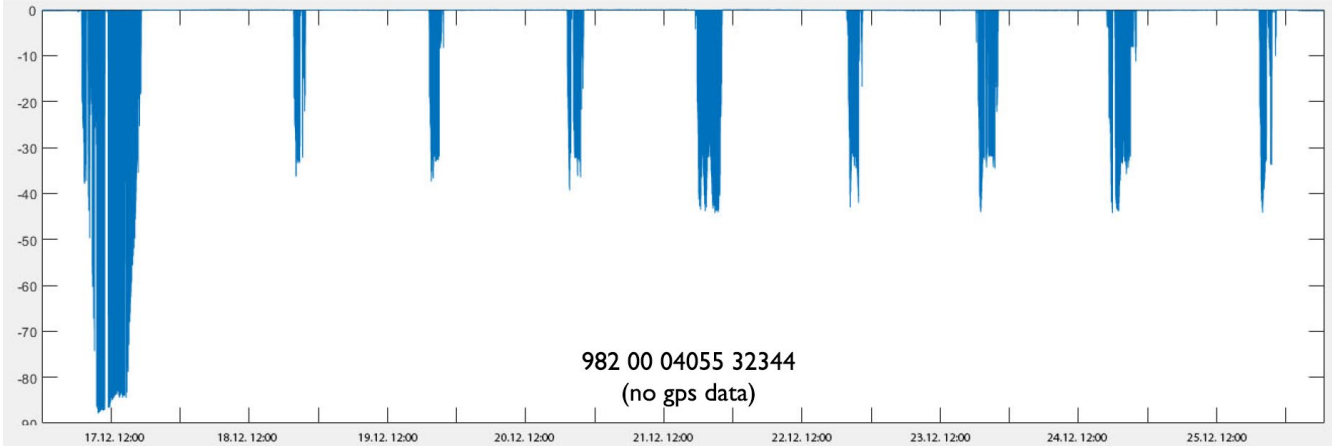
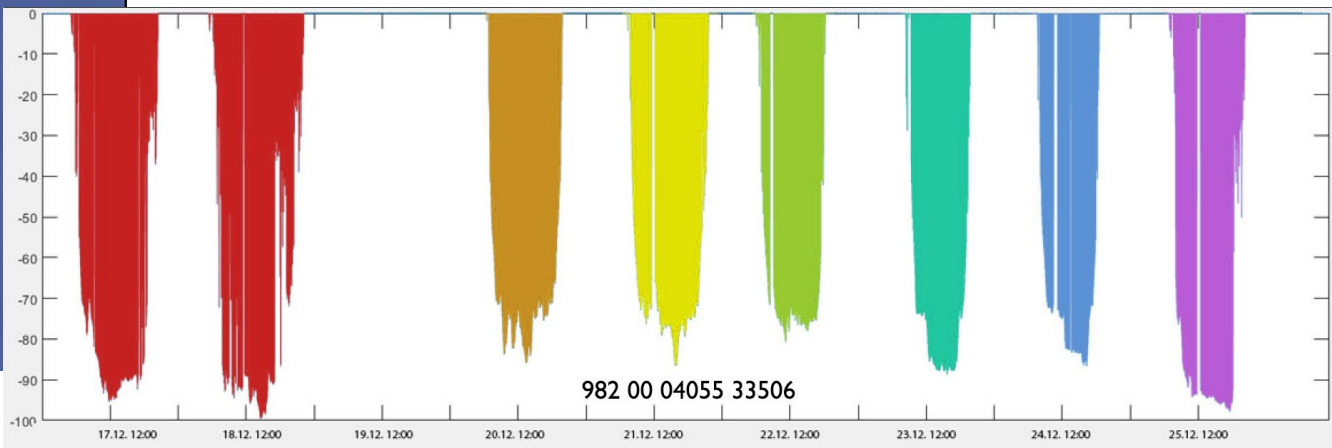
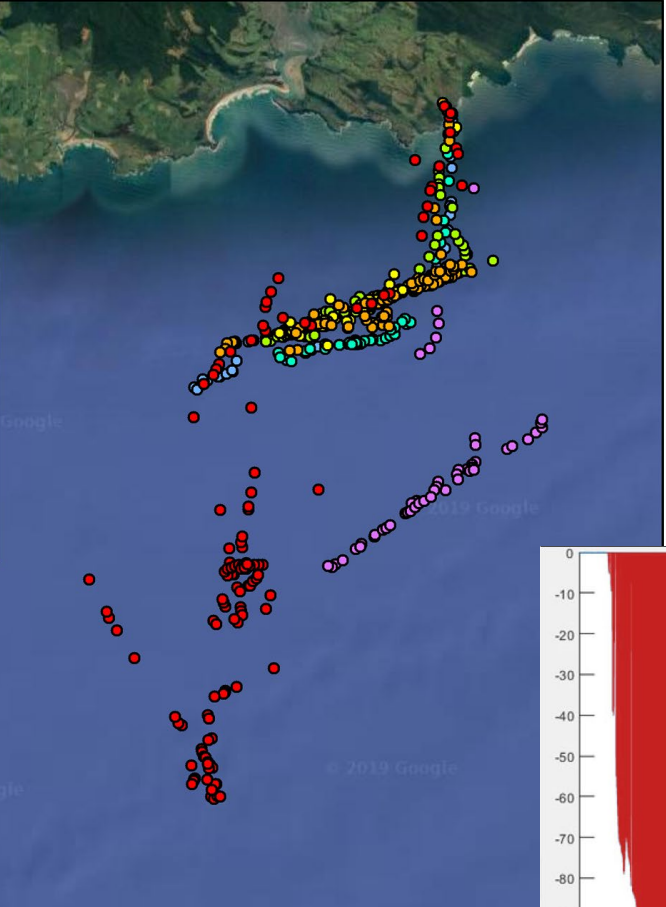


# Te Rere

16-26 Dec 2018

## Te Rere - 982 00 04055 33506

- Trip 1 - 17-18 Dec 2018
- Trip 2 - 20 Dec 2018
- Trip 3 - 21 Dec 2018
- Trip 4 - 22 Dec 2018
- Trip 5 - 23 Dec 2018
- Trip 6 - 24 Dec 2018
- Trip 7 - 25 Dec 2018



Deployments:  
Recoveries:

**3 adult penguins**  
**2 devices**

Map

Satellite

Catlins Conservation Park

Progress Valley

Chaslands

# Te Rere

23-25 Jan 2019

Waikawa



# Hoiho tracking

Pre-moult Feb-Mar 2019



▲ ARAMOANA  
▲ OTAPAHI

188 km

Data SIO, NOAA, U.S. Navy, NGA, GEBCO  
Image Landsat / Copernicus  
Data LDEO-Columbia, NSF, NOAA

Google earth

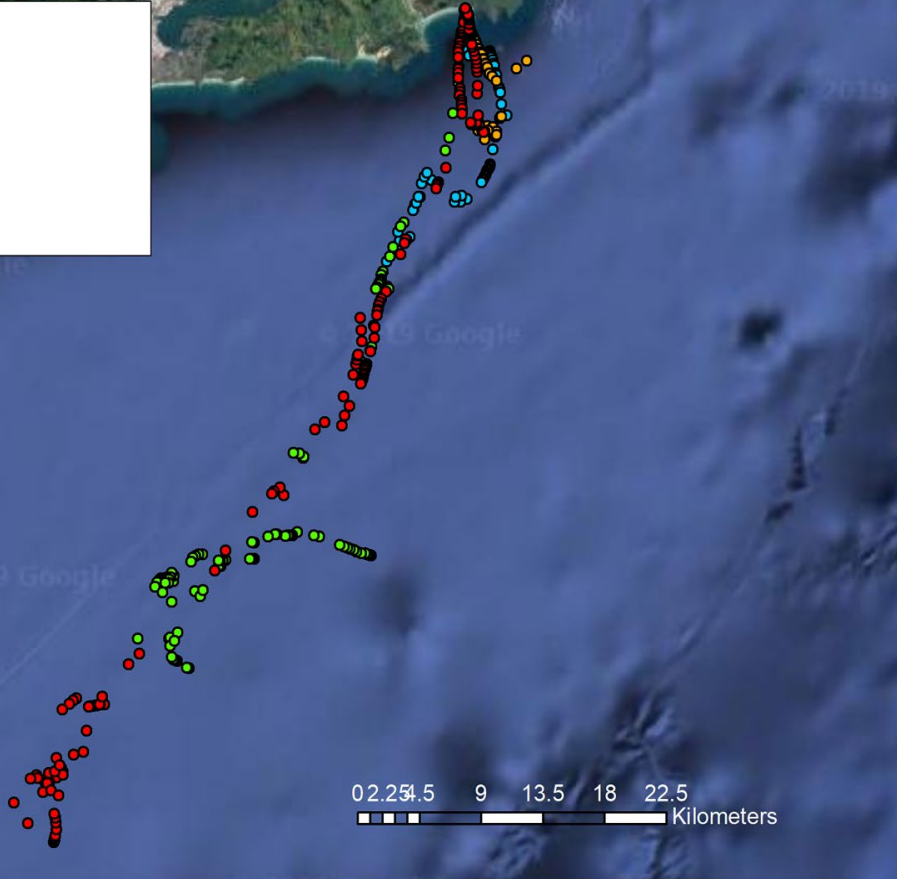
Imagery Date: 12/14/2015 lat -45.715825° lon 170.009493° elev 521 m eye alt 739.66 km



▲ OTAPAH

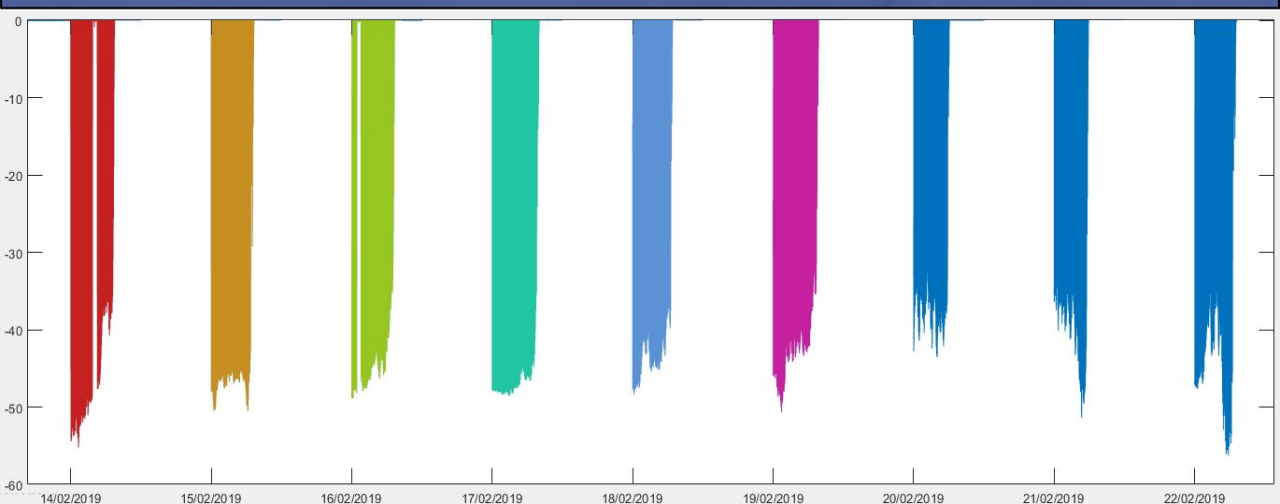
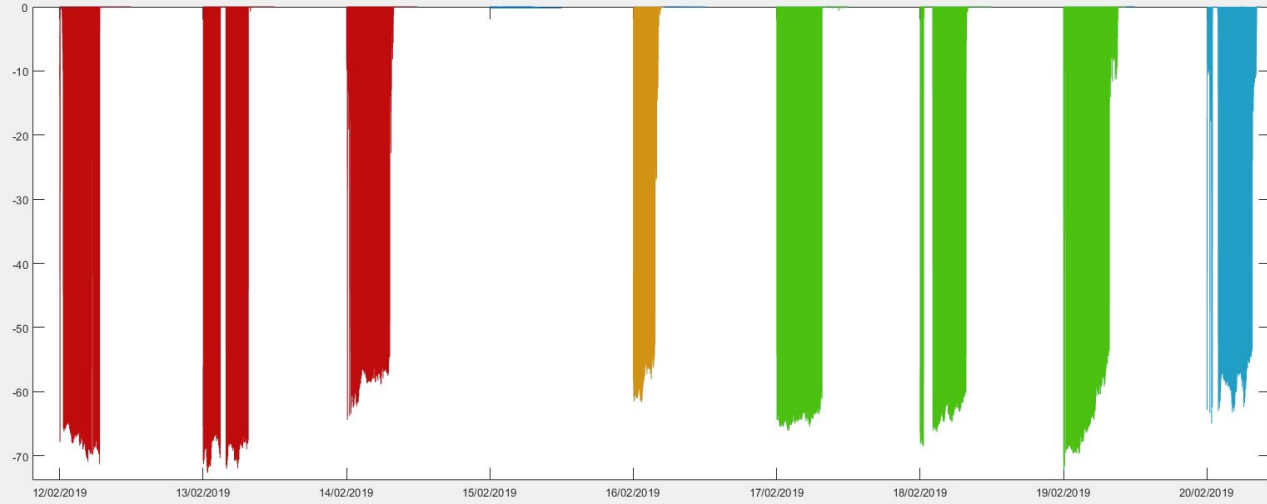
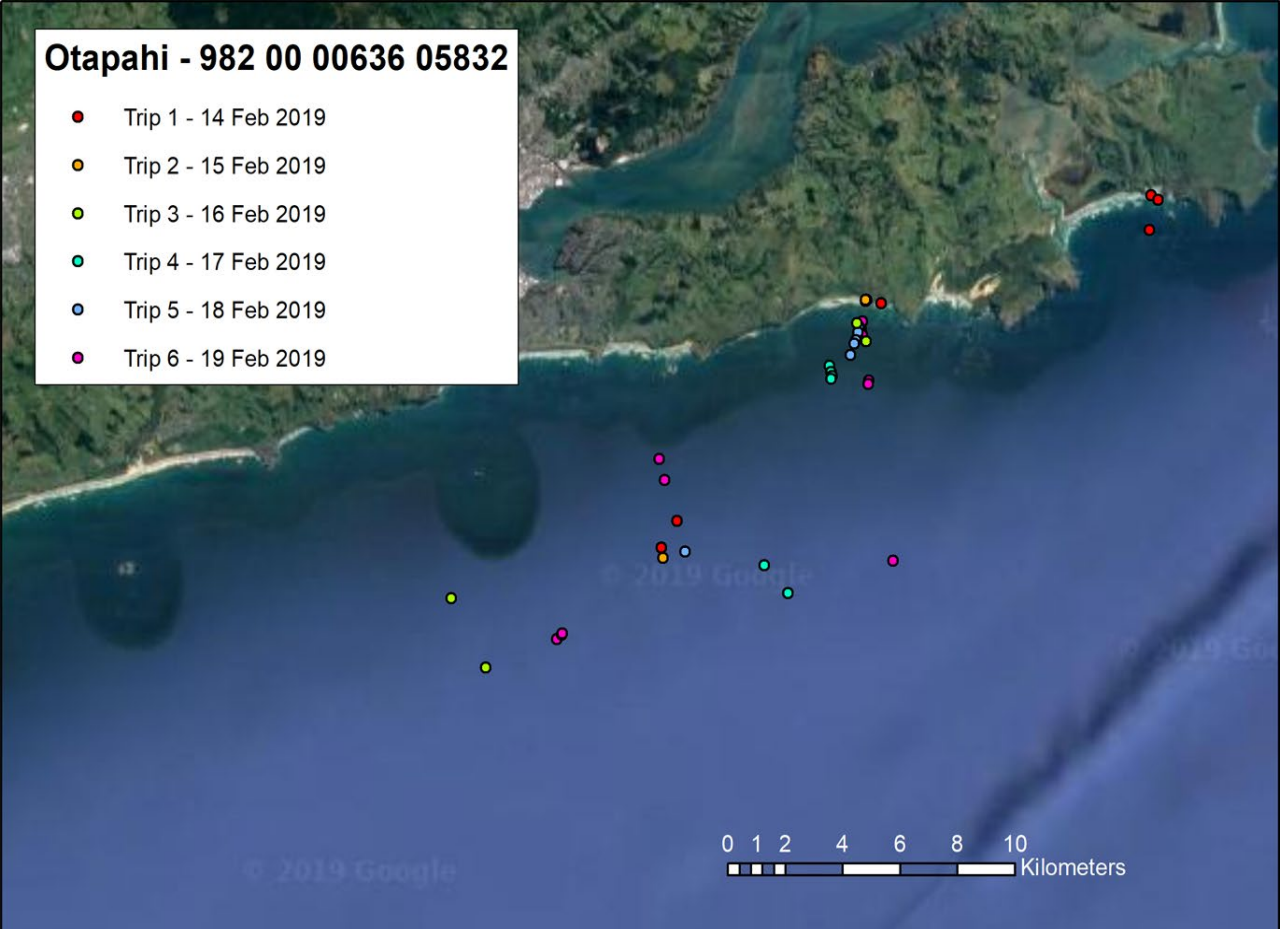
# Otapahi - 18472

- Trip 1 - 12-14 Feb 2019
- Trip 2 - 16 Feb 2019
- Trip 3 - 17-19 Feb 2019
- Trip 4 - 20 Feb 2019



# Otapahi - 982 00 00636 05832

- Trip 1 - 14 Feb 2019
- Trip 2 - 15 Feb 2019
- Trip 3 - 16 Feb 2019
- Trip 4 - 17 Feb 2019
- Trip 5 - 18 Feb 2019
- Trip 6 - 19 Feb 2019



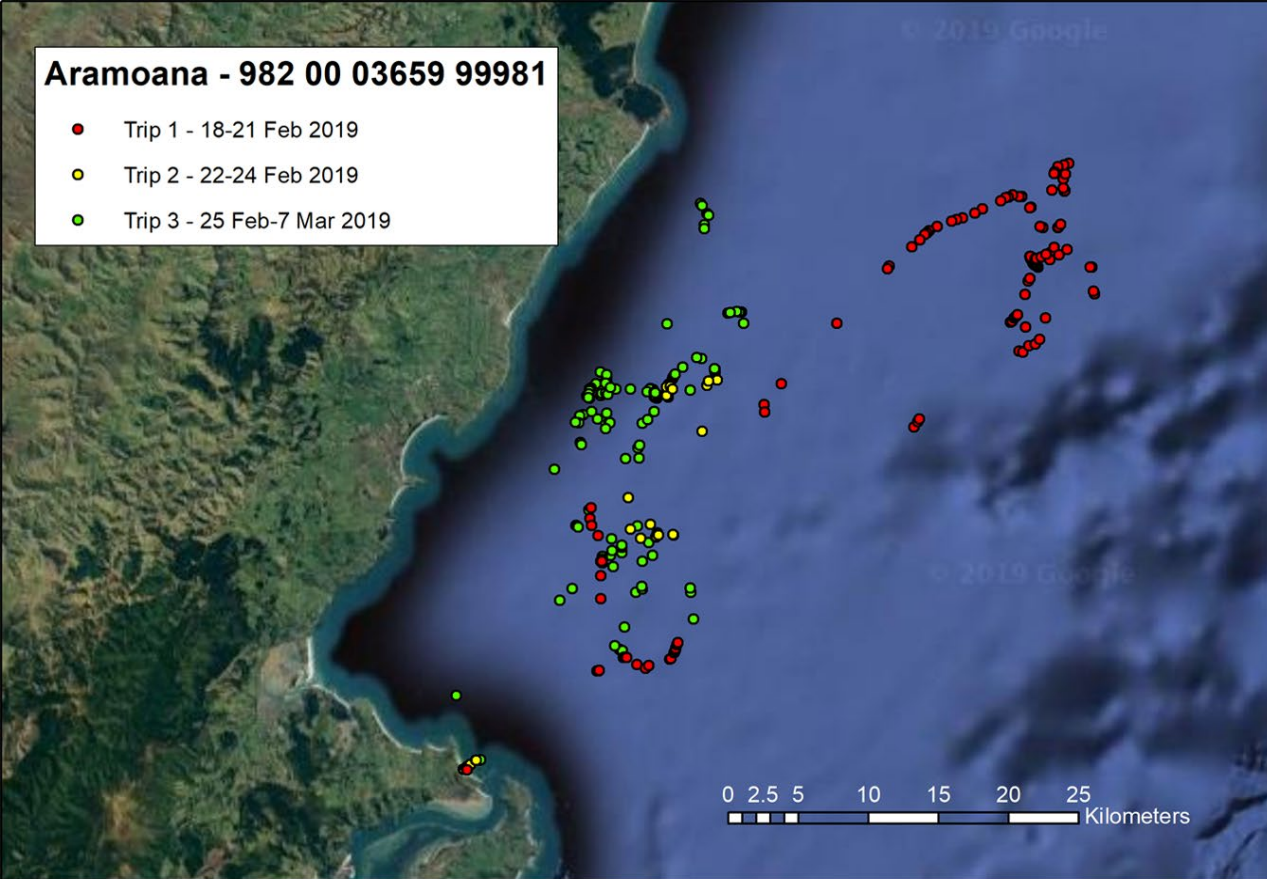


**ARAMOANA**



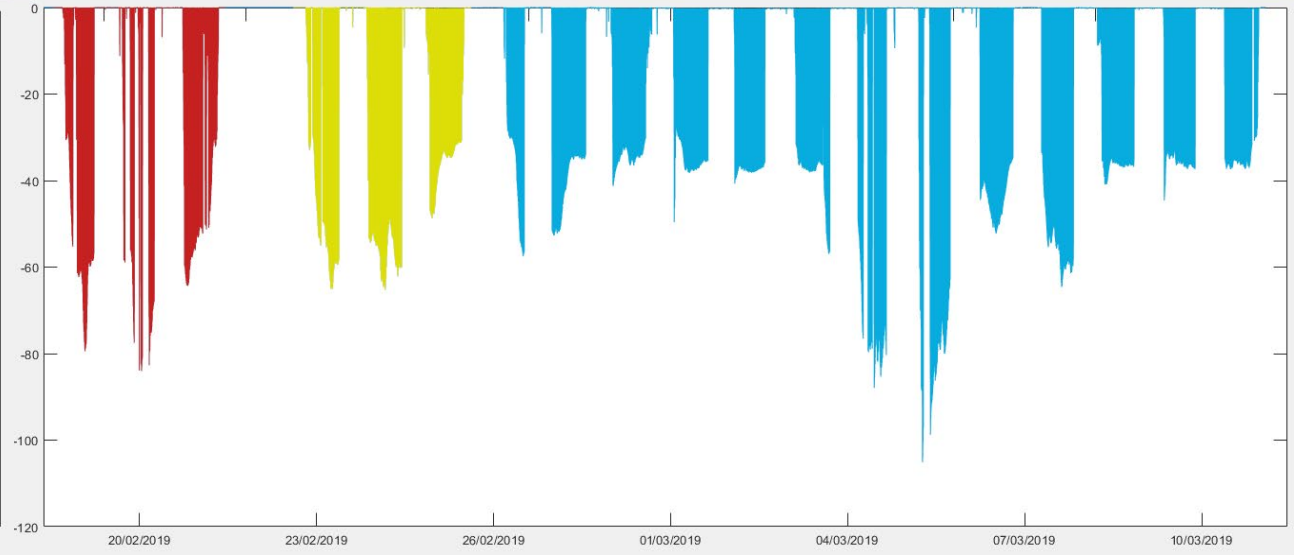
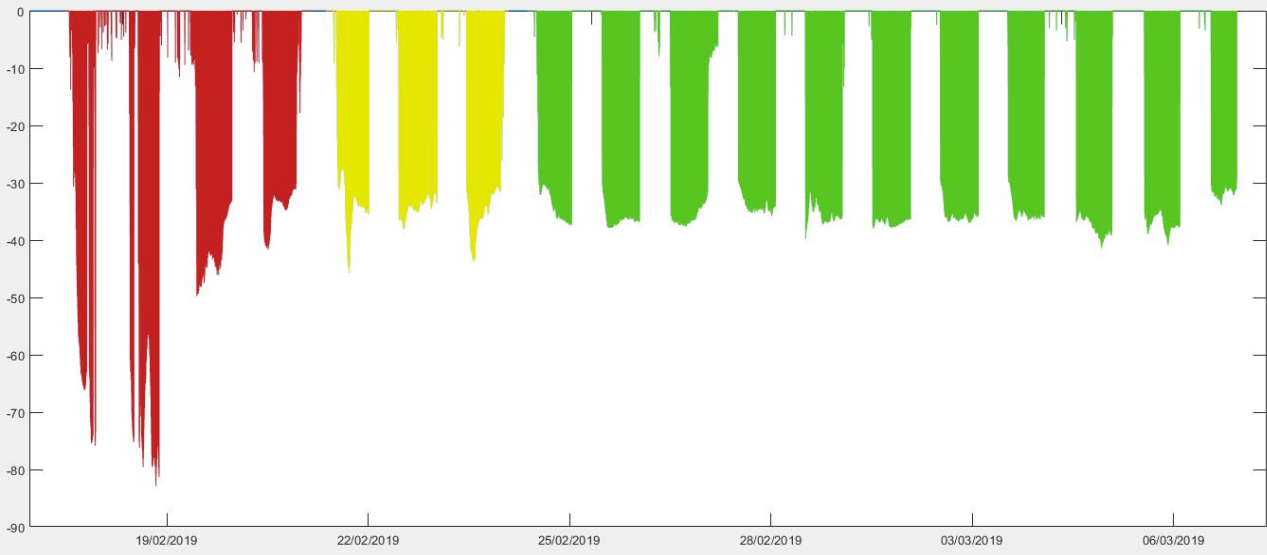
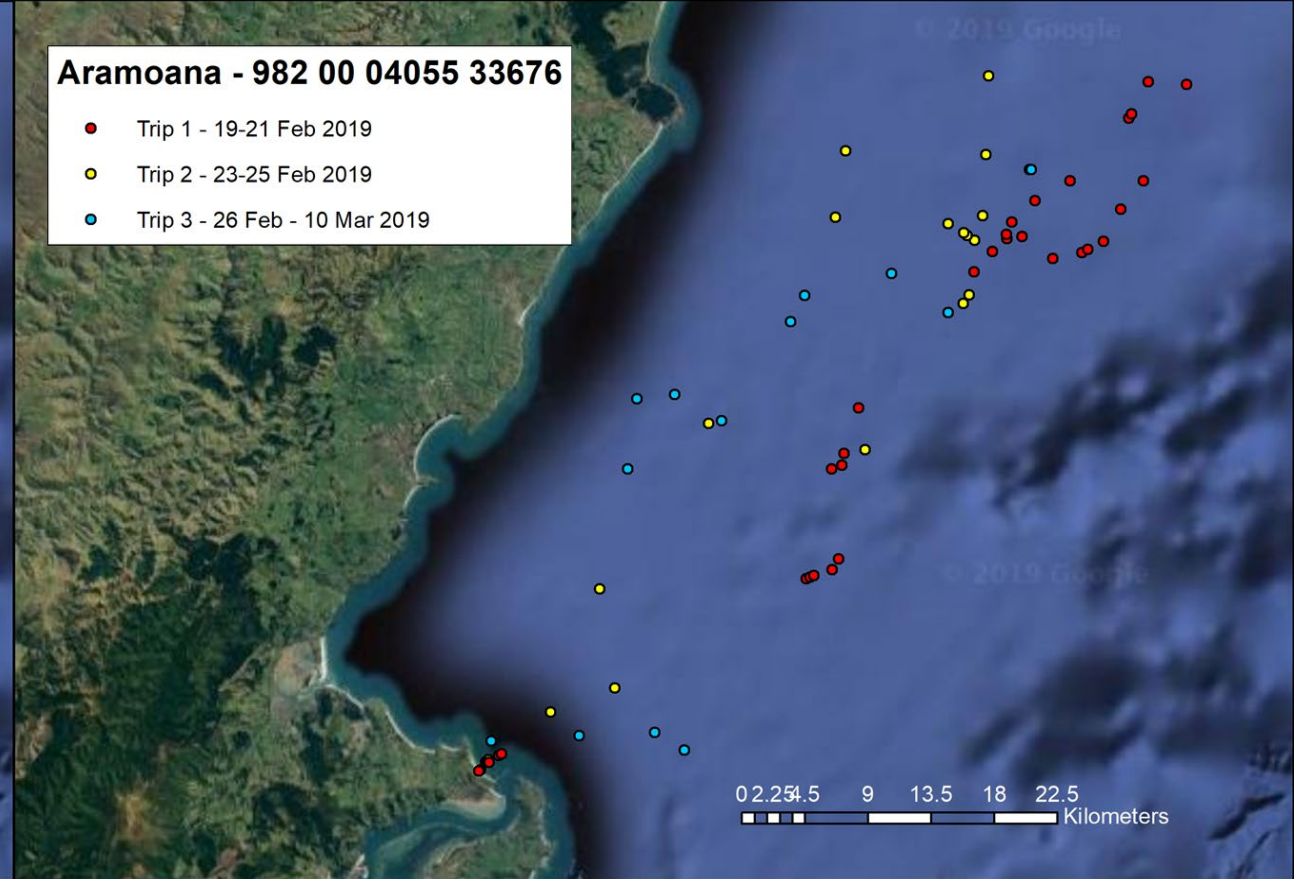
### Aramoana - 982 00 03659 99981

- Trip 1 - 18-21 Feb 2019
- Trip 2 - 22-24 Feb 2019
- Trip 3 - 25 Feb-7 Mar 2019



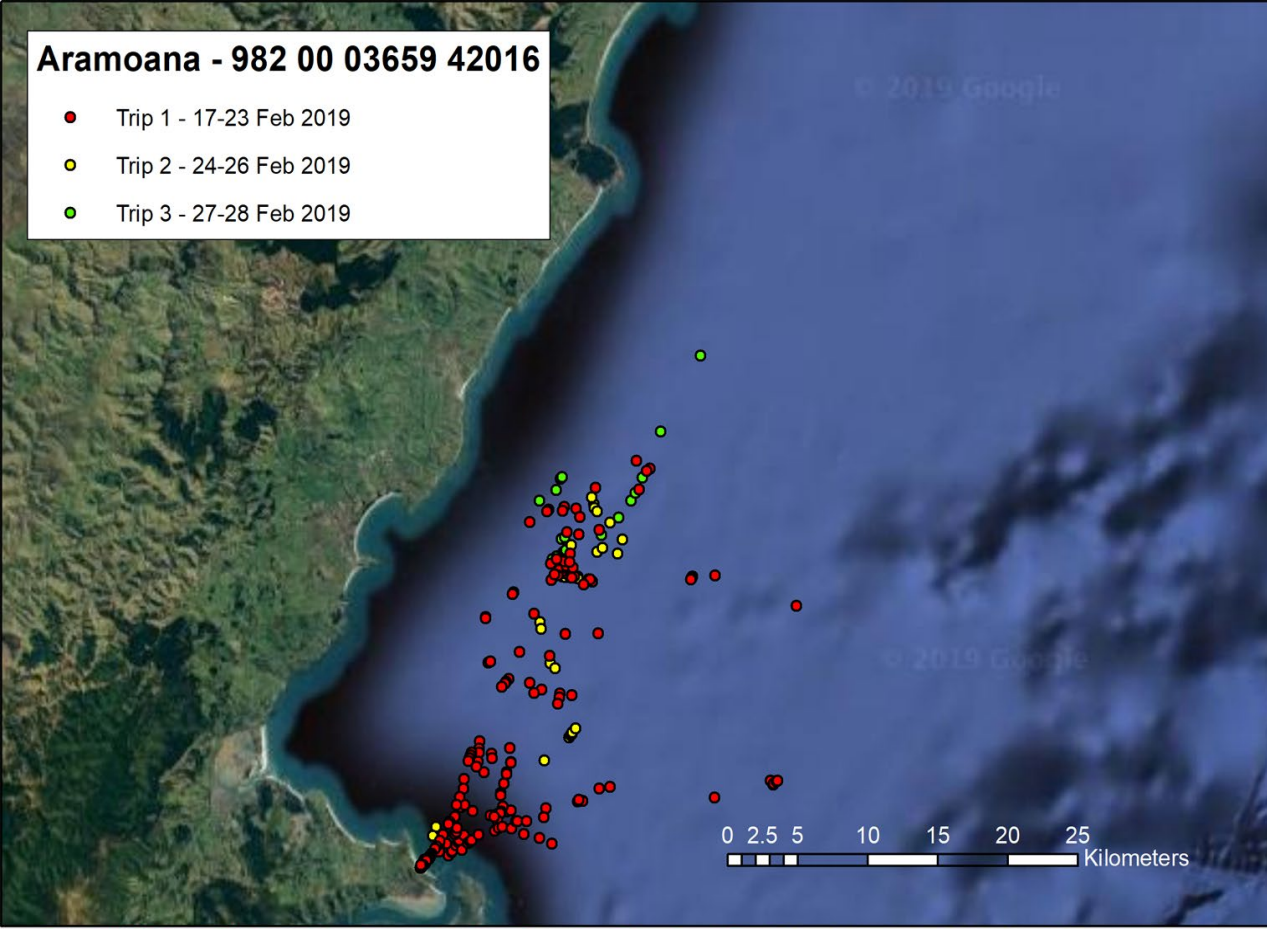
### Aramoana - 982 00 04055 33676

- Trip 1 - 19-21 Feb 2019
- Trip 2 - 23-25 Feb 2019
- Trip 3 - 26 Feb - 10 Mar 2019



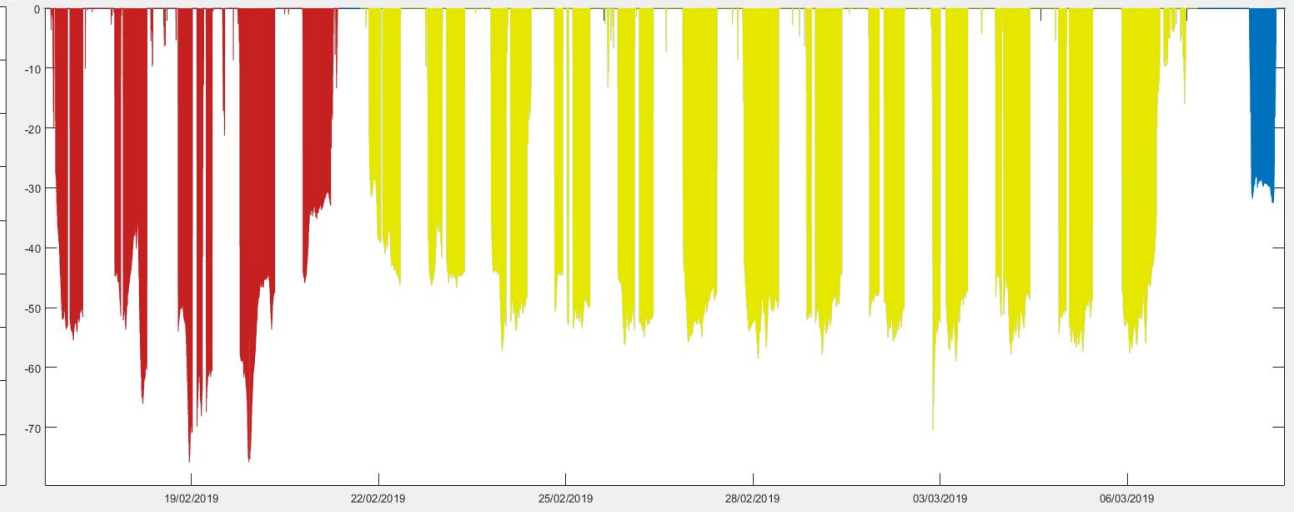
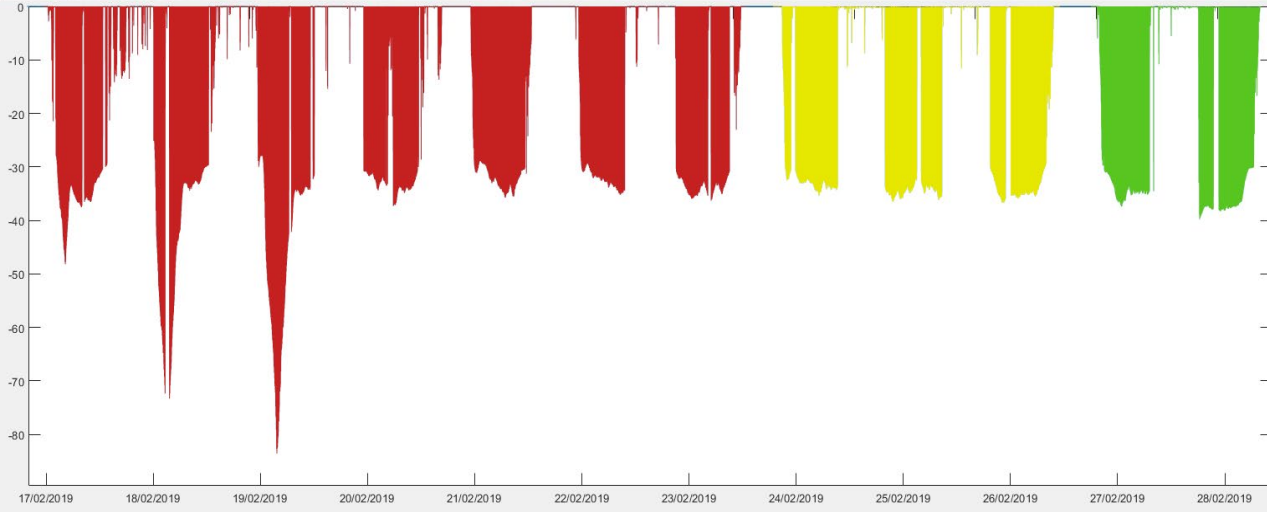
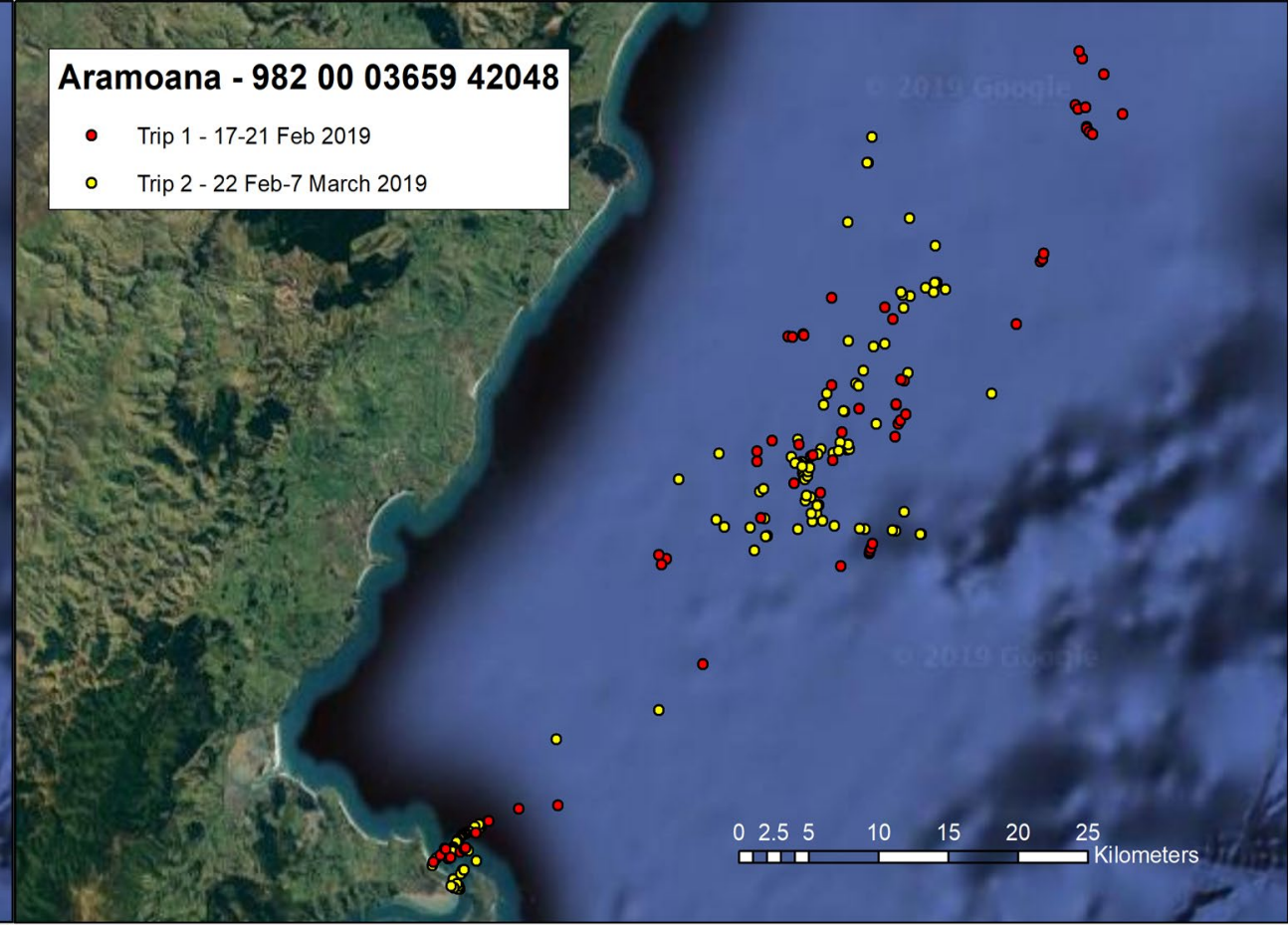
### Aramoana - 982 00 03659 42016

- Trip 1 - 17-23 Feb 2019
- Trip 2 - 24-26 Feb 2019
- Trip 3 - 27-28 Feb 2019



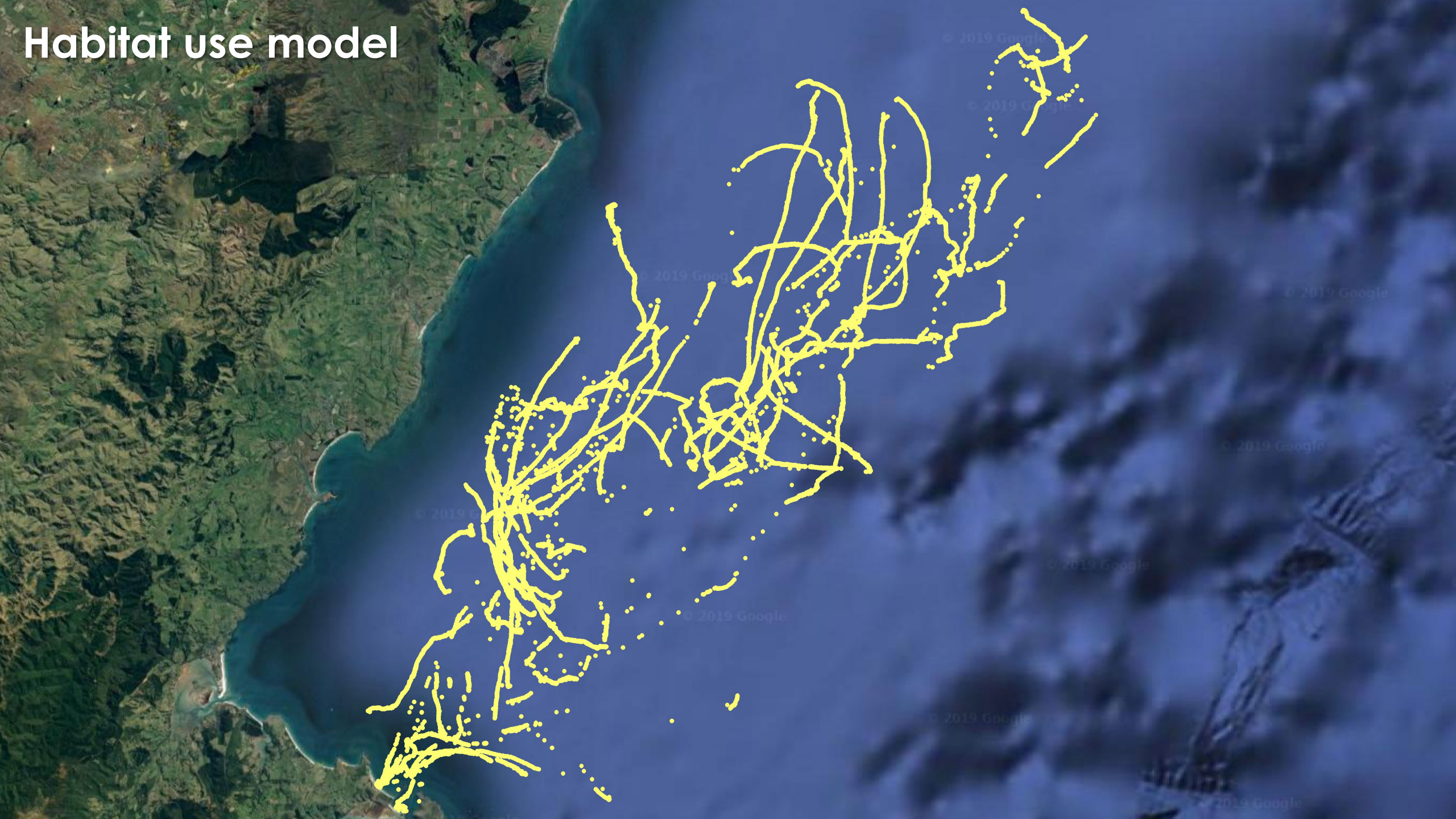
### Aramoana - 982 00 03659 42048

- Trip 1 - 17-21 Feb 2019
- Trip 2 - 22 Feb-7 March 2019



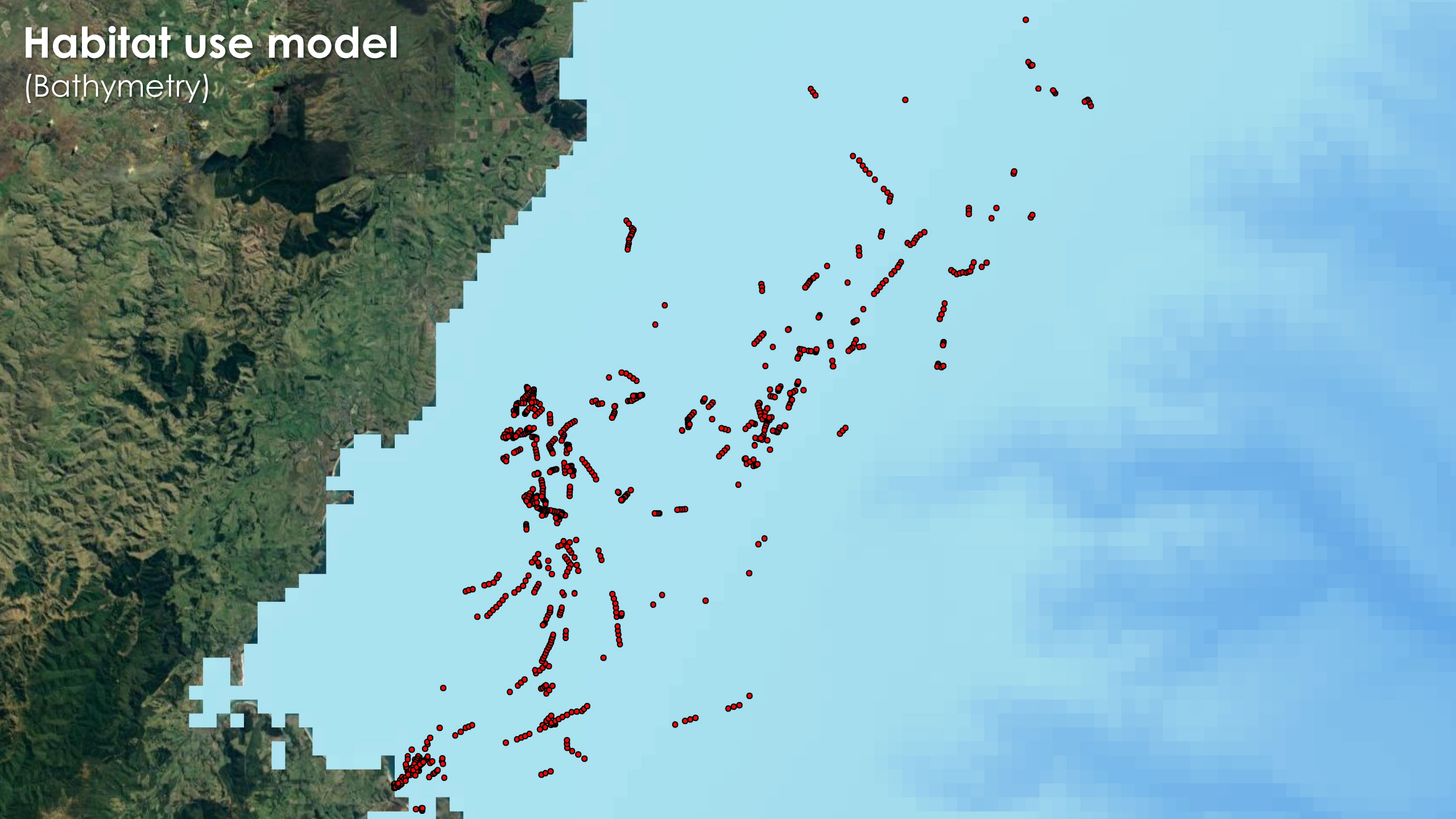


# Habitat use model



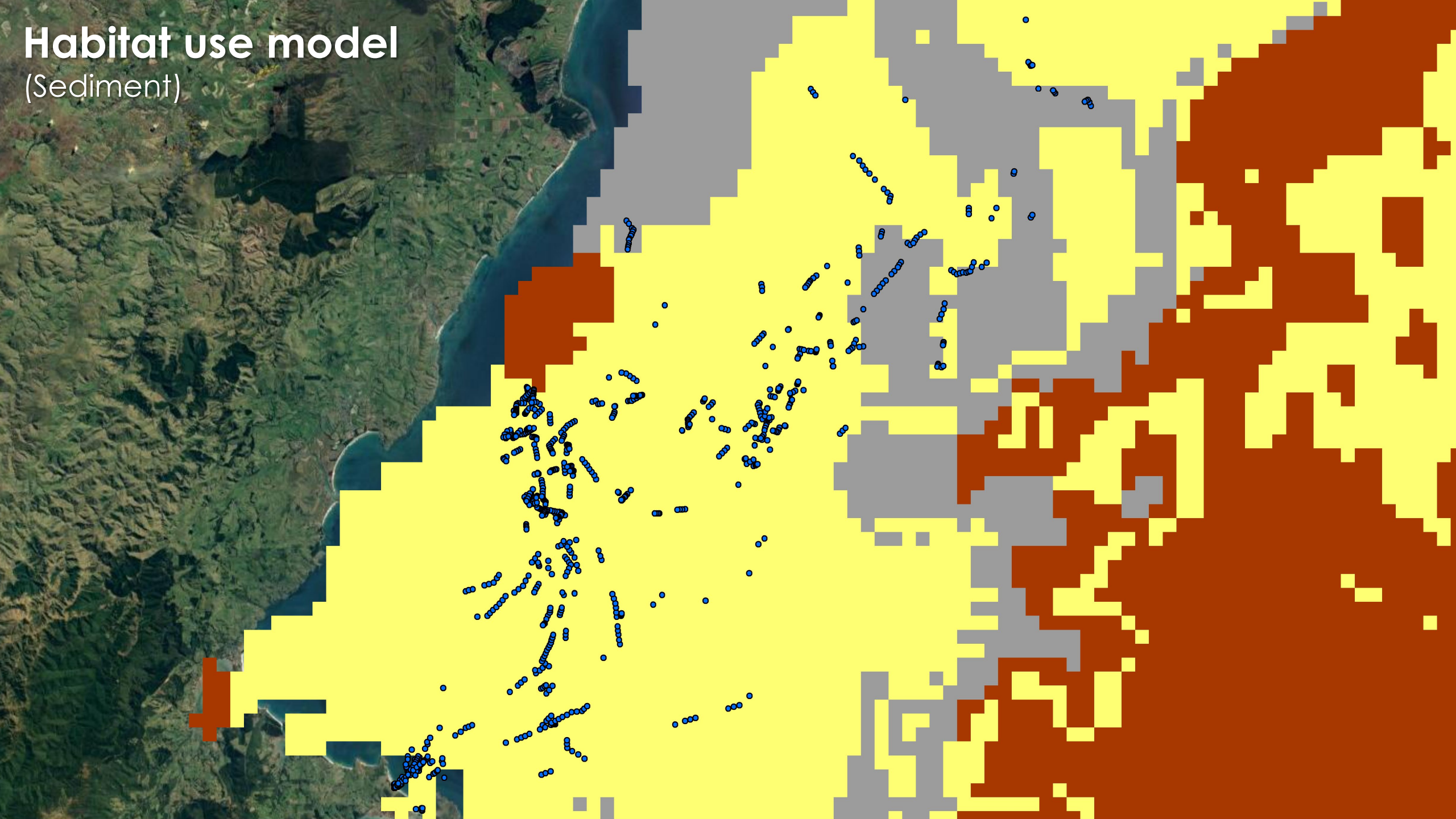
# Habitat use model

(Bathymetry)

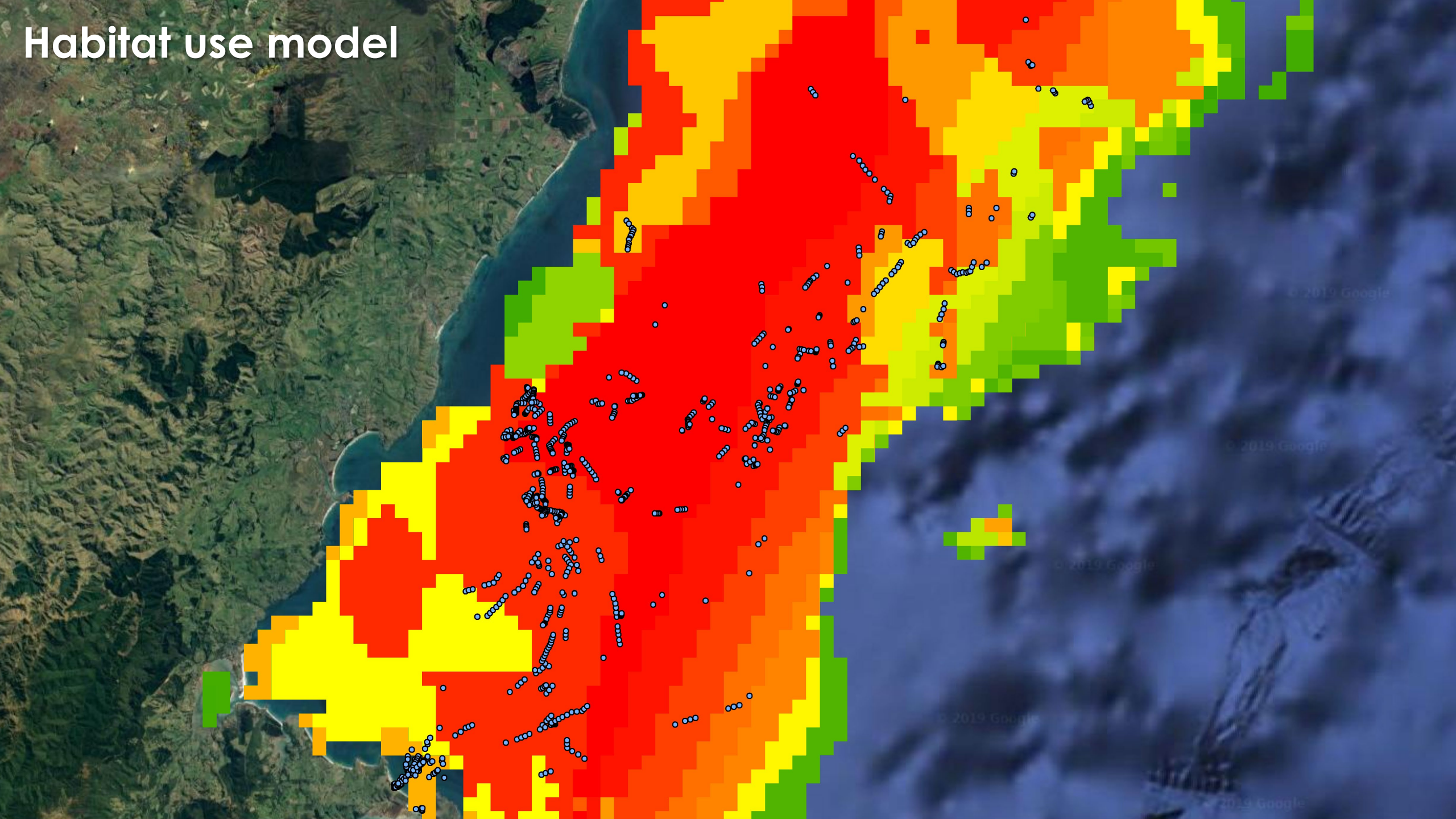


# Habitat use model

(Sediment)

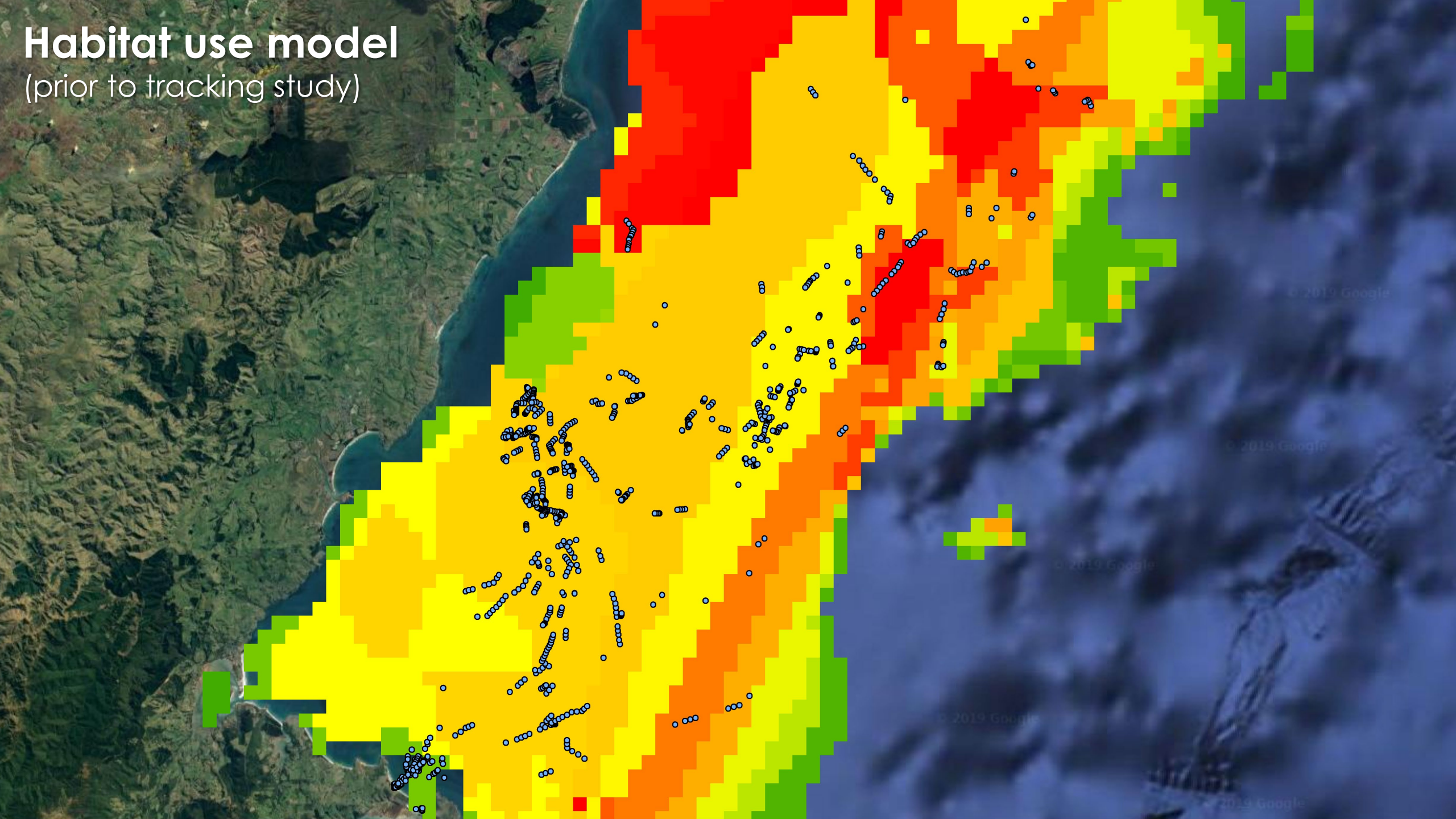


# Habitat use model

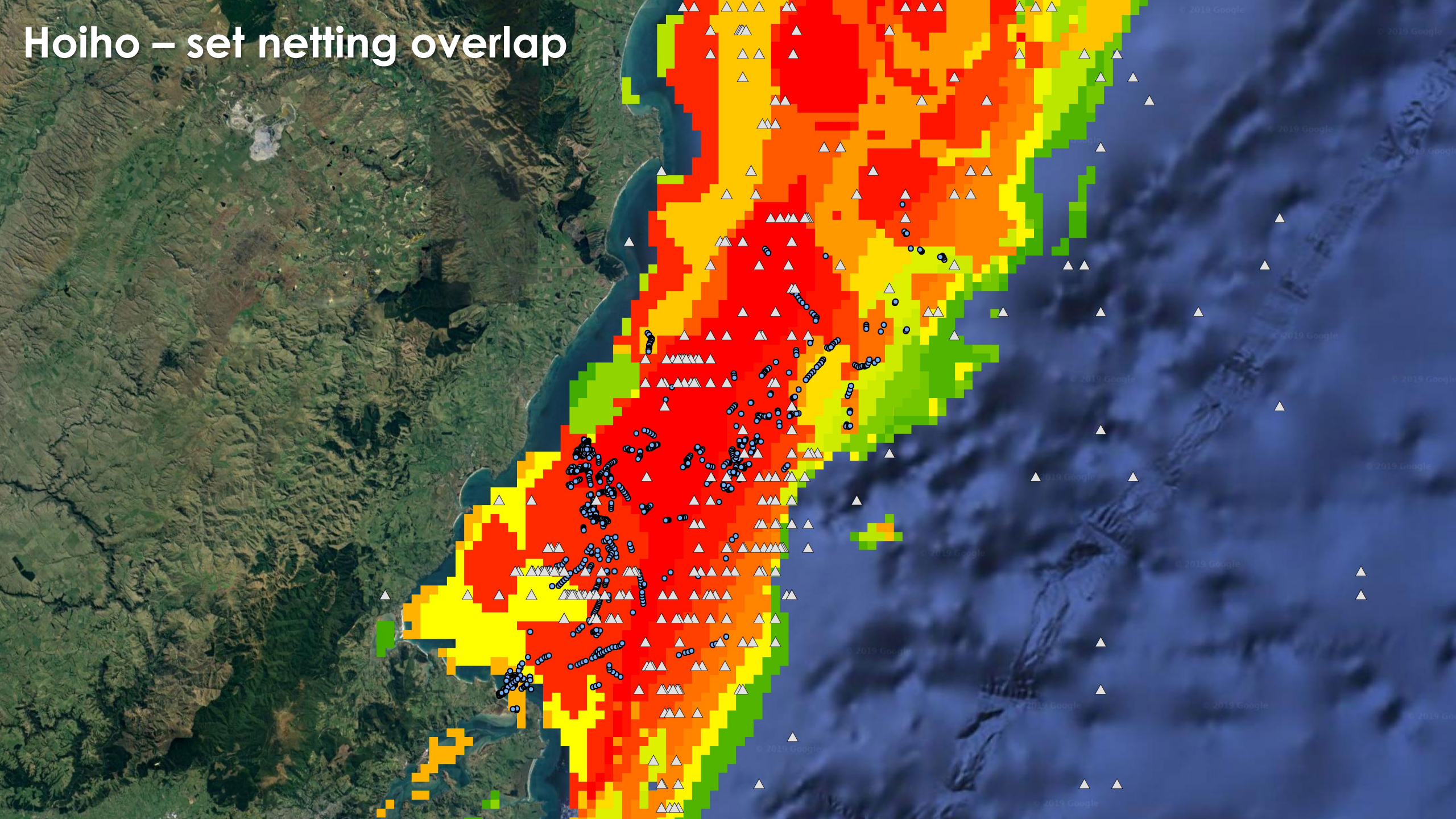


# Habitat use model

(prior to tracking study)



# Hoiho – set netting overlap



# Hoiho tracking

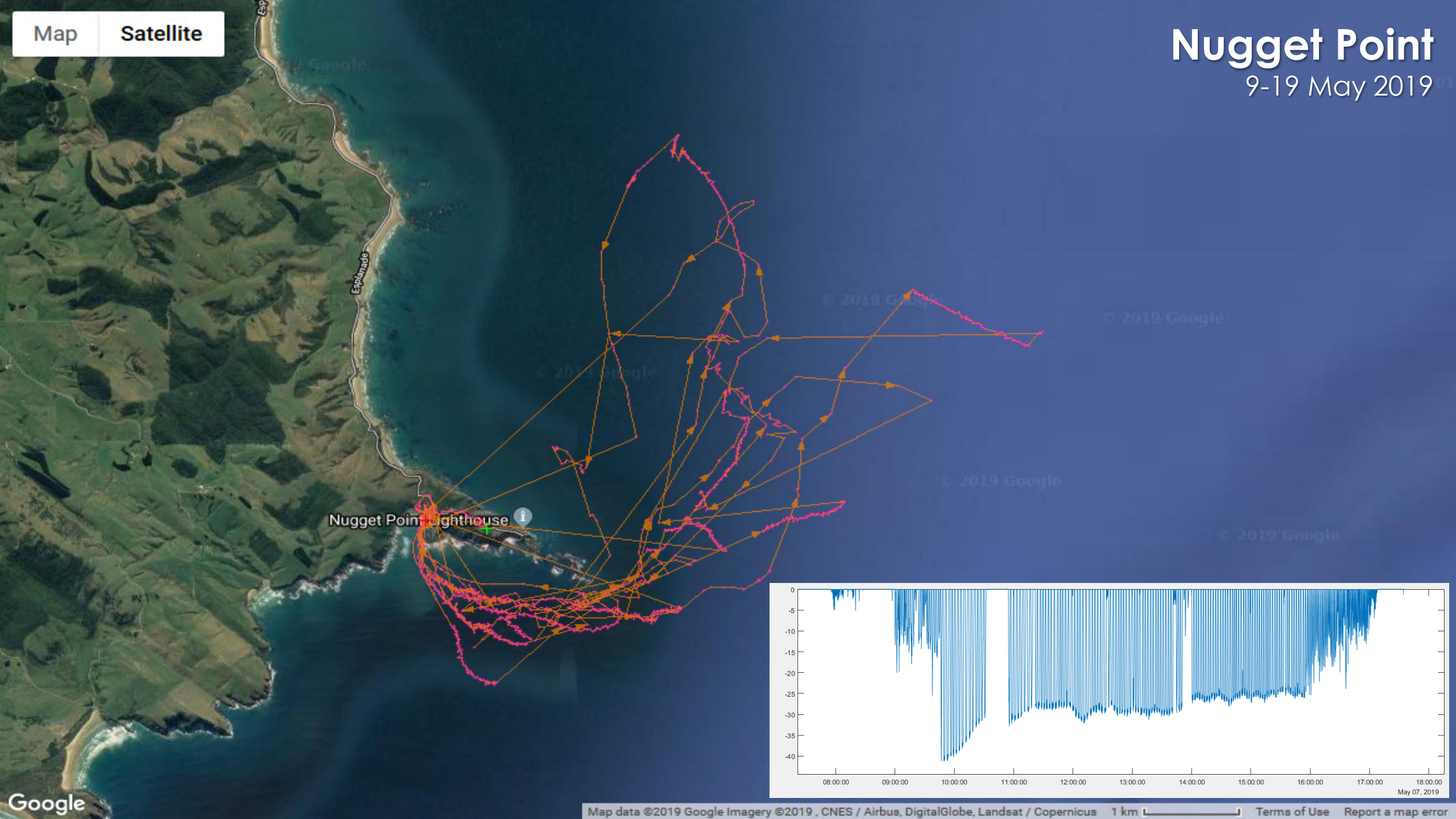
Pre-breeding - ongoing

- ▲ **Nugget Point** (3 birds)
- ▲ **Penguin Bay** (1 bird)
- ▲ **Te Rere** (2 birds)



# Nugget Point

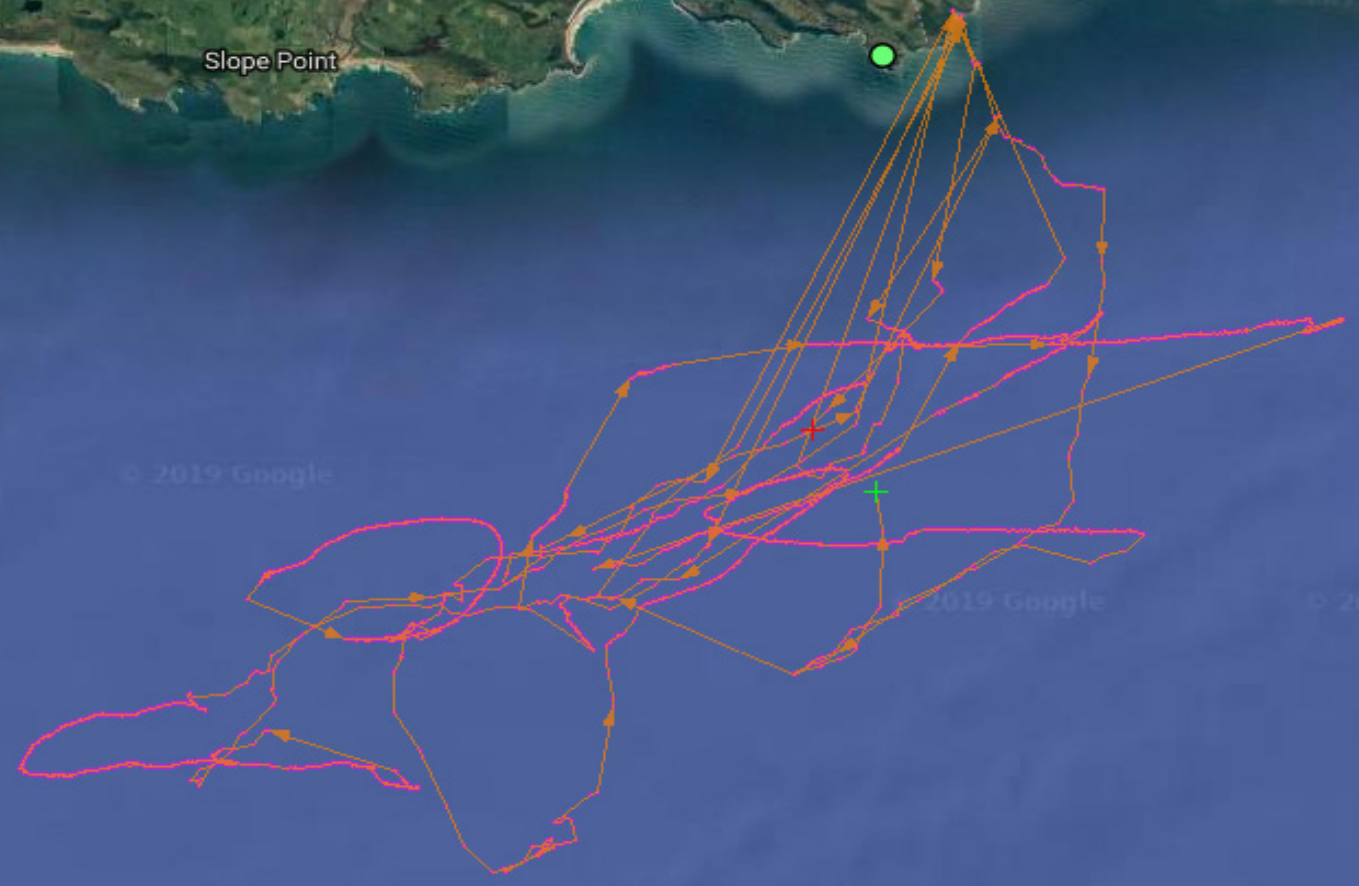
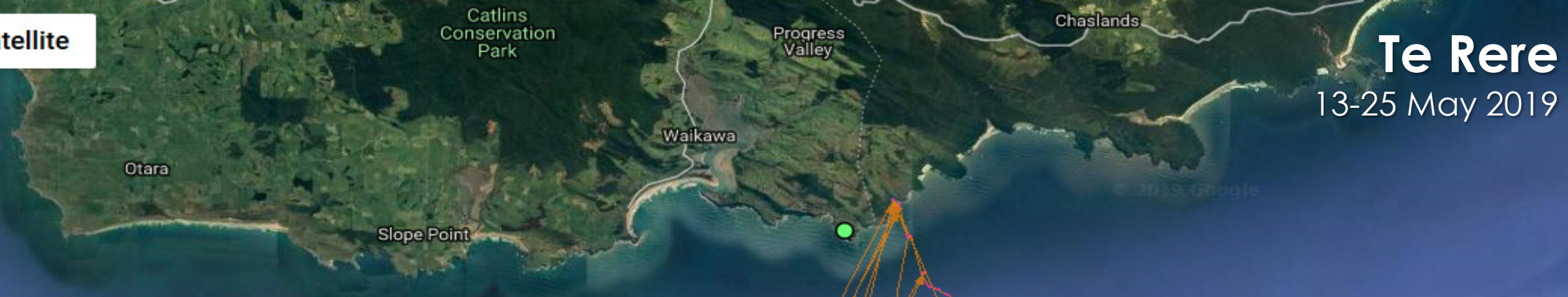
9-19 May 2019

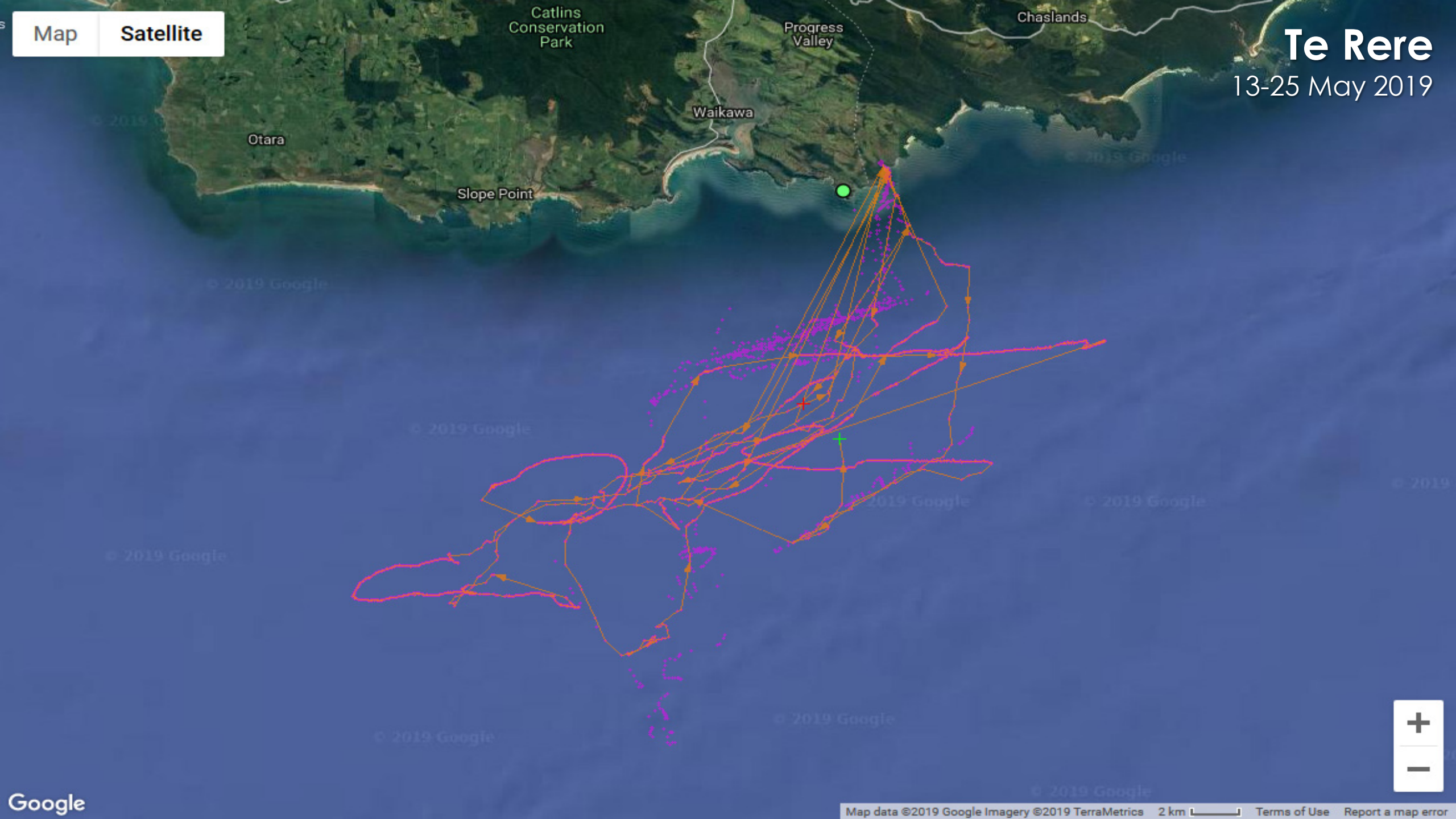


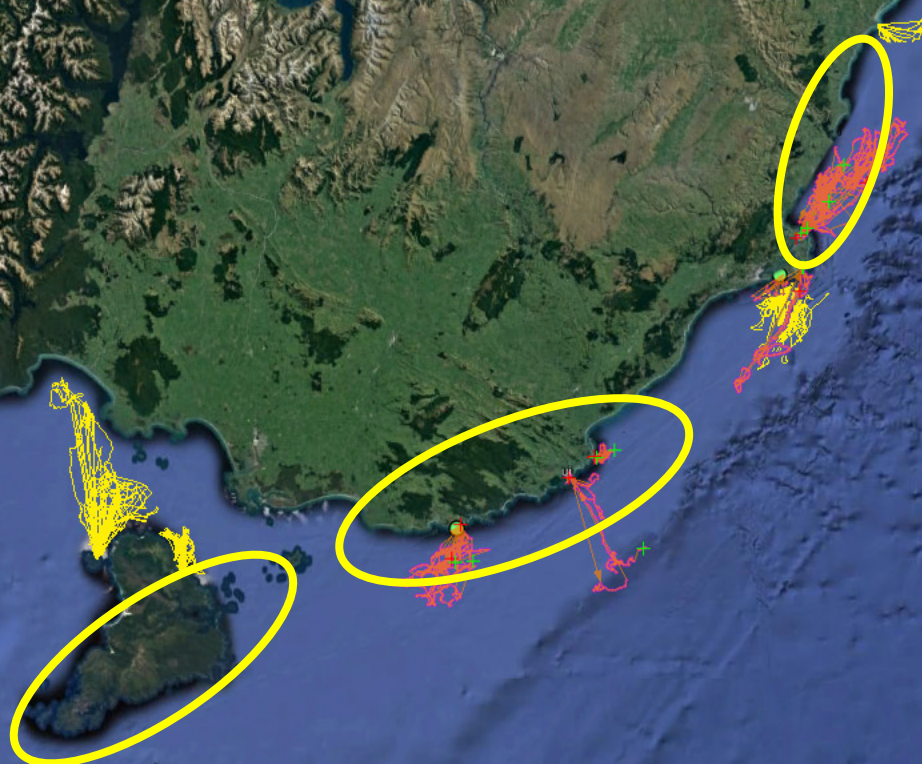


# Te Rere

13-25 May 2019

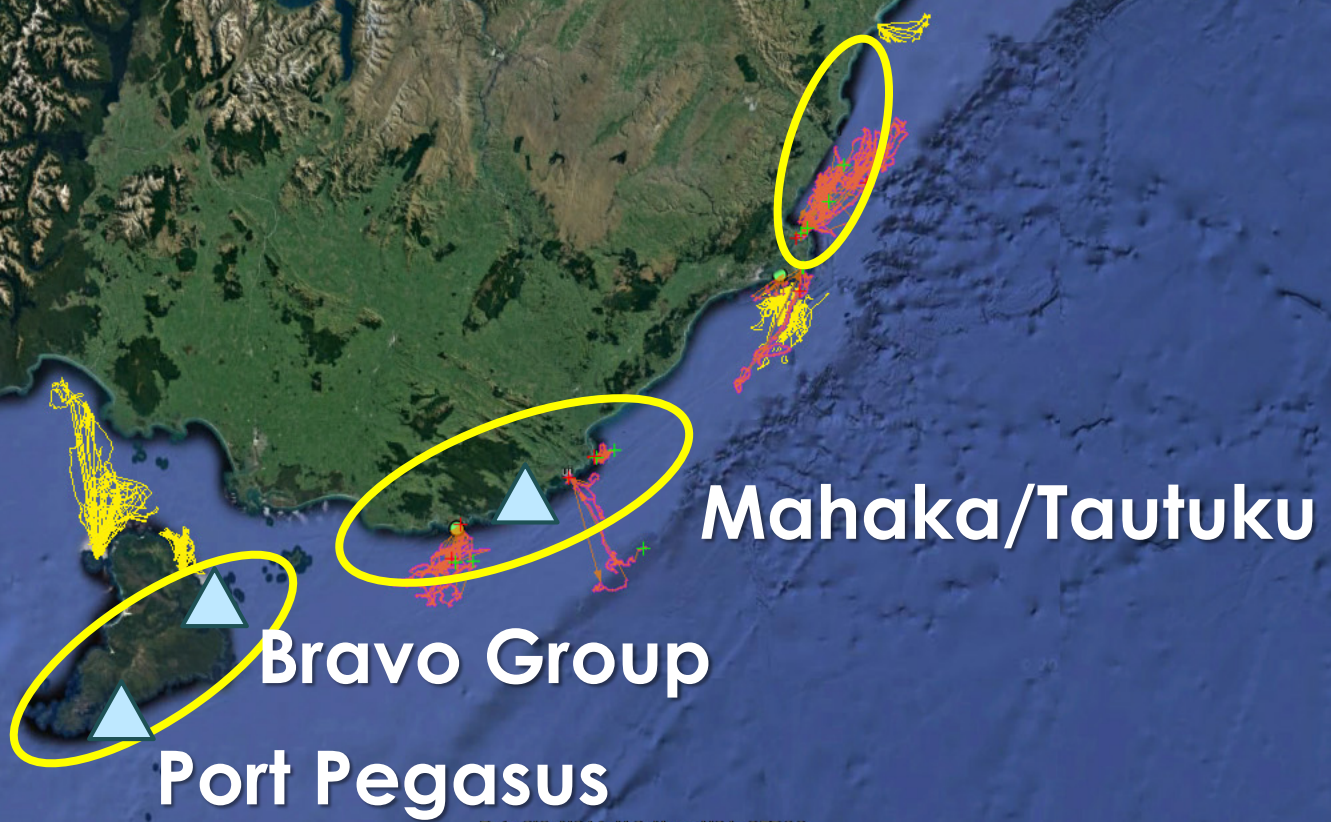






Data SIO, NOAA, U.S. Navy, NGA, GEBCO  
Image Landsat / Copernicus  
Data LDEO-Columbia, NSF, NOAA

Google earth



**Mahaka/Tautuku**

**Bravo Group**

**Port Pegasus**

Data SIO, NOAA, U.S. Navy, NGA, GEBCO  
Image Landsat / Copernicus  
Data LDEO-Columbia, NSF, NOAA

Google earth

188 km

Imagery Date: 12/14/2015 lat -45.715825° lon 170.009493° elev 521 m eye alt 739.66 km