

# FEATHER FORECAST



## UNPREDICTABLE WITH A CHANCE OF BREEDING FAILURE

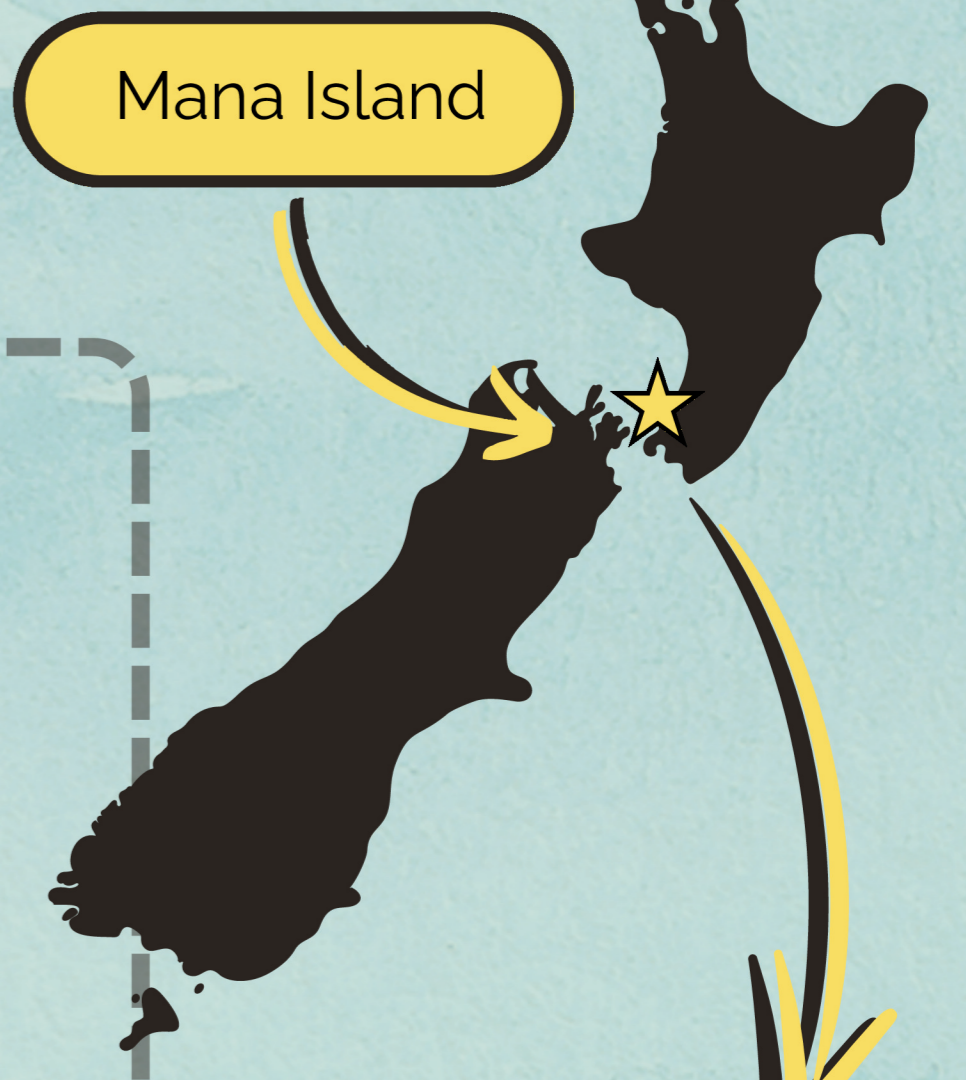
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### BACKGROUND

- Sooty shearwaters (titi) are native to Aotearoa and culturally important as a harvest species.<sup>1</sup>
- Titi and their ocean habitat are impacted by climate change, but the extent of this threat is uncertain.<sup>2</sup>
- Climate phenomena such as El Niño (cyclical and varied warming of the Pacific) also impacts ocean conditions e.g. primary productivity unpredictably.<sup>3</sup>

### METHODS

- Establish study burrows.
- Track adult titi with GPS to identify foraging hotspots.
- Measure adult titi and their chicks.
- Repeat 2023 - 2026.



Does titi condition decrease with changing ocean conditions due to El Niño?

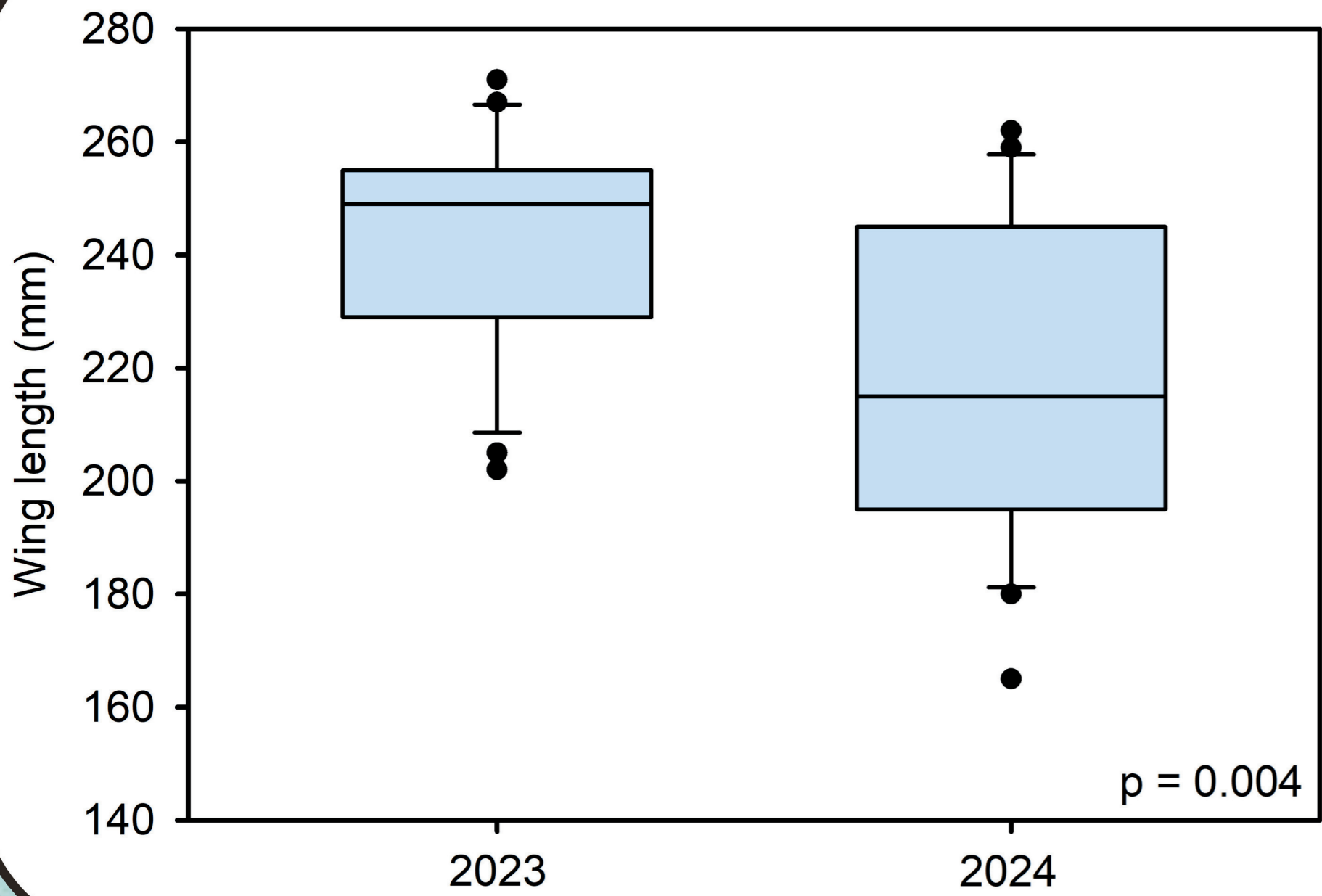


Figure 2: Wing length (proxy of chick growth) of sooty shearwater chicks on Mana Island 5th - 6th April 2023 (n = 21) and 29th - 31st March 2024 (n = 23).



Foraging near the Chatham Rise, supported by literature.<sup>4</sup>

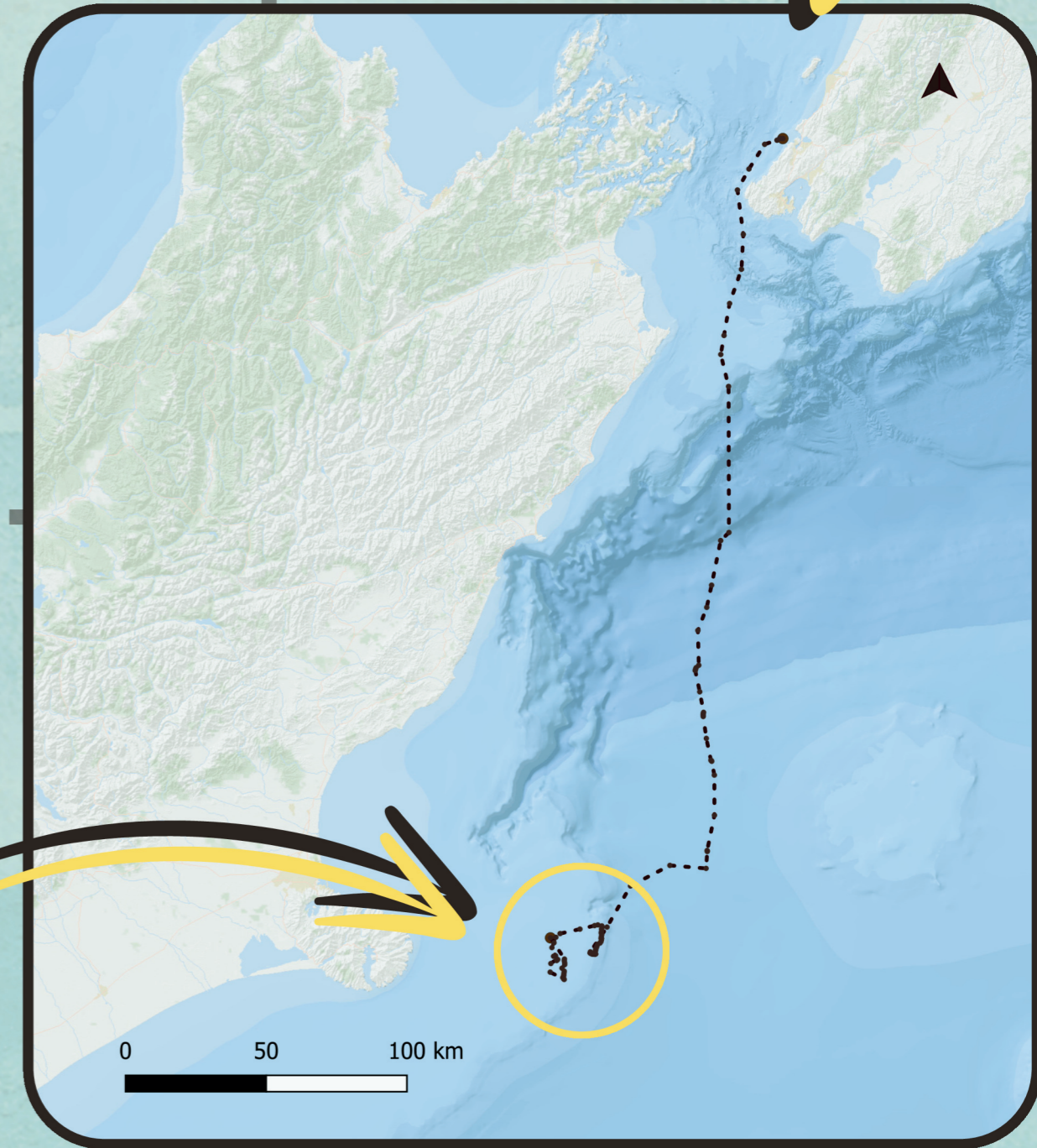
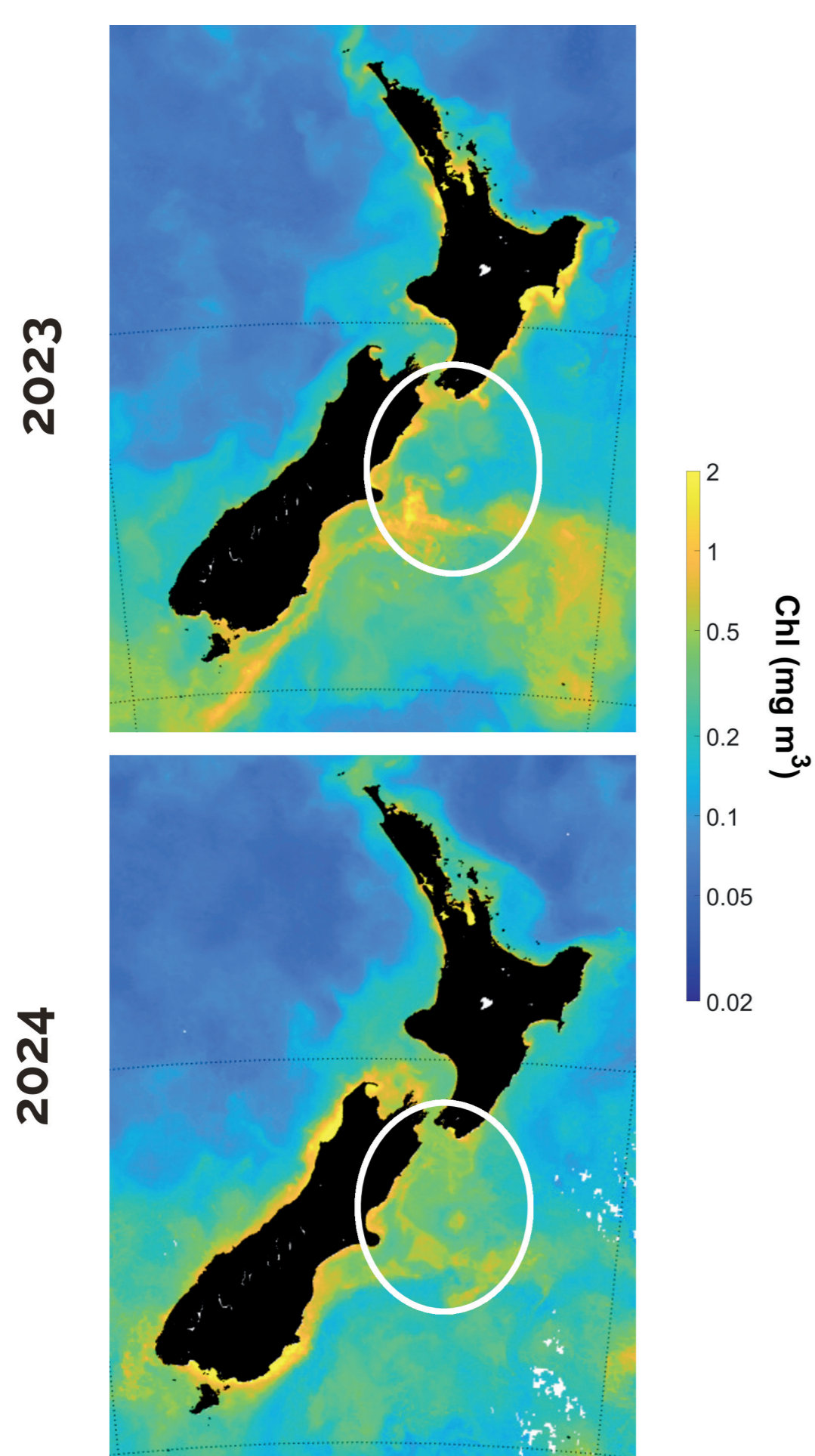


Figure 1: GPS track of adult titi, 2nd - 4th March 2023.

### CHLOROPHYLL - A



Spot the difference...



Phytoplankton can be observed from space by measuring chlorophyll-a concentrations!

### RESULTS AND DISCUSSION

- Shorter, more variable wing lengths in 2024 chicks.
- Suggests adult titi may be struggling to find food.
- May be due to lower chl-a concentrations on the Chatham Rise, a known foraging hotspot for Mana titi.
  - Likely a result of the strong 2024 El Niño.<sup>5</sup>

References:

1. Clucas et al., 2012, *New Zealand Journal of Zoology*.
2. Lyver et al., 1999, *Marine Ecology Progress Series*.
3. Racault et al., 2017, *Frontiers in Marine Science*.
4. Shaffer et al., 2009, *Marine Ecology Progress Series*.
5. Humphries & Möller, 2017, *Marine Biology*.

### NEXT STEPS

- Assess titi stress using feather hormones.
- Model links between ocean conditions, prey availability, and titi condition to forecast breeding success.

Figure 3: Chlorophyll-a concentrations around Aotearoa, particularly the Chatham Rise, on 2nd March 2023 and 2024.

