

## Sooty shearwater: Conservation conundrum on Kāpiti Island

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*Ardenna griseus* (Sooty Shearwater), also called Tītī, is a medium-large seabird from the petrel family *Procellariidae*, who nests only deep in the Southern Hemisphere within burrows or suitable rock crevices. Chasing summer across the Atlantic or Pacific, tītī carry out annual migrations among the longest recorded for any animal tracked to date ( $64,037 \pm 9,779$  km). With an estimated 21 million individuals and 4.4 million pair breeding in Aotearoa, they are one of the most abundant species of petrel in the world and certainly one of the better studied of Aotearoa. Although still an abundant animal, the total number has been decreasing at an alarming rate for the past decades with tītī disappearing from numerous former nesting sites (classified as "near threatened" by the IUCN in 2020). Multiple causes have been identified to explain the overall decline, including fisheries bycatch, climate change and predation by introduced predators. Tītī are taonga (treasured species) and this fast decline is of high concern.

With no chick fledgling recorded in the last two years, the Kāpiti island population is no exception to this fast decline. Located at Tuteremoana, the summit of the island, the remaining colony is heavily suffering the impact of weka (*Gallirallus australis*), who predate on tītī eggs and chicks. Weka are a native predator essential to Aotearoa ecosystems as omnivorous scavengers and critically important seed dispersers. Additionally, Kāpiti weka are a unique and invaluable hybrid species descendant of both North Island and Western subspecies, and thus also taonga. The importance of preserving both species as part of the island ecosystem is creating a crucial conservation conundrum. Introduced weka negatively affecting seabird burrowing species are recurrent situations throughout Aotearoa. The case of Kāpiti remarkably illustrates the disruption of the natural predator-prey balance for weka and aim to raise crucial mitigation strategies.

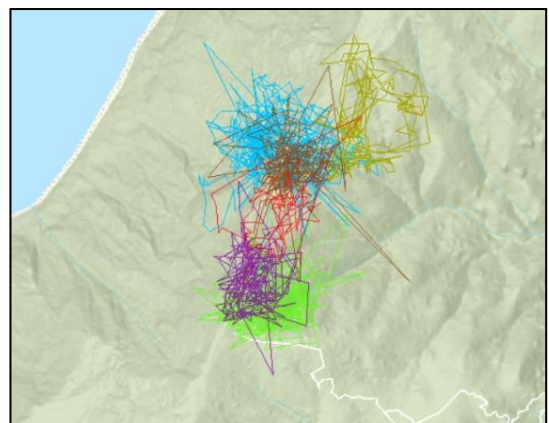
Through this research fund, it has been decided to use GPS tracking to understand the impact of weka on Kāpiti tītī colony. This work incorporates two fundamental aspects: i) developing a procedure to capture and harness weka, and ii) design a robust and light tracking system. The pilot study was done in September/October 2023 and allowed the capture of 8 individuals who have been equipped with a tracking system. Geospatial data have been captured for 10-14 days before recapture. Except for one pair, all individuals provided 10-14 days of data. This pilot study confirmed the efficiency of the capturing method (ground-noose) as well as the robustness and reliability of the tracking system capable of operating under the dense canopy of Kāpiti. It confirmed the importance of radio telemetry transmitters for the recapture and will serve as a basis to repeat a tracking of weka during the breeding cycles of tītī in January 2024 (tītī are breeding in the southern hemisphere from late October to late March, and wintering in the northern hemisphere the rest of the year). This pilot also provided valuable data to understand the evolution of the behaviour of weka while tītī are in the Northern hemisphere as opposed to when they are on Kāpiti breeding ground.



Figure 1: Elisabteh Daigle (DOC volunteer) holding a weka harnessed with the tracking device, ready to be released for the pilot.

This January tracking study will be done on individuals holding territories around tītī burrows as well as on weka holding territories away from the tītī colony and susceptible to climb up to the colony. The study aims to understand if tītī eggs and chick's predation by weka is carried out by specialized individuals capable of navigating tītī burrows or on the contrary by potentially all Kāpiti weka. This question arises from the hypothesis that Kāpiti tītī burrows are extremely long and complex and navigating such networks might be a behaviour requiring learning. These unusually long burrows are likely the result of weka predation, forcing tītī breeding pairs to dig deeper every season to escape weka. This work will provide valuable knowledge for the decision making of a mitigation strategy. For instance, in the case of a predation by weka specialists, mitigation steps might use the behaviour of individual weka and point toward strategies such as the annual removal of these specialists.

Field observation from 2022/2023 indicate that most of the clearing of tītī nests likely occurs soon after hatching. Out of 37 burrows with an egg in early December 2022, 73% had been cleared out by January 24<sup>th</sup>, 2023, and no chick was recorded fledgling in April. The predation likely occurs soon after the beginning of the rearing period when adults leave the nest unattended to go at sea to forage. A video taken in 2018 shows a weka dragging a tītī chick outside of its burrow. The birdsNZ research fund permitted significant progress to understand this conservation conundrum. This work will provide valuable knowledge to implement a more in-depth tracking in January 2024, at the peak of tītī breeding and when chicks are the most vulnerable. This tracking could eventually sustain the decision making for a mitigation strategy on Kāpiti island.



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Figure 2: Geospatial data obtained from weka holding territories around the tītī colony (Tuteremoana). Data are displayed using ArcGIS.