Identifying areas of high conservation concern through fine-scale GPS tracking of kuaka (*Pelecanoides whenuahouensis*) during the breeding period

Te Arawhetu Waipoua[1], Phil Seddon[1], Ursula Ellenberg[1], Johannes Fischer[2]

[1]University of Otago, Dunedin, New Zealand

[2]Department of Conservation, Wellington, New Zealand

The critically endangered kuaka (*Pelecanoides whenuahouensis;* Whenua Hou Diving Petrel) is a recently described burrow-nesting seabird species, that is a taonga species to Ngāi Tahu. Kuaka were once widespread throughout southern Aotearoa, but now the last remaining colony is restricted to Whenua Hou, with an adult population of ~200 individuals. Threats from commercial fishing efforts around Whenua Hou, such as vessel-based light pollution, which can lead to disorientation and collisions (vessel strikes) of birds, may inhibit population recovery. Kuaka are most at risk during the breeding period, as they are bound by central-placed foraging with their distribution overlapping with commercial fisheries and marine traffic. With the anticipated installation of offshore aquaculture and wind farms, it is crucial to identify areas of conservation concern to mitigate current threats and prevent future risks.

To achieve this, we GPS-tracked 25 adult kuaka during the 2023/24 breeding season, deploying 10 <3.5g Pathtrack nanoFix GEO-mini loggers. Devices were deployed via the tail mount method, with devices attached to the four central tail feathers using waterproof tesa tape. Retrieval of devices was quite successful with an 86% recovery. We tracked birds during three stages of the breeding period, courtship (n = 6), incubation (n = 10) and chick-rearing (n = 9). Two loggers fell off birds at sea and one bird evaded recapture. The remaining seven loggers will be redeployed in the upcoming breeding season.

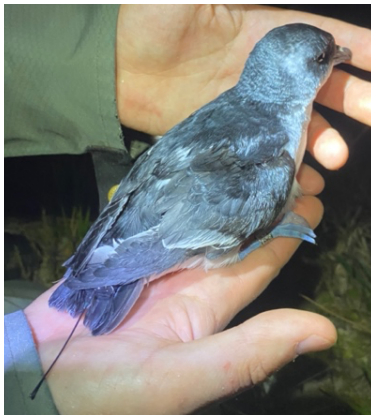

***Figure 1**: Kuaka equipped with a GPS logger upon recapture*

During courtship, trip duration was an average of 24.7 ± 22.4 hours (mean ± SD), with a maximum distance from the colony being 13.4 ± 7.8 km and a total distance travelled 63.1 ± 15.7 km. Incubation foraging trips lasted longer and birds travelled farther from the colony compared to any other breeding stage (duration: 33.9 ± 15.3 hours; maximum distance from colony: 35.2 ± 32 km; Total distance: 135.2 ± 94.3 km). Chick-rearing trips were the shortest compared to other stages (duration: 20.6 ± 1.0 hours; maximum distance from colony: 19.1 ± 13.3 km; total distance: 91.6 ± 38.1 km). Kuaka utilise the eastern Foveaux Strait the most during courtship and chick-rearing. During incubation, kuaka expand their range utilising both the eastern and western Foveaux, with three birds travelling into Sub-Antarctic water on a 2-day trip. Incubation shifts last 2 – 4 days allowing for more exploratory behaviour and increased foraging ranges.

This research marks the first-ever fine-scale tracking of kuaka and provides valuable information on their at-sea distribution while breeding. A variety of models, habitat and overlap analyses are currently underway. Results feed into my MSc thesis and are expected to contribute to refining and identifying key marine conservation areas for kuaka.

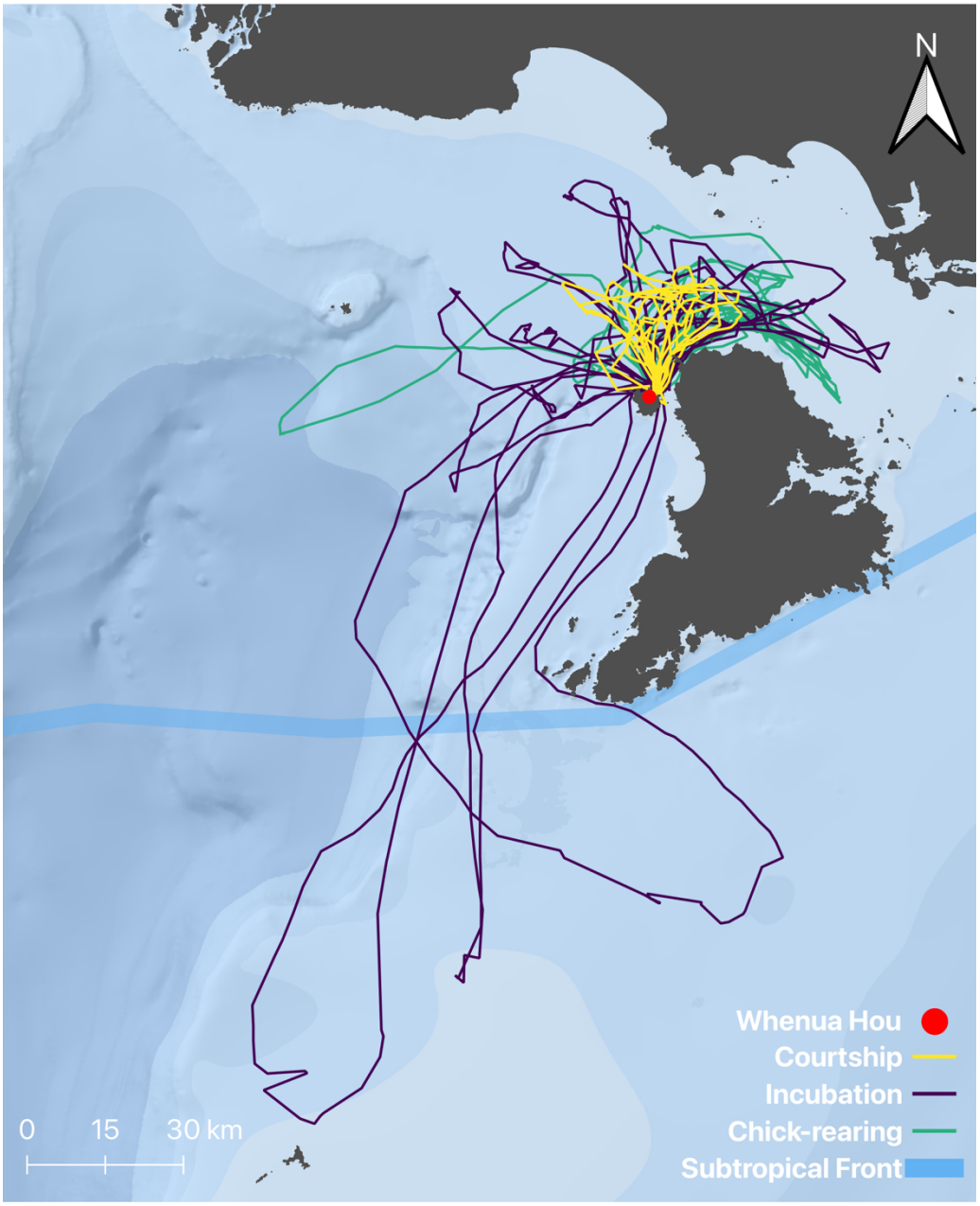

Figure 2: *GPS tracks of adult kuaka during courtship (yellow), incubation (purple) and chick-rearing (green) during the 2023 breeding season.*