



Chatham petrel foraging ecology and climate change vulnerability

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The Chatham petrel *Pterodroma axillaris* is one of the rarest seabird species in the world (c. 1100 adults). This Chatham Islands endemic was once abundant on several islands of the archipelago. It is now restricted to a handful of intensively managed populations. While major threats on land have been identified and are being managed, the at-sea threats this species is facing are largely unknown. Around Aotearoa New Zealand, ocean temperature, acidity, and the frequency of marine heatwaves are increasing and one of the most important climate change impacts on oceanographic conditions is predicted to occur along the Chatham Rise, near the Chatham Islands. These predicted alterations of the marine environment around the Chatham Islands could reduce Chatham petrel forage availability. Improving our understanding of the species foraging ecology is therefore crucial to better assess and predict how climate change might affect this threatened species.

To that end, we tracked with GPS Chatham petrels breeding on Rangatira Island, the species' largest colony, from mid incubation through mid chick rearing. The deployment and recovery of GPS on breeding Chatham petrels was quite successful with 70% recovery and a cumulative tracking of 358 days. 10 GPS were deployed in early February, out of which 7 were recovered in late March (all recording data for the whole tracking period), 2 fell from the birds, and one bird was not recaptured as its breeding attempt failed due to disruption by prospecting broad-billed prion *Pachyptila vittata*. The seven recovered GPS tags are still functional and will be redeployed on Chatham petrels next season. There was no impact of GPS deployment on breeding success between tagged and untagged birds.

The tracks were described in terms of trip range (i.e., maximum distance from burrow), length, and duration. During incubation the trips lasted on average 9.96 ± 2.50 days (mean \pm SD), with a range of $1,237 \pm 251$ km, and a length of $5,312 \pm 1,058$ km. Chick rearing foraging trips were shorter (duration = 3.55 ± 2.06 days; length = $1,625 \pm 1,011$ km) and closer to the burrows (trip range = 357 ± 230 km). Tests are underway to investigate the effect of sex on the trip metrics. The birds flew mostly south and southeast during incubation and south-southwest during chick rearing. The population level core area during chick rearing (50% utilisation distribution) is centred about 100km south-southwest of Rangatira Island. There is a high overlap in individuals' utilisation distributions. Interestingly, very few locations were recorded north of Rangatira Island, which might reflect the species habitat preference. We haven't started the behavioural and step/habitat analyses yet, but initial exploration of the tracking data shows indication that wind direction might be a key factor affecting the birds' movements with foraging trips' spatial and temporal pattern seemingly matching that of the region's wind circulation driven by eastwards drifting low- and high-pressure systems.

Funds have been secured for a second season of tracking. 20 GPS will be deployed in 2023-24 and results compared to this initial tracking to assess inter annual variation in the species foraging ecology. This will also help refine the identification of the environmental variables driving the species movements, its habitat preferences, and the subsequent modelling of the future distribution of its preferred habitat under different climate change scenarios.

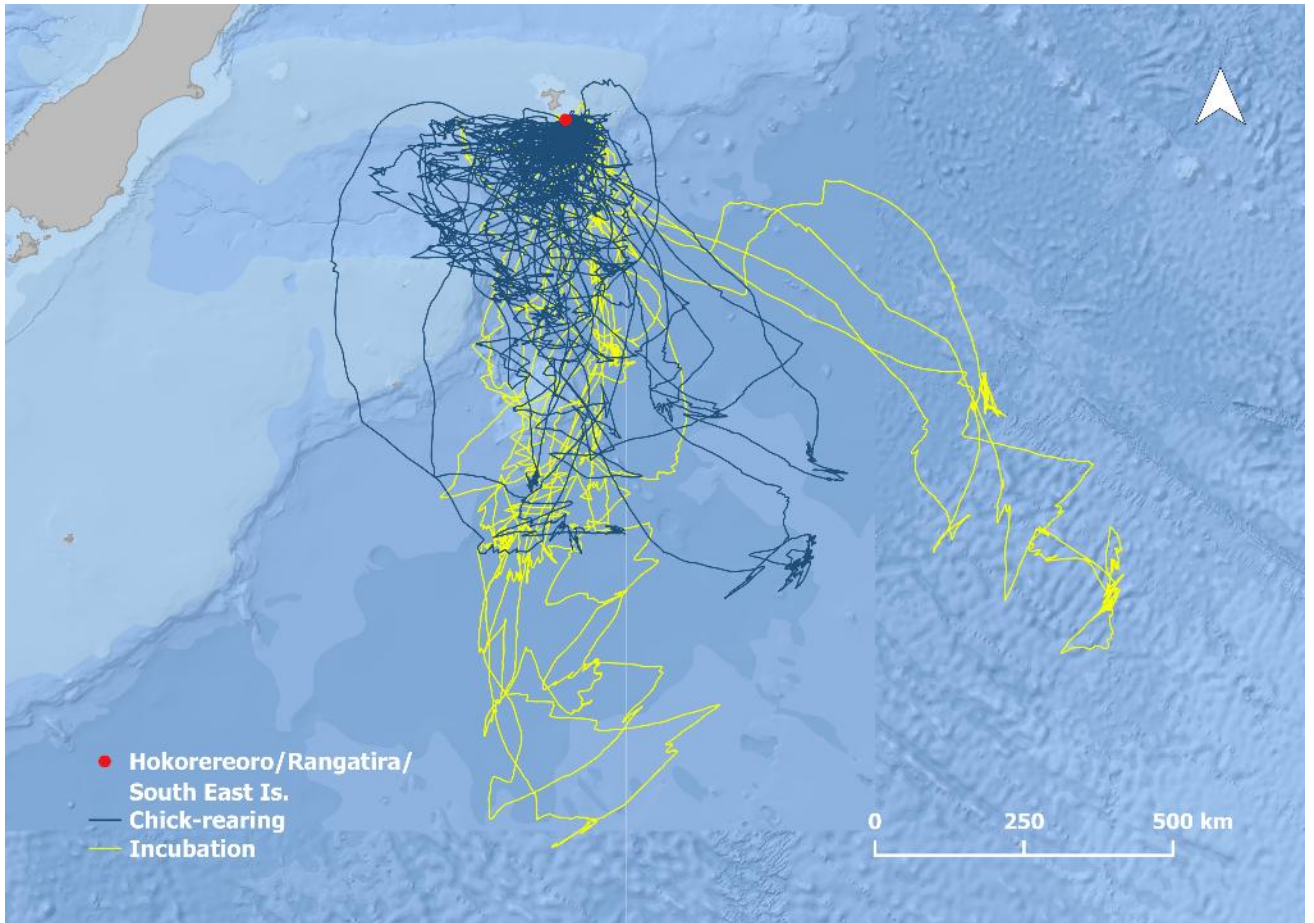


Figure 1. Tracks of breeding Chatham petrel, in yellow during incubation and in blue during chick rearing.