

New Zealand and its outer islands are rich in endemic and migratory seabird species. Many of these bird species are threatened with extinction, including penguins. In comparison to other penguin species, crested penguins (*Eudyptes*) are poorly understood genetically; despite four of the eight species inhabiting New Zealand waters (Tawaki/Fiordland crested, Snares crested, erect crested and Eastern rockhopper penguin).

The aims of this project are to (1) evaluate levels of genetic diversity within the three New Zealand endemic crested penguin species, (2) compare genetic diversity between New Zealand vs other Southern Ocean crested penguins, and (3) explore the potential of New Zealand crested penguins to adapt to a warming climate.

We obtained samples from >250 individual crested penguins spanning almost all species, and generated >100,000 base pairs of sequence data per individual. This is an unprecedented amount of data compared to previous genetic projects (which generally only sequenced <1000 base pairs), allowing a powerful comparison within and between crested penguin species. We were unable to obtain genomic data for the Erect crested penguin, as the samples had degraded since they were collected.

We have undertaken a large number of analyses between and within crested penguin species, and are almost finished this step of the research. Genetic diversity within Fiordland crested and within Snares crested penguins is low – and this suggests that the species' represent single panmictic units. This reflects the ability of the species' to swim vast distances, and the lack of



barriers to gene flow within the Southern Ocean – and is a positive finding in light of conservation concerns (as no localities sampled are genetically isolated). Within Snares crested penguins, we find no evidence to suggest a second taxon inhabits the Western Chain. In comparison to Snares crested and Fiordland crested penguins, the Eastern rockhopper penguin also appears to be largely panmictic throughout the Southern Ocean, with possible historical isolation within New Zealand – possibly reflecting glaciation histories during the Last Glacial Maximum. We are now using this taxon to study adaptation to climate change, but have not finished the final analyses – yet.

This project is part of the final chapter of my PhD research. Without the funding provided by OSNZ, I would not have been able to include Fiordland or Snares crested penguins in the genomic study - which would have been restricted to Royal/Macaroni and Rockhopper penguins. Ultimately, results from this project can be fed directly into future conservation management strategies for crested penguins within the New Zealand region, and throughout the Southern Ocean. Please email tesscole1990@gmail.com for more information.