Stress and stable isotopes: carryover effects and foraging ecology of three seabirds
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This project will investigate the foraging niches and physiological condition of three small seabirds breeding in the wider Hauraki Gulf region: fairy prions (*Pachyptila turtur)*, fluttering shearwaters (*Puffinus gavia*), and little shearwaters (*Puffinus assimilis haurakiensis*). These species have overlapping breeding seasons, and varying levels of observed overlap in their foraging ecology. Identifying the foraging niches of these species during chick-rearing will help us to understand what may drive population-level changes under warming oceanic conditions, which will impact their various prey species differently. In addition, assessing condition metrics (e.g. stress hormones) across several seasons will enable us to determine how the environmental conditions adult birds encounter during their non-breeding period impact on their breeding success the following season. Detecting these potential 'carryover effects' of suboptimal environmental conditions and poor foraging during non-breeding will help us understand what physiological thresholds these birds must meet to breed successfully.

The two primary questions are:
Q1: How does adult non-breeding condition impact on chick condition?
Q2: How do these three species partition local resources during their chick-rearing periods?

To answer these questions, a non-invasive measure of physiological stress (corticosterone hormone extraction from feather samples) will be used to determine adult condition during non-breeding, and chick condition during development. By comparing these metrics over three seasons, we can gain an understanding of whether there are carry-over effects of stress that adults experience during the non-breeding season that impact their breeding success the following season, as measured by the condition of their chicks. Stable isotope analysis of chick feathers and adult blood samples taken during the chick-rearing period will be used to investigate the foraging niche-space for all three species. By looking at three seasons of data, we will also investigate whether any differences in foraging niche between years have an impact on chick condition within these three species. Funding from the BNZRF will enable the analysis of samples from three field seasons (2019-2021).

Fairy prion over kahawai school. Photograph: Edin Whitehead