

Stress and stable isotopes: carryover effects and foraging ecology of three seabirds Edin Whitehead

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.

Due to lab delays, only the stable isotope data are presented here, while the stress hormone extractions are currently underway. These data will be formally analysed and published by the end of February as part of a doctoral thesis. Briefly, stable isotope data from adult blood and chick feathers showed similar patterns of partitioning over the three (fluttering shearwaters and fairy prions) or two (little shearwater) years of study. Fluttering shearwaters appear to occupy a broader and higher trophic-level niche compared to the other two species. The low nitrogen-15 values from little shearwaters were surprising, as observational data, faecal matter, and regurgitates all suggest a more fish-based diet than the other two species, which appear to feed more primarily on zooplankton. Further investigation utilising regurgitate samples to gather prey reference stable isotope values will assist with interpreting these data.

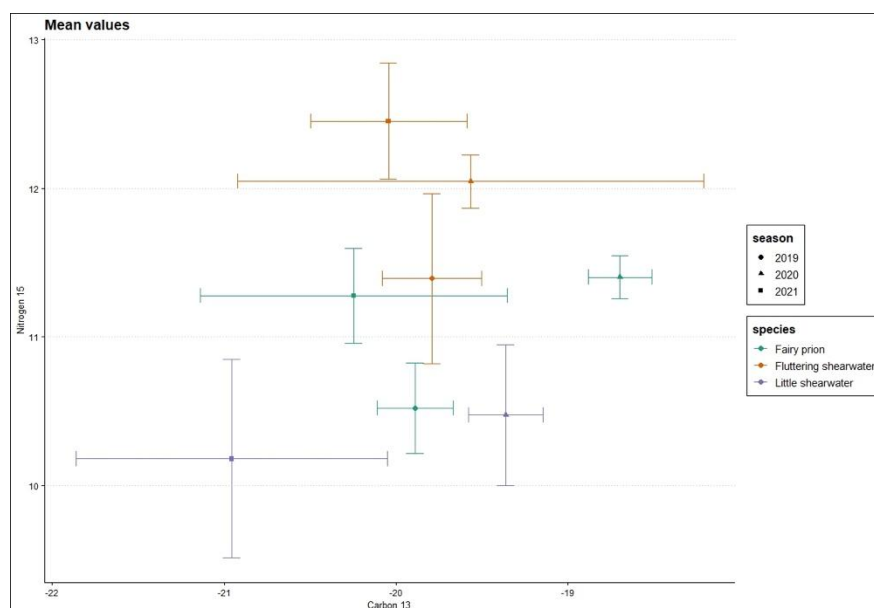


Figure 1: Mean (\pm standard deviation) blood stable isotope values from fairy prions (blue), fluttering shearwaters (red) and little shearwaters (purple) over three seasons, 2019 (diamonds), 2020 (triangles), and 2021 (squares). Note only 2020 and 2021 data are available for little shearwaters.