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The Foraging Ecology of Little Penguin (*Eudyptula minor*) on Tiritiri Matangi Island.

A thesis submitted in partial fulfilment of the requirements of
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Fiona Rea Katrine McKenzie
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Little Penguin 2011. Artist Samuel McKenzie. Age 10.

Abstract

Little Penguins (*Eudyptula minor*) are the smallest penguin in the world. They have a distribution ranging from south-western Australia, through to New Zealand and the Chatham Islands. Some populations in Australia and the South Island of New Zealand have been the subject of considerable research, but there has been less undertaken on populations in the northern half of New Zealand. The Department of Conservation however, are concerned about their status and have list the northern populations as 'At Risk – Declining' in the New Zealand Thread Classification System. As part of a new longitudinal study on Little Penguins (LP) resident on Tiritiri Matangi Island, Hauraki Gulf, New Zealand this study focussed on their foraging behaviour and breeding success over 2010 and 2011.

Two new biogeochemical techniques were used in this study to examine LP diet from tissue samples. Stable isotope analysis of LP blood, feathers and potential prey species established the trophic level of the LP (calibrated from a captive feeding trial) and was able to determine both temporal and spatial shifts in trophic level over a 12 month period. These shifts may indicate changes in prey type or abundance, however more research is required to determine this. Fatty acid signature analysis of potential prey and LP adipose found similarities that suggest the prey types were likely included in the LP diet, but sample sizes were small and again further research is required. Abundance of potential prey species within the local Hauraki Gulf region were extrapolated from commercial catches of bait fish statistics and foraging ranges from were proxied from previous studies. It was determined that commercial fishing is unlikely to impact the LP at this time. A third emerging technology, GPS tracking dataloggers, was proposed to track the penguins across the breeding and non-breeding seasons to determine where they foraged, how far they ranged and how this changed seasonally. Unfortunately, equipment failures resulted in no tracks being recorded. Breeding success recorded for 5 years was extremely variable however, for one year at least, it

was apparent that a significant absence of preferred prey may be linked to a devastatingly poor year for rearing chicks.

Top predators such as seabirds, including penguins, are a model bioindicator for the health of their local marine environment i.e. a seabird population that breeds well and is in good body condition likely indicates there is abundant food and clean water. Conversely a seabird population that is declining in size or experiences poor recruitment, may be an indication that prey is absent or that waters are polluted. With the local North Island LP populations potentially already in decline, it is important to continue to monitor aspects of their breeding and foraging in the coming years – not only for the benefit of the penguins, but for the wider conservation of the Hauraki Gulf Marine Park.

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