A comparative study of the vertical foraging behaviour of three *Procellaria* petrel species.

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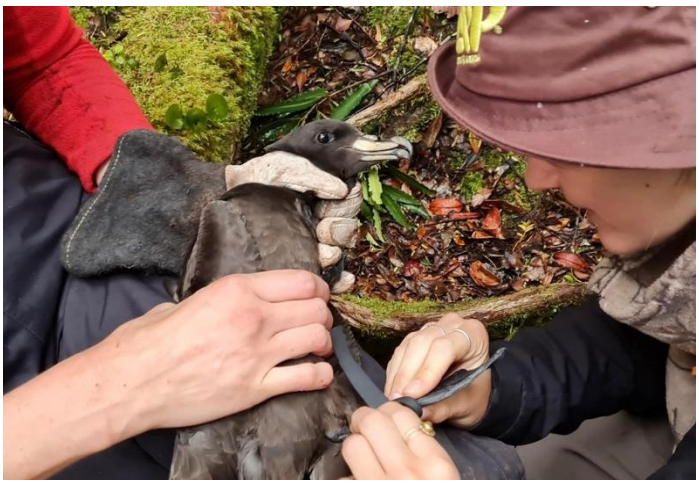
The *Procellaria* genus comprises five petrel species, all of which are vulnerable to bycatch in longline fisheries. I will investigate the diving behaviour of three *Procellaria* petrels. The white-chinned petrel (*Procellaria aequinoctialis*) is the most bycaught seabird worldwide, and is recognised as Vulnerable on the IUCN Red List. Endangered Westland petrels (*P. westlandica*) and Vulnerable black petrels (*P. parkinsoni*) are both Aotearoa/New Zealand endemics, with black petrels currently recognised as having the highest bycatch risk from commercial fisheries in New Zealand waters.

Bycatch mitigation measures include bird-scaring lines, increasing hook sink rates by increasing weight and reducing the spacing between weights, and the setting of lines at night when many seabirds are less active. Nevertheless, bycatch still poses a serious threat to many seabirds, suggesting such measures are insufficient or ill-informed. In order for measures to be appropriately revised, a thorough understanding of seabird foraging behaviour is imperative. For example, the descent rate and dive depths of seabirds can directly inform the necessary sink rates of hooks, and known maximum diving ability can inform depths to which hooks must be protected. Diving behaviour in seabirds can be investigated with the deployment of time-depth recorders (TDRs). These loggers retrieve depth measurements at 1-2 second intervals from which dive depths, durations, and frequencies can be extracted. Previous studies have investigated white-chinned and black petrel dive depths, respectively. However, the diving behaviour of endangered and endemic Westland petrels has not yet been studied. Furthermore, variation in diving behaviour among species has not been examined, nor has variation in diving behaviour when associated with fishing vessels.

I will analyse and compare the diving behaviour within and among study species and between sexes, and thus across a gradient of body sizes, phenology, and distributions. Currently, there is no distinguishing between vessel-associated dives and natural foraging dives of petrels. Given that the risk of bycatch is specific to vessel-associated dives, this is a major limitation in previous studies on their foraging behaviour and the associated implications for bycatch mitigation. Thus, I will pair TDRs deployed on black petrels with high resolution GPS tags. Location and diving data can then be aligned with fishing vessel locations during setting and hauling to determine which dives are vessel associated. The specific objectives of my study include: 1) examining and comparing the diving behaviour of all three study species, 2) separating and comparing vessel-associated and natural diving behaviours, and 3) directly relating these findings to bycatch mitigation strategies. Overall, my study will provide significant contributions to our understanding of the foraging ecology of these species and has the potential to inform the revision of bycatch mitigation measures.



Time-depth recorder (TDR) deployment on a black petrel on Aotea/Great Barrier Island