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**Characteristics of
White-chinned Petrels
Procellaria aequinoctialis Linnaeus
in New Zealand Waters**

**A thesis presented in partial fulfilment
of the requirements for the degree of**

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ABSTRACT

Current taxonomy of the white-chinned petrel suggests that all populations are similar enough to be a single global taxon, *Procellaria aequinoctialis* Linnaeus. This thesis challenges that view with an analysis of morphological characteristics of white-chinned petrels from fisheries bycatch in the New Zealand Exclusive Economic Zone (EEZ). The two main aims were: first, to determine if white-chinned petrels in New Zealand waters comprise one taxon; and second, to determine if white-chinned petrels in New Zealand waters fit the proposition of a global taxon. Morphological characteristics included; standard external measurements (head, bill, tarsus, wing and tail measurements), descriptions (area of white on the chin and bodily descriptions), and measurements of internal organs of a sample of 723 bycatch white-chinned petrels. Twenty-five white-chinned petrel study skins from breeding islands in the South Pacific, Indian and Atlantic Oceans, and 29 study skins from birds caught off Chile were also measured for comparison with the bycatch birds.

I compared a range of external measurements from the bycatch sample taken by myself and 'the Laboratory' (measurements and descriptions of white-chinned petrels taken by C.J.R. Robertson and E. Bell) to estimate the measurement error between multiple observers measuring the same sample of birds. Results clearly showed very little measurement error between the two observers, and the small amount of error was biologically insignificant.

I found two cluster groups of bycatch white-chinned petrels, the 'Antipodes Island group' (n = 105) which was significantly larger in most external measurements than the 'Auckland Island group' (n = 45). Using discriminant analysis I could differentiate 93% males of the 'Antipodes Island group' versus the 'Auckland Island group' based on culmen and tail length. I could also differentiate 92% of females from the 'Antipodes Island group' versus the 'Auckland Island group' based on head and bill length, culmen depth at the base and wing length. Discriminant analysis indicates that the Antipodes Island population male and female white-chinned petrel study skins related closest to the 'Antipodes Island group' and the Auckland Island, South Indian Ocean, South Atlantic Ocean, and Chile male and female white-chinned petrel study skins related closest to the 'Auckland Island group'.

The results suggest that within the New Zealand EEZ there are two taxa of white-chinned petrels based on external morphology: '*aequinoctialis*' Linnaeus, the smaller sized white-chinned petrels from the Auckland Islands; and '*steadi*' Mathews, the larger sized white-chinned petrels from Antipodes Island and most likely Campbell Island.

The results also suggest that, globally, the external morphology of white-chinned petrels can be used to identify two taxa: '*aequinoctialis*' Linnaeus, the smaller sized white-chinned petrels which comprise the Auckland Islands, the South Indian Ocean, and the South Atlantic Ocean populations; and '*steadi*' Mathews, the larger sized white-chinned petrels which comprise the Antipodes Islands population. Further, most white-chinned petrels caught off Chile are likely to be from the Auckland Island breeding population or South Atlantic Ocean breeding populations.

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