Population Structure in the New Zealand Falcon

(*Falco novaeseelandiae*)

Photo-Lena Olley

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Flight

On the slow wing-beat

of a curious falcon

my wishes belonged.

I rose and spiralled

on thermals

and the mountains smiled

all afternoon.

The falcon's wings

splintered the autumn sunlight

above the remnant fog

that sat on the river

like a marquee

and water scrawled inscriptions

on every stone.

-Brian Turner

Abstract:

The New Zealand falcon (*Falco novaeseelandiae*) is a medium sized falcon endemic to New Zealand. New Zealand falcons have a flexible ecology, inhabiting a variety of habitats including bush, coastlines, mountains, open tussock land, farm land and exotic pine forests. Phylogenetic analysis suggests the New Zealand falcon is not sister to or related closely to any species in either Australia or South America as proposed in earlier research. Neither does it appear to fit within in any other major group such as the heirofalcons or the kestrels.

The New Zealand falcon is currently defined as a single variable species with three recognised morphs or races that are referred to as the Bush, Eastern and Southern these appear to differ in colour and size. This proposal was established in 1977 and has since become generally accepted. However, there are alternative hypotheses as to how this variation is size may be spatially partitioned across the New Zealand landscape. A reassessment of the morphometric data in New Zealand falcons is needed to identify how this morphological variance is distributed. Specifically, to identify any evidence for three distinct morphs, in contrast to the alternative hypothesis of a gradient in size consistent with Bergmann's rule. The analysis suggests that there is little support for the occurrence of three morphs of New Zealand falcon; instead, there is a distinct difference in size between the North and South Islands. There is some evidence of a gradual change corresponding to latitude but this appears to be minimal. Mean wing lengths are significantly longer in male and female falcons in the South Island compared to those in the North Island.

To understand if the size difference between the North and South Islands is an effect of an adaptive response and to examine the extent of gene flow occurring between the two islands a study of neutral genetic markers is needed. Evidence of genetic structure was tested for among New Zealand falcon populations using nuclear and mitochondrial data. Little support for any population structuring was identified. Evidence from this analysis suggests that the falcons are responding to particular environmental conditions within each island resulting in a change in size, however high juvenile dispersal may be preventing the partitioning of gene flow between the North and South Islands.

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Preface

This thesis has been written and organised as self-contained chapters that will act as submissions to peer-reviewed scientific journals. Because of this, individual chapters will contain unavoidable repetition. This thesis is original work of the author, unless stated otherwise in the references, methods and acknowledgments.

Note on names

Latin names are given once in each chapter for each species, otherwise common names are used. The exception is in chapter two where latin names are used in the results for ease of translation with figures in which only latin names are used. The discussion of chapter two then gives the latin names once again.

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