Investigating the habitat suitability of Maungatautari Ecological Island for the reintroduction of kākāpō (*Strigops habroptilus*)

A thesis submitted in partial fulfilment of the requirements for the degree of

Master of Science in Conservation Biology

Massey University, Palmerston North

New Zealand

Alexandra J. Hurley

2017

“They are our national monuments. They are our Tower of London, our Arc de Triomphe, our pyramids. We don’t have this ancient architecture that we can be proud of and swoon over in wonder, but what we do have is something that is far, far older than that. No one else has kiwi, no one else has kākāpō. They have been around for millions of years, if not thousands of millions of years. And once they are gone, they are gone forever. And it’s up to us to make sure they never die out."

Don Merton

Abstract

The kākāpō (*Strigops habroptilus*) is a large, flightless parrot endemic to New Zealand which was once abundant across mainland New Zealand. However, this nocturnal bird species is now listed as critically endangered with a population of approximately 154 individuals. Kākāpō are currently only found on four offshore, predator-free islands where kākāpō were not found historically - Whenua Hou/Codfish Island, Hauturu-o-Toi/Little Barrier Island, Anchor Island and an unnamed island in Fiordland. However, there is hope to have kākāpō living on mainland New Zealand again with the potential reintroduction of kākāpō to Maungatautari Ecological Island in the near future. Kākāpō breeding is heavily dependent on environmental factors, specifically in that breeding coincides with the mast fruiting of specific plant species, particularly rimu (*Dacrydium cupressinum*). Therefore, kākāpō breed only once every two to five years which significantly constrains the potential population growth of the species. However, with a record breeding season in 2016 and expectations for kākāpō breeding to continue successfully, kākāpō populations on Whenua Hou and Anchor Island are considered to be nearing capacity. Therefore, identifying sites that contain the environmental factors that favour kākāpō survival and reproduction is an important task. Additionally, finding new habitat sites will help mitigate catastrophe risks and may be used for kākāpō advocacy. The purpose of this research is to assess the habitat suitability of Maungatautari Ecological Island as a potential site for the reintroduction of kākāpō, specifically assessing the density of selected tree species known to induce nesting; and modelling habitat suitability based on key habitat features known to influence kākāpō distribution.

A total of 260 adult trees were identified during a distance line transect survey DISTANCE analysis and were used to estimate the density of key tree species across Maungatautari. A maximum distance a priori was set at 100 m and so only trees observed within 100 m of the transect line were recorded. An a priori for the minimum diameter at breast height (DBH) was also set at 30 cm. The results of this analysis found density estimates of 1.113 stems/ha for adult rimu and 2.310 stems/ha for other key adult tree species across the entire study area. These findings are not at all comparable to the stem densities estimated on Whenua Hou/Codfish Island where kākāpō already inhabit and have successfully bred. However, although rimu and other key tree species occur at higher densities on Whenua Hou, the Whenua Hou tree population are most probably much smaller in size in comparison to those on Maungatautari. This suggests that a comparison of basal areas or size distributions between the two sites would indicate that rimu may be closer in biomass to Whenua Hou than in density.

Abstract

Therefore, based on these comparisons of density, we should not discredit that rimu and other key tree species may occur on Maungatautari at sufficient levels to at least induce breeding attempts by female kākāpō if they were to be reintroduced.

This research also combined GIS spatial analysis tools with multi-criteria evaluation (MCE) methods to create a model of habitat suitability which can be used to identify the areas of Maungatautari most likely to sustain kākāpō and support their breeding. The computed habitat suitability map predicted that suitable and moderately suitable breeding habitat for kākāpō occupied 5% and 3% of the mainland island's area respectively. These areas of suitable and moderately suitable habitat occurred predominantly in the southern regions and in some central regions of the mountain at moderate to high altitude levels. I predict that these areas of the mountain are likely to provide the most adequate sustenance and support for kākāpō survival and breeding, particularly in low podocarp mast years. Habitat located at low altitudes, around the outer regions of the mountain, and in gullies in the central regions are predicted to be unsuitable for breeding, particularly in years when podocarp and rimu fruit supply is limited. Areas predicted to be unsuitable for kākāpō occupied 77% of the total area on Maungatautari. To increase the likelihood of a successful reintroduction to Maungatautari, it is necessary to release kākāpō into areas likely to support survival and breeding. Therefore, I recommended that the first cohort of reintroduced kākāpō should be released in the southern and central regions of the mountain at moderate to high altitude levels prior to any other region of Maungatautari. Additionally, modifications need to be made to the existing Xcluder™ fence prior to a reintroduction to prevent kākāpō from climbing outside of the sanctuary boundaries.

Acknowledgements

I would like to acknowledge a number of people for their continuous support during the various stages of this study, without whom this research would not have been possible. Firstly, I would like to thank my supervisor, Prof. Doug Armstrong, for his academic advice, expertise and constructive feedback throughout this thesis. I would also like to acknowledge the input and support from my co-supervisors, John Innes and Andrew Digby.

I would like to thank those that helped extensively with fieldwork, namely Brooke Donoghue and Ash Rowe for their assistance and long hours with me in the field. A special thanks to Rod Miller for his advice on Maungatautari's monitoring tracks and for organising transport for myself and my field assistants. Also, a big thank you to his team, Warren, Steve, Richard and the rest of the MEIT team for their 4WD skills and transport to my survey track start points each day. I would also like to thank Matthew Lark for assisting with fieldwork permit approval and for coordinating the start date of my fieldwork with the MEIT team.

A special thank you to the Department of Conservation's Kākāpō recovery team and the Waipa District Council for their financial support that helped make this study possible.

Finally, a heartfelt thank you to my family and friends for their continuous support over the years, particularly during my Masters study. A special thank you to my parents, Vince and Carol for always supporting all of my endeavours and encouraging me in every aspect of life.

Table of Contents