The effect of conservation management on Little Blue Penguins (*Eudyptula minor*) on North Island, New Zealand

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

Masters of Science

in

Conservation Biology

at Massey University, Auckland

New Zealand.

Mark Ian Lowe

2009

ACKNOWLEDGEMENTS

In completing this thesis I would like to acknowledge the following people for their direct input into this study. In addition to the names mentioned here, there are many more people that could also be mentioned for their help and support throughout the study.

I would like to acknowledge the input and support from my Supervisor, Dr. Weihong Ji, co-supervisor, Associate Professor Dianne Brunton and Advisor Dr. Tim Lovegrove. I would also like to acknowledge those that helped extensively with field work, namely Clementine Connor and Monique Van Rensberg. A special thanks to Jacqueline Geurts for teaching me how to band Little Blue Penguins and carry out necropsies. Thanks to Dr. Andre Chiardia and Dave Huston for their willingness to provide expert knowledge on the subject of Little Blue Penguins. I would also like to acknowledge Assoc Prof. John Cockrem and Jane Candy for carrying out the hormone assays and the contribution of their expert knowledge. A special thanks to the Auckland Regional Council and Massey University for the funding that helped make this study possible.

Ethics approval for all research described in this thesis has been obtained from the University Ethics Committee

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ABSTRACT

This study aimed to fill a gap in research, particularly on the size of breeding populations of Little Blue Penguins in the North Auckland area, while also providing recommendations for the conservation management of Little Blue Penguins. Three sites North of Auckland were used for the majority of this study; Tawharanui North, Tawharanui South and Goat Island

The abundance and nest density of Little Blue Penguins was estimated for the three sites north of Auckland. All three sites had a very low nest density: 0.0096 nests/100m^2 at Goat Island, 0.0064 nests/100m^2 at Tawharanui North and 0.0048 nests/100m^2 at Tawharanui South. Abundance showed a similar trend, with Goat Island having the highest average number of birds coming ashore over the year (2.25 birds per night), followed by Tawharanui North (1.81 birds per night) and finally Tawharanui South (1.19 birds per night).

Habitat surveys were conducted at the three sites and differences in habitat structure were found between all three. Tawharanui North was predominantly sand and flax and Tawharanui South was predominantly pebbles and scrub, while Goat Island displayed mostly sand with no vegetation. The results suggested that grass and boulders make up the Little Blue Penguins' preferred nesting habitat and it was predicted that sites containing more of this habitat type would have higher nest densities and abundance, although small sample sizes prevented this from being validated statistically.

The nest success was calculated, again for the three sites, using the Mayfield method. The key results showed that the incubation period was associated with the lowest success rate of any of the nesting stages observed. Success rates for the incubation stage at the three sites fell

between 0.11 and 0.66, success rates for the guard stage fell between 0.74 and 1.00, and success rates for the post-guard stage fell between 0.62 and 1.00. Findings also revealed that nest success was greater at the two Tawharanui sites (where similar rates of nest success were observed) than at the Goat Island site

The number of carcasses recovered was recorded as follows: Goat Island, 0.67 birds/km; Tawharanui North, 0.63 birds/km; and Tawharanui South, 0.43 birds/km. There was no statistically significant difference between the rates of carcass recovery and the study site, nor was there a statistically significant difference between the rates of carcass recovery and the season. The rates of carcass recovery were also determined to be lower than historically found for these sites.

As an aside to the rest of this study the acute stress response of Little Blue Penguins to pit tag and metal flipper band application was assessed through measuring corticosterone levels in the blood of the birds. The results showed that implantation of a pit tag produced a significantly greater acute stress response than banding with the traditional metal flipper bands.

This study makes recommendations regarding the study and conservation of Little Blue Penguins. These recommendations are found throughout this thesis; however, key recommendations are repeated here for convenience.

- Re-assess density and abundance measures for the Tawharanui and Goat Island sites in 5 to 10 years time

- Research what makes a particular habitat type more preferable than another for Little Blue Penguins
- Place nesting boxes around the Tawharanui coast to increase suitable nesting habitat
- Carry out ongoing carcass recovery observations and necropsies on penguin populations in Auckland to better understand the causes of mortality
- Engage in further study regarding both the acute and chronic stress levels induced by different identification techniques
- Engage in further study into possible alternatives to both pit tags and metal bands for penguin identification
- Protect Little Blue Penguins from predators on the mainland where possible