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Applying Structured Decision Making to management of the reintroduced hihi population in Bushy Park

Female hihi. Photo by Author.

A thesis presented for the degree of

Master of Science in Conservation Biology

at Massey University, Palmerston North, New Zealand.

Iuliia Panfylova

2015
**ABSTRACT**

The use of Structured Decision Making (SDM) for choosing optimal management actions in reintroduction projects has been recently pioneered by the North American whooping crane *Grus americana* programme. SDM requires projecting population dynamics under different scenarios to predict outcomes of management strategies. In this thesis, I applied SDM to a population of an endangered New Zealand forest bird, the hihi *Notiomystis cincta*, which was reintroduced to Bushy Park in March 2013 when 44 birds were released. My aim was to determine the optimal management of the Bushy Park population.

The need of this decision was triggered by Bushy Park Trust application for additional translocation of 15 females in order to reinforce the population. The Hihi Recovery Group developed four fundamental objectives, which included maximizing the number and persistence of female hihi in Bushy Park as well as to minimize the impact on the source population on Tiritiri Matangi Island and minimizing costs; and three management alternative actions, including the status quo and follow-up translocations of 15 females in either 2015 or 2016.

In order to project population dynamics under each alternative, I estimated the survival and reproduction rates of the Bushy Park population based on the 18 months of the monitoring data. Comparison of the survival rates of translocated juveniles and juveniles that were born in Bushy Park allowed distinguishing between age and post-release effects. Modelling indicated that translocated juveniles experienced post-release effects that resulted in the rapid population decline during the first 6 months. Survival rates were then used in population viability analysis in program OpenBUGS. An integrated population model was designed to model fecundity and the Bushy Park population dynamics over 10 years under the above-mentioned management alternatives. The median projections suggested a slow decline of the population under each management alternative, but with great uncertainty.

I used the novel approach for decision analysis, whereby uncertainty was incorporated into the decision. In one single model I combined the released population, the source population and the Simple Multi-Attribute Rating Technique for decision analysis. This approach showed that none of the alternatives were clearly preferred and the decision was sensitive to uncertainty in the projections.
ACKNOWLEDGEMENTS

I would like to express the deepest appreciation to my supervisor, Professor Doug Armstrong, who introduced me to New Zealand’s unique nature, which I was unfamiliar with. He also introduced me to and encouraged me to learn conservation modelling and programming in OpenBUGS. The later became the biggest part of my thesis. He provided me with constant help and support not only in my research project, but also in my personal life. Without his guidance, persistent help and encouragement this thesis would not have been possible.

I would like to thank my co-supervisor Professor Isabel Castro, who deepened my knowledge about hihi, their biology, behaviour and diseases. She was understanding, responsive and ready to help me anytime.

I would like to thank my co-supervisor Professor Peter Frost, who provided me with a database of hihi sightings and kept me up to date with what was going on in Bushy Park between my visits.

A great thank you to Chris Devine, Ellis Bemelman and Bushy Park volunteers for offering access to hihi monitoring data collected from the reintroduction until the end of the first breeding season. When combined with my own monitoring data, these data allowed me to model hihi survival and finish my research project in one year.

The next thank you goes to the Chair of Hihi Recovery Group, John Ewen, who helped me a lot with Chapter 4 and guided the Structured Decision Making (SDM) process. I also want to thank members of the Hihi Recovery Group who took a part in the elicitation of weights for Chapter 4 and were very understanding as time was limited.

In addition, I want to thank Allan Anderson, the board member and Project Convenor for his hospitality and making my field work in Bushy Park easier and more comfortable in many ways.

Thank you Donal Smith for introducing me to hihi and other New Zealand birds on Tiritiri Matangi Island and for teaching me how to identify birds by colour bands. Thank you Samuel Wright for driving me to Bushy Park and helping in my field work.

I would also like to thank for the financial support granted through the Julie Alley Bursary.

Finally the biggest thank you to my family, my husband Iaroslav, my mum Viktoria, my stepfather Viktor, Alla and Max Panfilov, Elena and Valentin Panfilov, and my father Yuri, who believe in me and whose financial support gave me this amazing opportunity to study at Massey University in New Zealand.
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