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**An evaluation of the conservation of New Zealand's
threatened biodiversity**

Management, species recovery and legislation

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

Doctor of Philosophy

In

Ecology

at Massey University, Auckland,

New Zealand

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2010

Frontispiece



New Zealand endemic Pateke, brown teal *Anas aucklandica*

Photo: Mark Seabrook-Davison

This thesis is dedicated to my Great Uncle

Lieutenant E.B (Teddy) Davison

Wildlife Field Officer, Wildlife Division (1945-1956)

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Abstract

It is only recently that New Zealand wildlife managers have become aware of both the taxonomic range of New Zealand's indigenous biodiversity and the number of species threatened with extinction. The entire New Zealand archipelago has been described as a biodiversity hotspot; a term with both negative and positive connotations as although its biodiversity is unique and diverse, it has lost three quarters of its primary vegetation and much of its remaining endemic biota is in decline. This thesis evaluated aspects of New Zealand's approach to the management of biodiversity with an emphasis on methods used in the recovery of threatened species. Possible solutions are presented that New Zealand could investigate to improve the delivery of species recovery. A survey was conducted amongst Department of Conservation (DOC) staff to investigate management tools available to them. Results suggest that inadequate resources, staff shortages and an overwhelming workload have resulted in a failure to achieve comprehensive recovery of threatened species. A review of New Zealand wildlife conservation legislation and a comparison with the USA Endangered Species Act 1973 and Australian Environment Protection and Biodiversity Conservation Act 1999, suggests that a lack of dedicated threatened species legislation is hindering the effective recovery of New Zealand's threatened species.

The thesis concludes that New Zealand has the advantage of a large conservation estate but lacks an integrated national management approach to the conservation of its biodiversity. Considerable improvement of the management and recovery of threatened species can be achieved with the enacting of dedicated threatened species legislation.

Keywords: Threatened species, biodiversity, biodiversity hotspot, conservation, management, recovery plans, recovery groups, Department of Conservation, legislation,

threat classification system, listing, ecological function, ecosystem services, staff
survey, New Zealand

Preface

Thesis outline

The overall aim of this thesis was to examine the status of New Zealand's threatened species and to evaluate approaches to their management and recovery. Specific objectives were to evaluate the effectiveness of the Department of Conservation (DOC) in its role as New Zealand's principle conservation agency and to identify the strengths and weaknesses of the conservation tools available to DOC. New approaches to conservation biology such as improving the efficacy of pest control and the use of molecular analysis in taxonomic classification were investigated. A comparison of New Zealand's wildlife management legislation is made with that of the United States of America (USA) and Australia.

A number of methods have been used to achieve the objectives of this research including literature searches, field-based study, laboratory analyses and surveys.

Thesis structure

The thesis is comprised of four research chapters (Chapter Two to Five) with an introductory chapter (Chapter One) and a chapter (Chapter Six) detailing the overall conclusions and recommendations. The research from Chapters Three, Four and Five has all been published. Additional to the research for my thesis, I conducted molecular analysis into the phylogeny and taxonomy of the Australasian *Coturnix* quail complex and the published paper is included as an appendix at the rear of the thesis.

I have followed the protocol of Massey University by presenting all my research as independent research chapters. My supervisors, Assoc. Prof. Dianne Brunton and

Dr Weihong Ji are co-authors of all published papers resulting from these chapter manuscripts. Their assistance has been invaluable with experimental design, fieldwork logistics and statistical analysis. My advisors, Dr Leon Huynen, Prof. John Craig, Dr Graham Ussher and Ray Walter have provided me with advice and assistance with equipment design, molecular analysis and computer modelling. The contents of each chapter are as follows:

Chapter One: Introduces the research question of the thesis and reviews New Zealand and international literature relevant to the topic. This chapter also highlights the description of New Zealand as a biological hotspot and the uniqueness of its biodiversity.

Chapter Two: This chapter presents the results of a survey conducted amongst a sample of people domiciled in Auckland; representing New Zealand's largest population centre to gauge their perception of government spending on conservation. The survey was conducted according to the regulations of the Code of Ethical Conduct of the Massey University Human Ethics Committee which deemed the survey low risk. The survey questionnaire was designed by M. N. H. Seabrook-Davison. The manuscript resulting from this research has been submitted to the *New Zealand Journal of Ecology*. and co-authored by W. Ji and D. H. Brunton. The survey questionnaire is attached as

Appendix 7.1.

Chapter Three: This chapter presents the results of a survey conducted with New Zealand Department of Conservation (DOC) Biodiversity Assets staff responsible for the management and recovery of threatened species. The survey was conducted according to the regulations of the Code of Ethical Conduct of the Massey University Human Ethics Committee protocol #: 07/055. The aim of this chapter was to survey the

opinion of conservation workers directly involved in the management of threatened species and to identify the strengths and weaknesses of the management tools available to them. The open-ended questionnaire was designed by M. N. H. Seabrook-Davison. Questionnaires were distributed to DOC staff by the Conservator of each DOC conservancy. Analysis was conducted by M. N. H. Seabrook-Davison with assistance from D. H. Brunton. This chapter is based on a published paper: Seabrook-Davison, M.N.H; W, Ji; Brunton, D.H. 2010. Survey of New Zealand Department of Conservation Staff involved in the management and recovery of threatened species *Biological Conservation*. Vol. 143 pp. 212-219. The manuscript was written by M. N. H. Seabrook-Davison with the published paper co-authored by W. Ji and D. H. Brunton and improvements provided by K. A. Stockin, G. Taylor and G. Ussher. The survey questionnaire is attached as Appendix 7.2.

Chapter Four: This chapter presents a review of New Zealand's threatened species legislation. This research had two aims; 1) to identify and evaluate New Zealand government statutes enacted for the management, recovery and protection of threatened species and, 2), to assess the appropriateness of using the USA Endangered Species Act 1973 (ESA1973) and the Environment Protection and Biodiversity Conservation Act 1999 (EPBC1999) of Australia as models to create legislation in New Zealand dedicated to the recovery of threatened species. Surveys were conducted to obtain the opinions of experts on the operation, strengths and weaknesses of the ESA1973 and EPBC1999. Surveys were designed and implemented by M. N. H. Seabrook-Davison with all correspondence with respondents conducted by email. The manuscript for this chapter was written by M. N. H. Seabrook-Davison and the published paper was co-authored by W. Ji and D. H. Brunton. Seabrook-Davison, M.N.H; W, Ji; Brunton, D.H.

2010. New Zealand lacks comprehensive threatened species legislation – comparison with legislation in Australia and the USA. *Pacific Conservation Biology*, Vol. 16.

Chapter Five: Chapter five discusses the future direction for the conservation of New Zealand's biota. This chapter was the basis of a published response to the recent publication: L. N. Joseph, R. F. Maloney, S. M. O'Connor, P. Cromarty, P. Jansen, T. Stephens, H. P. Possingham (2008) *Improving methods for allocating resources among threatened species: the case for a new national approach in New Zealand*. *Pacific Conservation Biology* Vol. 14, issue 3, pp 154-158. The response: *Future direction for the conservation of New Zealand's biodiversity (2009)* was written by M. N. H. Seabrook-Davison, co-authored by W. Ji and D. H. Brunton and published in *Pacific Conservation Biology* Vol. 15, issue 3, pp. 153-157.

Chapter Six: Presents the overall conclusions of the research and provides recommendations on suggested improvements for the management of New Zealand's biodiversity and threatened species.

Acknowledgements

I sincerely thank my supervisor Associate Professor Dianne Brunton who has guided me through my studies and the challenges faced over the last four years. Dianne has always provided invaluable advice and has fully involved herself with my research. I have always appreciated Dianne's decisive manner where there is always a solution to any research problem. She never stops to amaze me that she finds time to regularly provide us with her home cooking and produce from her extensive garden.

I appreciate the additional supervision from Dr Weihong Ji and Dr Graham Ussher. Weihong's door is always open and she has a refreshingly forthright way in suggesting how research findings should be presented. Graham provided me with practical advice on how not to overcomplicate doctoral research. I have enjoyed receiving his pragmatic supervision which has pushed me to explore novel areas of threatened species management. Dr Mark Orams has provided me with inspiration and guidance, especially at the beginning of my research. Mark's advice on survey methodology enabled me to expand the scope of my PhD.

Dr Rosemary Barraclough and Dr Karen Stockin have always provided me with critical comments of my research writing and I also thank them for providing me with relevant reference material. The wisdom of Professor John Craig helped me decide on the objectives of my research, making me realise that conservation ecology is a dynamic science where controversial ideas should also be considered.

I am grateful to the organisations that have provided the funding for my research. I thank Massey University for my Vice Chancellor's Doctoral Scholarship which has funded most of my research and life for the last four years. Professor Russ Tilman of the Massey University Institute of Natural Resources provided funding for the molecular

analysis of quail. Dr Leon Huynen and Professor David Lambert of the Allan Wilson Centre have provided the time and equipment to assist me with the DNA gene sequencing and phylogenetic analysis of quail. Leon has been a joy to work with and I commend his patience with me as I came to grips with analysing minute molecular solutions and tolerating me continually emailing him asking... "*did the PCR work?*" Thanks are extended to the Supporters of Tiritiri Matangi who helped fund the field research of quail. Two Department of Conservation (DOC) Rangers, Ray and Barbara Walter were the inspiration to commence my doctoral studies. Ray and Barbara have incredible wisdom, wit and affection for wildlife and I thank them for their support of my studies. Jennifer Haslam and Ian Price are two other DOC Rangers who made research on Tiritiri Matangi an enjoyable experience.

My colleagues in the Ecology & Conservation Group are a fantastic bunch of people. My room mates Michael Anderson and Jo Peace have made the PhD experience great fun, sharing research, jokes and really good music. Thanks for the cakes Jo, you are a fantastic cook. I thank Manuela Barry for assisting me with statistical analysis and the boxes of herb tea. Thank you Marleen Baling for being very patient when I wanted a set of tracking tunnels or some other piece of field equipment and thank you for the valuable advice and assistance in preparing my research findings for conferences. Many thanks to Taneal Cope, Clare & Jamie Seabrook-Davison, Marleen Baling, Kevin Parker and Mark Delaney for assistance with fieldwork.

I thank all the museums that have provided tissue samples, photographs and reference material. New Zealand quail samples were supplied by Dr Brian Gill of the Auckland War Memorial Museum, Dr Paul Scofield of Canterbury Museum, Cody Fraser and Sue Michelsen-Heath of Otago Museum. Australian quail samples were supplied by Dr

Gavin Dally of Museum and Art Gallery of Northern Territory and Claire Stevenson of Museum of Western Australia.

Thank you to my family, Jane, Clare and Jamie for their support during my PhD studies. They have been invaluable in assisting me with many aspects of my research. My daughter Clare has always been able to keep my PhD ego in check with comments like this... *"I can think of better ways to use my stress"*. A big thank you to my parents who are never surprised when I take on a new venture.

I dedicate this thesis to the many people who give so much of their time and passion to prevent the extinction of New Zealand's unique species.

Glossary and Acronyms

- BACC** Biosecurity Authority Clearance Certificate. New Zealand ports clearance certificate issued by Ministry of Agriculture and Forestry for the importation of animal or plant products.
- CBD** Convention on Biodiversity. International treaty to protect and promote sustainable use of biological diversity. Concluded at Rio de Janeiro on 5 June 1992.
- CCG** Community conservation groups. Groups of volunteers who are involved in rehabilitating degraded ecosystems and who advocate for sustainable use of natural resources.
- Conservancy** New Zealand is divided into 13 separate conservation management areas or DOC conservancies. Each conservancy has its own Conservator who manages the conservation assets (biodiversity, archaeological, commercial and public access) within the boundaries of the conservancy.
- COSEWIC** Committee on the Status of Endangered Wildlife in Canada. Canadian conservation agency which administers SARA2002 and the management of threatened species.
- CWS** Canadian Wildlife Service of Environment Canada. Conservation agency of Canada.

DEWHA	The Department of the Environment, Water, Heritage and the Arts. Australian department that deals with environment protection and conservation of biodiversity.
DOC	Department of Conservation. New Zealand's principal conservation agency.
DOW	Colorado Division of Wildlife. The agency of the Colorado Department of Natural Resources, a USA state department which administers the management of game species and native biodiversity.
EIA	Environmental Impact Assessment. Reporting tool that predicts the possible impacts of an activity on the natural environment and wildlife
EPBC	Environment Protection and Biodiversity Protection Act 1999. Australian legislation that guides the assessment of natural resource use and directs the conservation of Australia's wildlife.
EPI	Environmental performance index.
ESA	Endangered Species Act 1973 of the United States of America. This is a USA Federal government Act dedicated to the recovery of threatened species and degraded critical ecosystems.
FOC	Fisheries and Oceans Canada. Canadian Federal government ministry administering Canadian fisheries and marine resources.
FWS	USA Fish and Wildlife Service. The USA Federal government agency that manages the conservation of freshwater and terrestrial biodiversity.

GAO	General Accounting Office of the United States of America Federal government
IPCC	Intergovernmental Panel on Climate Change. Scientific organisation with international membership with the objective to provide decision-makers with information about climate change. IPCC was set-up by the World Meteorological Organization (WMO) in association with the United Nations Environment Programme (UNEP).
ISSG	Invasive species specialist group of the IUCN, World Conservation Union.
IUCN	International Union for the Conservation of Nature. A global environmental network of scientists and conservation managers providing information on environmental and development issues.
LINZ	Land Information New Zealand. A government department that provides geographic information about New Zealand.
LIRP	Low impact research permit. Authority granted by Department of Conservation for research to be conducted on wildlife reserves and ecologically sensitive areas of the New Zealand conservation estate.
Listed species	Species that are included on central government registers that are legally assessed as threatened with extinction. Listing process developed by the USA as directed by the obligations under the USA. Endangered Species Act 1973 (ESA1973).

MAF	Ministry of Agriculture and Forestry. A government ministry that administers the agricultural and forestry resources of New Zealand.
MOF	Ministry of Fisheries. A government ministry that administers the fisheries resources of New Zealand.
MFE	Ministry for the Environment. A ministry that advises the New Zealand government on environmental issues.
NGO	Non governmental organisation. Organisations outside national governments with no political affiliations. NGOs tend to be advisory or advocacy organisations which promote social and environmental ideals.
NOAA	National Oceanic and Atmospheric Administration. A USA Department of Congress agency responsible for the scientific monitoring and research of the marine and atmospheric environments. Responsible for the management and recovery of listed marine species under the ESA1973.
NZ	New Zealand. A south Pacific country, part of Oceania.
NZBS	New Zealand Biodiversity Strategy. A report produced by the Ministry for the Environment as part of New Zealand's commitment as a signatory to the CBD.
NZCA	New Zealand Conservation Authority. An advisory group which advises the Minister of Conservation on planning and policy initiatives that affect the administration of the DOC estate.

NZCPS	New Zealand Coastal Policy Statement. Proposed policy initiatives for the conservation and management of New Zealand coastal environment produced by DOC.
NZT	New Zealand Treasury. A New Zealand public service department that advises the government on monetary issues and economic policy.
OSNZ	Ornithological Society of New Zealand. A society with nationwide membership who conduct regular quantitative bird surveys. Results of their surveys and research is published in the journal <i>Notornis</i> .
PCE	Parliamentary Commissioner for the Environment. A New Zealand public service office independent of the government which has the power to investigate issues of environmental concern.
PPP	Project prioritisation protocol. A model developed by Joseph <i>et al.</i> , 2009 for prioritising recovery funding to threatened species. [Joseph, L. N., Maloney, R. F., Possingham, H. P., 2009. Optimal Allocation of Resources among Threatened Species: a Project Prioritisation Protocol. <i>Conservation Biology</i> 23: 328-338]
RMA	Resource Management Act. New Zealand legislation that controls the use of natural resources and directs the issuing of building and land use permits.
SARA	Species At Risk Act 2002. Canadian Federal government act that directs the conservation and recovery of threatened species.

SOTM	Supporters of Tiritiri Matangi. A New Zealand community conservation group who in partnership with the New Zealand Department of Conservation (DOC) have created the Tiritiri Matangi Scientific Wildlife Reserve.
SRG	Species recovery groups are composed of DOC staff and other experts who develop TSRPs and programmes for the recovery of threatened species.
TTM	Tiritiri Matangi. A New Zealand wildlife reserve established by DOC as an open sanctuary with public access to some of New Zealand's most threatened species.
TSRP	Threatened species recovery plans are produced by DOC to guide the recovery of threatened species.
UNEP	United Nations Environment Programme
USDI	United States Department of the Interior. A USA Federal government department that administers aspects of the Endangered Species Act 1973.
WMO	World Meteorological Organization
WWF	World Wildlife Fund. An international non-governmental organisation that raises awareness of threatened species and inhumane practices involving wildlife.

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