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Brown Teal (Pateke) diet and its consequences for releases

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

This thesis addresses three research needs central to the conservation of the Brown Teal (*Anas chlorotis*): diet, release and post-release techniques for captive-bred teal, and identifying cause of death.

The diet of wild Brown Teal was studied using gut and faecal analysis, and feeding observations. Teal had a very diverse diet for a dabbling duck: 78 taxa were recorded, including terrestrial, freshwater and marine invertebrates, fungi, and terrestrial and freshwater vegetation. Despite having the bill morphology of a typical dabbling duck, wild Brown Teal were observed prising open the shells of cockles to extract the flesh. Oystercatchers (*Haematopus* spp.) are the only other birds known to use this feeding method.

Wild Brown Teal had a more varied and higher fibre diet than captive teal. The digestive tract is morphologically flexible, and differences between captive and wild diets can cause differences in birds' gut morphology. The size and mass of the digestive organs (proventriculus, gizzard, small intestine, caeca, rectum and liver) of 57 wild, 7 captive and 4 captive-bred released teal were compared. Captive Brown Teal had much shorter and lighter small intestines and caeca than wild teal. These differences could reduce the ability of captive-bred teal to efficiently digest a wild diet. Increased fibre and diversity in the captive diet, plus supplementary feeding post-release, are recommended.

Little is known of the causes of mortality in captive-bred Brown Teal released to the wild. A method to detect starvation using the wing fat content of Brown Teal was developed. Lipids were extracted from four outer wing components of 17 intact teal carcasses. The lipid content of each component reflected the birds' nutritional condition (based on body mass and size, and visible fat). Lipids were also extracted from the outer wing components of seven partial Brown Teal carcasses, six of which were from captive-bred released birds. All of the released teal were found to have been in very poor nutritional condition, identifying starvation as the cause of death. Starvation was also identified as the cause of death for six wild juvenile teal from Great Barrier Island. Human-induced changes to the landscape may limit food availability for wild teal, particularly during droughts.

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Preface

Each of the research chapters in this thesis has been written as a paper, two of which are in press. This preface gives references for the two chapters soon to be published and explains the roles of the contributing authors to each of the research chapters and Appendix 2. For each chapter I did the majority of the work, planned and carried out the research, and analysed and wrote up the results. My supervisors were Ed Minot and Ian Henderson of Massey University, and John Innes of Landcare Research.

Chapter 2 The diet of North Island Brown Teal

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Ian Henderson assisted with invertebrate identification for gut and faecal samples, as well providing editorial and statistical advice. Colin Webb identified the seeds found in the gut samples. Phil Battley accompanied me during some field work on Great Barrier, assisted with initial dissections, helped identify bivalves and estimate shell length from hinges, and provided editorial advice.

Chapter 3 Cockle-opening by a dabbling duck, the Brown Teal

Co-author: Phil F Battley, Department of Mathematics and Statistics, Otago University.

Phil and I both observed teal feeding on cockles. Phil helped measure bivalve densities at Akapoua Bay, and gave editorial advice. This chapter is in press:

Moore, S.J. and P.F. Battley. 2003. Cockle-opening by a dabbling duck, the Brown Teal. *Waterbirds* 26(3): 331-334.

Chapter 4 Digestive organ morphology of wild and captive Brown Teal and implications for releases

Co-author: Phil F Battley, Department of Mathematics and Statistics, Otago University.

Phil Battley assisted with the initial carcass dissections, and later provided statistical and editorial advice.

Chapter 5 The use of wing remains to determine condition before death in Brown Teal

Co-author: Phil F Battley, Department of Mathematics and Statistics, Otago University.

Phil Battley assisted with initial dissections. He demonstrated how to use the Soxhlet apparatus, and helped set it up for the first batch of wing components, later Phil provided statistical and editorial advice. This chapter is in press:

Moore, S.J. and P.F. Battley. 2003. The use of wing remains to determine condition before death in Brown Teal (*Anas chlorotis*). *Notornis* 50: 133-140.

Appendix 2. Pateke/Brown Teal Monitoring, Okiwi Basin, Great Barrier Island, August – November 2001.

Co-author: Phil F Battley, Department of Mathematics and Statistics, Otago University.

This appendix was originally written as a report to the Department of Conservation, as part of a contract position we shared on Great Barrier Island.

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