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The Foraging Ecology of Non-breeding Wrybills (*Anarhynchus frontalis*) in the Firth of Thames

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Abstract

The Firth of Thames in the North Island of New Zealand is one of the most important wintering sites for Wrybills (*Anarhynchus frontalis*), second only to the Manukau Harbour. Together these two estuarine areas support approximately 85% of the entire Wrybill population between late summer and early spring each year. While the breeding biology and ecology on their braided river breeding grounds in the South Island have been well documented, the foraging ecology of Wrybills in their non-breeding habitats has not been deeply studied. Wrybills possess a uniquely shaped bill considered to be an adaptation to their life on the South Island braided rivers during their breeding months. However, despite this they use their bill very effectively on the tidal flats of their winter habitats. In this thesis I studied the foraging ecology of Wrybills in the western Firth of Thames, with a focus on the factors affecting their low-tide feeding distribution, and how diet and intake rates varied with foraging mode.

The distribution of foraging Wrybills was correlated with a number of environmental variables (sediment type, sediment softness, water content, and polychaete abundance and biomass). Foraging Wrybills showed a preference for areas of tidal flat close to shore with soft sediment and high polychaete biomass.

Wrybills exhibited different foraging modes that were used in areas with different environmental conditions. Birds fed (1) visually, walking slowly and obtaining most of their biomass intakes from large polychaete worms, (2) by tactile means, capturing mainly small worms or (3) a combination of the visual and tactile methods. Visual feeding tended to occur in drier, sandier sediments and tactile in wetter, muddier areas close to shore. Despite proportionately different intakes of large and small polychaete worms across the different foraging modes, the total biomass intake rates were similar. In addition to polychaete captures, tactile foragers in particular frequently took mouthfuls of sediment, an action which raised the possibility that they may be feeding on surficial biofilm. Stable isotope analysis of Wrybill faeces, blood and feathers revealed some evidence of biofilm feeding in Wrybills at the Firth of Thames.

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Table of Contents

Abstract.....	i
Acknowledgments.....	ii
1 General Introduction.....	1
1.1 Introduction.....	1
1.2 Wrybills.....	2
1.2.1 Bill Morphology and Use.....	3
1.2.2 Wrybill Feeding in the Firth of Thames.....	6
1.3 Shorebird Feeding Ecology.....	9
1.3.1 Biofilm Feeding.....	9
1.4 Stable Isotope Analysis in Ecology.....	11
1.5 Thesis Outline and Structure.....	12
2 The Feeding Distribution and Activity of Wrybills (<i>Anarhynchus frontalis</i>) in the Firth of Thames in Relation to Environmental Factors.....	14
2.1 Abstract.....	14
2.2 Introduction.....	14
2.3 Methods.....	16
2.3.1 Study Site.....	16
2.3.2 Wrybill Counts.....	18
2.3.3 Sample Collection.....	18
2.3.3.1 Sediment Samples.....	18
2.3.3.2 Polychaete Worm Samples.....	18
2.3.3.3 Penetrometer Readings.....	19
2.3.4 Sample Analysis.....	19
2.3.4.1 Sediment.....	19
2.3.4.2 Polychaete Worms.....	20
2.3.5 Distribution Maps and Balloon Plots.....	21
2.3.6 Correlation Test.....	21
2.3.7 Data Modelling.....	21
2.4 Results.....	22
2.4.1 Wrybill Foraging Distribution.....	22
2.4.2 Environmental Factors Distribution.....	22
2.4.3 Polychaete Worm Size and Frequency.....	25

2.4.4	Model Selection	28
2.5	Discussion.....	30
3	Different foraging modes and evidence of biofilm feeding in Wrybills (<i>Anarhynchus frontalis</i>) at the Firth of Thames.....	35
3.1	Abstract.....	35
3.2	Introduction	35
3.3	Methods.....	38
3.3.1	Study Site	38
3.3.2	Videoring of Wrybills	39
3.3.2.1	Video Recording	39
3.3.2.2	Video Analysis	39
3.3.2.3	Graphics and Statistical Analysis.....	40
3.3.3	Stable Isotope Sample Collection	40
3.3.3.1	Water Samples	41
3.3.3.2	Polychaete Samples	41
3.3.3.3	Sediment Samples.....	41
3.3.3.4	Biofilm Samples.....	41
3.3.3.5	Blood, Feather, and Faeces Samples.....	42
3.3.4	Stable Isotope Preparation	43
3.3.4.1	Water	43
3.3.4.2	Polychaetes	44
3.3.4.3	Sediment and Biofilm.....	44
3.3.4.4	Blood	44
3.3.4.5	Feathers	44
3.3.4.6	Faeces.....	45
3.3.5	Stable Isotope Analysis	45
3.4	Results.....	46
3.4.1	Video Results.....	46
3.4.1.1	Distribution of Different Foraging Modes.....	46
3.4.1.2	Differences between Foraging Modes.....	46
3.4.2	Handling Times of Polychaete Worms.....	51
3.4.3	Stable Isotope Results.....	51
3.5	Discussion.....	54
3.5.1	Foraging Modes	54

3.5.2	Diet Composition	56
4	General Discussion	60
5	References.....	67