



THE BEHAVIOUR OF THE BANDED DOTTEREL,

*CHARADRIUS BICINCTUS*

Mary Bomford

A thesis submitted for the degree of

Master of Science in Zoology

at the University of Otago, Dunedin,

New Zealand.

1978

## TABLE OF CONTENTS

	<u>Page</u>
<u>CHAPTER 1</u> - INTRODUCTION	1
<u>CHAPTER 2</u> - ARRIVAL, TERRITORIAL BEHAVIOUR AND AGGRESSION	6
I Pre-breeding Flocks	6
II Establishment of Breeding Territories	8
III Threat-displays and Fights	9
IV Interspecific Aggression	14
V Territorial Flight-displays	16
<u>CHAPTER 3</u> - COURTSHIP AND SCRAPE-MAKING	20
I Scrape Ceremonies	20
II Coition and Associated Displays	23
III Choice of a Nest Site	25
IV Nest Dimensions and Lining	29
<u>CHAPTER 4</u> - LAYING, INCUBATION, HATCHING AND CHICK REARING	31
I Laying	31
II Incubation	33
III Change-over Behaviour	39
IV Re-nesting	43
V Hatching	43
VI Brooding and Behaviour of Chicks	44
<u>CHAPTER 5</u> - REACTIONS TO PREDATORS	48
I Types of Predators	48
II Camouflage of Nest, Eggs and Chicks	49
III Chick Reactions to Predators	51
IV Parent Escape Behaviour and Alarm-calls	54
V Distraction-displays	57

	<u>Page</u>
VI Nesting Success	63
VII Responses to Predators of Non-breeding Flocks	66
<u>CHAPTER 6 - FEEDING AND MAINTENANCE BEHAVIOUR</u>	70
I Daily Routine	70
II Maintenance Activities and Resting	77
III Aggression in Non-breeding Birds	79
IV Feeding Habitats and Sampling at Lake Wainono	80
V Feeding Methods and Responses to Changes in the Environment	85
VI Feeding in the Cass River Delta Study Area	91
<u>CHAPTER 7 - SUMMARY AND CONCLUSION</u>	98
<u>REFERENCES</u>	101

## LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
1. The Lake Wainono Study Area	4
2. The Cass River Study Area	5
3. A Banded Dotterel Running in the Horizontal Threat Posture	10
4. A Banded Dotterel in the Upright Threat Posture	11
5. A Courtship Bowing Display	21
6. The Arrrival of the Female in a Scrape Ceremony	21
7. The North Bed Nesting Grounds	26
8. Dates for Laying of the First Egg	32
9. A Typical Nest Scrape during Laying	34
10. Dates for the Start of Incubation	35
11. Shading of the Eggs on a Sunny Day	37
12. A Typical Incubating Nest	40
13. A Female Banded Dotterel Head-bowing during a Change- over Display	42
14. (A) Two Eggs and a Chick in a Nest Scrape	50
(B) A Chick Crouched Motionless	50
15. The "Spread-eagled Posture" Distraction Display	61
16. A High Intensity Distraction Display	64
17. A Banded Dotterel Tilting its Head to Check the Sky for Aerial Predators	67
18. The Two-wing Stretch	69
19. The Percentage of Banded Dotterels Feeding in Lake Wainono Flocks	71-75
20. A Banded Dotterel Head Scratching	78
21. A Banded Dotterel Resting	78

Page

22. Changes in Flock Sizes at Lake Wainono	90
23. Changes in Prey Availability on the Breeding Grounds	95

## LIST OF TABLES

<u>Table</u>	<u>Page</u>
1. Feeding, Preening and Resting Times	76
2. Salt-marsh Sampling Results	82
3. Results of Water-edge Sampling at Maori Lake	84
4. Mudflat Sampling Results	84
5. Pasture Sampling Results	86
6. Feeding Behaviour in Different Habitats	87
7. Opportunistic Feeding	89
8. Weights and Numbers of Prey Species on the Breeding Grounds	93
9. Species Composition of Prey Animals on the Breeding Grounds	94

## CHAPTER 7

## SUMMARY AND CONCLUSION

Small numbers of Banded Dotterels were present on the Cass River delta throughout the year. Migrating birds began arriving in July, and in early August pair-bonded birds started occupying territories on the stable shingle riverbeds. Territorial ownership was established with threat-displays given by both members of the pair towards intruders and with flight-displays by the male. The typical behaviour in both these displays is described.

Courtship activities and trial scrape-making started upon occupation of a territory. The male made trial scrapes and invited the female to inspect them. This behaviour, and that during coition and its preliminary displays, is described. Comparisons are made with related species and these indicate that the Banded Dotterel is a typical *Charadrius* plover in its mating behaviour. In choosing a nest site Banded Dotterels selected a location on level ground where the shingle was stabilized by mat-plants, with good all-round visibility. The male lined the nest-scraps with small pieces of stones and vegetation.

Laying commenced in August and continued until December on the Cass River delta, with peak laying in late September and early October. Eggs were laid at average intervals of three days to a normal clutch of three. The start of incubation varied, commencing earlier in the laying period as the season progressed. The female did 82% of the incubating and the incubation period averaged 26.5 days  $\pm$  one day.

Forty-three per cent of all eggs hatched and two nests were observed when a chick was hatching. Chicks left the nest as early as a few hours after hatching if the weather was fine. Chicks and parents stayed in the territory until the chicks fledged at five to six weeks of age. After chick-fledging, family parties joined social feeding flocks.

The potential predator species are listed. The response of Banded Dotterels to predators was typical of the *Charadrius* genus. They relied mainly on camouflage to protect the nest and eggs. Chicks relied on cryptic plumage for camouflage and remained motionless when a predator approached. Banded Dotterel parents often gave distraction-displays when a human approached the nest or chicks. These displays were most frequent and intense at the time of hatch and also when a chick gave an alarm call. Distraction-displays involved false-brooding, injury feigning and, questionably, small mammal imitations. Breeding adults responded to aerial predators by taking flight and circling, giving alarm-calls. In the non-breeding season Banded Dotterels showed a purely escape response to all predators, flying up and circling in a closed flock.

On the Cass River delta, breeding Banded Dotterels and their chicks fed on the dry shingle riverbeds. Potential animal prey species were sampled and showed a highly significant increase in dry matter per unit area at the beginning of the breeding season. The stomach and intestine contents of one Banded Dotterel chick were examined and contained the remains of many fruit and seeds from a small mat-plant *Muehlenbeckia axillaris*.

Banded Dotterels were studied in the non-breeding season at Lake Wainono. The birds spent an average of nine hours feeding per day



and this was independent of daylength. The time spent preening and resting during daylight decreased with shortening daylength. Preening behaviour is briefly described. Salt-marshes, mudflats, water-edge habitat and pasture were all exploited for food by Banded Dotterels and these habitats were sampled for available prey species. Feeding methods and feeding rates are described and discussed. Banded Dotterels were very flexible in their feeding routines, rapidly responding to changes in lake level and prey availability by moving to exploit new habitats. Total flock sizes decreased during the study period from a maximum in March to a minimum in June. This reflected the migration of birds away to northern New Zealand and Australia in the non-breeding season.