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## ANNUAL MOVEMENT PATTERNS AND BREEDING-SITE FIDELITY OF THE NEW ZEALAND DOTTEREL (*Charadrius obscurus*)

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### ABSTRACT

A post-breeding flock of New Zealand Dotterels was monitored for 3.5 years at a site on the east coast of Northland, New Zealand. The pattern of flocking and dispersal was the same each year; the flock began to form in January and was at peak numbers in February and March. Birds began to return to their breeding grounds in late March, and two-thirds of those that bred away from the flock site had left by the end of April. Individual colour-banding showed a very high degree of breeding-site and flock-site fidelity. All the adults in the flock bred within a 16 km radius (the central study area) and none was found outside this area during the study. All adults in the central study area visited the flock each year; however, at two other localities in the greater study area a few birds were entirely sedentary on their breeding grounds and did not visit a flock. Breeding territories of birds resident at the flock site changed little between seasons. Unlike many migratory members of the genus *Charadrius*, NZ Dotterels of the northern population showed very high mate-retention from one season to the next, with both members of a pair usually occupying their territory for much of the year.

### INTRODUCTION

The New Zealand Dotterel (*Charadrius obscurus*) is a large, endemic plover with a population estimated at about 1500 and a restricted distribution. Most of the present population (probably about 90%) inhabit the coast of the North Island, north of 38°S. These northern birds frequent sandy beaches and tidal estuaries year-round and breed only on the coast. The southern birds breed on the mountain tops of Stewart Island at 47°S. In the 19th century, large numbers also bred inland in many parts of the South Island and southern North Island, often at high altitude (e.g. Buller 1882, Seebohm 1888).

One well-known characteristic of the species is the annual movement from breeding grounds to post-breeding flock sites. For the southern mountain-breeding birds, this was usually a descent to the coast (Potts 1872),

a pattern still seen on Stewart Island. Sibson (1967) showed that the coastal breeding birds in the Auckland area also gather in post-breeding flocks. He suggested that these flocks were formed mainly from the local breeding pairs and their progeny, there being no evidence of immigration from a distance. Flocks tended to become bigger between January and April and were breaking up by mid-winter. Counts collected by Edgar (1969) suggested similar local post-breeding movements and flocking throughout the northern population. Reed (1981) described the flocking period as short ("lasting approximately from February to early May") and noted that some birds remain in pairs all year round.

Although juvenile birds are known to wander widely (McKenzie 1978, Dowding, unpubl.) very little is known of adult movements other than the basic features of flocking and dispersal. McKenzie (1978), referring to the South Auckland district, noted very little regularity, some birds being sedentary, some moving back and forth in one area and others moving between areas.

Little information has been published on breeding-site fidelity. McKenzie (1978) described two banded pairs, one of which bred in the same locality for three consecutive seasons, the other for two. He cautioned, however, that such behaviour may not be the rule. "The species in general wanders so much that it could well be that most will find mates and breed wherever they happen to be when the breeding season comes round." In contrast, Reed (1981) monitored banded birds on the Mangawhai-Pakiri coast, North Auckland, and concluded that "Once established on a breeding ground, they return to the same area each year."

Although many aspects of the biology of the New Zealand Dotterel have been described in outline, there have been few detailed studies on the species. We have monitored the movements of a group of birds of the northern coastal population to learn more about the timing of flock formation and dispersal, distances travelled, ranges of individual birds, and breeding-site fidelity from one season to the next.

## STUDY AREA

Figure 1 shows the greater study area. During the study, this area contained 130-140 adult NZ Dotterels, roughly 10% of the North island population. Within it, two major post-breeding flocks formed, one at Mangawhai with a usual maximum of 60-65 adults and the other at Omaha with a maximum of 50-55 adults. Most of our observations were made in the central study area, which consisted of the coastline from Poutawa Stream to Beehive Island, including Omaha.

NZ Dotterels of the northern population often nest, roost and form post-breeding flocks on sandspits at the mouths of tidal estuaries or streams. It is likely that NZ Dotterels used the spit at Omaha before humans exploited and developed the area, but the establishment of the present flock seems relatively recent. Counts before 1979 are few but it is clear that the Whangateau Harbour was a feeding ground for the species before the current flock was present. In the 1940s, sand was mined from the spit and dredged from the harbour entrance. Recession of the spit head was first

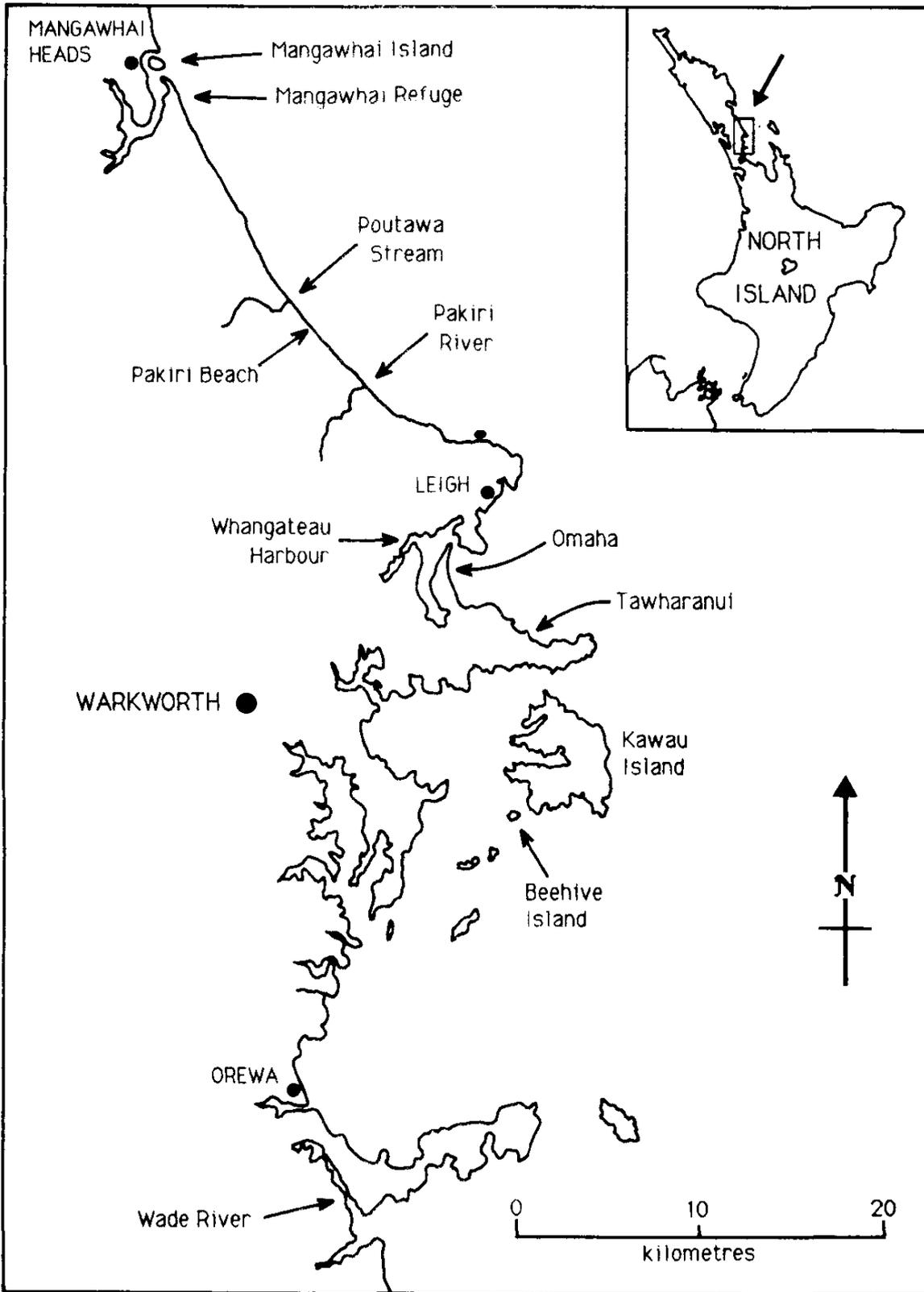


FIGURE 1 — Map of the greater study area. The central study area extends from Poutawa Stream to Beehive Island.

noticed in the 1950s and during the 1960s and 1970s erosion of the beach became increasingly severe and the spit almost disappeared. In 1979, three rock groynes were installed at the mouth of the estuary to reform and stabilise the spit. Most wader species in the area quickly adopted the new spit as

### **Mate fidelity**

We have little information on long-term stability of pair-bonds but two birds banded as a pair in December 1977 at Mangawhai are known to have bred together for at least 10 of the past 12 seasons. In our study, most (if not all) pairs were faithful both during and between breeding seasons. In 1987-88 both birds of three pairs were banded and all these pairings were retained in the following season. In the 1988-89 season 10 such pairs were in the greater study area. All these pairings were retained in the 1989-90 season, giving a total of 13 retained-pair years. In addition, we have not detected an exchange of mates within a breeding season. Of the 28 pairs in the central study area at the start of the 1989-90 season, 23 were recognisable by having one or both birds banded. In 1988-89 we found 27 pairs, of which 18 were recognisable.

### **Flocking**

Fidelity of individuals to the Omaha flock was very high. During our study all banded birds seen at Omaha in any autumn (and known to be alive the following year) returned there the next autumn. Two birds banded before this study began have been seen at Omaha each autumn for the past 8 years. Most birds arrived at the flock between mid-January and mid-February each year (Figure 2), but in a few cases birds arrived as late as mid-March when raising a late brood.

In the central study area birds that bred together also flocked together. Bonded pairs were therefore together for all or most of the year. In a few cases we detected members of a pair arriving to join the flock at different times. In 1989, for example, one member (M-GYR) of a pair which had nested 15 km to the south was first seen at Omaha on 4 February whereas its mate (M-YWB) was not seen there until 26 March. This pattern was repeated in 1990 and the interval was similar; M-GYR was first seen at the flock on 23 January and M-YWB on 17 March.

About 90% of the adult birds in the greater study area visited their flock each year, if only for a short time, but a few pairs appeared to be sedentary. All the banded adult birds breeding in the central study area visited Omaha each autumn during our study. In addition, the local breeding birds at Omaha ceased defending their territories after the breeding season and moved the short distances (up to 400 m) from their territories to roost with visiting birds in the flock. In contrast, in at least two places in the greater study area pairs remained on territory all year round. The four pairs breeding at the Wade River sand-bar were present in all months of the year and were recorded nowhere else; four of the eight birds have been banded for 18 months or more and none was seen elsewhere during the study (average of 18 sightings per bird, range 12-25 sightings). Two or three pairs which bred on Mangawhai Island either remained on territory all year or left so briefly that their absence was not detected, even though a large flock was less than 2 km away.

### **Return to breeding grounds**

Table 1 shows the numbers of banded birds leaving Omaha each month to return to their breeding grounds.

TABLE 1 — Numbers of banded birds leaving Omaha each month to return to their breeding grounds

	1988	1989	1990	Total
March	2	0	3	5
April	4	7	6	17
May	2	1	2	5
June	1	1	2	4
July	0	2	0	2
Total	9	11	13	33

The first birds left towards the end of March, approximately half (17 of 33 bird-years) left during April, and two-thirds (22 of 33 bird-years) had left Omaha by the end of April. Although we have limited data, it appears that birds consistently left the flock early or late. The same six individuals left in late March or April three years in succession; by contrast, two others left late (in June or July) each year, also for three years. Because observations were made at approximately two-week intervals, we have no precise information on whether members of a pair left the flock simultaneously. In 1990, however, four pairs breeding away from Omaha had both members banded; in each pair both birds left during the same two-week interval and it thus seems that partners depart within a short time of each other, if not together. Once birds had dispersed, most remained on or near their territories; although none returned to Omaha for long periods before breeding, we did record a few birds (2 in 1988, 2 in 1989, 1 in 1990) that visited Omaha briefly in June, July or August (see section on 'other movements' below).

At Omaha, where birds breed close to the flock site, the timing of territory occupation was more variable. Perhaps local breeding birds can remain in the flock and easily occupy and defend their territories when necessary. In 1988, for example, we found some birds (not all the same each time) on territory at each visit from the end of April onwards but there was considerable movement of birds back and forth between territory and flock through the winter. In 1989, by contrast, we found no birds on territory at Omaha until July; all territories were occupied by early August and defended from then onwards.

### Breeding-site fidelity

Table 2 shows the pattern of movement to breeding grounds in the central study area and the number of pairs at each breeding locality in the 1988-89 and 1989-90 seasons. All recognisable pairs (i.e. with one or both birds banded) dispersing from Omaha returned to the same stretch of coastline to breed each year. The number of such pairs increased during the study as more birds were banded; the five pairs recognisable in 1986 have all

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