ESTIMATED POPULATION OF THE RED-BREASTED DOTTEREL

By A. T. EDGAR

During 1966-1969 the writer and a team of helpers counted Red-breasted Dotterel *(Charadrius obscurus)* on Northland beaches. When preparing the results of these counts for publication it seemed appropriate to include a selection of previous records from these and other areas, and so to arrive at an approximate estimate of the Red-breasted Dotterel population. The records from which this estimate is compiled are spread over a number of years. Many of them have appeared in *Notornis,* others have been sent to me as contributions to O.S.N.Z. Recording Scheme or in personal correspondence. References to Classified Summarised Notes or Annual Locality Reports in O.S.N.Z. publications are given in abbreviated form, those from Reports and Bulletins 1939-42 thus (RB:13), and those from New Zealand Bird Notes and its successor *Notornis* thus (6:213). Records previously unpublished include the name of the observer, except when the observation is from my own notebooks. By courtesy of Wildlife Branch, Department of Internal Affairs, I have had access to results of counts carried out on Coromandel Peninsula and some Northland beaches in 1964 and in the area of Kaipara North Head in 1968.

The population estimate naturally suffers somewhat in accuracy from the fact that data have been collected over a period of years but is probably a reasonably close approximation. Although the number of dotterel present in an area may show marked seasonal variation in any given year, the indications are that local resident dotterel populations do not alter greatly within the space of a few years, except in special circumstances. For each locality such records as are available and relevant are listed in some detail, as a basis for future field work. The population figures given in brackets after each locality heading are based, as far as practicable, on the number of birds found present during a breeding season.

If beach counts are to be of value as a means of estimating dotterel population it is important that the count should be made at a time when the breeding season is well advanced and at a suitable state of the tide. It may be appropriate to summarise here some information on breeding cycle and feeding habits.

Red birds guarding territory were reported at Ruakaka as early as the second week in May 1951 (5:94) but this is probably exceptional. Territorial behaviour has been reported in June and frequently in July, but at Waipu birds were still not on territory in 28/9/63. Field work has shown that post-breeding movement away from breeding grounds may be associated with late arrival on territory the following season, and in such case a count in early spring might not include the full potential breeding population of an area.

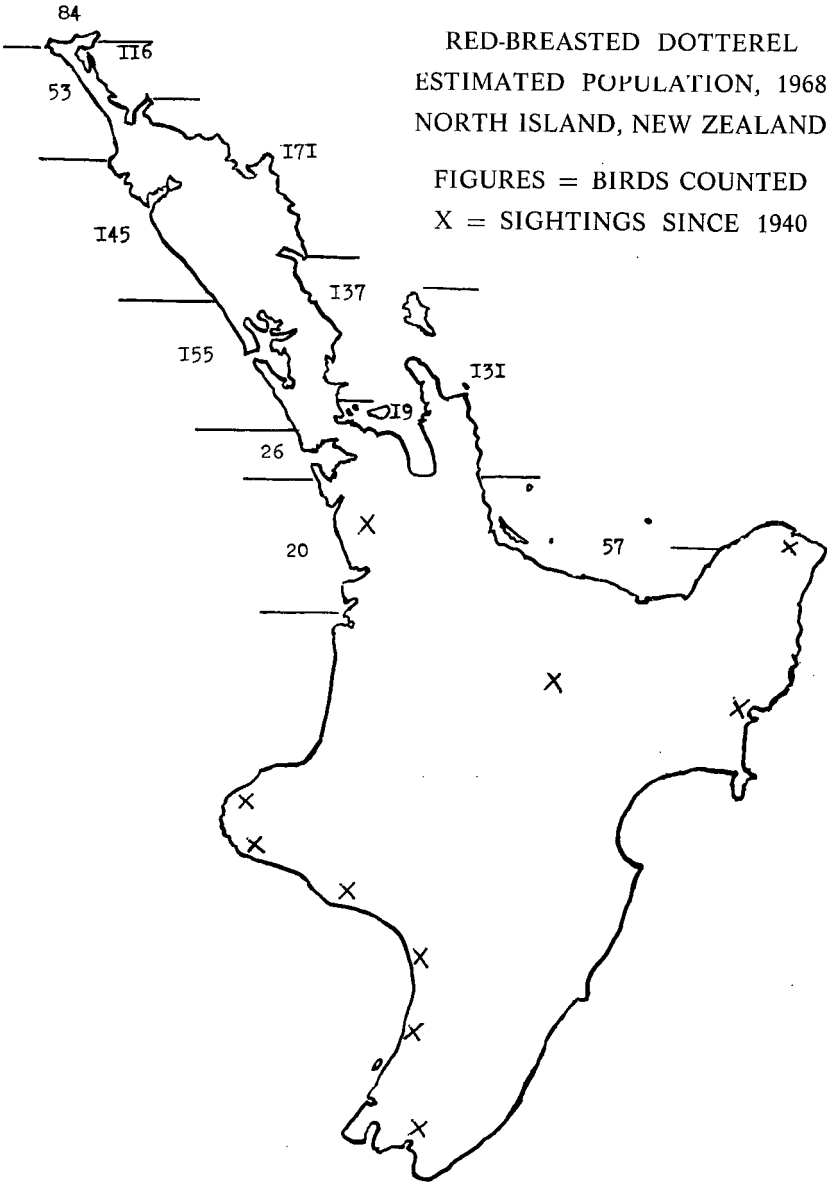
Nine to ten weeks may elapse between taking up territory and laying the first egg, as at Clevedon, birds showing territorial aggression 8/7/50, first egg 9/9/50 (McKenzie, 1952); birds fussing as if territory-minded 17/6/51, first egg 29/8/51 (McKenzie, 1953). On a shellbank

in Kerikeri Inlet a pair showed territorial behaviour on 2/7/68 and through July and August actively chased away other dotterels; copulation was observed on 1/9/68, nest scrapes 6 - 12/9/68; the birds then left the shellbank, perhaps disturbed by constant presence of gulls and Caspian Terns, and probably nested on one of the small offshore islets or reefs.

Eggs have been recorded in late August from South Auckland and in September from Bay of Plenty, South and North Auckland, but the main breeding season in Northland seems to be October - January. Oliver (1955) mentions one February record. The normal clutch is three. Exceptionally four and five eggs have been recorded (McKenzie, M.E., 1967). Incubation period has been recorded as 28-32 days. When the hen is incubating the male bird often stands guard some distance from the nest. Vigorous distraction display serves to draw an intruder away from the eggs or downy chicks; when I was inspecting a nest with eggs near to hatching the female bird flew right up to me; uttering cries of distress it circled round my feet with staggering gait, ruffled plumage, wings trailed or irregularly flapping. In a small Northland bay a picnic party having tea on the beach was approached by both birds of a pair, obviously agitated, advancing a few steps, stopping, and advancing again until they were within a few feet of the intruders. The following day a nest with three eggs was located about 20 yards from where the picnic party had sat on the sand.

The chicks leave the nest soon after hatching and at first remain in the vicinity but when they are a little older the agitated behaviour of parents is no guide to the whereabouts of the young birds, which may be lying quietly some distance away, often on the edge of some cover. The hatching to flying period may vary from under 38 to about 50 days.

Red-breasted Dotterel feed on crustacea, small mollusca and marine organisms which they find between tidemarks, also on insects. One was seen to eat a wriggling cricket and another captured a small moth (10:350). In late summer birds which frequent coastal paddocks at high tide feed busily over the grassland and may be seen tossing aside pieces of dry cowdung. On the coast south of Reef Point I saw a dotterel feeding in a rock pool, but this is probably exceptional. In estuaries dotterel may start feeding as soon as a strip of moderately firm mud is exposed by the falling tide, gradually feeding outwards as the tide recedes. At the turn of the tide the dotterel may fly, or may continue to feed ahead of the rising tide as long as some feeding ground remains uncovered by water. On ocean beaches most of the feeding between tidemarks takes place on a falling tide, places most favoured being where a freshwater stream empties into the sea. When the tide is rising the dotterel tend to move to dry sand or dunes where they find insect food. Beach counts should therefore be made on a falling tide. As an example, on the stretch of 90 Mile Beach between Scott Point and Bluff a casual observer noted 12+ dotterel one day in early November; my journey along the same stretch in mid-November, on a rising tide, failed to produce a single sighting but in mid-December on a falling tide I counted 18, widely scattered, still paired, no sign of flocking.


RED-BREASTED DOTTEREL
ESTIMATED POPULATION, 1968
NORTH ISLAND, NEW ZEALAND
FIGURES = BIRDS COUNTED
X = SIGHTINGS SINCE 1940
84
116
53
171
145
137
155
131
19
26
20
57

LOCALITY COUNTS

1. *North Cape Area.* (84).

This area includes beaches north of a line drawn from Scott Point to Coal Point.

(a) *Western beaches, south of Cape Reinga.*

19/12/67, Te Werahi, 25; Te Kohatu, 2; Twilight Beach, nil; total 27. This tallies fairly closely with a winter count by Alan Wright in June 1964 (20, 2, 2 = 24).

(b) *Northern beaches.*

Taputaputa, 19/12/67, 3; Spirits Bay, 12/11/67, 10; Tom Bowling Bay, 20/12/67, 14; total 27.

A flock of 12 was recorded at Spirits Bay on 10/1/58 (8:71). There is probably some local movement between these beaches. Graham Adams found only 5 at Tom Bowling Bay on 26/12/67, a week after my visit when 14 were counted. At Taputaputa Alan Wright counted 7 in June 1964 and a Houhora resident noted 6 about a month before my 1967 visit.

(c) *Eastern Beaches.*

Between North Cape and Coal Point beaches known locally as Waikuku and Whareana had on 20/12/67 16 and 14 respectively; none on Ngakino, 14/1/68; total 30.

Graham Adams counted 15 at Waikuku on 28/12/67.

2. *Far North, East Coast.* (116).

(a) *Parengarenga harbour.*

In 1947-50 dotterel nested on shellbanks in many places in the harbour, and nests had been found on the hillside of open scrub in Te Kao valley (Watt, 1947) and on the scrubby hill above Paua (Turbott, 1951). There has been vigorous land development in this area of recent years and most of the land around the western side of the harbour is now in grass.

16 (including an albino) were seen near Paua in early September 1953 (5:225). I have not had an opportunity to search the harbour thoroughly for nest sites but such spring and early summer observations as I have been able to make lead me to the conclusion that there may now be about six pairs nesting within the harbour itself (not counting those on the outer beach).

There are a number of records of flocks in and around the harbour in late summer and autumn, e.g. 15/2/50, 35 and 26/3/51, 71 (Turbott, 1951); 100+, sheltering in a hollow in sandhills on 6/4/53 (5:225); on coastal paddocks, used as a high tide resting place by many hundreds of waders in late summer, 32 on 3/2/68, 55 on 4/3/68, 76 on 23/3/69.

(b) *Parengarenga South Head to Houhora North Head.*

11/11/67, Great Exhibition Bay, 30; Rarawa Bay, 4; Henderson Bay, 4; Kowhai Beach, 8; total 46.

(c) *Houhora South Head to Cape Karikari (Rangaunu Bay).*

The long beach from Houhora South Head to and including Kaimaumau gave a count of 24 on two occasions, 25/3/67 and 5/11/67; about three pairs are reported from the sandbank off Kaimaumau, on which terns breed; Rangiputa sandbank, 18/12/67, 10; Karikari Bay, 8/10/67, 18; total 58.

At Kaimaumau 15+ were recorded on 12/1/58, including two pairs with small running young (8:71). On 12/2/61 70, in parties of 6 - 7 birds, were feeding on the exposed sea-grass flats with other waders, As the tide rose the parties of dotterel joined to form flocks which flew towards the harbour heads.

At Karikari Bay on 15/1/67 52 were counted, but 30+ were in a tight flock and most probably were not local birds but had come in from elsewhere.

None were present at Whaturu Bay, south of Cape Karikari, on 8/10/67; J. F. Anton found five birds there on 13/2/68 but I regard these as probably wanderers from Karikari Bay or some other location.

3. *Far North, West Coast.* (53).

Ninety Mile Beach (actually about 57 miles) can be divided into three sections for which 1967 summer counts were —

(a) Scott Point to Bluff 18
(b) Bluff to Beacon 17
(c) Beacon to Ahipara ..... 18 — total, 53.

On (b) I had a count of 24 in August 1962. This section is much frequented by fishermen and toheroa gatherers and there may have been some decline in dotterel population over recent years. From (b) and (c) I had a count of 32 in April 1963; Dr. J. Murray Speirs (Canada) counted 33 on 21/7/68. All the above counts were made from a moving vehicle, on a low tide; 1967 counts included inspection of areas of flat sand behind the beach, on foot. Possibly some birds may have been missed if instead of coming out to the beach they elected to feed round some of the small pools which lie well back from the beach, in the dunes.

Old residents recall a much larger dotterel population, but a May 1940 count on the whole length of the beach was 50 - 60 birds, in small scattered parties (RB:30). It is clear that a considerable number of dotterel remain on this stretch of coast during winter.

4. *Northland, West Coast.* (145).

(a) *Reef Point to Herekino North Head.*

Reef Point to Waikeri, 15/1/68, 32. Mr. J. Morrison, by whose kind help we were able to inspect this beach with the minimum of difficulty, has seen a winter flock of c.25 sheltering in a hollow on the grassy duneland behind the beach. The southern end was covered on 2/2/68, crossing by boat from Owhata; 12 dotterel were counted near Herekino North Head. Total 44.

From Herekino South Head to Whangape the coast is mainly rocky.

(b) *Whangape South Head to Hokianga North Head.*

Whangape South Head to Akaroa Rock, 7/11/67, 24 (Bob Cowan); Akaroa Rock to Mitimiti, 24/9/67, 20 (Bob Cowan); Mitimiti to Hokianga North Head, 12/1/68, 19; total 63.

My only winter count in this area was on about three miles of the centre section on 18/6/65, 8 birds.

(c) *Hokianga South Head to Maunganui Bluff.*

On 11/1/68, 9 birds at the northern (Waimamaku) end and 29 at the southern (Waipoua) end; total 38.

There may also be some birds around the mouth of Waiwhata-whata stream, south of Outer South Head, which I have not visited. S. D. Potter (RB:13) reported in 1937 three pairs at South Hokianga Heads and three miles south; large numbers had bred at Waimamaku. R. B. Sibson (RB:88) reported 15 on 10/5/40 from Waipoua River to Waimamaku River.

5. *Northland, East Coast.* (171)

(a) *Doubtless Bay.*

Small beaches in Matai Bay area have been visited but no dotterel were seen. Tokerau Beach, as far as Aurere, 8/10/67, 12; Taipa Beach, 24/9/67, 2; total 14.

No birds have been found at Cable Bay or Cooper's Beach, both much frequented by holiday makers.

(b) *Ocean Beaches, Berghan Point to Cape Wiwiki.*

Motukakaha Bay, 14/2/68, 2 (J. F. Anton).

Taupo Bay, 18/9/66, 2; 24/9/67, 2; 14/2/68, none (J. F. Anton).

Arrow Island, just outside the entrance to Whangaroa harbour, a pair on 20/12/51 (5:113).

Tauranga Bay, 26/3/53, 5 (5:225); 18/9/66, 5; 24/9/67, 4; 14/2/68, 2 (J. F. Anton).

Matauri Bay, 10/9/66, 4; Feb. 1967, 2; Feb. 1968, 2; 20/7/68, 4.

Takou Bay (includes Takou, Tapauetahi and Taronui Bays), 14/1/67, 22; 16/10/67, 26; 17/2/68, 15.

Mataka (a small beach N.E. of Cape Wiwiki), a breeding pair in January 1965 and subsequently.

Records from Taupo, Tauranga, Matauri and Takou Bays suggest local movement after the breeding season.

Total recorded in most recent breeding seasons, 45.

(c) *Cavalli Islands.*

Sibson (1953) recorded in December 1951 three pairs on Motukawanui and two pairs on Motukawaiti. I have not had an opportunity to check the present position but local information indicates that birds still inhabit these island beaches. Estimated population 10.

(d) *Bay of Islands.*

Island sightings are reported from Motu Arohia, 16/5/60, 5 (9:75), and Waewaetorea, 15/3/64, one; November 1967, a pair (C. W. Devonshire). Odd pairs breed in several locations in and around the Bay and its inlets. The winter flock in Kerikeri Inlet probably provides a reasonable figure for estimate of population, and has risen from 16 in 1963 to 20 on 12/7/68.

(e) *Ocean Beaches, Cape Brett to Bream Head.*

No birds have been found on small beaches north of Bland Bay.

Bland Bay, 23/9/66, 10; 6/8/67, none; 21/10/67, 12.

Mokau Bay, Feb. 1961, 4; 21/2/63, 2 (M. Ross); 9/9/65, 2; 23/9/66, 2.

Oakura and Helena Bays, none seen on several visits.

Mimiwhangata (north and east beaches), 16/6/57, 11 (H. R. McKenzie); 21/8/61, c.10 (9:242); 17/10/66, 19; 4/7/67, 6; 21/10/67, 16.

Whananaki, south of river, 2/1/54, 5 (H. R. McKenzie); 16/9/67, 10.

None found at Sandy, Woolley or Matapouri Bays, 16/9/67.

Ngunguru, January 1937, 4 (RB:13); 18/5/40, 3 (RB:88); no recent records available.

Ocean Beach, 6/12/64, 29, two nests each with three eggs (Wildlife party); 4/2/66, 12 (Mrs. E. Ward).

Seasonal fluctuations in numbers at Bland Bay, Mimiwhangata and Ocean Beach suggest local movement after the breeding season.

Total recorded in recent breeding seasons, 69.

(f) *Whangarei Harbour.*

Whangarei Heads, 1/1/62, 2 (Ruth Trower).

Marsden Bay, 12/1/57, 6 (H. R. McKenzie); 24/11/59, c.20 (9:75); 13/2/66, 2 (Mrs. E. Ward).

Kioreroa, 25/1/69, 9, on sandbanks formed by dredging operations.

Estimated population, based on most recent records, 13.

6. *North Auckland, East Coast.* (137).

(a) *Ruakaka.*

13/2/46, 25+ at estuary (H. R. McKenzie); 13/1/47, c.26 (2:164); 2/2/58, 34 and 7/4/58, 30+ (8:71). The population seems to have declined. Wildlife party on 5/12/64 recorded only 20 from Ruakaka estuary to Marsden Point.

(b) *Waipu.*

Wildlife party, 5/12/64, 26 on river spit, 6 plus two well-grown chicks at estuary, 2 between estuary and Tip Road, total 34 plus two well-grown chicks.

January 1968, 18 on one mile of Spit (G. F. H. Moon); 18/2/68, 14 on the flats behind the Spit (J. F. Anton); 24/3/68, 20 on estuary and spit (Graham Adams).

(c) *Mangawhai, Te Arai, Pakiri.*

Maximum counts recorded prior to 1964 were, Mangawhai, 21/5/40, c. 36 (RB:88); Te Arai, May 1955, 20 (6:204); Pakiri, 2/1/47, 16+ (2:164); total, c. 72.

In December 1964 Wildlife party recorded —

Mangawhai, Spit, 10 plus one fledged young = 11; forestry road to high dunes, 6; total 17.

Te Arai, forestry road to Te Arai stream, 3; Te Arai stream mouth, 10; Te Arai Point to Pakiri north stream, 16; total 29.

Pakiri, north Pakiri stream, 12 plus two one-day-old chicks and a nest with three eggs; Pakiri beach, 4; Pakiri lagoon, 10; total 26. Grand total, 72.

More recent records from Pakiri are 6/1/68, 26 and 28/7/68, 22 (Graham Adams). G. J. H. Moon (pers. comm.) states that the population at the south end of Pakiri has dwindled during 1965-1968 period following extensive planting of marram grass, also the lower end of the beach has become very popular with surfers and there is a camp near the river; Te Arai beach is similarly affected but the northern end still has a good population.

(d) *Kawau.*

Moon (1957) mentions a pair which nested on the shell beach of a small island off Kawau Island, near a colony of White-fronted Terns.

(e) *Whangaparaoa Peninsula (Shakespeare Bay).*

7/1/53, one, perhaps two (5:225); 21/10/66, 4 and 10/5/68, 7 (R. B. Sibson).

(f) *Takapuna, Shoal Bay.*

A pair nested on a shellbank near a Pied Stilt colony in 1967/68 season (G. D. Leitch).

7. *North Auckland, West Coast.* (155).

(a) *Maunganui Bluff to 14 miles south of Glink's Gully.*

10/12/67, no dotterel found on this stretch of coastline, on much of which the beach is narrow, backed by sandstone cliffs.

(b) *Kaipara North Head.*

Entering by Ngatawhiti (formerly Ricky's) road, D. J. Murphy and J. C. Smuts-Kennedy (Wildlife) inspected the area north and east of Kaipara North Head as far as the lighthouse between 30/11/68 and 6/12/68 and recorded 75 dotterel.

(c) *Kaipara Harbour.*

On January 18-20, 1965, O.S.N.Z. survey recorded, Tapora, 26; Jordan's, 5; Poutu, east side, 13; Tauhora river, 5; mid-South Head, 5; upper South Head, 25; total 79 (McKenzie, 1965).

(d) *Muriwai Beach and Waionui Spit.*

Winter 1940 — regular counts on 30 miles of Muriwai Beach reveal few or no birds from February to April, increasing in May and 20 - 30 in June - September (C. A. Fleming, RB:45); 9/6/40, 31 (R. B. Sibson).

North end of beach, 18/7/47, 17 (3:95); 17/1/60, 13 (9:75); Spit, 8/4/50, 30 (4:46).

On 14/7/68 Peter Gross and E. K. Saul inspected the whole coastline from Muriwai township to Waionui Spit, about 34 miles. Miles 1 - 12, no birds; miles 12 - 17, 10; beyond mile 25, 31; total 41.

The sum of 75, 79 and 41 = 195, but some adjustment is needed because of probable overlap between the three counts. Sibson (1967) has shown that the harbour population is increased in autumn and winter by post-nuptial flocking, and many of the birds in these flocks will have come from the outer beaches, but as early as January 18 - 20 1965 the effect of this influx would be relatively small, compared with counts later in the season.

Precise knowledge of how many birds breed within harbour limits is lacking, but we know that a few pairs nest at Tapora and a few pairs round Sandy Island (Sibson, 1967); some nest at upper South Head (6:204); Malcolm Ross recorded 10 at Poutu on 7/7/63 and some probably nest in that area. There may well be other unrecorded nesting sites in so vast a harbour.

If it is assumed that half the birds counted in January 1965 had bred outside harbour limits, an acceptable population estimate would perhaps be 75 (b) plus half of 79 = 39 (c) plus 41 (d) = 155.

8. *Auckland Area.* (26).

Perhaps the most reliable guide to the population of Auckland isthmus is the flock count at Kidd's Bay, Manukau Harbour, which has built up from 8 in March 1962 to 25 on 15/4/67 (26 on 31/3/68, R. B. Sibson, pers. comm.) and is considered to have as likely points of origin Manukau Heads, Waikato estuary and the Wairoa estuary across the isthmus at Clevedon (Sibson, 1967). Six birds were recorded at Turanga estuary, Whitford, on 22/6/58 (8:71) but H. R. McKenzie considers that Whitford birds do not normally stay there after breeding and could well be in the Manukau count. Winter records from Clevedon include 16/5/64, 14; upwards of two present throughout 1964/65, 9 on 16/3/65 (Miss A. Goodwin). H. R. McKenzie comments: " Clevedon birds fluctuate greatly and I am sure go to and from Manukau and Firth of Thames, as banding indicates."

One or two pairs have from time to time been reported breeding at Bethell's beach but generally leave in the autumn, though Miss McIntyre recorded two in May 1963. There are numerous records of birds at Whatipu in 1951 - 1959; in 1960 12 were present in January and 10 in December. Some winter counts are 6/6/60, 11 (9:75); May 1961, 11 (R. B. Sibson); May 1962, 7. If birds still winter at Whatipu they would be additional to Kidd's Bay count and the estimate would require upward revision.

9. *Waikato beaches.* (20).

(a) *Waikato Heads and Port Waikato sandhills.*

Some records are, 7/4/47, 11, flocked (2:164); 24/8/60, 15 (9:75); 3/3/63, 13 (Sibson, 1967). Sibson (pers. comm.) writes that normally at least two pairs nest on the big area of sand on the south bank and probably another pair or two on the sandy island which now nearly blocks the river.

(b) *Waikaretu.*

K. M. Sorby once saw two pairs but when visited in 1951 the area was overgrown with lupins (R. B. Sibson).

(c) *Raglan.*

Te Horea, 20/3/59, one (8:204); may harbour a few pairs (R. B. Sibson).

(d) *Aotea Harbour.*

Ruapuke, a four-egg nest found by J. L. Kendrick (McKenzie, M.E., 1967).

The estimate of 20 birds for this area is perhaps conservative and organised observation might disclose a higher figure.

H. R. McKenzie sends a report of 3 birds seen inland on a farm near Lake Wahi in September or October 1965. It is interesting to speculate where they came from and where they were going.

10. *Firth of Thames.* (19).

Autumn and winter flocks at Miranda, 4/7/65, 17; 6/3/66 to 11/4/66, 18; 28/5/67, 19, are made up partly of local breeding birds and partly from birds drawn from other areas (Sibson, 1967). There is known to be traffic between Manukau and Firth of Thames. H. R. McKenzie considers that birds from Ponui and Waiheke Islands probably winter with the Miranda flock. Records from these islands are — Ponui, 8/1/65, 3, strongly territorial (Miss A. Goodwin); Waiheke, Te Matuka Bay, 10/12/54, 2 (6:204); Owhiti Bay, 1955,

2 (7:81); 2/12/63, one (Mrs. Sewell); Palm Beach, July 1963, 2 (Miss L. J. Bishop).

11. *Coromandel Peninsula, Great Barrier and Mercury Islands.* (131).

(a) *West Coast.*

Manaia and Coromandel harbours, no records.

Cabbage Bay, 30/8/60, 6 (9:75).

In December 1964 Wildlife party found none at Cabbage Bay or Otautu, but 2 at Waiaro and 4 at Port Jackson.

(b) *Waikawau Bay.*

December 1964, 14, one nest with three eggs (Wildlife party).

(c) *Kennedy's Bay.*

December 1964, 7, including a newly fledged young bird (Wildlife party).

(d) *Whangapoua harbour.*

31/12/52, 21, in groups of 11, 5 and 5 (5:225).

December 1964, 14, but there may have been others on shell banks in the harbour which were not covered by the tide at the time of the count (Wildlife party).

R. W. Jackson found 20 at Te Rerenga on 11/3/67; in the same month Peter Howard counted c. 80 on Maturangi (Omaro) Spit, shortly after high tide. This autumn concentration represents over 80% of all birds found on Coromandel Peninsula at December 1964 count.

(e) *Promontory between Whangapoua and Mercury Bay.*

Kuaotunu, 31/8/60, a pair with several scrapes (9:75); 28/11/61, a pair, three large and one small chicks (Mrs. Hamilton); December 1964, 6 (Wildlife party).

Otama beach, 5 plus two chicks; Mahinapoua and Opito Bays, 6, December 1964 (Wildlife party).

R. W. Jackson found about six pairs at Kaoutunu, Otama and Mahinapoua in December 1967.

(f) *Mercury Bay.*

19/9/46, Buffalo, an odd bird; Davis Beach, a pair (2:45); Buffalo and Ohaka beaches, December 1964, one (Wildlife party).

Cook's Beach, 6/1/53, 20 in dunes (5:225); 27/1/54, 6 or 7 (6:97); December 1964, 4 (Wildlife party).

These beaches are now highly developed.

(g) *Hot Water Beach.*

December 1964, 7 (Wildlife Party).

(h) *Tairua.*

10/9/46, a pair (2:45); December 1964, Pawanui beach and spit, at the mouth of the harbour, 9 and one chick (Wildlife party); 24/12/67, 2 at Tairua (R. W. Jackson).

(i) *Opoutere.*

Recorded in 1955 and 1962; 16/6/64, 6 (Mrs. Waters); December 1964, 16 (Wildlife party); June 1967, 12, per Mrs. Waters (Sibson, 1967).

(j) *Great Barrier.*

Whangapoua estuary, June 1957, 8 - 10 pairs; December 1960, 20 - 30 birds including two almost fledged young, all in pale plumage (Bell and Brathwaite, 1964).

Kaitoke beach, 2/11/50, at least 12 (4:184); December 1960, three pairs and a single bird (Bell and Brathwaite, 1964).

(k) *Great Mercury Island.*

White Beach, September 1961; 31/8/62, a pair at Coralie Bay, a pair and a single at White Beach; two pairs, very agitated, on pasture land on the flats, 27/11/62 (Skegg, 1963).

12. *Bay of Plenty.* (57).

(a) *Whangamata,* 2 males and a female in December 1963 (J. Lambert).

(b) *Little Waihi.*

28/5/58, 3 (8:71); 17/7/66, 5 (R. W. Jackson); 8/8/66, 5 (Mrs. McLintock); 3/6/68, 8 on the spit off Bledisloe beach (W. Broun).

(c) *Athenree,* 1966, 6 (R. St.Paul).

(d) *Matakana Island,* 21/5/64, 12 (Mrs. Calvert); Spring 1967, five pairs, a nest with three eggs (P. Densem).

(e) *Tauranga Harbour.*

Panepane, a pair, 11/12/54 (6:204); Otumoetai tidal flats, first record, 6/7/56, 4 (7:81); the late Mr. Hodgkins reported further sightings, up to 4 in May 1958 (8:71); Otumoetai beach, 31/3/59, 3, 13/11/59 to 27/5/60, up to 5 (9:75); 14/7/61, 9, and one at Sulphur Point flats on 27/12/61 (Mrs. McLintock).

(f) *Maketu.*

River mouth, 31/8/55, a pair (6:204); ocean beach, 28/12/62, six pairs, two nests (C. D. Blomfield); 14/5/67, river mouth, 8 (R. W. Jackson).

(g) *Rangitaiki estuary.*

May 1958, 3 (8:71); 23/5/59, a pair (8:204); 14/8/66, a pair in breeding plumage (R. W. Jackson).

(h) *Ohope,* one on 29/3/59 (8:204).

(i) *Hawai River mouth,* 1957, one pair breeding (7:196).

(j) *Whale Island,* recorded in 1955 (R. T. Adams).

(k) *Rurima Rocks.*

January 1967, a pair with a running chick, and a lone adult (Roy Weston); September 1967, 4 birds and a nest with three eggs (G. Anderson); January 1968, a pair with two flying young and another pair probably nesting (Roy Weston).

Summary of estimated population, North Island known breeding area.

1.	North Cape area	84
2.	Far North, East Coast	116
3.	Far North West Coast	53
4.	Northland, West Coast	145
5.	Northland, East Coast	171
6.	North Auckland, East Coast	137
7.	North Auckland, West Coast	155
8.	Auckland area	26
9.	Waikato Beaches	20
10.	Firth of Thames	19
11.	Coromandel Peninsula and offshore islands	131
12.	Bay of Plenty	57
	Total	1114

Recent Occurrences Outside Known Breeding Area
North Island

East Cape.

Te Araroa, 1952, Mr. O. J. McLachlan, resident since 1900, has seen odd ones on rare occasions (5:225).

Gisborne.

Muriwai Lagoon, 21/3/59, one (8:204); 9/12/62, one (A. Blackburn).

Hawke's Bay.

"Formerly present on Portland Island, and recorded by Hamilton (1886) as present in the area between the Tutaekuri and Mohaka Rivers. . . . I know of no recent occurrences anywhere along this coast." (Brathwaite, 1955).

Volcanic Plateau.

From 1914 to 1925 in the area between Karioi and Waiouru 5 - 6000 acres were in oats and large blocks in winter fodder, mainly swedes. New Zealand and Banded Dotterel then frequented this area. There is no cropping now. (E. Dear).

Ohaki, near Broadlands, between Taupo and Rotorua, 5/3/60, one at lake (9:75).

Taranaki.

29/10/67, a bird in red plumage at the mouth of Waiwakaiho River; 10/3/68, a pale bird at the mouth of Pungaereere stream, near Rahotu, south of Cape Egmont (D. G. Medway).

Wanganui.

Waitotara estuary and lagoon, one on 29/10/46, 8/1/47 and 21/2/47 (2:164); one at lagoon, 24/10/47 (3:95); two at estuary, 4/12/48 (3:209).

A bird thought to be this species was seen at Turakina beach in 1966 by a Royal Forest and Bird Society party (M. G. Macdonald).

Manawatu.

Ohau River mouth, south of Levin, 1/3/40 (RB: 88).

Wairarapa.

Very rare; only seen once, Onoke Spit (RB:13).

South Island

Marlborough.

Wairau Bar, 29/12/43, flock of 14 (1:73); two seen by J. L. Kendrick in December 1968, but had moved on by 26/12/68 (B. D. Bell).

Nelson.

Farewell Spit, mid-March 1958, 2 (8:71); 22/1/61, 5 (Bell, McKenzie and Sibson, 1961); May 1962, 5 (Edgar, 1962); 19/9/62, one (Bell and Zumbach, 1963); 6/4/65, 3 (Bell, 1966); June 1966, 6 (B. D. Bell); January 1967, 3 (Andrew, 1967).

West Coast.

Okarito (RB:88); Harihari, 13/11/65, one flushed near outlet of saltwater lagoon (J. Hilton, J. R. Jackson).

Otago.

Two seen near Luggate in Central Otago about 1953 (Williams, 1963).

Southland.

The status of the species in Southland is not yet clear. There may be a small resident population breeding in a location as yet undiscovered, or the frequent sightings at Oreti, Invercargill Estuary, Awarua Bay and Waituna may be birds which have come across from Stewart Island. All sightings which have been published or of which I have a record were in the period January to July, except for 10 birds recorded at Waituna on 1/10/55 by R. M. Royds. Even this comparatively late date is not evidence of breeding, which has been stated to take place about a month later in Stewart Island than in Northern New Zealand.

Stewart Island

Breeds on bare hill tops about 1500 ft. a.s.l., and on sand dunes at Mason Bay. Seen on mudflats, Freshwater River. Largest number probably several hundred, Freshwater Estuary (R. H. Traill). At Old Neck, 23/5/55, 218+ in one flock, few showing colour (6:204).

Freshwater River, 8/1/57, six groups of up to 30 birds (D. E. Crockett).

There are numerous more recent records from coastal areas and elsewhere on the island, but in small numbers.

Post-Breeding Flocking and Local Movement

R. B. Sibson informs me that a flock of 51, the biggest yet recorded for Southland, was seen near Tiwai Point in January 1969. In the absence of proof that dotterel breed on Southland coast it must for the present be assumed that these birds came across Foveaux Strait; there is no evidence that southern birds move further north.

A large proportion of Coromandel dotterel population evidently flocks in Whangapoua harbour. Sibson (1967) gives detailed flocking records from Miranda, Manukau and Kaipara, showing that flocks in these locations reach their maximum size about April. The biggest flocks recorded in Kaipara are, Tapora, 16/4/61, 40 in a flock and 10 scattered; 19/4/65, 40; Jordan's, 39 on 18/2/68, 41 on 17/3/68 (R. B. Sibson, pers. comm.); Mairetahi, 24 in a paddock on 16/3/64 (H. R. McKenzie). The sum of these maxima (40 + 41 + 24) = 105, against a tentative estimate of 155 for the population of Kaipara harbour and beaches to north and south of it. The indication is that in this area the proportion of birds flocking to those which remain near their breeding stations is approximately as 2:1.

Further north it seems that a high percentage of west coast birds may spend the winter near their breeding grounds (see Locality 3, 90 mile Beach and 4(b), Reef Point to Herekino. A flock of 12 in January 1958 at Spirits Bay may have represented that year's population for this area.

On Northland East Coast several flock records have been mentioned — Parengarenga harbour, 55, 71 and 76 in March, 100+ in April; Kaimaumau, 70 in February; Karikari Bay, 30+ in January. The sum of these maxima is c. 200 birds, at first sight an impressive figure compared with an estimated population of 317 from North Cape to Whangarei harbour, of which about 20 are known to winter

in the Bay of Islands; but there is a reasonable probability that the January Karikari Bay flock and the February Kaimaumau flock were on their way further north. As far as is known Parengarenga flocks are at maximum in March and April, and this area may be the final destination of flocking birds seen elsewhere on Northland East Coast earlier in the season. We know that a flock of 100+ was present in April 1953 on the white sand spit between the harbour and the outer beach, an area difficult of access and so extensive that even a large flock sheltering in a hollow could easily be missed. In April 1953 the western shore of the harbour was under scrub, and exceptionally high tides caused waders to concentrate on the sandspit and on beaches at the Heads. Conversion of the scrubland to grass paddocks has now provided an alternative high tide roost; such autumn flock counts as have been made since 1953 have been on these paddocks, but the maximum recorded (76) does not necessarily represent the total number of birds then present in the area, which could only be ascertained by a simultaneous count on paddocks and sandspit.

Records under Locality 5 (b) show that there is post-nuptial movement away from Taupo, Tauranga, Matauri and Takou Bays; September-October counts from these four localities totalled 36 and counts in the following February totalled 19. Under Locality 5 (e), Mimiwhangata records of 19 in October, 6 in July and 16 the following October are fairly conclusive evidence of movement of adults as well as young birds. No valid conclusion can be drawn from Bland Bay figures because of the possibility that birds may have flown from the beach to the mudflats south of the bank, or from Ocean Beach because of the lapse of time between records.

Substantial winter counts from Mangawhai and Te Arai, Locality 6 (c), tend to show that birds in this area may be fairly static.

These admittedly inconclusive paragraphs have been written on the principle that to set down what you do know is the best way to find out what you don't know — a useful guide-line for future field work.

Banding has shown that young birds wander. Chicks banded at Kaiaua on 13/12/53 when about 22 days old were seen several times during March and April 1954 at Karaka, 26 miles overland from the point of banding (Bull, 1954). Two young birds banded at Whitford in November 1967 were seen at the end of February 1968, one at Karaka and one at Miranda (H. R. McKenzie). This observer (in litt.) does not recollect that any one of his banded birds has been known to remain in the same place for a year. Some have come back to the place of banding after being away for some time. At Karaka in the nesting season he has noted that unemployed birds, identifiable by colour and odd features, have changed in one week.

Survival of the Species

Many hazards affect nesting success. Shellbank nests may be washed away by high tides, sand dune nests covered by shifting sand or trodden by wandering stock; development of beaches may deprive dotterel of traditional nesting sites, and of course accentuate the human interference factor; eggs and young may suffer from animal

predators, hawks or Black-backed Gulls. It seems that one egg of the three often fails to hatch or produces a weakling which fails to survive; family parties of two adults and three young birds are seen less often than might be expected.

H. R. McKenzie's close study of Red-breasted Dotterel in Auckland area has added much to our knowledge and suggests that it is a reasonably hardy species. Dotterel are good parents and if the first or even the second clutch fails will nest again, sometimes with good results. He records (1952) that in 1950 two pairs of birds laid three clutches, each of three eggs, from which only four chicks were known to reach flying stage, but that what was almost certainly a single pair had 3 eggs on 2/10/54, later washed out; 3 eggs on 14/11/54, later robbed; 3 eggs on 15/1/55 which hatched, and the young birds were banded on 12/2/55. (6:213).

Evidence that young birds can breed in their first year is provided by his record (pers. comm.) of the female of a pair which, seen at Miranda on 5/11/62 with a week-old chick, carried leg bands showing that it had been banded at Karaka on 7/12/61 when approximately one month old. His record of a bird banded at Karaka in December 1961, seen in May 1966 and again in January 1968, is evidence of long life.

Even in Buller's day the Red-breasted Dotterel was " nowhere very plentiful." Its distribution at that time included Rotorua in North Island, the Central Southern Alps where it bred as high as 4,800 ft. a.s.l., and probably the Spencer Ranges in Nelson district. No longer is it " distributed along the whole of our shores " but the distributional gap between northern and southern populations has narrowed somewhat within the last twenty years. When C. A. Fleming (2:45) found one pair on territory at Tairua on 10/9/46 he noted this as apparently the southernmost record on the east coast of North Island in late years; since then there has been an encouraging number of records from all along Bay of Plenty. Records from Marlborough and Farewell Spit pose the question of whether there may still be a small residual breeding population in the high country of that part of South Island. A slow but steady increase in population is taking place in Auckland area, Kaipara is still a notable stronghold, and on many thinly populated Northland beaches it is difficult to persuade local residents that they are looking at one of the rare birds of the world.

CONCLUSION

I am grateful to Terence Calvert, Dale Calvert and Bob Cowan for many miles of beaches run and for their meticulous tallying of dotterel and other birds seen: to Peter Gross for his Muriwai count; to H. R. McKenzie and R. B. Sibson for much practical assistance; to A. H. Watt and R. H. Michie for helpful discussion; to E. G. Turbott for reading and commenting on the manuscript, and to all those who have contributed items of information.

I am very conscious of the limitations of a population estimate compiled from data gathered over a number of years, but as far as I know no such estimate has previously been attempted and perhaps an estimate on this basis is better than none at all. It is, I think, conservative.

Some of the information on habits, behaviour and distribution has already appeared in print, but spread over many years; I make no apology for presenting it again in summarised form, for the benefit of those who are not fortunate enough to live in areas where these dotterel are easily available for observation. By one's own observations to correct or amplify what has already appeared in print is a most rewarding exercise for a field observer; I hope that many members will take the opportunity to do so, those in "dotterel areas" by gathering additional information on population, flocking, local movement and ecology, those in less favoured localities by keeping a good watch for wandering dotterel or occupation of new breeding areas. All such information which may be gathered should please be recorded, if not in *Notornis*, at least in O.S.N.Z. Recording Scheme.

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SHORT NOTE

BEHAVIOUR OF BLACK-BACKED GULLS

The sight of Black-backed Gulls *(L. dominicanus)* dropping pipis and other bivalves on to hard beach sand and coastal rocks is a common one, and is a type of behaviour probably acquired by learning, as opposed to instinct. By what process, other than reasoning, has the bird acquired the habit of dropping shellfish on to the bitumen surface of roads? I was interested recently to observe four Black-backed Gulls dropping pipis on to the bitumen of Wainui Beach Road, some 200 yards from the source of the food.

— J. W. BAIN