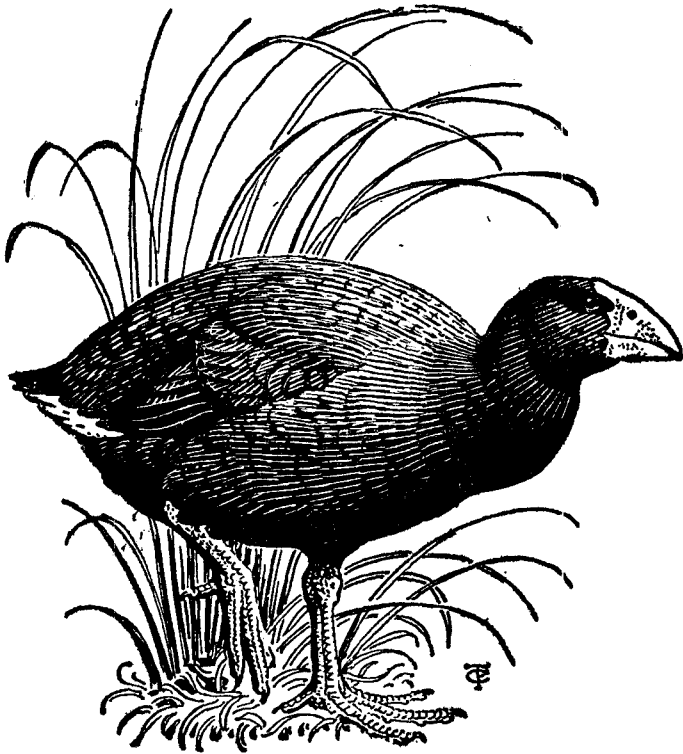


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DISTRIBUTION OF THE NORTH ISLAND KOKAKO (*Callaeas cinerea wilsoni*)

A REVIEW

By R. B. LAVERS

Wildlife Service, Department of Internal Affairs

"The crow . . . is sparingly dispersed over the North Island, being very local in its distribution." — W. L. Buller (1882)

ABSTRACT

The past and present distribution of the North Island Kokako is determined from reported observations for four periods: pre-1900; 1900-1939; 1940-1959; and 1960-1970. Changes in distribution are described for nine geographical districts. Since the late 19th century distribution has contracted in areas to the north and south of the central Volcanic Plateau. This is attributed mainly to the removal of suitable forest habitat. The Kokako is a weak flier and, with continued deforestation, populations are further isolated from one another and the survival of the species is threatened.

INTRODUCTION

According to Maori tradition the Kokako was once common "on all the ranges of the North Island forests" (Reischek 1886) and sub-fossil remains indicate a widespread distribution before the arrival of European settlers. In the period immediately following settlement the bird was widely but irregularly distributed in many parts of the North Island (Buller 1882, 1892, 1905, Martin 1885, Reischek 1886, Medway 1968). By the turn of the century, however, it was thought to be "fast disappearing before civilization" (Anon. 1892); and where it was once considered common (e.g. Wellington province) Buller (1905) noted that "with the destruction of native bush, it has long since disappeared." Oliver (1955) recorded that in Northland the Kokako had gone by about 1900 and Best (1908) and M'Lean (1912) regarded it as rare in the Urewera in the early 1900s.

Although the distribution continued to shrink in the first half of the 20th century, reported sightings of Kokako in the last 30 years show that the bird has remained in many forests, especially those in the centre of the North Island (Falla *et al.* 1966, Fisher *et al.* 1969, MacDonald 1966, Turbott 1967). While the reduction in range has continued with the logging of indigenous forests, recent reports indicate that in extensive unmilled areas the remaining populations are possibly fairly stable. This paper examines the past and present range of the Kokako and summarizes all available records about its distribution up to 1970.

Information on early distribution was compiled from a literature search, from personal communication with local and overseas museums and institutions, and with people known to have observed Kokako. A list of museums holding specimens will be published separately (Lavers, in prep.).

Observations have been grouped according to the period in which they were made:— pre-1900; 1900-1939; 1940-1959; 1960-1970. Few reports give precise details of localities. Where it has been possible to place reports within a 10,000 yard square (on the national grid) this has been done (Figs 1-4). Less precise records are omitted from the maps but are included in the summary of distribution for a particular district (Appendix 1). Nine arbitrary districts are used (Fig. 1): Northland, Auckland, Great Barrier Island, Coromandel, Rotorua, South Auckland, Taranaki, Urewera-East Coast, and Wellington. Changes in the distribution pattern are described for each and are related to both the removal of forest and disturbance of its composition.

DISTRIBUTION

Northland

Subfossil remains are known from only three areas (Scarlett pers. comm.); one from a midden at Ocean Beach and the others were found in a part of the North Cape which was originally forested (Figs 1 & 5). Records before 1900 indicate a sparse distribution and Buller (1905) considered the bird to be extremely rare in the far north even before 1850.

The type specimen was obtained from the Hokianga River area about 1840 (Oliver 1955). Oliver believed the species to have disappeared from Northland by 1900. However, there have been a few sightings between 1949 and 1970 in the Tangihua and Tutamoe Ranges, and in the Puketi and Warawara forests (Figs 2 & 3).

In addition to the damage and destruction caused by earlier Maori fires, the Northland forests have been severely reduced since European settlement and are now in scattered pockets separated by scrub and farmland. Kokako numbers have been markedly reduced and only a few small, isolated populations exist.

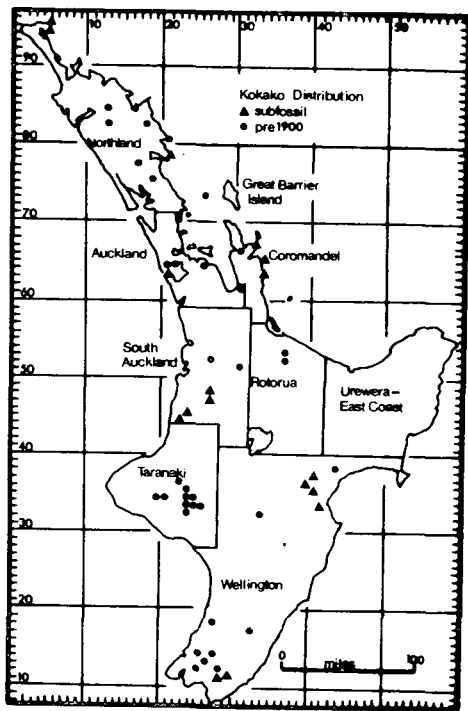


FIGURE 1 — Early records of Kokako and the location of the arbitrary districts for which changes in Kokako distribution are recorded.

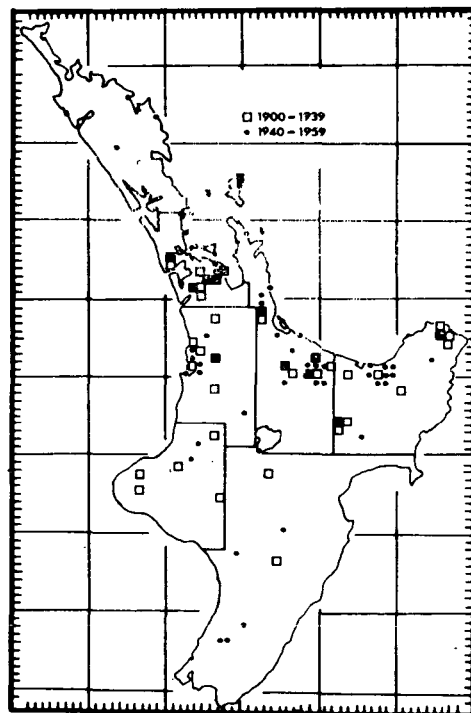


FIGURE 2 — Kokako distribution between 1900 and 1939, and 1940 and 1959.

Great Barrier Island

In 1868 Hutton recorded Kokako on Great Barrier Island but they were not very common. Reischek (1886) noted that this was the only off-shore island where the species was found. Between 1933 and 1963 Kokako have been reported from several localities in the north (Figs 2 & 3). Of the island's forest only a small central area has so far been cleared. Approximately 7,600 hectares have been designated State Forest and milling has been restricted to this area (P. Logan, pers. comm.).

Coromandel

Subfossil remains from Maori middens on the east coast and pre-1900 reports (Fig. 1) support Turbott's (1947) belief that Kokako were once common on the Coromandel Peninsula. Although there has been relatively limited deforestation in this part of the country, Kokako have declined markedly. There have been only three reported sightings between 1900 and 1939, ten from 1940 to 1959 and one between 1960 and 1970.

Auckland

The first recorded sighting of the North Island Kokako was made in this district in the forest on the banks of the Thames River some time prior to 1835 (Oliver 1955). From that time until 1900 reports were concentrated in the Waitakere Range to the west of Auckland city and the Hunua Range to the south-east (Fig. 1). There is one subfossil record from the Manukau Heads at the southern end of the Waitakere Range.

Reports since 1900 indicate that birds also occurred in lowland forests south of Auckland city, but as these were reduced to isolated stands the Kokako gradually declined and has not been reported in this area since 1944 (Fig. 2).

Kokako were observed on the Waitakere Range until 1932 (Falla pers. comm.), but the reports from the Hunua Range (McKenzie pers. comm.) indicate that this is the only area to have Kokako present from before 1900 until 1970 (Figs 1 & 2).

Rotorua

No midden or subfossil remains have been found in the Rotorua district. The earliest reports (by Buller 1877 and Potts 1882) are from the northern Mamaku plateau in the late 19th century (Fig. 1).

I know of no Kokako records in this area for the period between 1900 and 1920. However, since that period many observations have been made on the Mamaku plateau in the west and on the Kaharoa plateau in the north-east (Figs 2 & 3). Both of these places contain extensive native forest which, until recently, has not been significantly reduced in area (Fig 5). However, large plantings of exotic pines have been established in close proximity and the process is continuing.

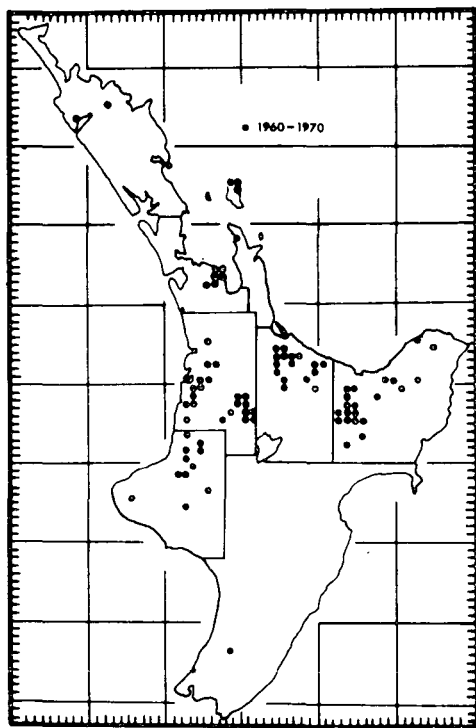


FIGURE 3 — Kokako distribution between 1960 and 1970.

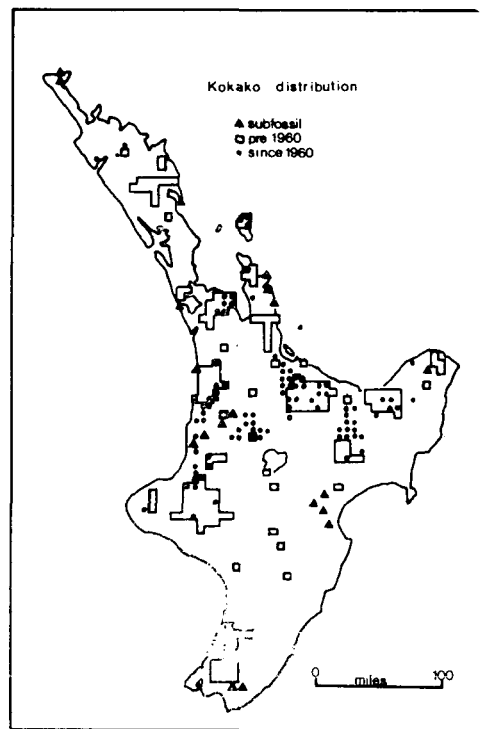


FIGURE 4 — Summary of the changes in Kokako distribution as shown by sub-fossil, pre-1960 and 1960 - 1978 records. Kokako have been recorded in an additional 13 grid squares since this survey was completed in 1970. These records are included here and details are given in Appendix 2.

Nicholls (1963) estimated that, by the middle of the 19th century, only a third of the Rotorua district was covered in forest. Maori fires and volcanic activity had greatly changed the vegetation pattern before European settlement. With the logging of accessible forests in the period following settlement, these factors have altered the type of habitat available to Kokako.

Although recent records show this to be an important area for Kokako, there is not enough information to show the past pattern of distribution.

South Auckland

The distribution of subfossil remains from Awakino to Raglan shows that in pre-European times Kokako occurred over most of the district (Fig. 1). Reports in the 19th century are few and Buller (1888, 1905) recorded that the species was rare near Taupo and in the Waikato. In the early 20th century reports again suggest a widespread distribution from Huntly to Te Kuiti (Fig. 2). The forest area to the east and west of Te Kuiti has not changed much since before settlement (Fig. 5) and reported sightings in these forests since 1960 show that Kokako still occur widely (Fig. 3).

Taranaki

The area of native forest in Taranaki was reduced by more than 400,000 hectares between 1893 and 1950 (Kirk 1895, Nicholls 1956), but some 283,000 hectares remain (Fig. 5) and this is believed to be one of the largest remnants of original forest cover in the North Island (Nicholls 1956). During the period of deforestation records of Kokako were few. However, available reports suggest that their early distribution covered most of the district (Figs 1 & 2).

Reports before 1900 are scarce except for those of an early surveyor, J. R. Annabell. Between 1880 and 1885 Annabell covered much of the forest inland from Wanganui and recorded precise localities where he either sighted or shot Kokako. These records have been summarised by Medway (1968), who lists 17 localities, covering ten different grid squares (Fig. 1). Although two recent sightings were made in the Matateonga Range neither of these can be placed in a particular square and so the present status of birds in areas where Annabell recorded them remains uncertain.

After 1900 records are mostly from areas north of the Matateonga Range (MacDonald 1966) and are centred on the Tangarakau River valley. Other reports in the early 20th century are from Mount Egmont and near Pipiriki, but most sightings have been made since 1954 (Fig. 2).

Recent observations indicate that Kokako are present in much of the remaining indigenous forest and it is likely that Kokako were widely distributed in the very extensive pre-European forests of this district.

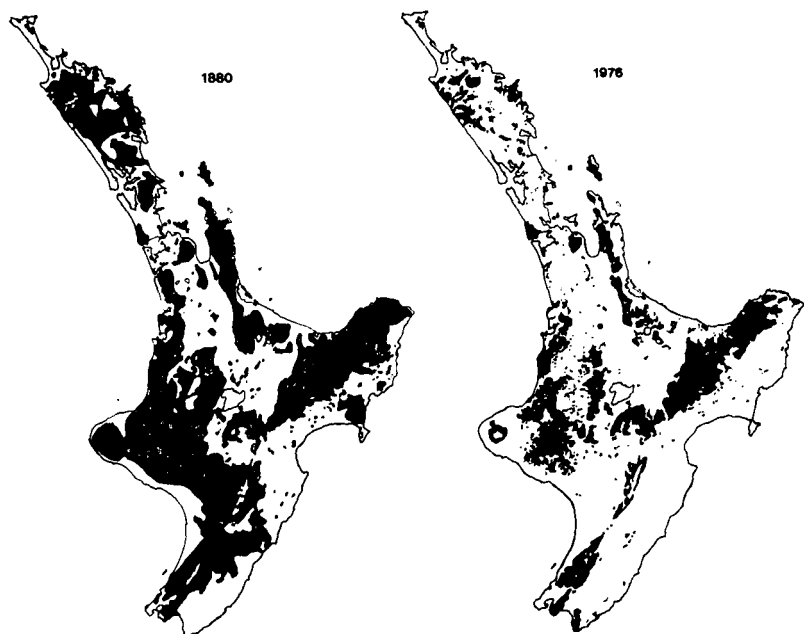


FIGURE 5 — Indigenous forest cover, North Island, 1880 and 1976 (after P. T. Royle 1976. Map of New Zealand forest cover. Wellington: Govt. Printer).

Urewera - East Coast

Between 1874 and 1903 Elsdon Best travelled extensively in the Ureweras and noted that Kokako, although scarce, were occasionally seen in the upper Parahaki and Waiau Rivers, near Opouriao, in the Waioeka area, and at Ruatahuna (Best 1908). Another early observer, J. C. M'Lean, made detailed notes on Kokako behaviour in the Maungahaumia forests, where he considered the bird to be common. Elsewhere M'Lean (1912) regarded the Kokako as rare.

There is little information on distribution before 1950. Reports since that time, however, indicate that the range of the bird covers much of the district. The few records prior to 1950 suggest a widespread distribution; though with a considerable reduction of forest in the eastern area Kokako have declined in certain places. Fleming (pers. comm.) found that between 1910 and 1935, birds in the watershed of the Kopuapounamu Stream were confined to successively smaller patches of forest. Since 1950 there have been no records from this area.

Most lowland forest was cleared in the early stages of settlement (Fig. 5) but the remaining forest, which is largely undisturbed with a

diverse flora, covers much of the district. The vegetation is mainly beech and sub-alpine scrub, with podocarp-hardwood forests on the lower slopes and in the valleys.

Recent sightings of Kokako have been restricted to the podocarp forests, mainly in the Whakatane River watershed. To the south of this, where beech forest predominates, there have been no reported sightings. Other reports since 1960 have come from the Raukumara Range to the north-east of the Urewera National Park (Fig. 3). Although distribution has become restricted in eastern lowlands, to the west it has been maintained during the present century at least (Figs 2 & 3).

Wellington

The decline in the range of Kokako is most clearly seen in this district. Many subfossil remains have been found in southern Wairarapa and Hawkes Bay (Fig. 1) and early references to the presence of Kokako are numerous. Between 1900 and 1961 a few sightings were made — mainly in the Tararua Range (Figs 2 & 3) — but there have been no reports recently.

When Buller was in Wellington in 1854 he found that Kokako were not uncommon (Turbott 1976). Many were shot for specimens up until about 1890, but by 1892 Buller found the species "very rare where it formerly abounded" and considered that the destruction of native forest had caused the decline (Buller 1905).

Some of the lowland forest had been burned by Maoris prior to the arrival of Europeans. Their clearing activities were limited in the southern part of the district (Franklin 1967); but in Hawkes Bay most of the forest was destroyed by repeated burning before settlement (McLintock 1959). Several subfossil remains are recorded in Hawkes Bay where the Maoris indicated that the bird was plentiful before the forest was destroyed (Guthrie-Smith 1969). Virtually all the remaining lowland forest has been cleared since the time of settlement.

Large areas of forest remain on the Tararua and Ruahine Ranges but elsewhere only small patches occur. The absence of reports since 1961 suggests that the remaining (predominantly beech) forests are unsuitable for Kokako.

DISCUSSION

The New Zealand wattlebirds (Callaeatidae) make up an endemic family which is thought to have survived from a larger group, developed by adaptive radiation in the New Zealand archipelago during the Tertiary (Fleming 1962). The Huia (*Heteralocha acutirostris*) occupied a range in the southern part of the North Island before the 20th century but is now considered to be extinct (Williams 1962, 1976). The North Island Saddleback (*Philesturnus carunculatus rufusater*) was once wide spread, but by about 1890 it could be found only on some northern offshore islands (Williams 1976). The range of the South Island races of the Saddleback (*P. c. carunculatus*) and the Kokako

(*C. c. cinerea*) also diminished rapidly early in the period of European settlement (Williams 1976). The South Island Saddleback is now found on only a few small islands off Stewart Island and the South Island Kokako is considered very close to extinction. Both originally occurred throughout the South Island.

The North Island Kokako may therefore be the only member of the wattlebird family still on the mainland of New Zealand. Nevertheless, since European settlement its distribution has been shrinking, although more slowly than that of some other species.

A contracting distribution of old endemic groups, often resulting in their extinction, is a notable feature of the New Zealand avifauna and of island avifaunas elsewhere. It appears that the higher their taxonomic level, the less adaptable they are to change and the more readily they become extinct. Most declines and extinctions are contemporary and are probably accelerated, perhaps even started, by factors associated with man (McDowall 1969). This is certainly the case with the Kokako. Its range may have started to contract before the large-scale deforestation at the turn of the century (Williams 1976). Introduced predatory and competitive mammals and disease could have accelerated the decline, yet the destruction of habitat since European settlement has clearly been the main cause (Williams 1976).

Climatic changes within the last 15 000 years have caused some major changes in forest composition (Nicholls 1956). Volcanic eruptions and fire within the last 2 000 years destroyed large areas, especially in the central North Island (McKelvey 1963). Before European settlement, and up to about the end of the 19th century, however, extensive areas of forest still covered much of the North Island (Masters *et al.* 1957). Between 1847, when the removal of forests had just begun, and 1923, forest area was reduced by 57% from 11.3 to 4.9 million hectares (Masters *et al.*). In 76 years 6.5 million hectares of lowland forest were destroyed. In some areas small, isolated stands often remained uncut for several years (e.g. south of Auckland city), but the general distribution of forest changed markedly and rapidly (Fig. 5). In addition, the technique of selective logging changed the composition and structure of many of the remaining forests.

With the destruction of forest, Kokako distribution changed accordingly. Some early observers, such as Buller, noted this at the turn of the century (Buller 1905). However, it was not until the 1960s that, with added concern for this rare bird, more people began to record sightings and the extent of this contracting distribution became evident. By 1960 the decline of the Kokako was particularly noticeable to the north and to the south of the central Volcanic Plateau (Fig. 4), where there have been extensive changes in the size and type of forest.

Forest in Northland and Auckland has been reduced to isolated stands separated by wide areas of urban, farm or waste land. Kokako

in remnant pockets of forest become confined there because they are unable to fly over any great distance (Crook *et al.* 1971). Often they are reported from these small pockets for several years but eventually they disappear (Sir Robert Falla & Sir Charles Fleming, pers. comm.).

South of Lake Taupo and throughout the Wellington district virtually all the podocarp/mixed hardwood forest of the lowlands was removed by Maoris and early settlers, and the remaining forest is predominantly beech. Kokako have not been reported since at least 1961, indicating that the high country forest no longer suits Kokako even though pre-1900 records suggest that it was common in the Tararua and Rimutaka Ranges. Records since 1960 from the Urewera National Park give a similar picture, as Kokako have been found only above the Murupara-Waikaremoana road (an area of mainly podocarp/broadleaf forest), whereas in the predominantly beech forest south of this road Kokako have not been seen recently.

From as early as Buller's time, it has been noted that Kokako are often restricted to certain parts only of the available forest and this suggests that they have definite habitat preferences. Buller observed in 1873 (Turbott 1967) that the North Island race was "sparingly dispersed over the North Island, being very local in its distribution though comparatively plentiful in certain localities." With much of the forest destroyed or grossly modified Kokako are now confined to either small, isolated pockets (where no long-term survival can be expected) or those parts of the more extensive podocarp/hardwood forests which contain suitable habitat.

Kokako occur in several of the central North Island forests where, in spite of repeated destruction and modification in the last 2 000 years, preferred habitat is found. Recent studies in these forests (Crook *et al.* 1971, Crook *et al.* 1972) have shown that Kokako are found mainly in two types of forest — mature hardwood forest (mainly Tawa, *Beilschmiedia tawa*) and predominantly podocarp forest in which tall Tawa are common. Further, it has been found that Kokako are more likely to occur close to canopy gaps or forest margins, and that their distribution is probably limited by slope and altitude, with low altitudes and gently sloping terrain being favoured (Crook *et al.* 1971). More research on this aspect of the birds' ecology is required to explain fully the present distribution pattern.

While it is important to protect present populations of Kokako by setting aside areas of different habitat types, small representative reserves may not achieve this. The long-term survival of this threatened species therefore depends on retaining large unlogged areas of forest where populations are not isolated from one another.

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APPENDIX 1 † LOCALITY RECORDS OF KOKAKO

1. NORTHLAND

Locality	Date	Reference*	Grid	Comment
Maungaturoto	1880	Reischek	1875	
Hokianga River	1840	Galbraith		Collection specimen
Tangihua Range	1850	Buller	1677,78	
Tangihua Range	1879	Reischek	1677,78	
Tangihua Range	1882	Buller	1677,78	
Tangihua Range	1949	Rye	1677,78	
Whangarei Heads	1965	MacDonald	2078	
Ocean Beach dunes	Subfossil	Scarlett	2078	Probably a midden
Below Whangarei	1926	Moncrieff	—	
Ranges near Whangarei	1892	Buller	—	
Wairoa & Whangarei	1888	Buller	—	
Headwaters Wairoa & Whangarei Rivers	1882	Buller	—	
Kaitara Ranges	1882	Buller	—	
Kaitara Ranges	1895	Junge	—	Collection specimen
Kaitara Ranges	1898	Junge	—	Collection specimen
Tutamoe Range, Pakotai	1953	Secker	1379	
Tutamoe, Range, Pakotai	1953	Anon	1379	Specimen found
Tutamoe, Range, Pakotai	1953	Turbott	1379	Collection specimen — Alexander
Tutamoe Range, Pakotai	1955	Bell	1379	
Tutamoe Range, Pakotai	1955	MacDonald	1379	Specimen
Pakotai	1950-56	Oliver	1379	
East of Kaihu	1950-56	Oliver	1379	Plentiful
Tutamoe Range, Waimatenui	1956	Turbott	1379	
Near Ngunguru	1882	Reischek	2080	
Puhipuhi	1898	Pycroft	1282	Specimens collected
Warawara Forest	1965	MacDonald	0883	
12 miles south Russell	1940	Bell	1883	
Puketū forest	1960	Main	1285	
Puketū forest	1962	MacDonald	1285	
Puketū forest	1964	Fraser	1285	
Motukokako	1888	Buller	—	
North Auckland	pre 1900	Oliver	—	
Waikuku Beach dune	Subfossil	Scarlett	0409	Collection fossil
Tom Bowling Bay dune	Subfossil	Scarlett	0409	Collection fossil
Bay of Islands	1900	Oliver	—	
Okaihau	1898	Pycroft	1282	Specimens collected

2. AUCKLAND

River Thames	1835	Oliver	—	
Auckland	1870	Hutton	—	
Auckland	1891	Parkes	—	Collection specimen
Auckland	n.d.	Rikitsansky	—	
Auckland	n.d.	Amadon	—	
Waikino	1931	Falla	3259	
Onswhero	1918	Falla	2460	
Mauku	1917	Falla	2361	50 acres remnant bush
Patumahoe	1944	Sibson	2361	
Pukekohe	1916	Falla	2461	
Whangarata	1920	Falla	2461	
Manukau Heads	subfossil	Scarlett	2063	
Near Drury	1858	Von Pelzeln	2463	
Papakura-Hunua district	1912	Scarlett	2463	Collection specimen
Papakura bush areas	1910-20	Fleming	2463	
Hunua	1932	Falla	2563	
Waitakere Range	1885	Reischek	2064	
Waitakere Range — summit	1888	Buller	2064	
Waitakere Range	1932	Falla	2064	
Waitakere Range	n.d.	Turbott	2064	Collection specimen — Reischek
Waitakere Range	n.d.	Turbott	2064	2 Collection specimens — E. E. Vaile
Waitakere Range	n.d.	Turbott	2064	2 Collection specimens — Bathgate
Titirangi	1878	Turbott	2164	2 Collection specimens
Titirangi	n.d.	Turbott	2164	Collection specimen
Sth. Auckland	1955	Oliver	—	
Hunua Range	1887	Oliver	—	Collection egg — Munroe
Hunua Range	1937	Rye	—	

* See Appendix 3

† The cost of these appendices has been subsidised by Wildlife Service, Dept. of Internal Affairs

Locality	Date	Reference	Grid	Comment
Orere to Mt. London,				
Pararimu to Hunua	1900-40	St. Paul	—	
Moumoukai bush	1940	McKenzie	—	
Moumoukai Otau, Clevedon	1942	St. Paul	—	
Mt. London	1942	Sibson	2763	2300' ASL
Otau hills	1943	St. Paul	—	
Kaiaua to Clevedon, Orere & Hunua	1943	St. Paul	—	
Moumoukai & Mt. London	1943	St. Paul	—	
Clevedon	1943	St. Paul	—	
Mangatangi Valley	1943	St. Paul	—	
Otau hills & Hunua	1943	St. Paul	—	
Moumoukai	1943	McKenzie	—	
Moumoukai	1943	Mead	—	
Mt. London	1943	Mead	2763	
Clevedon	1944	Turbott	—	Collection nest — McKenzie
Moumoukai	1944	McKenzie	—	
Moumoukai	1945-46	St. Paul	—	
Pukapuka peak near				
Mangatangi Rise	1946	Rye	—	
Mt. London	1948	St. Paul	2763	
Moumoukai	1947	St. Paul	—	
Kohukohunui trig	1948	St. Paul	—	
Moumoukai	1948	St. Paul	—	
Moumoukai	1947-48	St. Paul	—	
Main ridge to Kohukohunui	1948	St. Paul	2763	
Main ridge to Kohukohunui	1949	St. Paul	2763	
Moumoukai	1950	St. Paul	—	
Moumoukai	1950	McKenzie	—	Nest
Mt. Kohukohunui trig	1951	St. Paul	2763	
Hunua bush	1951	St. Paul	—	
Hunua Range	1952	Newcombe	—	
Moumoukai	1952	McKenzie	—	Nest
Moumoukai	1952	Turbott	—	Collection nest — McKenzie
Moumoukai	1953	St. Paul	—	
Moumoukai	1953	St. Paul	—	
Manganese mine, Mangatawhiri				
Headwaters	1955-56	Manning	2663	
Manganese Mine	1955	Bell	2663	
Moumoukai	1956	St. Paul	—	
Moumoukai	1957	St. Paul	—	
Moumoukai	1957-58	St. Paul	—	Usual numbers
Moumoukai	1959-60	St. Paul	—	
Moumoukai	1961-63	MacDonald	—	
Hunua Range	1962	St. Paul	—	
Moumoukai	1965	McKenzie	—	
Moumoukai	1966-67	McKenzie	—	
Mangatangi water supply	1966	Merton	—	
Kohukohunui track	1967	McKenzie	2763	

3. GREAT BARRIER ISLAND

Great Barrier Island	1868	Hutton		
Great Barrier Island	1882	Reischek	—	
Great Barrier Island	1947	Turbott	—	
Katherine Bay Bush	1945	Sheet	2874	
Great Barrier Island	1949	Bell	—	
Range between Katherine Bay —				
Topuwai	1949	Bell	2874	
Mt. Hobson	1949	Bell	2974	
Mt. Hobson	1960's	MacDonald	2974	
Gorge near Miners head	1960's	MacDonald	2875	
Ahuriri catchment	1963	MacDonald	2875	
South of Ahuriri Point	1963	Merton	2875	
3 miles north Whangapoua Bay	1933	Bell &	—	
		Brathwaite	2975	
3 miles north Whangapoua Bay	1955	Bell &	—	
		Brathwaite	2975	
3 miles north Whangapoua Bay	1957	Bell &	—	
		Brathwaite	2975	
Rangiwahia Bay	1963	Merton	2975	

4. COROMANDEL

Waitawheta, Waihi	1941	McKenzie	3258	
Colville Ranges, behind Waitekauri	1949	McKenzie	3259	
Ranges near Paeroa	1954	Oliver	—	
Komata to Waihi Ranges	1960's	Kendrick	—	
Colville Ranges, 2 mls above				
Golden Cross	1959	Hamerton	3260	

Locality	Date	Reference	Grid	Comment
Wentworth Valley, behind Whangamata	1958	MacDonald	3361	
Tairua	Subfossil	Scarlett	3363	Moa hunter midden specimens
Hot Water Beach	Subfossil	Scarlett	3365	Moa hunter midden specimens
Tokatea Range, Castlehill	1880	Reischek	—	
Tokatea Range, Castlehill	1880	Rikitansky	—	3 collection specimens — Reischek
Tokatea Range, Castlehill	1880	Oliver	—	
Castlerock	n.d.	Darby	—	2 collection specimens
Above Papaaroa Bay	1959	McKenzie	2967	
Opito	Subfossil	Scarlett	3267	Moa hunter midden specimens
Behind Amodeo Bay	1960's	Kendrick	2968	
Kennedys Bay area	1957	Hunt	3068	
Kennedys Bay	1958	Anon	3068	
Coromandel	1947	Turbott	—	"once common"
N.E. Coromandel	1949	Bell	—	

5. ROTORUA

Rotorua	1921	Evans	—	Collection specimen — Wardlaw
Rotorua	1926	Moncrieff	—	
Rotorua	1937	Evans	—	Collection specimen — Plowden
Bay of Plenty	1933	Turbott	—	3 collection specimens — C. Cameron
Rotorua	1954	Bell	—	Increase in numbers
12 mls south Mamaku town	1953	Rawston	3549	
Horohoro	1956, 59		3549	
Sth Mamaku plateau	1970	Hall	3549	
Sth Mamaku plateau	1970	Lavers	3549	
Mamaku plateau	1928	Johnson	—	
Mamaku	1934	Fleming	—	
Paradise, near trout hatchery	1936	Phillips & Lindsay	3650	
Mamaku	1939	Phillips & Lindsay	—	
Mamaku	1940	Buddle	—	
Railway near Mamaku	1965	Jackson & Lyall	3550	
Nth side Rotorua-Tirau Road	1932	Fleming	3551	
14 mile peg Rotorua-Tirau Road	1954	Tattersal	3551	
Mamaku plateau - scenic reserve	1970	Lavers	3551	
Brakes bush	1930's	Tong	35,3651	
Lake Tarawera, east side	1949	Tong	3949	
Matahina block	1955	Bell	40,4149	
Mt Tarawera	1967	Sheppard	3949	
Okataina Lodge	1934	Fleming	3850	
Okataina	1944	White	3850	
3 mls from Rotoiti to Okataina	1970	Hadden	3850	
3 mls S.E. Lake Rotoiti	1939	Rye	3950	
Waione block	1940	Bell	3851	
Waione block	1940-44	Phillips & Lindsay	3851	
Waione block	1956-59	Hamlett	3851	
Lake Rotoiti	1950	Secker	38,3951	
Lake Rotoiti	1962	Vercoe	38,3951	
Piritangi, Lake Rotoiti	1956-59	Hamlett	—	
Between Hongis Track & Maniatutu Rd	1940	Dickenson	3951	
Hongis Track to L. Rotoehu	1939	Dickenson	3951	
Hongis Track	1946	McKenzie	3951	
Nth of Hongis Track	1953	Mitchell bros.	3951	
Mt. Matawhaura	1951	Falla	3951	
Mt. Matawhaura	1956-59	Hamlett	3951	
N.E. Lake Rotoiti	1959	Tanfield	3951	
Hongis Track	1960's	Jackson	3951	
Hinehopu northwards	1960's	Kendrick	3951	
Rotoiti eastwards	1964	Lyall	3951	
South of Rotoiti	1960's	Jackson	3951	
Lake Rotoma	1956	Secker	4051	
Rotorua Scenic Reserve	1957	Hamlett	4051	
Rotorua Scenic Reserve	1956-59	Hamlett	4051	
East end Lake Rotoma	1946	McKenzie	4051	
Hill from Rotorua to Te Teko	1932	Fleming	4151	
Lake Rotoma	1946	Odey	4051	

Locality	Date	Reference	Grid	Comment
Mangorewa forest	1877	Buller	3652	Comparatively plentiful
Mangorewa forest	1888	Buller	3652	
Mangorewa gorge	1960	Moresby	3652	
Mangorewa	1970	Lavers	3652	
Lake Rotoehu	1940	Secker	39,5152	
Bush behind Rotoehu	1940	Phillips & Lindsay	39,4052	
Pongakawa Valley	1943	Tong	3952	Four groups seen
Pongakawa district	1952	Watson	3952	
Rotoehu State Forest 88	1951-59	Hamlett	3952	
Near Pongakawa Road	1953	Newcombe	3952	Same report
Near Pongakawa Road	1953	Secker	3952	
Rotoehu State Forest 88	1962	Beveridge	3952	
Rotoehu State Forest 88	1965	Beveridge	3952	
Rotoehu State Forest 88	1969	Hellyer	3952	
Pongakawa-Hannon Road	1970	Hall	3952	
Rotoehu block west of Hannon Rd	1970	Lavers	3952	
Above Soda Springs	1960's	Lyall	4052	
Manawahe	1956-59	Hamlett	4052	
Manawahe	1946	McKenzie	4052	
Rotoehu-east of Hannon Rd., Nth. of Hamiltons Rd.	1970	Lavers	4052	
N.W. Opuiaki Stream: Mangorewa Stream	1964	Jackson	3652	
Mayors Waterfall	1962	Kendrick	3453	
N.W. Mamaku	1970	Lavers	3453	
2 miles east Kaimai Youth Lodge	1970	McLintock	3553	
N.E. Mamaku	1970	Lavers	3553	
N.E. Mamaku	1970	Hall	3653	
Oropi gorge-Glue pot & Burd Rd.	1970	McLintock	3653	
Mangatoi Rd. area	1970	Lavers	3653	
Oropi-Otanewainuku Reserve	1958	Williams	3653	
No. 3 Road Te Puke	1963	Tong	3753	
Mangatoi Rd. area	1970	Lavers	3753	
Ngamuwahine Stream	1966	Easton	3454	
McLarrens Lake	1960	Smith	3554	
Kaimai Range (Mamaku end)	1967	Walker	—	
Kaimai Range	1960's	Pracy	—	
Lower Kaimai & Mamaku Ranges	1939-40	Fleming	—	
Woods at Oropi, Tauranga	1882	Potts	3654	
Oropi area	1958	Anon	3654	
Oropi bush	1960	McLintock	3654	
Oropi-Tauranga district	1960's	Kendrick	—	
Tauranga	n.d.	Turbott	3655	Collection specimen
Tauranga	1951	Wilkinson	3655	
Whakamarama	1948	Anon	3455	
Papamoa	1944	Secker	3755	
6. SOUTH AUCKLAND				
Mt Pihanga	1948	Phillips & Lindsay	3240	
Otagiwai	1920	Falla	2643	
Kopaki behind Tihoi	1960's	Kendrick	3144	
Kopaki, Te Kuiti	1969	Turbott	3144?	Collection specimen
Pureora forest	1944	Beveridge	30,3145	
Pureora forest	1958	Beveridge	30,3145	
Pureora forest	1964	Beveridge	30,3145	
Pureora forest	1968	Drower	30,3145	
Pureora forest	1968	Turbott	30,3145	Collection specimen — Drower
Nth. of Pureora S.F. Headquarters	1970	Cragg	3045	
Mt. Titiraupenga	1960's	Kendrick	3145	
Mt. Titiraupenga northern slopes	1970	Cragg	3145	
Ranginui bush, Mangakino	1966	Cragg	3046	
West of Pouakani Reserve	1969	Cragg	3046	
Pureora S.F. 96, Ranganui Rd.	1970	Cragg	3046	
Whareorino Peak	1961	Kendrick	2247	2130' ASL 2832' ASL
Rangitoto trig	1960's	MacDonald	2947	
North end of Ponakani forest	1964	Beveridge	3047	
South east of Te Anga	1960's	Kendrick	2348	
Herangi Range	1960	Pracy	2345	
Fred Cave, Waitomo	Subfossil	Scarlett	2548	
Cut Throat Cave, Te Kuiti	Subfossil	Scarlett	2648	
Upper Waipa Valley	n.d.	Turbott	3047	Collection specimen
Ngaroma, Headwaters of Waipa River	1959	Bashford	3046	
Ngaroma	1964	MacDonald	3048	
Kinohaku to Te Anoa	1960's	Kendrick	2349	

Locality	Date	Reference	Grid	Comment
Te Anga vicinity	1964	MacDonald	2349	1500' ASL
Peak near Hauturu	1960's	Kendrick	2549	
Te Maika	1954	McKenzie	2250	
South of Te Maika towards Lake Taharoa	1962	Kendrick	2250	Collection specimen — Drew
Hauturu	1959	MacDonald	2450	
Te Kihī track, Te Raumoia	1968	Merton	2550	
Te Kihī track	1968	Cheyne	2550	
Kawhia	1923	Dom. Mus.	2351	
Kawhia	1926	Moncrieff	2351	
Kawaroa Stream head	1956	Sutherland	2451	Maoris call it common
Oparau	1964	MacDonald	2451	
Oparau	1966	Merton	2451	
Te Rauamoia, Pirongia Range	1962	MacDonald	2551	
Maungatautari	1888	Buller	3051	
Pirongia Range	1882	Reischek	—	
Pirongia Range	1882	Rikitsansky	—	
Pirongia Range	1882	Steinbacher	—	
Pirongia Range	1945	Pracy	—	
Pirongia Range	1949	Pracy	—	
Pirongia Range	1960's	Kendrick	—	4 collection specimens — Reischek
Aotea harbour	1953	Buckeridge	2352	
Te Mata-Aotea harbour road	1954	Buckeridge	2353	Collection specimen
Aotea harbour — back in bush	1960's	Kendrick	2353	
Te Kuiti	1931	Falla	2643	Collection specimen
Pirongia	1933	Turbott	—	
Pirongia	1963	Turbott	—	Collection specimen
Bridal Veil Falls	1920	MacDonald	2453	
Helcolite Cave, Raglan	Subfossil	Scarlett	2354	Always a rare bird here
Raglan	1907	Fulton	2354	
Waikato	1905	Buller	—	2 specimens shot 1114' ASL
Glen Massey to coast, Wilton Colliery area	1954	Bell	2555	
6 Miles west Ngaruawahia, Glen Massey	1953	Philburn	2555	
Kokako trig	1960	MacDonald	2555	
Kokako trig	1961	MacDonald	2555	
½ mile from Kokako trig	1961	MacDonald	2555	
Mangakara Stream	1961	MacDonald	2555	
Trig	1961	MacDonald	2555	
6 Miles west Ngaruawahia	1953	Turbott	2555	
Huntly	1926	Moncrieff	2657	Collection specimen
West Waikato	1962	Newcombe	—	
Whatawhata	n.d.	Turbott	2654	Specimen shot
Ngaruawahia	1953	Turbott	2656	
7. TARANAKI				
Near Ngamatapouri on Waitotara River	1883	Medway	2332	Specimen shot
Rakaumahi trig near Tunapoto Stream	1883	Medway	2333	
Rakautihitihī trig to Rakaumahi trig	1884	Medway	2333	Specimen shot
Waitotara River to trig	1884	Medway	2333	
Lake Rotokohu	1885	Medway	2333	Specimen shot
Tahronui trig to Rakautihitihī trig	1884	Medway	2433	
Taurukawau trig to Rakaumahi trig	1885	Medway	2433	4 specimens shot
Tuanuitakou trig to Mataimoana trig	1885	Medway	2533	
Lake Rotokare	1881	Medway	1934	Specimen shot
Mangatoromiro Stream	1800	Medway	2034	
Tahupo trig	1884	Medway	2334	Specimen shot
Maungarau trig to Tuanuitakou trig	1885	Medway	2434	
Whakauihi trig	1884	Medway	2334	Specimen shot
Junction of Waitotara & Omaru stms, Puteore Trig	1880's	Medway	2334,35	
Tahupo to Puteore trig	1885	Medway	2334	Specimen shot
Matematecnga Range	1968	Pracy	22,2334	
Upper Waitotara River	1960's	MacDonald	22,2334	Specimen shot
Behind Waverley	pre 1900	Smart	—	

Locality	Date	Reference	Grid	Comment
Behind Waverley	1958	Smart	—	
Whakauahi trig to Maungarau	1884	Medway	2434	
Whakauahi trig to Maungarau	1885	Medway	2434	Specimen shot
Pipiriki	1909	Scarlett	2734	5 collection specimens — Stead
Raetihi	1918	Oliver	2734	Numbers reduced — fire
Pipiriki	1944	Mead	2734	
Western Egmont Park	1964	MacDonald	15 35,36	
Egmont	1907	Fulton	—	
1 mile below Mangorei hut, Ponakai Range	1938	Medway	1637	
20 miles N.E. of Lake Rotokare	1846	Medway	2236	
Ngatimaru	1907	Fulton	2138	
Marco Rd, Whangamomona	1966	MacDonald	2238	
Matirangi S.F. 110	1968	Pracy	21,2238	
Tangarakau corge near road	1956	Smart	2339	
West of Tahore	1968	Pracy	2339	
Skinner Hill, Tahora	1962	MacDonald	2240	
Skinner Hill, Tahora	1963	MacDonald	2240	
Skinner Hill, Tahora	1966	MacDonald	2240	
Skinner Hill, Tahora	1970	Mantle	2240	Same 4 groups present
Moki Rd., Tahora	1968	MacDonald	2240	
Ohura	1940	MacDonald	2441	
Ohura	1954	Bell	2441	
Tokirima-Ahititi, Rerepahupahu falls, Tangarakau River	1955	Machaado	2441	Same report
	1955	MacDonald	2441	
Ohura	1964	MacDonald	2441	Specimen shot
Tongaporutu Valley	1963	MacDonald	22,2341	Specimen shot
Awakau Rd., 10 mls up Mokau River	1960's	MacDonald	2243	
Kokako trig, Waitaanga	1962	MacDonald	2442	
Mangatiti Stream, Wanganui River	1964	MacDonald	2536	
Waitaanga	1954	Packer	—	
Kokakonui	1912	Scarlett	2642	2 collection specimens — O'Connor
Robbers hole, Awakino	Subfossil	Medway	2244	
Herangi Range	1960's	Pracy	22,2345	
Bluegum cave, Mahoenui	Subfossil	Scarlett	2345	
Wanganui	1908	Vestergren	—	2 collection specimens — Rosenburg
Taranaki	1902	Dom. Mus.	—	Collection specimen
Taranaki	1926	Moncrieff	—	
Taranaki	1928	Stidolph	—	Not uncommon in several localities

8. UREWERA - EAST COAST

Te Puna, Lake Waikaremoana	1954	Hardacre	4542	Possible report
Forest ranges of Parahaki and Waiau Rivers	1908	Best	4243	
Huiarau Range	1924	Falla	4243	
Mokau falls, Waikaremoana	1966	MacDonald	4543	
Te Whaiti school area	1942	Hill	4244	
Ruatahuna	1909	Best	4344	
Tutaepukepuke clearing	1962	Williams	4345	
Maungapohatu	1962	MacDonald	4545	Nest collected
Maungapohatu	1962	Scarlett	4545	Collection specimen (nest)
Horomanga to Tawhiuau	1965	Pracy	4246	
Horomanga - Pukareao ridge	after 1968	Nilsson	4345	
West of Hunamahihi clearing	1961	Kiddie	4346	
Ohane - Waikare Catchments	1967	Miers	4446	
Urewera	1908	Best	—	Scarce
Denis Creek (Manaohau Stm - Hunamahihi Stm)	1965	Pracy	4347	
Galatea - btw. Manaohau & Hunamahihi Stms.	1964	MacDonald	4348	
Mangamoko - Waihua ridge	after 1968	Nilsson	4348	
Mangamoko - Waihua Stms	1969	Sutherland	4348	
Waikokou - Waihua ridge	after 1968	Nilsson	4349	
Rautiti Stm, lower Whakatane River	1969	Stack	4448	
Manganuku Stm, Waiocoka River	1967	Jones	4748	
Manganuku Stm, Waiocoka River	1969	Jones	4748	
Motu bush, Toatoo	1960-61	Blackburn	4948	
Motu bush, Toatoo bush	1962	Blackburn	4948	
Maungahaumi	1906	M'Lean	5048	3000' ASL
Waiocoka River area	1958	Blackburn	4749	
Urutana	1952	Secker	4849,50	

Locality	Date	Reference	Grid	Comment
Urutana	1953	Forester & Thompson	4850	
Urutana peak	1958	Forester & Thompson	4849	
Pakihi River	1953	Forester & Thompson	4849	
Otara River	1953	Forester & Thompson	4850	
Pakihi Valley	1952	Forester & Thompson	4849	
Ranges near Oporiao	1909	Best	4350	
4 mls sth Opotiki (reserve)	1945	McKenzie	4650	
Waioeka district	1909	Best	4750	
Otara River, Pakihi catchment	1964-66	Jones	4850	
Otara River, Pakihi catchment	1970	Jones	4850	
Papamoa bush, Toatoa	1944	Clark	4950	
Toatoa district	1951-52	Clark	4950	
Near Toatoa	1960's	MacDonald	4950	
Motu bush	1960	Blackburn	5250	
Waiotahi River mouth	1957	Talbot	4651	
12 mls sth Opotiki on Toatoa Rd.	1948	Anon	4851	
Te Atuahautapu (Toatoa)	1959	Hamlett	4951	
Southern Raukumaras	1966	MacDonald	—	In many parts
Taurangakautuku River	1919-34	Fleming	5654	
Tangitira Stm, Raukokore River	1961	Kendrick	—	
Mt. Hikurangi	1947	Sheet	5452	Maoris shot some
Kopuapounamu stm headwaters	1939	Fleming	5555	
Motumuka stream headwaters	after 1968	Nilsson	4446	
Ohane - Toromiro ridge	after 1968	Nilsson	4447	
Raroa peak	after 1968	Nilsson	4449	
Betw. Maungakakariki & Kopuapounamu headwaters	1935	Fleming	5555	
Kopuapounamu Stream	1950	Secker	5555	
Kiritahi Station, Kopuapounamu stm	1910	Fleming	5655	
Potaka, Hicks Bay	1934	Clark	5556	
Whanarua Bay, East Coast	1967	Weston	5255	
9. WELLINGTON				
Cave near Martinborough	Subfossil	Stidolph	2811	
Harrison's hole cave	Subfossil	Scarlett	2811	
Cave 1 — Martinborough	Subfossil	Yaldwin	2811	Bones possibly 8,000 years old
Cave 5 — Martinborough	Subfossil	Yaldwin	2911	
Wainuiomata	1890	Phillips	2512	
Wellington	1872	Junge	—	Collection specimen
Wellington	1873	Buller	—	Far from uncommon
Wellington	1881	Finsch	—	
Wellington	1888	Anon	—	
Wellington	1892	Anon	—	Fast disappearing
Wellington	1899	Dom. Mus.	—	2 Collection specimens
Wellington	1899	Ziegler	—	Collection specimen ¹
Wellington	1901	Amadon	—	Travers
Wellington & Southern Wairarapa	1926	Moncrieff	—	Collection specimen —
Wellington and Hutt	1854	Buller	—	Travers
Dry River	1884	Kirk	—	Comparatively common
Ridges above Mangaroa Valley	1900's	Pracy	2812	Specimen shot
Confluence of Wakatikei & Hutt Rivers	1890	Secker	2514	
Near Pakuratahi hotel, Rimutakas	1877	Buller	2714	Bird kept in captivity
Rimutaka Range	1881	Kirk	2714	Albino specimen shot
Rimutaka Range	1905	Buller	—	
Rimutaka Range	1934	Fleming	—	
Near Greytown	1884	Kirk	—	Specimen shot
Wairarapa	1873	Potts	—	
Wairarapa	1882	Kirk	—	Two partial albino specimens shot
Wairarapa	1890	Amadon	—	Collection specimen
Wairarapa	1890	Amadon	—	Albino collection specimen
Wairarapa	1891	Scarlett	—	Collection specimen —
Wairarapa	1892	Scarlett	—	Buller
Tararua Range	1892	Buller	—	Collection specimen —
Tararua Range	1892	Parkes	—	Buller
				Specimen shot
				Collection specimen

Locality	Date	Reference	Grid	Comment
Tararua Range	1905	Buller	—	
Tararua Range	1907	Fulton	—	Still plentiful
Tararua Range	1908	Oliver	—	Still plentiful
Waioatauru River, Tararuas	1952	McCann	2716	
Hector Stream, Tararuas	1959	Pracy	2816	
Tauwharehikau Ridge, Tararuas	1961	MacDonald	2816	
Otaki	1862	Buller	—	Specimen bought from Maori
Rangitumau hill	early 1900	Stidolph	3217	
Cleft creek, Tararuas	1956	Pracy	3018	
Ruamahanga River, Tararuas	1949	—	—	
Komako	1907	Fulton	3426	
Upper Tutaenui River, Marton	1957	Breen	2927	
Mt Colenso, Ruahines	1957	Adams	3530	
Hawkes Bay	1873	Buller	—	In certain localities
Napier	1886	Aellen	—	Collection specimen
Dartmoor Rockshelter	Subfossil	Scarlett	4133	
Rockshelter No. 2, Patoka	Subfossil	Scarlett	4035	
Limestone cave No. 3, Puketitiri	Subfossil	Scarlett	3936	
Midden - Rockhill rock shelter, Puketitiri	Subfossil	Scarlett	3936	
Te Weka cave No. 1	Subfossil	Scarlett	4037	
Kaupokonui (Hawkes Bay) Midden	Subfossil	Scarlett	—	
Hawkeston Gorge (Hawkes Bay) cave	Subfossil	Scarlett	—	
Pigeon Bush (Hawkes Bay) No. 1 rockshelter	Subfossil	Scarlett	—	30 miles from Napier 2000' ASL
Pigeon Bush (Hawkes Bay) No. 2 rockshelter	Subfossil	Scarlett	—	30 miles from Napier 3000' ASL
Pigeon Bush (Hawkes Bay) No. 3 rockshelter	Subfossil	Scarlett	—	
Hukanui No. 1 cave	Subfossil	Scarlett	—	30 miles from Napier 2700' ASL
Hukanui No. 3 rockshelter	Subfossil	Scarlett	—	30 miles from Napier 2500' ASL
Hukanui No. 7a cave	Subfossil	Scarlett	—	30 miles from Napier 2500' ASL
Hukanui No. 5 cave	Subfossil	Scarlett	—	30 miles from Napier
Tutira, Hawkes Bay	pre 1882	Guthrie-Smith	4238	
Wairoa - Gisborne	pre 1882	Guthrie-Smith	—	Extremely plentiful on coast forest

APPENDIX 2

ADDITIONAL LOCALITY RECORDS — SINCE 1970*

Grid	Observer	Comments
2239	R. J. Vail	1 seen
2551	P. D. Gaze	Seen
2845	Wildlife Service	State Forest 103 1975
3146	J. A. Gibb	Heard
3356	Wildlife Service	1-10 present. S.F.8 1974
3455	Wildlife Service	1 heard
3548	Wildlife Service	1-10 present
3552	Wildlife Service	Seen
3650	R. Jackson	1 heard
3752	R. Jackson, P. Roberts	1 seen; 8 heard
4051	J. A. Fowler	6 seen
4949	A. Blackburn	1 seen
3064	J. Wendelken	Pair & nest. SF. 149. 1978

* These records, compiled from OSNZ and Wildlife Service files, include only new grid square references and have been used to update Fig. 4.

APPENDIX 3

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NEW ZEALAND DOTTEREL BANDING REPORT NUMBER ONE

By H. R. McKENZIE

ABSTRACT

Eighty-six New Zealand Dotterel (*Charadrius obscurus*) have been individually banded with metal and colour bands between 1950 and 1977 in the Auckland district. Subsequent sightings of banded birds show that some move considerably within a limited range and that others are fairly sedentary. The recovery history of the most interesting cases is given in outline. The oldest-known bird, a male, is over 26 years. A female was recorded breeding within her first year.

INTRODUCTION

The northern population of the New Zealand Dotterel (*Charadrius obscurus*) has a breeding range on the coast from the northern tip of the North Island to Kawhia on the west coast and to eastern Bay of Plenty on the east coast, including some offshore islands. Its non-breeding movements are, with a very few exceptions, limited to the same area (Edgar 1969).

In the early days of organised bird banding in New Zealand, the New Zealand Dotterel was chosen as suitable for individual colour banding because of its comparatively small numbers and because it had been recognised in the field that the species was not sedentary. J. M. Cunningham, then Convener of the Ringing Scheme, persuaded me to use individual combinations, and the project began in December 1950.

This report covers up to 31 March 1977, but the project is continuing.

THE WORK

Banding and sightings began on the eastern coast at Mataitai (Clevedon) and extended to Miranda, Taramaire, Kaiaua, Clevedon North, Whitford, Pollen Island (in upper Waitemata Harbour, Pakiri, Te Arai, Mangawhai and Waipu; on the outer west coast the Waikato Heads and South Kaipara Head (at Waionui Spit); in the Manukau Harbour, Karaka, Seagrove, Auckland International Airport and Mangere; in the Kaipara Harbour, Jordans' on the southern arm and Taporā in the centre (see Fig. 1).

Banding has been successful only in the breeding season, when chicks and adults are most easily caught, from late August to about the end of January, but mainly from October to December.

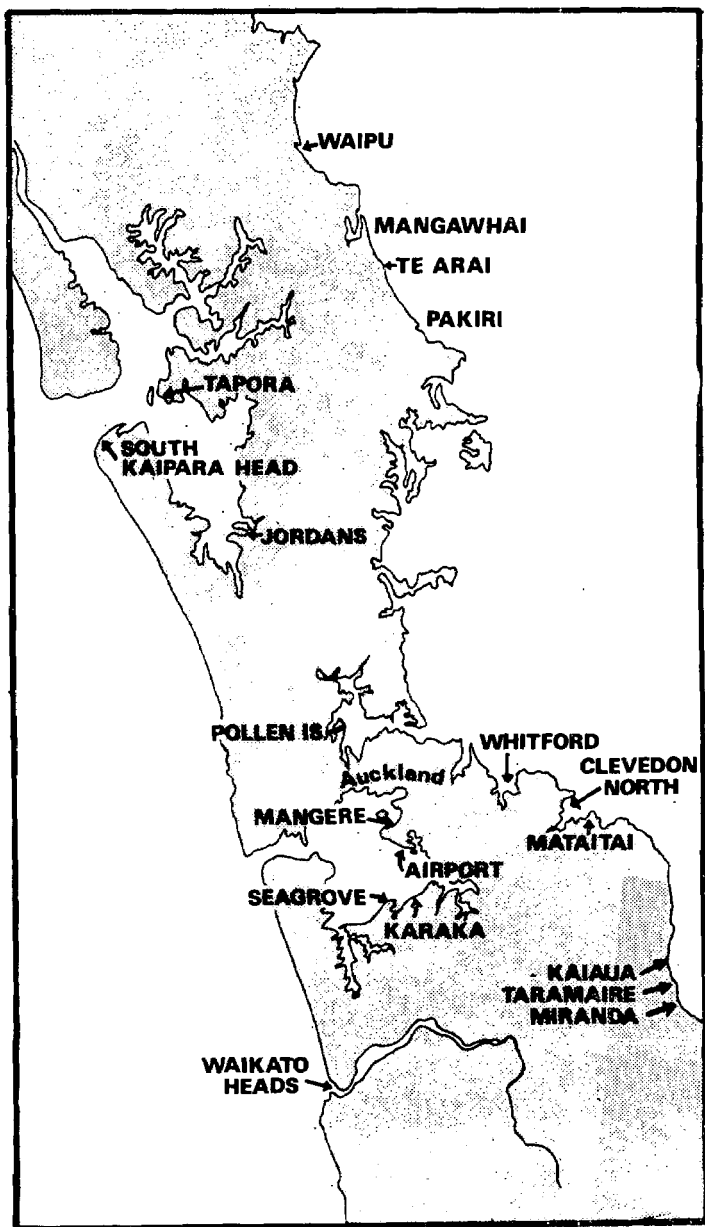


FIGURE 1 — Map of study area.

At first, banding was carried on steadily in a small way but with a lot of effort. Catching the chicks is not easy. While the pursuer is trying to run in mud more than ankle deep, the large chick is skimming over the surface like a departing aeroplane. On dry sand or shell it is simpler but several runners in strategic formation are still required. If the chick reaches cover it will penetrate it for a few yards and then "freeze," when, if it can be found, it can just be picked up.

I began with a party of eager young helpers who caught the chicks, while I did the banding. Later I entrusted the banding to experienced ornithologists, issuing the combinations and keeping the records myself. The pace stepped up when John and Beth Brown, with many ardent helpers, took part in various places but particularly at Karaka, where they also successfully poisoned rats which had made burrows in the shellbanks of the nesting areas.

Sylvia M. Reed has worked at all the places in Fig. 1 except Waikato Heads and Clevedon North. Since 2 November she has caught and banded 20 adults, 17 by drop trap at the nest and 3 by hand net as they displayed nearby. With helpers she opened up the very fruitful Waionui Spit area at South Kaipara Head, a difficult area where local help is needed with a four-wheel-drive vehicle.

Laurie and Alison Howell have regularly worked the Pakiri-Mangawhai stretch for sightings in the last few years. In the same period Anton Habraken has scoured all the southern places, especially the Waikato Heads, where in spite of many visits, no banded birds have been seen. It could well take a page to list all who have taken part, many of them extensively, during the 26 years of this interesting and popular project.

RESULTS

Eighty-six birds (66 chicks and 20 adults) were banded between 25 December 1950 and 31 March 1977. Fifty-two birds (60.5%), consisting of 35 chicks and 17 adults, have been seen again after banding for a total of 355 recoveries. Sightings ranged from 1 to 30 per bird. Only one was found dead. It was banded as a chick, D5289, at Pollen Island on 8 February 1970 and found at Clark's Beach, south Kaipara Harbour, on 3 September 1970.

Of the 35 chicks seen after banding, two had not fledged. The 33 seen alive after fledging give a minimum fledging success of 50%, but it could be better than 50% as some of the birds not seen after fledging may have moved to places such as offshore islands not covered by watchers, while others, from the earlier years, may have lost their colour bands. Also some, by moving about within the area, could have been missed, as it has not yet been possible to observe every place at the same time on one day.

The bands

Individual combinations of metal and colour bands were used, the first combinations being issued by J. M. Cunningham. The first metal bands, mainly or totally of aluminium, have been found to last, in one case at least, for 26 years, but that one was in very bad condition when recovered. The newer monometal bands are expected to last very much longer. However, the numbers on the new ones are so small that it has not yet been possible to read them in the field, even at a short distance. Only two bands, both of the earlier type, have been successfully read by sight, one, D5902 (R-M), by D. A. Urquhart on 3 July 1954 and one, D24268 (O-YM) by Maxine E. McKenzie and Anthea J. Goodwin on 8 November 1964. The colour bands had been lost.

The first coloured bands were of poor quality, and there is evidence that most of them came off within a year. This caused loss of many sight recoveries. Coloured bands of much better quality were later procured but there may still be trouble with the new bands as they are a little larger than the metal ones. When the two are on one leg a sight record may not be reliable because the metal band can have moved up or down inside the coloured one.

An example of an individual's band combination would be D1001 (RW-M), i.e., a red band over a white one on the left leg and a numbered metal band on the right. O = no band.

Outstanding records

The banding date is given first, then only the dates which indicate movements from one place to another.

D5902 (R-M) / D51438 (WB-M)

26 December 1950 chick, aged about 28 days, Mataitai. Seen again as a non-flying chick on 3, 6, 10 and 13 January 1951; flying weakly on 17 January; not seen on 5, 7 and 19 February. 4 March 1951 Karaka; 17 March 1951 Mangere (Puketutu); 8 April 1951 Karaka; 15 April 1951 Mangere (Puketutu); 22 April 1951 Karaka; 10 November 1976 Seagrove (where the number was changed to D51438 (WB-M); remained at Seagrove until March 1977, being then over 26 years old.

This bird had been banded D5902 (R-M). The red band lasted from 26 December to somewhere between 23 April 1952 and 8 May 1954 so apparently lasted longer than the other early coloured bands. This is the bird on which D. A. Urquhart read the number of the band by telescope.

On 10 November 1976 Sylvia M. Reed trapped it, a male, on the nest. The old metal band D5902 was so thin that it had not been seen previously that day when the bird was scanned with binoculars for bands. However there was enough of the band left to determine the number.

D51415 (RG-M)

15 December 1974 chick, Airport; 15 November 1975 Mataitai; 30 December 1975 Seagrove; 29 October 1976, 21 and 24 November 1976, 11 December 1976, 3 January 1977 Mangere.

D51419 (M-RW)

2 December 1973 chick, Karaka and seven more times there up to 4 August 1974; 29 December 1974 Mataitai and four more times there up to 15 November 1975; 23 December 1975 Whitford; 14 and 28 March 1976 Mataitai.

D51424 (BY-M)

1 December 1974 adult, Karaka and seen there again 28 times up to 6 March 1977. This is the highest number of sightings of a bird at one place only.

D51426 (BW-M)

7 December 1974 adult, South Kaipara Head; 12 February, 20 March, 14 September 1975 Karaka. This bird had moved 90 km (56½ miles) within 7 months.

D51428 (M-BY)

15 December 1974 adult, Mangawhai. Seen 11 times up to 14 November 1976 between Te Arai and Mangawhai. An example of a fairly sedentary bird. Several similar records of other birds have been made at various places.

D51439 (WY-M)

12 November 1976 adult, Karaka; 21 November 1976 Mangere; 17 February 1977 Karaka; 2 March 1977 Seagrove; 6 March 1977 Karaka. A case of rapid changes in a limited area.

D127604 (YR-M)

5 January 1975 chick, South Kaipara Head; 6 July 1975 Jordans', South Kaipara; 9 and 25 November 1975 Miranda. The distance travelled, measured in a straight line, was 133 km (82½ miles) within ten months.

D127607 (GY-M)

26 December 1974 adult, South Kaipara Head; seen six more times there up to 8 December 1976; 2 March 1977 Seagrove. This was a movement of 90 km (56½ miles) within three months.

D127609 (GW-M)

2 January 1975 adult, Karaka. Seen there 26 times up to March 1977. It made only one known excursion from there, to Mataitai, on 16 November 1975.

D24269 (O-RM) / D5290 (O-MR)

7 December 1961 chick, Karaka; seen to be flying 22 December 1961; 4 November 1962 Kaiaua, colour band missing but number on

metal band read with binoculars. It was a female with a mate and at least one chick about a week old. 8 and 25 January 1968 Karaka; 7 March 1970 Taramaire, caught in mistnet by A. M. C. Davis while netting wrybills. The colour band being absent and the metal one not in first class order he rebanded it D5290 (O-MR). It was seen there again three times up to 24 March 1976. It is to be noted that this bird bred within a year of being hatched.

Other Notes

Three birds, with 7, 7 and 10 sightings did not move from the Pakiri-Mangawhai block (see Fig. 1). Four, with 6, 6, 13 and 14 sightings did not leave the Manukau Harbour block. Two others with 7 and 12 sightings, started in Manukau and transferred to the Miranda block. One Clevedon bird, with 6 sightings, moved to the Miranda block. Miranda block had one with 7 sightings. All other birds not mentioned had less than 6 sightings, or none.

DISCUSSION

Coverage

This scheme has so far been quite rewarding, though the percentage of New Zealand Dotterel banded is still very small. Difficulties are met because there are not observers to cover the ground. No active banders live at or near most of the haunts shown in Fig. 1 so that much travel is involved. The work is done mostly by people who go, according to time and tide, to study all birds, so that sighting of New Zealand Dotterel is often fortuitous. An ideal would be a complete census, say four times a year, so that every place would be covered at the same time. Once this can be done the sighting of all the banded birds alive will be more likely, but it will still be impossible to check the legs of all birds seen and there would still be the problem of banded birds wandering beyond reach to places not under observation. Where, for example, was D24269 / D5290 at long intervals between 1961, 1962, 1970 and 1976?

Flocking in relation to banding

Few banded birds have been sighted among the larger flocks. Most records have been made of birds when breeding, or staying in the same place after breeding.

The highest proportion of banded birds in a flock was found recently at Scagrove, 6 out of 11. Wandering flocks of up to 20 or more may yield no band sightings at all.

In North Auckland, Edgar (1969) showed that the species largely spreads out to breed, then re-forms into flocks afterwards. The attenuated northern terrain could be the cause for this. The complexity of the Auckland area imposes less geographical restriction, allowing flocks or single birds to move freely and irregularly from one resort to another.

Edgar (1969) showed that, even in the breeding season, many birds are still in flocks on the breeding beaches or on nearby estuaries, with comparatively few birds breeding. This was true, for example, of the Pakiri-Te Arai-Mangawhai beaches (Edgar 1969: 91) and has been confirmed by L. and A. Howell during their monthly patrols for dead seabirds on these beaches. At times it has been noted, as at Karaka (Edgar 1969: 98), that the individuals of an unemployed flock, identifiable by some odd features, may be there one week and not the next, although the flock total is unchanged.

Family ties

It seems that the parents lose interest in the chicks soon after they have fledged. The two Whitford chicks which flew, shortly after fledging, to Karaka and Miranda respectively, are hardly likely to have had a parent each accompanying them. At Karaka three flying chicks which had escaped being banded stayed in a loose party among scattered adults for at least two or three weeks with no parental care. There have been as yet no cases known of banded parents and chicks rejoining after absence.

On 10 January 1976 Sylvia M. Reed banded two chicks, D51429 (M-WB) and D51430 (M-WG), the banded parents being D127615 (GR-M) and D127618 (M-GB). The young were flying on 1 February 1976 but were not seen again. The parents remained.

Sylvia M. Reed, at South Kaipara Head, banded a female D127607 (GY-M) on the nest on 26 December 1974. On three further dates up to 6 December 1975 she had a lame unbanded mate. On 27 December 1975 the lame mate was missing and was replaced by another male, D51420 (RB-M). D127607 was still tending a lone chick, D51435 (W-M), on 17 January 1976. She was seen there again alone on 8 December 1976, then at Seagrove, as already stated, on 2 March 1977.

Pair bonds

Up to the present there have been only two pairs of banded breeding birds, both at Seagrove. The first pair, D127615 (GR-M) and D127618 (M-GB) was trapped and banded at a 3-egg nest on 20 December 1975. On 7 March 1976 the pair was seen at Karaka but on 9 March 1976 was back at Seagrove and stayed there during seven further observations to 15 December 1976, when they had one chick, which was banded D51434 (GM-G). The chick was not seen again. The last sighting of the pair in the period of this report was on 2 March 1977. Since then however they have remained at Seagrove and were seen paired again on 16 July, 20 August and 14 September 1977, so if they breed in the 1977-1978 season it will be their third consecutive season in the one territory.

The other pair D5902 (R-M) / D51438 (WB-M), the 26 year old veteran, and his mate D51437 (WR-M) were found breeding at Seagrove on 10 November 1976. Only one chick resulted from the

three eggs and it was found dead on 21 November 1976. The further dates of observation were the same as the first pair. This pair remained constantly at Seagrove and was also found paired on 16 July, 20 August and 14 September 1977 so may be expected to breed there for two consecutive seasons.

It would not be safe to assume on the evidence provided by these two pairs that such behaviour would 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.

Breeding age

The bird banded D24269 (O-RM) / D5290 (O-MR) provides the only evidence of early breeding so far obtained. When banded on 7 December 1961 it was about 25 days old. Found with a chick a week or so old on 4 November 1962 it must have laid near the end of September, when it would have been about eleven months old. This was probably a rare case, as chicks hatched later in the season would hardly be likely to breed until the second year.

D5902 (R-M) / D51438 (WB-M), a male, has made a record by breeding at the age of 26 years. He was hatched on 25 November 1950 and found breeding on 10 November 1976. The breeding was unsuccessful, two eggs failing to hatch and a chick dying a few days after hatching. He was seen several times up to 12 March 1977 when his age was 26 years, 3 months and 14 days. Beyond the ending date of this report (31 March 1977) he was seen up to 14 September 1977, with his 1976 mate.

Known ages of birds banded as chicks (to the nearest year)

These ages are 1 of 26 years, 1 of 8, 2 of 7, 1 of 5, 1 of 4, 5 of 3, 6 of 2, and 10 of 1.

These sightings are few, largely due to the failure of the earlier coloured bands. Quite a few birds were seen to be wearing unreadable metal bands only. Unfortunately I did not record the date when the new colour bands were first used. However, one bird, D24269, banded on 1 January 1960 had lost its coloured band when captured in a net by A. M. C. Davis on 7 March 1970 so that most of the 23 birds banded between 25 December 1950 and 1 January 1968 could have had defective bands. It is not yet known how long the new coloured bands will last.

Movement habits

The instances given under "Outstanding records" show very little regularity. Some have stayed in one block, such as the several places in the Manukau Harbour, moving back and forth within it. A very few stay in one resort only, within a block. Others have moved from one block to another, some to several blocks.

No evidence has so far been found of birds returning, after wandering, to a former resort to breed. D24269 (O-RM) / D5290 (O-MR) was reared at Karaka and bred within a year at Kaiaua, an example of lack of attachment to birthplace.

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SHORT NOTE

NOMENCLATURE OF THE SHINING CUCKOO

New Zealand's Shining Cuckoo is one of four races of a species which also breeds in south-east Australia, New Caledonia and the New Hebrides. The species in turn is one of a group of 12 known collectively as the glossy cuckoos, and distinguished by their iridescent plumage and small size. Taxonomists with largely regional interests grouped the four African species as *Chrysococcyx*, placed the non-glossy *osculans* in a monotypic genus *Miscallius*, and referred the remaining seven Indo-Australian species to *Chalcites* (Friedman 1968, *The evolutionary history of the avian genus Chrysococcyx*. (U.S. Nat. Mus. Bull. 265). New Zealand ornithologists follow the *Annotated Checklist of the birds of New Zealand* (OSNZ 1970) in calling the Shining Cuckoo *Chalcites lucidus lucidus*. However, Berger (1955, *On the anatomy and relationships of glossy cuckoos of the genera Chrysococcyx, Lamprolaima, and Chalcites*. Proc. U.S. Nat. Mus. 103: 585-597) compared the anatomy of several glossy cuckoos (including *lucidus*) and concluded that all are congeneric, and referable to *Chrysococcyx*, the oldest available name. The decision is widely accepted, and while it is unfortunate to have to deviate from the Checklist, the change in New Zealand from *Chalcites* to *Chrysococcyx* is desirable, to conform with current international usage.

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WHITE ISLAND — VOLCANIC ACTIVITY AND BIRD LIFE

By KAZIMIERZ WODZICKI

White Island has recently been subject to increased volcanic activity. A major eruption began in December 1976 and ash has been emitted since then. Lava bombs were ejected in mid March 1977 and especially severe tephra eruptions have occurred several times, the most recent being on 25 August.

The kind invitation of Professor Robin H. Clark of Victoria University of Wellington and Mr Graeme Wilson, Producer at the Natural History Unit, Television One, Dunedin, to accompany the television team, provided an opportunity to visit the island on 28 August, 1977.

The surprisingly large number of 26 bird species has been recorded on White Island (Wodzicki, 1956; Wodzicki & Robertson, 1959), consisting of 11 seabirds, one shore bird and 14 land bird species. The distribution of the gannet colonies has been studied and a census of the White Island gannets (*Sula bassana*) was also carried out (Robertson & Wodzicki 1948; Fleming & Wodzicki 1952).

Very few seabirds were observed while sailing from Crater Bay to Ohauora gannetries. They included a few White-fronted Terns (*Sterna striata*) and Red-billed Gulls (*Larus novaehollandiae*) in Crater Bay. Also about a dozen Red-billed Gulls were seen at each gannet nesting colony.

As described in some detail by Wodzicki and Robertson (1959), there are on White Island three groups of nesting colonies of gannets on the south and south-west sides of the island: Otaketake, Ohauora and Te Matawiwi. Ohauora was the only place where it was possible to land and count the gannets, but Mr Wilson flew over the island the day after our visit and in the course of his work was able to observe all the gannetries. Mr Wilson's account was compared with the

TABLE 1 — STATUS OF GANNETRIES ON WHITE ISLAND IN 1949 AND 1977

Gannetries	Otaketake		Ohauora				Te Matawiwi						Total areas nesting
	a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.	l.	
1949	B	B	B	B	B	R	B	B	B	B	B	B	11
1977	B	B	B	B	B	B	B	B	B	B	B	B	12

B = Nesting colony; R = Roost

observations by Wodzicki and Robertson (1959), which were carried out in November 1949, i.e. approximately in the middle of the nesting season. The present records were made in late August, that is, at the beginning of the nesting season, when most of the birds were old birds, the young birds arriving at the colony later in the nesting season.

Table 1 records the numbers of discrete nesting areas in 1949 and 1977. During these 29 years a roost at Ohauora has become a nesting area so that there are now 12 nesting areas compared with 11 in 1949.

We are reasonably well informed about the gannet population of White Island. Robertson and Wodzicki (1948), counting on the ground, assessed the gannet population to be 3,062 pairs in January 1947. Counts from aerial photographs (Fleming & Wodzicki 1952) gave a total of 5,227 pairs, while Wodzicki and Robertson's count on the ground in November 1949 gave an estimated number of 5,376 pairs. Finally, our total estimate in 1977 (Table 2) amounts to 2,755 pairs, i.e. only about 50% of the number counted 28 years before.

Two factors which may have affected the numbers of gannets are the earliness of the 1977 counts — two months or more before the

TABLE 2 — THE GANNET POPULATION ON WHITE ISLAND
IN 1949 AND 1977

Year	Gannetry	Year	Gannetry
1949	Otaketake	1977	Otaketake
	a. 2171 (est.)		a. 1540
	b. 479		b. 130
	Total		Total
	2650		1670
	Ohauora		Ohauora
	c. 361		c. 217 (counted)
	d. 110		d. 30 "
	e. 888		e. 256 "
	f. —		f. 130 "
	Total		Total
	1359		633
	Te Matawiwi		Te Matawiwi
	g. 378		g. 12
	h. 160		h. 130
	i. 694		i. 30
	j. 49		j. 30
	k. 60		k. 130
	l. 26		l. 120
	Total		Total
	1367		452
	Grand total		Grand total
	5376		2755

Note: The 1949 population was counted on the ground except at a. With the exception of Ohauora gannetries the 1977 populations have been estimated.

peak time of the nesting season — and a fluctuation from year to year in the number of gannets. However, the decrease in numbers between the 1949 and 1977 counts is so large that an effect of increased volcanic activity on gannets cannot be dismissed.

Considering the kind of vegetation on White Island (Hamilton 1959), a surprisingly large number of landbirds has been reported. Among the 14 species recorded, six species are very scarce or rare visitors such as the Black Shag (*Phalacrocorax carbo*), Australasian Harrier (*Circus approximans*), New Zealand Kingfisher (*Halcyon sancta*), Grey Warbler (*Gerygone igata*), Bellbird (*Anthornis melanura*) and New Zealand Pipit (*Anthus novaeseelandiae*). The following eight species were all observed by Wodzicki and Robertson (1959) and were considered not uncommon; Song Thrush (*Turdus ericetorum*), Blackbird (*T. merula*), Hedgesparrow (*Prunella modularis*), Tui (*Prosthemadera novaeseelandiae*), Silvereye (*Zosterops lateralis*), Chaffinch (*Fringilla coelebs*), House Sparrow (*Passer domesticus*) and Starling (*Sturnus vulgaris*). Most of these birds were observed in or round the pohutukawa (*Metrosideros excelsa*) forest.

The only observations that could be carried out on 28 August 1977 were to walk through the pohutukawa forest round the Ohauora gannetries and to listen for bird calls during most of the day. There was complete silence in the forest and not a single bird was heard. A thick layer of volcanic ash was found on the leaves, limbs and branches of pohutukawa trees. Although still alive, many pohutukawa trees looked unhealthy and *Histiopteris incisa* on the forest floor was dead. The prevailing impression was that ash may have killed insects and other invertebrates and that this had led to the disappearance of bird life.

It is likely that with reduced volcanic activity, the recovery of the vegetation will be followed by the return of insects and other invertebrates and, at a later stage, of birds. Further observations on the effect of the volcanic activity on the gannets and their numbers and on the re-colonisation of the island by passerine birds would be of considerable interest.

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Sir Charles Fleming and Dr. Hamish R. Thompson kindly read the text and Professor Robin H. Clark supplied a brief description of the recent volcanic activity on White Island.

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GREY PHALAROPE IN THE BAY OF PLENTY

By B. BROWN and P. C. M, LATHAM

On the morning of 19 June 1977, PCML saw an unusual bird swimming at the edge of the lagoon adjacent to the Kaituna River mouth, central Bay of Plenty coast, North Island. After he had drawn it to the attention of BB an approach was made to within 8m where we were able to observe it through 8 x 30 binoculars in excellent light. We were later joined by A. J. Palliser with a 20 x telescope. On a subsequent visit that afternoon PCML, finding the bird exceptionally tame or almost indifferent to his presence, approached to within 4m. The bird was watched almost continuously from 1930 to 1600 hours, with a further three hours (PCML) on 25 June.

Body size: About that of a Sharp-tailed Sandpiper (*Calidris acuminata*), though the legs were noticeably shorter.

Crown: Dark grey, streaked with buff, tapering at the nape to form a narrow line ending on the mantle, and coming forward through the forehead to join a dark grey patch at the base of the bill.

Forehead: Dark.

Superciliary: Broadly white.

Lores: Dark from base of bill through lores continuing faintly to well behind the eye.

Ear coverts: White.

Chin and upper throat: Dark.

Lower throat, lower central breast and underparts: Whitish with light buff-chestnut mottling.

Neck, upper breast, sides of breast, sides, flanks and undertail coverts: Pinkish chestnut, with a mauvy-grey wash which showed particularly strongly below the carpal joint; some white mottling present, with a small white patch beside each carpal joint and two irregular white patches between flanks and tail.

Upper surfaces: Feathers blackish brown with buff edging.

Tail and uppertail coverts: Black.

Rump: White, with central dark line.

Bill: Shorter than *C. acuminata*, yellow from base to a little over half its length, then black to the tip; nostrils noticeably large and black on the yellow.

Legs: Grey, feet not well seen.

In flight a pronounced white wing bar showed on the dark upper wing surface; underwing uniformly pale except for dusky leading edge and tip. When wings were folded, white edges on the secondaries showed plainly.



FIGURE 1 — Grey Phalarope, Bay of Plenty, 22 June 1977

Photo: R. B. Goffin

In the six-day interval between the initial and the final sightings PCML found that the pinkish-chestnut of neck, upper breast, sides of breast, sides, flanks and undertail coverts had deepened to a reddish-chestnut and that much of the white mottling had gone. However, the white spots beside each carpal joint and the irregular white patches on flanks remained.

From this description it is clear that the bird was a Grey Phalarope (*Phalaropus fulicarius*) in advanced pre-nuptial moult.

Witherby *et al.* (1940) described both sexes in winter as having sides of breast blue-grey. The mauvy-grey wash, as described, suggests to us a bird not quite in full breeding plumage. The breeding season, according to Witherby, is in late June and early July in Spitzbergen; about ten days later in Siberia. Therefore, by late June birds could be expected to be in full breeding plumage or very close to it.

Furthermore, the colouring of this bird suggested that of an adult male. Comparison of PCML's colour photographs with P. Harrison's (1969: 963) colour photograph of a male shows a remarkably close similarity, mainly because of the dark forehead, white mottling of the underparts, the restricted white developing on the sides of the face, the crown and nape dusky streaked with buff, bill half black half yellow and the generally subdued colouring of the plumage.

According to Witherby, the adult female in (northern) summer has "crown and nape black centre of nape bluish mouse-grey lores and chin sooty black on sides of face surrounding eye a large white patch; sides of neck auburn shading into chestnut-brown; remaining under-parts chestnut-brown Bill chrome yellow, tip black." The adult male in (northern) summer is "markedly duller than female, especially on head has crown and nape streaked black and buff, lores and chin more dusky, with less and dingier white on sides of face white patch round eye much smaller and in some confined to eye-stripe remaining under-parts as female but more or less intermixed with white feathers, some suffused with chestnut-brown at tip Bill base yellow, rest black." Juvenile male and female: "upper-parts resemble adult male in summer but forehead light buff or white. Bill grey-brown shaded to black tip."

In (northern) winter the Grey Phalarope is mid-grey above, white below and on forehead and crown, with darkish patches on rear of the crown and around and behind the eye, and has blackish-brown wings.

The Grey Phalarope, or Red Phalarope as it is called in the Americas, breeds in Arctic North America, Greenland, Iceland, Spitzbergen, Novaya Zemlya and Arctic Siberia from the Taimyr Peninsula eastward to the coast of Anadyrland. Its winter distribution is entirely oceanic and is not fully known; outlined by Palmer (*in* Stout 1976: 263) as "off the Aleutians, Baja California (Mexico), and areas from there south to central Chile; in Atlantic apparently off Argentina, also off bulge of western Africa and south to the Cape. Also somewhere within or near the south China Sea." Winter records of birds on land are sparse. In New Zealand, only three Grey Phalaropes have been recorded previously: all females, collected from Waimate South (June 1883), Lake Ellesmere (1925) and Hastings (July 1934) (OSNZ 1970). The Bay of Plenty bird is, therefore, the first male recorded in New Zealand.

According to Falla (1936: 13), phalaropes are entirely accidental in New Zealand and there is no evidence that their wintering range includes the New Zealand region, for there have been no records in the southern summer. The sightings of a Red-necked Phalarope (*P. lobatus*) at Washdyke Lagoon on 19 March 1961 (Crockett 1961) in non-breeding plumage modifies this view slightly but the occurrence of phalaropes remains accidental. The only Australian record of a Grey Phalarope

is of a bird in Victoria in 1976. This bird, in complete non-breeding plumage, was found on 22 February 1976 at Lake Woorinen, 350 km inland (Smith 1976).

We had been unable to find a reference in the literature to the white patch beside the carpal joint, which shows plainly in PCML's colour photographs and in the colour photographs of a male Grey Phalarope in breeding plumage (*in* Harrison, 1969). However, Smith (1976), describing the only Australian record of a bird in winter plumage, said "Underparts: Pure white from chin and sides of neck to undertail coverts. Feathers of underparts along sides and flanks extending up to enclose the edge of the folded wing." His Plate 47 shows the mark clearly.

For all three species of phalarope Harrison (1969) remarked — "There is a reversal of the normal sexual relationship, the female being the larger of the two with the brightest summer plumage. It is the female which initiates courtship and the male which incubates the eggs and rears the young." Food includes crustaceans, molluscs, insects, small jellyfish, algae and moss, "and it is said to forage in the wake of whales." Witherby *et al.* stated that L. Kumlien described this species as regularly alighting on backs of whales resting at surface, in search of parasites.

When discovered, our bird was swimming buoyantly with head erect, and spinning on the water with a pirouetting movement. "... the plumage is dense and carries a cushion of trapped air ... and enables the bird to swim high and buoyantly in the water so that it can pirouette characteristically round and round when feeding" (Harrison 1969). For so small a bird it swam strongly.

It fed in several ways when swimming; plunging the head below the surface; upending and spinning. The latter movement was frequently employed to get at insects on the surface but on occasion seemed to be used to stir up food particles from below. Much of the bird's observed feeding time was spent wading in the *Spirogyra*-like weed which chokes a great deal of this shallow lagoon. Here it fed on the flies which abounded there, in an unhurried though purposeful way, not running but never still, a quick stab here and another there. "... darting this way and that as it snaps at gnats and flies, its favourite food on land. ..." (Coward 1953).

Once, while swimming, the bird was seen to gulp convulsively six or seven times in quick succession. The head was erect, not arched as though to regurgitate. It was also seen to adopt a "crouching" position while on the water, with head and neck held low. Flattening itself to the surface, with head held first on one side and then the other, it gave the impression that this was a posture assumed when threatened from above, though it could have been peering intently into the water.

When washing, the partly opened wings were fluttered to throw water over the body. The head and breast were forcibly bobbed under the water a number of times in quick succession.

When it approached a feeding Pied Stilt (*Himantopus himantopus*) too closely the phalarope was chased and finally put to flight. No flights of more than 30 m were observed and the bird was not heard to call.

It is interesting to note that the feet of phalaropes are partly webbed and partly lobed. This was noticeable in the bird to the extent that it had a flat-footed appearance, somewhat like a gull.

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SHORT NOTE

SWALLOWS AT SEA TO THE NORTH OF NEW ZEALAND

On 22 March 1978, at 1300 hours when in position 30°21'S 176°55'E (which is some 240 km (150 miles) north-east of Cape Brett) two Welcome Swallows (*Hirundo neoxena*) were seen flying about the ship. By 1600 hours the same day there were five swallows on board sitting on rails and pipes. Some, if not all, of these birds were still on board when *Marama* arrived at Auckland the following morning.

On 25 March 1978, at 1400 hours when in position 32°07'S 175°32'E (about 260 km (160 miles) north-eastward of North Cape), one Welcome Swallow flew about the ship for about twenty minutes. It did not land on board and was not seen subsequently.

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TERRITORIAL SPACING OF THE NEW ZEALAND FALCON (*Falco novaeseelandiae*)

By N. C. FOX

ABSTRACT

142 nesting sites in five study areas totalling 7 800 km² around Marlborough, Kaikoura, North Canterbury, Cass and Fox Glacier were used to measure local densities of New Zealand Falcons. Adult falcons are considered to be sedentary. The spacing of nesting territories in each study area is illustrated. Territories in Marlborough and North Canterbury averaged 3.80 and 3.95 km apart. Six territories near Fox Glacier averaged 13.7 km apart but some pairs had probably been overlooked. Falcon pairs in open country probably had home ranges of about 15.0 km², and those in forest areas ranges of less than 189.0 km².

INTRODUCTION

The New Zealand Falcon (*Falco novaeseelandiae*) appears to have several territorial boundaries and in this respect follows closely the model postulated for the Peregrine (*Falco peregrinus*) by Cade (1969: 199). Around the nest itself is a nesting territory defended against all intruders while the nest is in use. Males defend a larger nest territory than females (Fox 1978). Beyond this central territory is the home range or hunting range which is undefended except intermittently against other falcons. Additionally, favoured spots such as roost sites, hunting perches and temporarily disused alternative nest sites may be defended occasionally.

Contrary to Moncrieff's (1929) suggestion that the falcon is a partial migrant, my observations indicate that it is sedentary and that adults live and roost in the same area all the year round. Ten recoveries from 37 birds banded showed a mean distance travelled of 4.4 km (max. 10.0 km). Certain gullies have been inhabited by falcons throughout living memory (at least 30 years) (see also Harrow 1965), and the uric acid deposits at some roosts (Fox 1977a) indicate that occupation has extended for decades, if not centuries. Trained falcons flown in occupied home ranges during April 1976 elicited a territorial response on five occasions and it appears that resident falcons are to some extent territorial all the year round.

METHODS

As New Zealand Falcons tend to nest in the same place each year and have a noisy nest defence, people such as farmers and rangers often know if falcons are present. By talking to such people it was easy to establish the presence of many pairs. About 120 high-country

stations were visited. Sheep runs were the most rewarding as musterers are often dive-bombed during the tailing muster in November and also most of these stations are now well supplied with tracks, giving easy access by trail-bike. There is less chance of falcon nests being found on cattle runs such as Molesworth and Clarence Reserve which are mustered only once or twice a year. By establishing a network of informants I had, in effect, several hundred people each year covering the areas for falcons during mustering. This also gave me an unexpectedly high number (27%) of banding recoveries (cf Shor 1976).

Five areas in South Island were studied (Fig. 1). These contained 142 known pairs of falcons. Two of the areas, A (Marlborough) and C (North Canterbury) received much more attention than the others. The salient data on the study areas are shown in Table 1. The sheep farming sections of study areas A-D were similar but area E was predominantly lowland temperate rainforest. The flora and fauna of these areas, and the nesting histories and success of the falcons in them, have been described by Fox (1977b).

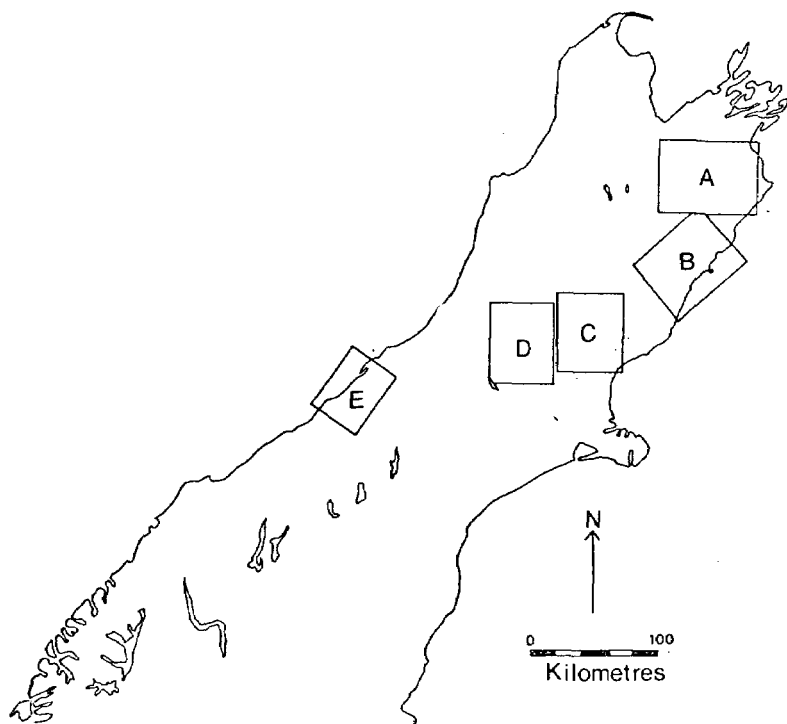


FIGURE 1 — Location of Study Areas in South Island.

	A	B	C	D	E
Location	Marlborough	Kaikoura	N. Cant'y	Arthur's Pass	Westland
Longitude	173°40' E	173°20' E	172°20' E	171°45' E	170°00' E
Latitude	41°45' S	42°25' S	43°00' S	43°05' S	43°20' S
No. documented Falcon pairs	80	11	27	17	7
Approximate area (sq. km)	3000	1240	1060	1250	1250
Max. height (m) A.S.L.	2883	1830	1290	1920	1218
Min. height (m) A.S.L.	100	0	306	650	0
Height of most pairs (m) A.S.L.	610	610	610	980	460
Angle of slope	30°	35°	30°	30°	0°-40°
Mean annual rainfall (mm)	890	1270	890	1270	3810
Mean annual temp. (°C)	7.8	9.2	9.2	7.8	8.9
Dominant rock type	Greywacke	Greywacke	Greywacke	Greywacke	Garnet Zone Schist
Land use	Extensive sheep farm	Extensive sheep farm	Extensive sheep farm	Sheep/Nat. Park	Nat. Park
Major vegetation cover	95% Grassland 5% Bush	90% Grassland 10% Bush	95% Grassland 5% Bush	40% Grassland 40% Bush 20% Alpine	80% Bush 15% Alpine 5% Grassland
Main river catchments	Wairau Waihopai Awatere Flaxbourne	Kahutara Conway	Hurunui Waipara Okuku Ashley	Wainakariri	Waiho Cook

TABLE 1 — Data on the Study Areas.

An arbitrary 4.0 km diameter circle, approximating the size of most home ranges, was drawn on the map around each falcon nest site in each study area. Where a pair was known to use two or more sites, the centre was taken as equidistant between them unless one site was rarely used. The distance between pairs was measured by drawing lines between all adjacent pairs. No line was drawn if this entailed cutting the circle of a third pair or crossing another line; thus where four pairs were placed in a roughly square formation only one diagonal, the shortest, was drawn. If two pairs were widely separated by suitable nesting habitat, known to be untenanted by falcons, a line was drawn connecting the pairs. This was not done for area E, since the terrain between pairs was not definitely known to be untenanted.

RESULTS

The spacing of pairs in each of the 5 study areas is shown in Figures 2-6. The frequency of inter-pair distances is shown in Figure 7.

DISCUSSION

Spacing of pairs

The results showed that the spacing was markedly consistent, indicating that in these areas nest sites are less important in limiting the populations of the New Zealand Falcon than in most Peregrine populations (Hickey 1942). Pairs were a mean distance apart of 3.80 km and 3.95 km in areas A and C respectively, the majority of pairs being between 2 and 5 km apart. By contrast, pairs in E averaged 13.7 km apart.

KEY TO FIGURES 2 - 6

Complete 4.0 km circles indicate known, frequently occupied Falcon nesting areas. Broken circles indicate marginal sites not now in use. Black dots mark known harrier nest areas. Narrow, continuous lines indicate sea-coast.

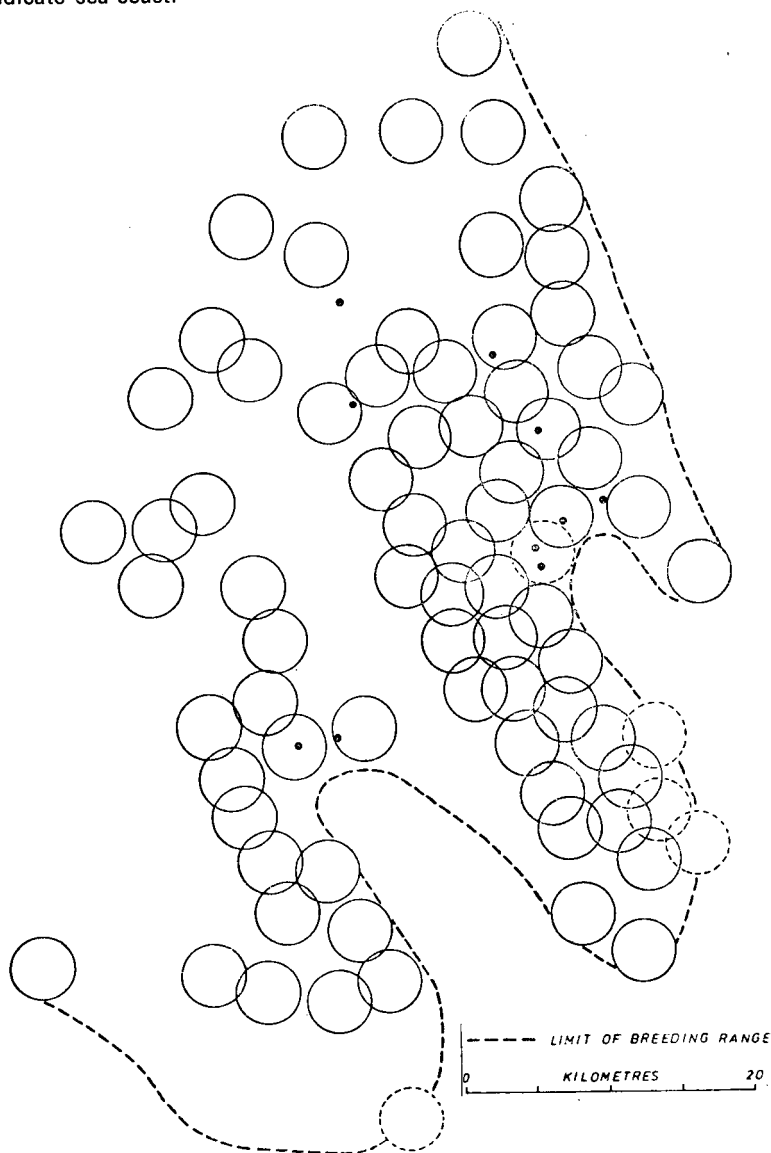


FIGURE 2 — Study Area A — Marlborough.

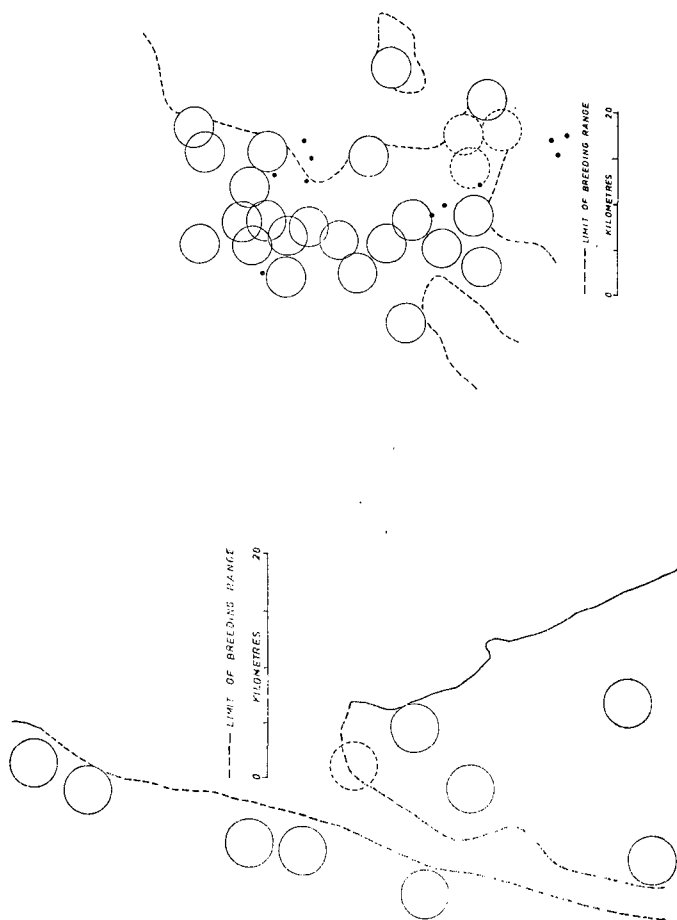


FIGURE 3 — Study Area B — Kaikoura.

FIGURE 4 — Study Area C — North Canterbury.

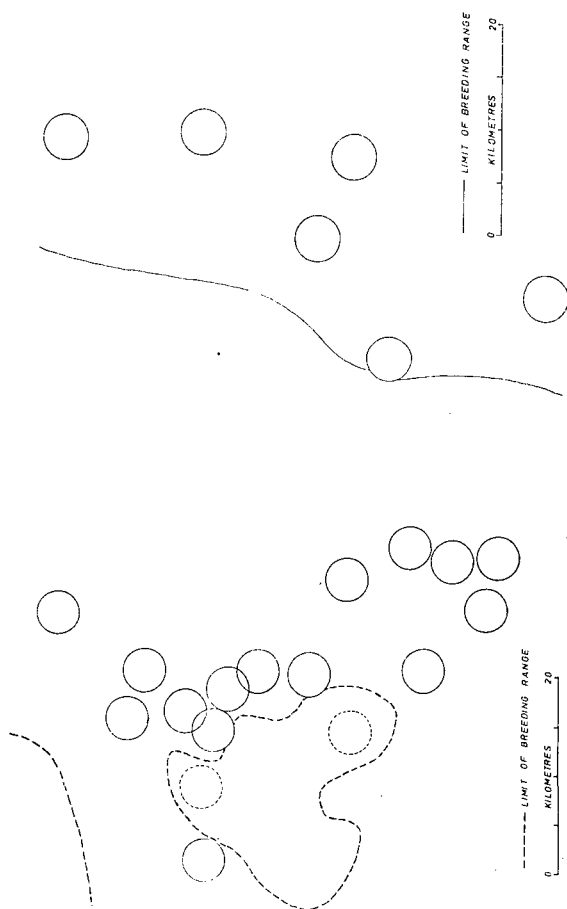


FIGURE 6 — Study Area E — Fox Glacier.

FIGURE 5 — Study Area D — Cass.

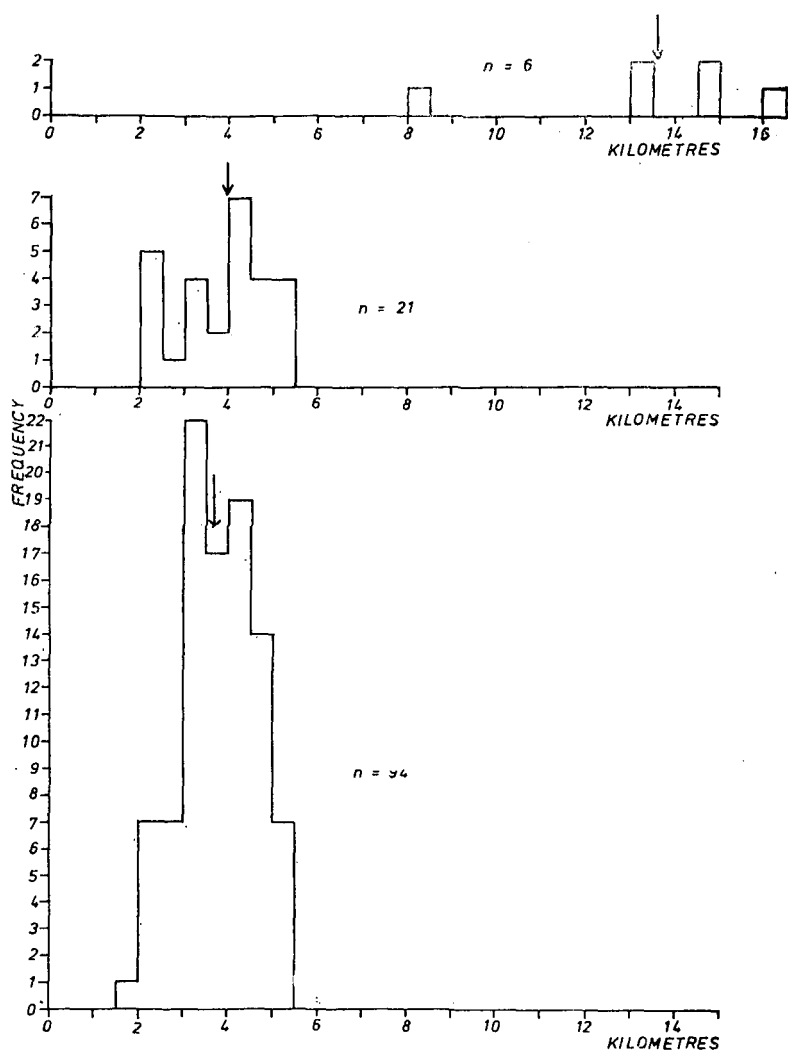


FIGURE 7 — Frequency histograms showing distances (km) between adjacent pairs. Arrows mark mean values. Top: study area E (Fox Glacier). Middle: study area C (North Canterbury). Bottom: study area A (Marlborough).

Either there were intermediate, unlocated pairs in area E, or pairs were further apart in E than in A and C, or there was a combination of both possibilities. Southern & Lowe (1968) found that Tawny Owls (*Strix aluco*) are much more efficient hunters and require

smaller territories in open forest than in dense forest with heavy undergrowth. Also, Lay (1938) found that margins of clearings had 95% more birds than comparable areas inside the adjacent woodlands. It seems probable that a similar situation exists here and that falcon pairs were more widely spaced in the forested area E than in the other areas.

Where the forest has been partially felled, creating margins and clearings, the density of falcons and their prey may be higher. John Powell (pers. comm.) found two falcon pairs 3.2 km apart in partly logged Rimu/Beech forest in the southern Ureweras. Guthrie-Smith (1927) recorded that in 1921, 5-6 pairs of falcons were present on his 20 000 acre runholding. Pairs must have been about 4.3 km apart. However at this time the area was being cleared from virgin bush, exposing prey and creating optimal hunting conditions for falcons. The falcons were probably temporarily superabundant — Guthrie-Smith noted that only one pair had a permanent breeding site — and by 1927 when most of the run had been cleared no falcon nests were found.

Home range sizes

The size of the hunting range of a pair of falcons can be answered at this stage only by making some more or less unsubstantiated assumptions. The subject needs to be investigated more thoroughly, possibly using radio-telemetry. If it is assumed that the hunting range of a pair of falcons is hunted by that pair alone, then the maximum hunting area of a pair of nesting falcons in Marlborough is about 14.4 km². The corresponding figure for North Canterbury (area C) is 15.6 km² and for Westland (area E) 189 km². The scanty data available thus suggest that falcons in bush may use hunting ranges about 13 times as large as in open country. Possibly only about 10% of this bush area is actively hunted by the falcons. I believe that if study area E were investigated more thoroughly, more pairs of falcons would be located and that densities approaching one pair per 75 km² would be found.

The way in which home range is measured and calculated is important. In this study the area occupied by one pair of falcons was taken as the square of the mean distance between adjacent pairs. No extra allowance was made for margins of breeding ranges; field work indicated that such areas tended to be occupied by non-breeders.

Craighead and Craighead (1956) based their figures on visual observations of unmarked birds and their data may be subject to error. They found that home range sizes for any one species varied by a factor of over 100% between pairs. Ratcliffe (1962) found 26 pairs of Peregrines nesting contiguously with a mean distance between adjacent pairs of 4.7 km. He enlarged the hypothetical territorial area around the periphery of the population so that the boundary extended 4.7 km from each outside pair, rather than 2.35 km (half the mean

inter-pair distance) applied to the central pairs. This increased the area taken into consideration by a factor of 2.3, so that, instead of reaching a figure of 22.1 km² per pair for a continuous population density, by allowing for a big periphery he obtained a figure of 50.5 km² (19.5 square miles). Because this latter figure is proportional to the size and distribution of the population it cannot be used for comparisons with other populations. Rowan (1921) found that Merlins (*Falco columbarius*) had ranges of about 13 km².

Schoener (1968) stated that territory size increases with raptor size. Thus one would expect the New Zealand Falcon's home range to be intermediate in size between that of the Merlin and of the Peregrine. In open country the home ranges were slightly smaller than anticipated, possibly because the Australasian Harrier (*Circus approximans gouldi*) is the only competing species. In temperate rainforest the areas appeared to be about 13 times larger than expected. Because food supply affects breeding densities (Moore 1957, Mebs 1964, Nelson & Myers 1976, Newton 1976) it is probable that falcons breed at lower densities in the alpine and sub-alpine valleys than they do in the lower-lying hill country.

Spacing mechanisms

Since falcons are not affected by ecological factors, such as available nest sites, they are probably spaced out by their behaviour. If display flights and calls are the mechanism, as is frequently the case in raptors, an intruding falcon, on seeing a resident falcon, would leave the area or at the least would not breed. To investigate this, two pairs of falcons were artificially established about 150-200 m apart so that normally one pair would be within the nesting territory of the other. One pair was in an aviary with an open netting roof. The other pair was free. The free falcons could thus space themselves by any means except physical violence. The free pair frequently flew over the aviary, and each morning the two males called loudly. Yet both pairs laid eggs and it appeared that, if anything, these displays, by promoting pair-bonding, enhanced breeding. One can conclude tentatively that breeding pairs of New Zealand Falcons are spaced out by physical attack. Territory size would therefore be limited by the area which the resident birds were capable of patrolling or by the area which the residents had to patrol to obtain sufficient food. Although the mechanism of spacing would be territorial behaviour, the ultimate density-controlling factor would be food supply.

ACKNOWLEDGEMENTS

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SHORT NOTE

WELCOME SWALLOW IN MID TASMAN SEA

On 10 May 1978, a Welcome Swallow (*Hirundo neoxena*) was seen fluttering around the DSIR ship R.V. *Tangaroa* in the mid Tasman Sea, at 36°07'S 163°24'E. The bird was clearly identified as it flew close to the ship, briefly landing several times. No other ships came in sight on the cruise. A few days later the swallow was seen again, looking rather weak, sheltering under a tarpaulin. A brief search was made on returning to Wellington but it was not found.

For about a week before the sighting a large anticyclone had been moving slowly eastwards across the Tasman, giving light winds. By 10 May this had moved off and most of the Tasman was having northerly winds; 15-20 knots at our position.

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INCUBATION TEMPERATURES OF THE NORTH ISLAND BROWN KIWI (*Apteryx australis mantelli*)

By BARRY ROWE

ABSTRACT

Incubation temperatures of the North Island Brown Kiwi (*Apteryx australis mantelli*) were studied by telemetry methods. Using the equipment described, the temperature was found to be 37.0°C on the upper surface of the egg in contact with the male's brood patch and 35.0°C at an approximate embryo depth within the egg. Using the temperatures obtained and to test the observation that the eggs are not turned, artificial incubation of a Kiwi egg was successfully carried out.

INTRODUCTION

The successful development of a fertile avian egg depends on the three physical factors of temperature, humidity and mechanical turning frequency being maintained within fairly narrow limits.

Since a Kiwi egg is very large when compared with the size of the incubating male (approximately 20% of the male's mass) it seems likely either that the egg is turned frequently to maintain even temperatures throughout the egg, or that the egg is not turned at all and the embryo tolerates a gradient of temperature which decreases through to the bottom of the egg.

Flieg (1973) gave incubation temperatures of five species of ratites, the eggs of which are, however, incubated by birds whose body is much larger in proportion to the egg than is the Kiwi, so that the heat flow from the incubating parent is not particularly unusual. For example, an Ostrich egg is 1.7% of body weight, according to Welty (1975).

Previous surveys of incubation temperatures refer to "internal egg temperature," "mean egg temperature," or simply "egg temperature," as if this were uniform throughout the egg (Huggins 1941, Drent 1970, White & Kinney 1974). Although this is no doubt adequate for most bird eggs, there can exist a significant vertical temperature gradient within larger eggs, which must reach an extreme in an egg as large in proportion to the incubating adult as a Kiwi's.

METHODS

To obtain temperatures continuously, telemetering equipment was installed in a dummy egg. The transmitter used an integrated circuit

* Otorohanga Zoological Society Scientific Publication No. 3

timer wired up as an audio oscillator with a thermistor which changed frequency when the resistance altered with temperature change. The range was about one metre.

Signals were picked up by an aerial set into the back of the Kiwi's burrow. The aerial was run to the outside of the pen into a covered van, a distance of about ten metres, and connected to a receiver and logic decoder. Readings were recorded on a Metrohm Labograph E428 chart recorder using a chart speed of 20 mm per hour. The egg used was a fibreglass shell approximately 3 mm thick and measured 135 mm x 85 mm. The shell was split longitudinally into equal halves. One thermistor was cemented flush with the shell surface with epoxy resin (Araldite). This was positioned 45 mm back from the "air-cell" end of the egg, which placed it 2 mm below and 10 mm forward of the greatest diameter. This thermistor gave temperatures at the shell surface. The transmitter was then placed in this half of the shell. The second half of the shell was filled with paraffin wax which has a specific heat close to that of egg albumen (Varney & Ellis 1974). Into this matrix, 33 mm from the shell surface and positioned lengthwise so as to be in the centre of the egg, a second thermistor was placed and wired to a double throw switch so that either shell or core temperatures could be monitored. The completed egg weighed 420 g, which is within the normal range for this species. Temperature readings were taken from a single bird nesting in an artificial burrow within a 250m² enclosure at the Otorohanga Zoological Society's aviaries at Otorohanga.

The egg was resting on a natural soil base, the top and sides of the "burrow" being built of untreated and unsealed timber 20 mm thick. Kiwis had used this burrow successfully the previous season to incubate six eggs.

Testing was spread over July and August so as to cause least disturbance to the incubating male and covered the period from the first egg laid, up to and including the period when the third egg was laid. No more than two eggs were left with the bird, including the dummy egg. In each test period, the dummy egg (previously warmed) was substituted for one of the bird's eggs.

By rotating the dummy egg, five different readings were possible: (1) top shell temperature (2) bottom shell temperature (3) upper core temperature (4) mid-core temperature (5) lower core temperature.

Each position was tested for three separate periods of 24 hours. The thermistors were calibrated in a still-air incubator with a mercury thermometer held horizontally from the thermistor point, and a water-bath was used to obtain core calibrations. A further check was done by placing copper-constantan thermocouples at each thermistor point and readings were taken direct from an electric thermometer (Model Bailey BAT.4).

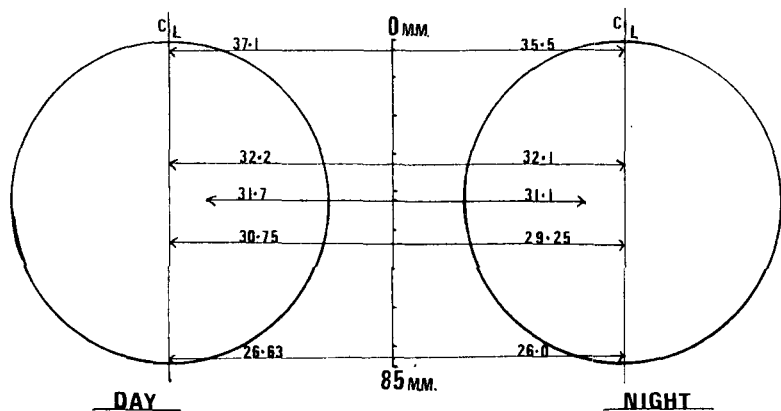


FIGURE 1 — Diagrammatic cross-section of egg showing temperatures obtained at points indicated. Figures are degrees Celsius.

RESULTS

The readings are summarised on the egg cross section (Fig. 1). The variation in temperatures from night to day are opposite to the body temperatures of the Kiwi published by Farner *et al.* (1956). The gradient in temperatures through the egg was consistent. Interference to the radio signal after dusk and again before dawn did suggest the egg may have been turned. Checks, however, showed the egg had been shuffled without being turned over, as the bird left the burrow to feed.

Observations on viable eggs at Otorohanga have shown that the air-cell faces uppermost throughout incubation. (The air-cell in a Kiwi egg lies off-centre at the larger end.)

Typical bird eggs are turned frequently to prevent adhesion of the membranes. On hatching, the chick is able to rotate within the egg and, using its egg tooth, pip its liberating circle of punctures. However, the Kiwi does not hatch in this typical manner. Generally, a single puncture is made in the air-cell end which has a thinner shell than the rest of the egg (Calder, pers. comm.). No egg tooth has been observed at this stage or in two partially developed embryos examined. The hatching chick may pause for as long as two days before finally flexing and rupturing the shell, which usually fractures along the line of the air-cell. It seems, therefore, that the Kiwi egg does not need to be turned because the chick does not have to rotate at hatching.

To test these ideas, a normal Kiwi egg was placed in a still air incubator (Onslow Model 0-90), to give the required gradient in temperature through the diameter of the egg. The temperature at the top of the egg was 35.0°C and the air-cell was kept uppermost. The

egg used weighed 402.6g immediately after laying and measured 160 mm x 77 mm. The egg was candled periodically to check progress and was placed in a metal can every two to three days for metabolic experiments, but received no deliberate turning. Humidity was kept at approximately 70% RH until hatching when it was increased to 87% RH. Hatching occurred after 71 days.

Within limits, an embryo develops more rapidly the higher the temperature, and therefore the temperature at which an egg is incubated affects the rate of embryo development and the time of hatching (Welty 1975). Hence, if the temperatures of the incubator are set appropriately, the incubation time should correspond to that observed in nature. In the practical test applied, the incubation time of 71 days falls within the minimum range of that observed for the Kiwi at Otorohanga.

DISCUSSION

Hatching success of domestic hen eggs falls to 15% if the eggs are not turned at least once daily (Welty 1975). A positive statement that Kiwi eggs do not need turning cannot therefore be made on the results of the one egg artificially incubated and further eggs will need to be tried before this can be proved beyond doubt. However, it may well be that the Kiwi embryo by its extreme activity, prevents adhesions in the developing embryo. We have observed that at 49 days a Kiwi embryo is capable of changing its position inside the egg, causing the egg to rock when placed on a flat hard surface. The physical problem of turning an egg as large as a Kiwi's within the small floor area of the natural burrow may have led to the unusual feature of an active embryo inside an egg that is not turned. The Australian megapodes are one of the few species known currently which do not turn their eggs.

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Telemetry circuits are available on request from the author.

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SHORT NOTE

FIJI WHITE-THROATED PIGEON NESTING IN AN EPIPHYTE FERN

The White-throated Pigeon (Columba vitiensis) is generally (Mayr 1945: 65, Goodwin 1970: 90) said to build its nest 3-6 metres above the ground in forest trees. Kleinschmidt (Anon. 1876: 173) reported nesting only 4-8 feet above the ground in Fiji. There is one definite record of the New Caledonia race (*C. v. hypoenochroa*) nesting on the ground (Warner 1949: 90), confirming what the Layards (1882: 528) had been told.

On 27 September 1975, 300 m a.s.l. on the cliffed but partially bush-clad southern face of Joske's Thumb, a 442 m volcanic plug in southern Viti Levu, Fiji, I found a White-throated Pigeon's nest in a large "bird's nest fern" (*Asplenium nidus*) 3 m above the ground in a stunted tree. The pigeons had built in the centre of the epiphyte fern. The large surrounding circle of fronds, clustered about the humus and leaf-litter covered rhizome, formed a cup support fully as firm as the ground and completely concealed the nest from below. I discovered the nest only because I glanced down while descending the cliff directly above it, and noticed the incubating bird.

The nest was a typical pigeon's nest of twigs some 25 cm in diameter, and contained a single white egg measuring 40 mm by 28.9 mm, at an early stage of incubation.

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THE CATTLE EGRET IN NEW ZEALAND IN 1977

By B. D. HEATHER

ABSTRACT

Results are given of a census made in August 1977 of Cattle Egret and other egrets, spoonbills and ibises in New Zealand. Approximately 300 Cattle Egrets were present. The year's records are given for each region, together with observations on plumage and habits. Features of Cattle Egret distribution and plumage changes are discussed.

INTRODUCTION

After the first reports of Cattle Egret (*Bubulcus ibis coromandus*) in New Zealand in 1963 and 1964, there was an apparent lull, with few birds reported in most years and none in several, until in 1973 small parties of from one to 3 birds were recorded in at least 12 localities from Northland to Southland. In 1975 there was apparently a moderate increase, coinciding with but possibly unrelated to an unusual influx of Glossy Ibis (*Plegadis falcinellus*). In 1976 there were widespread reports of small parties, greatest numbers being in Southland, Nelson and Waikato districts, and the largest flock being 24 at Rangiriri, Waikato, in September/October. Since there was no evidence of breeding in New Zealand, it was generally assumed that these birds were coming from and returning to Australia, as an extension of the post-breeding dispersal that occurs there (Jenkins & Ford 1960, Chalmers 1972).

In 1977, it had become clear by June that even larger numbers had arrived. To clarify the matter, the Council of OSNZ adopted a suggestion to attempt a national count of the Cattle Egret. The weekend of 27-28 August was chosen, at a period when most flocks would have stabilised after the winter but not yet broken up to migrate or breed. At the same time all other egrets, spoonbills and ibises were to be counted, but not the White-faced Heron (*Ardea novaehollandiae*) nor the Reef Heron (*Egretta sacra*).

In the event, over 200 members, Wildlife Service officers and others took part, after publicity and a widespread search to locate birds in the weeks before the count. Most contributors have been mentioned in the OSNZ newsletter and it is hoped that this will be accepted as a personal acknowledgment. The work of Regional Representatives or their deputies was particularly valuable and their contribution to regional summaries is acknowledged in the Regional Records.

RESULTS OF COUNT, 27-28 AUGUST 1977

Table 1 sets out the number of birds recorded in each district, including birds known to be present both before and after count weekend and too far from other birds to have been counted elsewhere. The species included are Cattle Egret (*B. i. coromandus*), White Heron (*Egretta alba*), Little Egret (*E. garzetta*), Glossy Ibis (*Plegadis falcinellus*), Australian White Ibis (*Threskiornis molucca*) and Royal Spoonbill (*Platalea leucorodia*). The Yellow-billed Spoonbill (*P. flavipes*) was recorded at one locality only (Awanui, one bird) and is not listed

	Cattle Egret	White Heron	Little Egret	Royal Spoonbill	Glossy Ibis	White Ibis
Stewart Island						
Southland	21		2	2		
Otago		6	2			
West Coast	20	7	1			
Canterbury	14	13	2		4	1
Marlborough	22	3	1			
Nelson	20	13	2	22		
SOUTH ISLAND	97	42	10	24	4	1
West Wellington			1			
Manawatu	15	2		18	1	
Wanganui	9					
Wairarapa	7	1			1	
Hawkes Bay	1	2	3	2		
Gisborne/Wairoa	5	5		2		
Taranaki	26		2	1		
Rotorua/Taupo						
Bay of Plenty	7	2			1	1
Waikato/Sth Auck.	97	8	1			
Auckland	4	7	3			
Far North	25	14	2	2		2
NORTH ISLAND	196	41	12	25	3	3
GRAND TOTALS	293	83	22	49	7	4

TABLE 1 — Number of birds in New Zealand, 27-28 August 1977, arranged by regions.

on the table. The Lesser (or Plumed or Intermediate) Egret (*E. intermedia*) was watched for but not recorded.

REGIONAL RECORDS

NORTHLAND (north of Helensville)

Aupori Peninsula 5 at Paua in April, feeding on fields and on road side in kikuyu grass; seen to take crickets. Others reported from Shenstone Farms, north of Paua and from Waihopo. 4 south of Te Kao, early May. None at Paua from May to 24 November when one appeared but did not stay.

Awanui In May, northern birds apparently moved south and joined others on farms around Awanui estuary (Unahi and Kumi Roads) where there were flocks totalling 43 birds on 7 May, rising to 52 by end of May. 2 found dead. 31 noted once in May mixed in a dense flock of sheep at Unahi. From 7 June, numbers fell to 15-20 birds and for a time none was reported; however, from about mid-June to mid-August, 25-40 were on a farm about 10 km further east, not far from Lake Ohia. Some of these apparently drifted back to Awanui area where the number built up again to 25 by late August, while the rest presumably moved south. The 25, sometimes in one flock, sometimes split, remained until they left finally about the second or third week of November. One seen about 30 November. Always on farm land, in May with sheep but usually with cattle although not necessarily closely with them. At times at Awanui and near Lake Ohia, associated on fields with White-faced Herons and Pied Stilts (*Himantopus h. leucocephalus*).

Dargaville Birds reported west of Whangarei late April/early May near Mangakahia Bridge, Titoki (2), Waiotira (1) and near Dargaville, one at Maitahi and 2 at Turiwiri. In mid-June, 2 were briefly around Dargaville sewage ponds and another spent part of July at Taingaehe, 30 km south of Dargaville, with White-faced Herons. None of these birds was present on 27-28 August. (A. T. Edgar)

AUCKLAND

4 birds apparently present June to August at Parakai, near Helensville.

SOUTH AUCKLAND - WAIKATO

One at Kawakawa Bay 20-21 June; one at Waitakaruru, Firth of Thames, on 26 June. 4 on Waikato River at Maioro on 24 May.

Aka Aka Muir's Road: 3 on 25 May, 23 from 24 June through to 27-28 August. Only 5 seen on 12 November but all 23 reported present on 16 November by the farmer, Mr Sandy Muir. With Jersey-Friesian cross cattle.

Waitetuna River estuary, Raglan, one on 27 August. Whangamarino, 2 in May. June, 5 at Mercer, 9 to 13 near Meremere. A. Habraken received reports of 4-8 birds, not included in census, which may have wintered in Tuakau district.

Rangiriri Main concentration in this area, where first sighting was of one on 29 April. Number built up to 22 by mid-May, 42 and 51 in June and 66 in August/September. These birds were in two flocks: (a) Te Onetea Road (W. Stone's farm), 23 on 25 June through to 1 October; 12 on 29 October. None on 5 and 30 November. (b) Plantation Road (Henderson's farm), 28 on 25 June, 37 on 28 July, 43 on 28 August through 1 October to about mid-October. 27 on 5 November. None on 30 November.

Waikato birds were mainly with dairy cattle, Jersey or Friesian, sometimes with beef cattle.

Lake Ngaroto (near Te Awamutu) 7 on 17 July and through to 26 October. 2 on 14 November. One on 23 November. With Jersey dairy herd but often on their own on the swampy land near the lake, either resting or feeding along the drainage ditches and on the grass.

Pokeno: one arrived late December and remained through to 1978 winter, passing through breeding plumage. With herd of Black Angus cattle but most often in same field with part-Charolais bull; near Ryburn's Lagoon. (J. H. & B. H. Seddon; B. Brown)

BAY OF PLENTY

None reported or found in Rotorua/Taupo/Turangi region. First seen was one on 19 and 25 June on and near Kaituna Cut lagoon and Maketu Lagoon. Presumably shifted to join others east of Matata in area bounded by Tarawera River, Awaite Wetlands Reserve, Greig Road and Main Road. Here there were 7 on 17 July and through to 27-28 August and 8 on 22 October. 3 only on 6 November. Not seen thereafter. Seen feeding with Jersey, Friesian and Aberdeen Angus cattle. (P. C. Latham; A. Palliser)

TARANAKI

North Taranaki 3 seen on 29 April at a farm on Ngatimaru Road, Waitara, after a report of 5 having been present about a week. Newspaper report of 5, possibly the same birds, among cows at Tikorangi, not far from first locality. Still present on 27-28 August and until early November. One on 6-7 May with a White Heron on a backwater near mouth of Waitara River. One on 4 May among heifer cattle on a farm on Kaihihi Road, Okato.

South Taranaki Newspaper report and photograph of 3 with sheep on Watino Road farm between Opunake and Pihama on 10 June; these birds stayed until late June. One present with dairy herd during June and up to late July on Mangapoua Road, Normanby. 3 with dairy herd on Hauroto Road, west of Hawera from May to July. R. Honeyfield's farm, Power House Road, Kakaramaea, near Patea, 4 arrived on 20 June, joined by 3 more two weeks later. Stayed among sheep until 29 August. 6 returned briefly on 16 and 19 September. Not seen again. Lake Waikato, Russell Road, Nukumarū, near Waitotara, 14 from at least early June. Present up to mid-November when 9 left.

5 up to 11 December. 2 stayed through to 1978 winter, passing through breeding plumage but without breeding activity. Fed among several neighbouring dairy herds. (R. W. Wheeler; B. D. Heather)

GISBORNE/WAIROA

2 on Kirkpatrick Road and 2 on Fox Street in Gisborne district on 27-28 August. One with a dairy herd at Awamate, near Wairoa, from mid-July to late August. No further information.

(J. C. Henley; G. Foreman)

HAWKES BAY

2 on Ahuriri estuary, Napier, in June/July. One in Hurimoana Swamp, Fernhill on 28 August. (N. B. Mackenzie, K. V. Todd)

WANGANUI

Farm 3 miles south of Wanganui, one on 25 April, 4 on 7-8 May, 6 on 14-15 May. 9 at Lake Whiritoa on 27-28 August. No further information.

MANAWATU/WELLINGTON

Opiki, 15 km west of Palmerston North, 6 from 6 August (already present for several months) to early November. Lake Koputara, Himitungi, 3 from 24 July to 28 August. Turnbull's Lagoon, Waiterere, 6 from 19 June (present for two weeks) to 15 October. 4 on 13 November. None on 11 December. Often with cattle or sheep, often alone. At Turnbull's, were sometimes accompanied by a Glossy Ibis. Otaki Beach, 4 on 8 May, on farm land with cows. Reports of between 5 and 8 at and near Lake Horowhenua could not be confirmed. Pauatahanui Inlet, one on 9 July at low tide, not feeding but fiddling with sticks. Several later reports not confirmed. Manawatu estuary, one in breeding plumage on 7 January; not seen again. Feilding, 2 reported on farm on Colyton Road on 7 December; not seen again.

(L. J. Davies; M. L. Falconer)

WAIRARAPA

One on 9 May on farm near Masterton where 2 had been for one day only on 19 April 1973; stayed 2 days. 2 near Gladstone on 27 July. B. Monk's farm between Featherston and Lake Wairarapa, 3 on 12 June (already present a month), 5 on 22 August and through to 20 October. One on 22 October; none thereafter. With several neighbouring dairy herds.

3 at Pirinoa on 25 May, one on 17 July. These few birds moved about within a restricted area near the eastern side of Lake Wairarapa, 5 being seen in late July/early August, and 2 through to early September. Thus there were at least 7 birds in Wairarapa on 22 August and presumably on 27 August when severe flooding hindered the census.

(D. Sim)

MARLBOROUGH

Northern Marlborough 2 at Lake Elterwater on 7 July; one at Dog Hill, Ward, on 8 July. Blenheim: second-hand report of 22 on the old bend

of the Wairau River during May. This flock apparently broke up in stages, with several reports of one or two at Rai Valley and near Fairhall School, leaving 12 which remained on lush pasture in the area close to the old ox-bow lake of the Wairau at Grovetown. Apart from a sighting of 15 in late July, 12 stayed, feeding among sheep, sometimes in company with White-faced Herons and Black-backed Gulls (*Larus dominicanus*), up to 13 November. 2 on 27 November. One well-coloured bird on 24 December near Blenheim sewage pond on Hardings Road, feeding with sheep on dry, salty pasture near a drying pond.

Kaikoura First seen were 4 on 28 May on M. Davidson's farm with town-supply herd, near Kowhai railway siding south of Kaikoura. About 9 June, shifted to R. Mackle's farm on Mt Fyffe Road in Kaikoura suburbs. 6 on 20 June and through to late July. In early August, shifted a kilometre to L. Weaver's and J. People's farms on Mill Road. Stayed there, occasionally on neighbouring farms, up to 27 November, when 5 left. The last bird went on 4 December. From early November, conditions became generally dry and the wet area they had used became a small pond heavily used by domestic ducks and geese.

2 birds of a second flock were seen on 6 August on P. Lawson's farm, Inland Road, on west bank of Kowhai River. By late August, there were 4, now a kilometre westward on O. Gray's farm. Last reported early September. (J. A. Cowie; R. N. Holdaway)

NELSON

Takaka: 15 on Whitwell's farm, Rotatai, on 7 and 25 August. No other information. March 20, one near Rough Island, not seen in April; May, one at Waimea Inlet; 5 among horses at Monaco, one with injured leg trailing in flight; one for several days at Atawhai, with sheep or cattle, or alone on tidal mudflats; 5 at Motueka, which disappeared early in June and may have been the 5 at Waimea Inlet 11 June to 4 July. **Appleby:** area of Pea Vine corner, Cottrells and Landsdowne Roads, 5 from June to August, 8 on 3 September, 10 for most of September. Reports of 7, 9 and 10 up to late October. Usually among cattle. (J. Hawkins; K. Owen)

WEST COAST

Very scattered reports, with few major flocks. **Cape Foulwind,** Westport, one on 7 September. **Punakaiki,** one in May. **Inchbonnie** (Arthur's Pass Road), one on 7 August, 2 on 27-28 August. **Matai,** north-east of Greymouth, 2 on 27-28 August. **Rotomanu,** east of Lake Brunner, 7 on 27-28 August, 12 in late October. All birds usually with cattle. **Whataroa** 3, **Harihari** 3, **Okarito** one on 27-28 August. **Taramakau** settlement, 2 in June. **Hokitika** River, one on 16 April, killed by car on 17 July. **Waiho** River flats, 4 in early May (one later recorded to have died). **Kowhiterangi-Kokatahi** area, two groups of 6 and 3 on 30 May, 7 and one in July, 7 on 2 August. **Fox:** Cook River flats, 2 in March, 3 in April/May; Fox Glacier township, 4 in April. **Matitahi** Valley, near Bruce Bay, 2 on 27-28 August. No further information after August. (D. P. Murray; C. S. Lauder)

CANTERBURY

Waikuku, north of Christchurch, one late April to June, in field of long grass, together with many White-faced Herons; 2 in September and up to 26 October.

Lakeside: an apparently resident population in an area covering 6-8 farms about 4 km from south end of Lake Ellesmere. Reported to have been continuously present since August 1974, the number seen varying from 2 to 6 but breeding has not been seen. From August 1976 to late July 1977, 12 remained in one flock. Occasionally up to 4 would leave and spend a few days with herds of cattle up to 12 km away. At end of July, number dropped to 10, later to 8, which was the number up to early December, apart from 9 on 27 August and 3 at Selwyn Huts in early September. 8 in early February, 9 on 25 March 1978, feeding among Friesian cattle.

Lake Wainono: 2 in April/May. Also seen on 27 August. 1 in October, reported by farmers to be present throughout October and until at least mid-November. Foraging in flooded fields and on grassy edge of the lake. Not attached to cattle.

(W. R. Mawson; R. J. Pierce; P. M. Sagar)

OTAGO

No Cattle Egrets reported or found.

(J. B. Hamel)

SOUTHLAND

21 birds located during census of 27-28 August were not in major flocks: 2 at Wallacetown, one at North Makarewa, 2 at Bay Road, Invercargill, one at Otatara, 3 at Menzies Ferry, one at Seaward Downs, 7 at Gorge Road and 4 at Te Anau. The Gorge Road birds arrived in May, stayed together until early August, thereafter in small groups of 2 or 3 up to early September; one on 10 November, 3 in mid-November. The Menzies Ferry 3 arrived in early April and stayed until early September; seen with cattle, calves, sheep, horses or alone. 2 appeared in early September on a tree-lined field behind Kew Hospital, Invercargill. Stayed 8 days, on three of which sheep were present.

(R. R. Sutton; M. L. Barlow)

STEWART ISLAND

No birds reported or seen in the few likely places.

(C. O'Donnell)

DISCUSSION

Birds began to arrive in New Zealand in late April/early May, with a few exceptions recorded near Hokitika and Fox Glacier in March and early April. The build-up continued well into May. Although many birds made their landfall in the Far North, the dates suggest that many others may have reached other western localities directly, without a major dispersal from northern to southern regions. In several districts birds occurred in small, scattered parties until June

when they came together into fewer, larger groups which stayed together until at least late September, often well into November. In several districts (e.g. Southland, West Coast), birds were in scattered small groups until at least late August.

Birds began to depart from mid-October, with the main exodus during November, and a few lingering through to mid-December. There was no evidence of any movement northward or of a build-up of flock sizes before leaving, birds seeming to leave piecemeal and in mixed parties of birds whose plumage varied from well-coloured to all-white. Apart from the Ellesmere group, only 6 birds were seen after mid-December: one on 24 December near Blenheim, one on 29-31 December near Benmore, one on 7 January near Foxton, one in Pokeno Valley from late December, and two in South Taranaki. The last three are the only birds known to have stayed over the summer to the 1978 winter season.

The New Zealand dates accord well with the published dates of Cattle Egret dispersal to southern Australia. The 1959 irruption into the south of Western Australia documented by Jenkins & Ford (1960) began in April, built up during May and birds remained in numbers until September. In the years 1965-1971, birds near Sale in eastern Victoria appeared generally in late April/early May, except for 6 on 1 April 1971, and they left in early November (Chalmers 1972). Near Orbost, eastern Victoria, a few birds appeared in late April/early May, numbers built up during May and birds left in late November, none being seen after the first week of December (Hollands 1972).

Australian breeding dates have not been clearly stated but, since Cattle Egrets often breed in large colonies of egrets and shags whose timing varies according to climate, particularly rainfall, the breeding dates vary from year to year. Over 10 000 were reported nesting in December 1957 on Adelaide River, Northern Territory (Frith & Davies 1961); birds have been seen on eggs in November in the swamps near Ulmarra, coastal northern New South Wales (Sharland 1957); nesting at Ulmarra began in early December in 1968-69, with chicks in early January (Hindwood *et al.* 1969); nestlings were seen in late February near Ulmarra in 1972, with flying young and nesting apparently finished in late March (Wheeler 1973). At the colony at Gattton, west of Brisbane, nesting began in mid-November 1977 and all birds were flying by 19 February 1978. 992 nests were counted, about one-third fewer than in the 1976/77 season (Walter 1978). At the colony near Murwillumbah, near the New South Wales border, by 8 October 1977, the first few birds had appeared; by 22 October, "hundreds" had appeared and some 50 pairs were renovating old nests in the centre of the colony; by 26 November, "hundreds" were on eggs while others were building nests; by 24 December, older chicks were well-feathered and about half grown (generally three chicks per nest) and 700-800 nests were estimated; by 19 January 1978, many young were on the ground; by 10 February, about two-thirds of the

birds had gone but some young were still in nests and on the ground (Pratt 1978).

The assumption is made here that, except perhaps for the small Canterbury population, birds are migrating to and from Australian breeding colonies. There is no direct evidence for this assumption, except that the pattern of movement has continued from the first winter records of the 1960s, merely the numbers increasing. This pattern also closely matches the dates of dispersal in southern Australia. It seems highly unlikely that New Zealand birds should be from the large Northern Territory colonies; more likely from north-eastern New South Wales where the Ulmarra colonies had grown from 6 nests in 1954 to between 250 and 300 in 1967 and may be more extensive by now; or from colonies in south-east Queensland. Colour marking of New Zealand birds would be a desirable but difficult exercise.

There is no evidence of breeding in New Zealand, despite a considerable search by land and air in likely areas. The reported probable breeding of a pair near Balclutha, Otago, in 1972 (Westerskov 1974) seems now by hindsight highly improbable, both the dates and the colour of soft parts of the adults suggesting that their breeding season had not yet arrived, particularly as they were not seen after 23 November. It is indeed surprising that birds have not bred in New Zealand where there are ample apparently suitable sites. However, unless there is an undetected major colony in northern New Zealand, an annual migration across the Tasman Sea is no less remarkable than the lack of breeding.

DISTRIBUTION — ATTACHMENT TO FARMS

The main localities of concentration have been in the Far North and the Waikato, with a good scattering of flocks in most other western regions, and in the north and south of the South Island. There were none in the central North Island, a scattered few in the eastern North Island and a noticeable gap in the eastern South Island from Ellesmere to Southland, apart from two birds at Wainono. One might speculate on a western landfall of birds followed by a limited movement eastward, deterred in places by the central mountain chain, particularly the Southern Alps (see Fig. 1).

More significant is the reappearance of birds on the same farms in successive years, even though New Zealand provides an extensive area of suitable farm habitat in most regions. In some cases, flocks occurred on farms close to lakes, less often coastal lagoons or land-locked estuaries, which may therefore act as landmarks and provide the roosting sites they are said to prefer, in trees beside lakes or swamps. In other cases, although there is no apparent reason why one farm is selected out of many similar farms in a district, birds have returned in successive years, usually accompanied by more birds. Examples of both types: Aka Aka, 5 in 1974, up to 11 in 1975, 23 in 1977; Henderson's, Rangiriri, 14 rising to 19 in 1975, 24 in 1976, 43 in 1977;

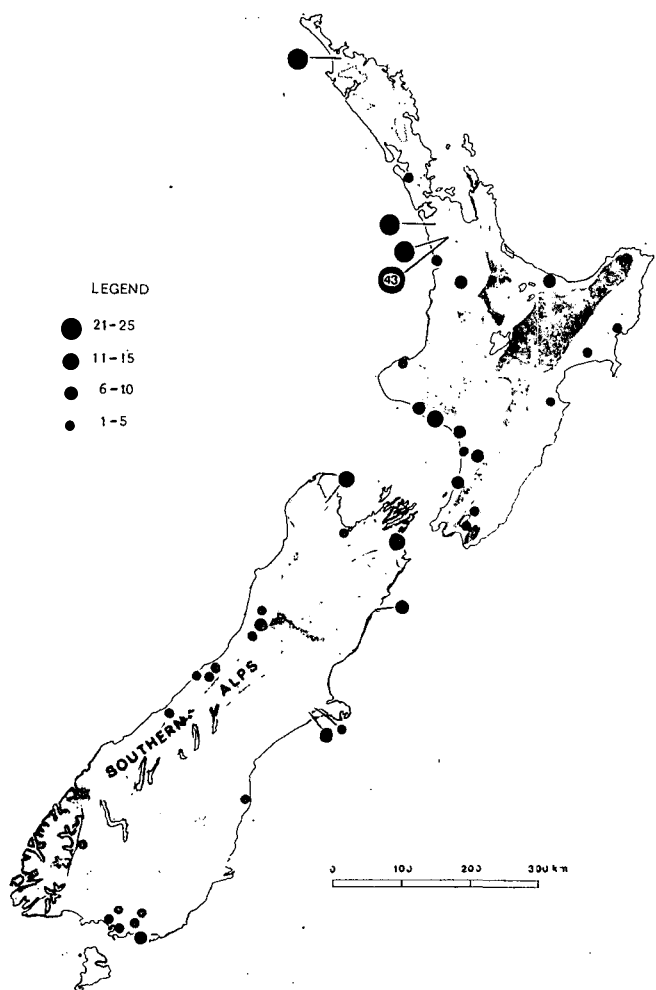


FIGURE 1—Distribution of Cattle Egret in New Zealand 27-28 August 1977. Shaded areas represent mountains and/or forest.

Lake Ngaroto, 2 in 1976, 7 in 1977; Normanby, Taranaki, one in 1976, one in 1977; Kakaramaea, Patea, one in 1975 and 1976, 7 in 1977; Waitotara, 6 in 1976, 14 in 1977; Opiki, Manawatu, 2 in 1976, 6 in 1977; Turnbull's, Manawatu, 6 in 1977, birds present in previous years; Takaka, 6-8 in 1976, 15 in 1977; Kaikoura, 2 each year since 1973, 6 in 1977; Lakeside, 2-6 since 1974, 8-12 in 1977; Menzies Ferry, Southland, 3 in 1976, 3 in 1977. According to farmers, birds have

been present on some farms near Greymouth and Hokitika for several years but in this and other districts there is little clear information from previous years.

PLUMAGE CHANGES

The authors of works which deal with regions where the eastern subspecies *B. i. coromandus* occurs state or imply that both adults and immatures in the non-breeding period are wholly white. On the other hand, adults of the nominate race *B. i. ibis* of Africa, southern Europe and the western Palearctic have in non-breeding plumage a pale buff crown, together with slightly elongated creamy feathers on lower throat and mantle in males; immatures are wholly white but develop the buffy crown at 5 months (Siegfried 1971, Cramp & Simmons 1977).

In New Zealand, birds have usually been difficult to approach closely, particularly to see any yellowish wash on the crown, but it does seem that all birds on arrival are wholly white and that a yellowish wash appears on the crown of all birds, both adult and immature, only late in winter, certainly no earlier than July, and usually much later. More careful field observation and a range of skins are needed to confirm this.

The following notes were made on plumage changes in 1977. *Awanui*: of 25 on 27-28 August, one noted as faintly buffy (M. Hows). Of 11 on 7 November, one very faintly coloured, 8 moderately well coloured, 2 very well coloured, with buffy-orange head, breast and back plumes, bill more orange than yellow, legs grey-green, paler on tibia and darker on feet. (J. H. & B. H. Seddon)

Far North: a bird found dead in May had a round patch of yellowish down on the breast, hidden by the lower-neck feathers. (A. T. Edgar)

Taingaohe, near Dargaville: the bird of July was all-white but with red instead of yellow iris. (C. D. Clunie)

Pokeno Valley, South Auckland: a single bird which appeared in late December and over-summered had on 31 December orange plumes, deep red bill and dark yellowish-orange legs; by 12 February it had lost most of the plumes, had yellowish-red bill and greenish-yellow legs; on 2 March 1978 it had a faint tinge of colour still on sides and back of head, a small patch of buff on upper breast, dark yellow bill, slightly reddish near base, and grey-green legs. (D. A. Lawrie)

Aka Aka: 21 of the 23 on 28 August were pure white, with yellow bills and blackish legs; the other two were distinctly orange on the head and slightly coloured down the neck. (A. Habraken)

Onetea Stream: of 23 on 28 August, one with buff on head. Of 23 on 1 October, 14 with well coloured crown and plumes, orange-red bill, apparently darker blackish legs; 3 with some colour; 6 all-white.

Of 12 on 29 October, all with some colour, varying to 2 fairly pale birds.

Plantation Road: of 43 on 28 August, 4 with some buff on head and breast. Of 43 on 1 October, 11 with well coloured crown and plumes and orange bill; 5 with some colour; 27 apparently all-white, although rain prevented detailed study. Of 27 on 5 November, only 4 very pale in colour; rest well coloured, bills deepening to reddish-orange, legs from grey-green to reddish-brown.

Lake Ngaroto: no colour on the 7 of 27 August. On 6 October, 2 well coloured, 3 slightly coloured, 2 all-white. Bills of coloured birds orange-red, legs slightly darker grey-green. On 26 October, 5 medium to well coloured, 2 faintly coloured. On 14 November, 2 well coloured, with buff-orange plumes on head, breast and back; bill orange-red, legs darker than usual grey-green; feet black. (J. H. & B. H. Seddon)

Bay of Plenty: of 8 on 22 October, 5 well coloured. Of 3 on 6 November, one well coloured, with pink bill, one with buffy neck, one all-white. (P. C. Latham)

Opiki: of 6 on 28 August, 5 showed varying colour — one with buff on head, breast and back, others with pale buff on crown or lower breast. On 15 November, 2 were well coloured, 3 slightly coloured, one all-white. The two well-coloured birds left early in November, over a week before the others.

Turnbull's Lagoon: the 6 on 30 July were noted (M. D. Dennison) to have beginnings of buff feathers on crown; a search of one area where they preened produced feathers with a light buff edging. Late August, 2 with some colour. On 15 October, 2 well coloured, 3 slightly, one all-white. (L. J. Davies; M. D. Dennison; H. A. Robertson.)

Kakaramaea: of 6 seen on 27 August, 4 with flesh-pink bills.

Waitotara: of 14 on 28 August, 2 with creamy-buff wash on crown and chest and pinkish-yellow bills. 2 on 11 December well coloured; on 19 December described by farmer Mr F. M. Rees as having bright reddish-orange bills and brownish-yellow legs; on 23 March 1978, were all-white with yellow bills, one still with traces of orange down the back. (B. D. Heather)

Featherston: of 5 on 9 October, one yellowish on crown and back, 2 with yellowish wash on crown and nape, 2 all-white. One remaining on 22 October had orange-buff back plumes, yellowish wash on head and nape. (B. D. Heather; S. Cook)

Nelson: the 15 at Takaka on 25 August were noted as "coming into breeding plumage." However, no colour was seen on the 8 near Nelson in early September, nor on the 10 at same locality on 27 September. (J. Hawkins) An immature female from Richmond, dated

1 May 1977 (Nelson Acclimatisation Society), in National Museum, is wholly white, not in moult, with faint yellowish tinge on crown — probably not visible in the field. o

Blenheim: of 12 on 31 October and 6 November, some noted to be very buff on head and neck, but could not be approached closely. On 13 November, 6 well coloured, 3 with buff head, 3 all-white. (R. N. Holdaway)

Kaikoura: at least 3 of the 6 still present in mid-November had conspicuous colour on head and neck. (J. A. Cowie)

Waikuku: of 2 on 26 October, one well coloured, one all-white. (P. M. Sagar)

Matai, Greymouth: 2 on 28 August showing yellowish tinge; legs grey, bill yellow, paler in one bird. (C. S. Lauder)

Gorge Road, Southland: 2 on 28 August had a buff flush on crown. (M. L. Barlow)

Hokitika: bird killed by car on 17 July, now in Canterbury Museum, described as white, without plumes, orange-brown on crown; bill lemon yellow, facial skin lemon yellow with slight green tinge; outer three primaries showing distinct wear; no moult in progress; shafts of tail

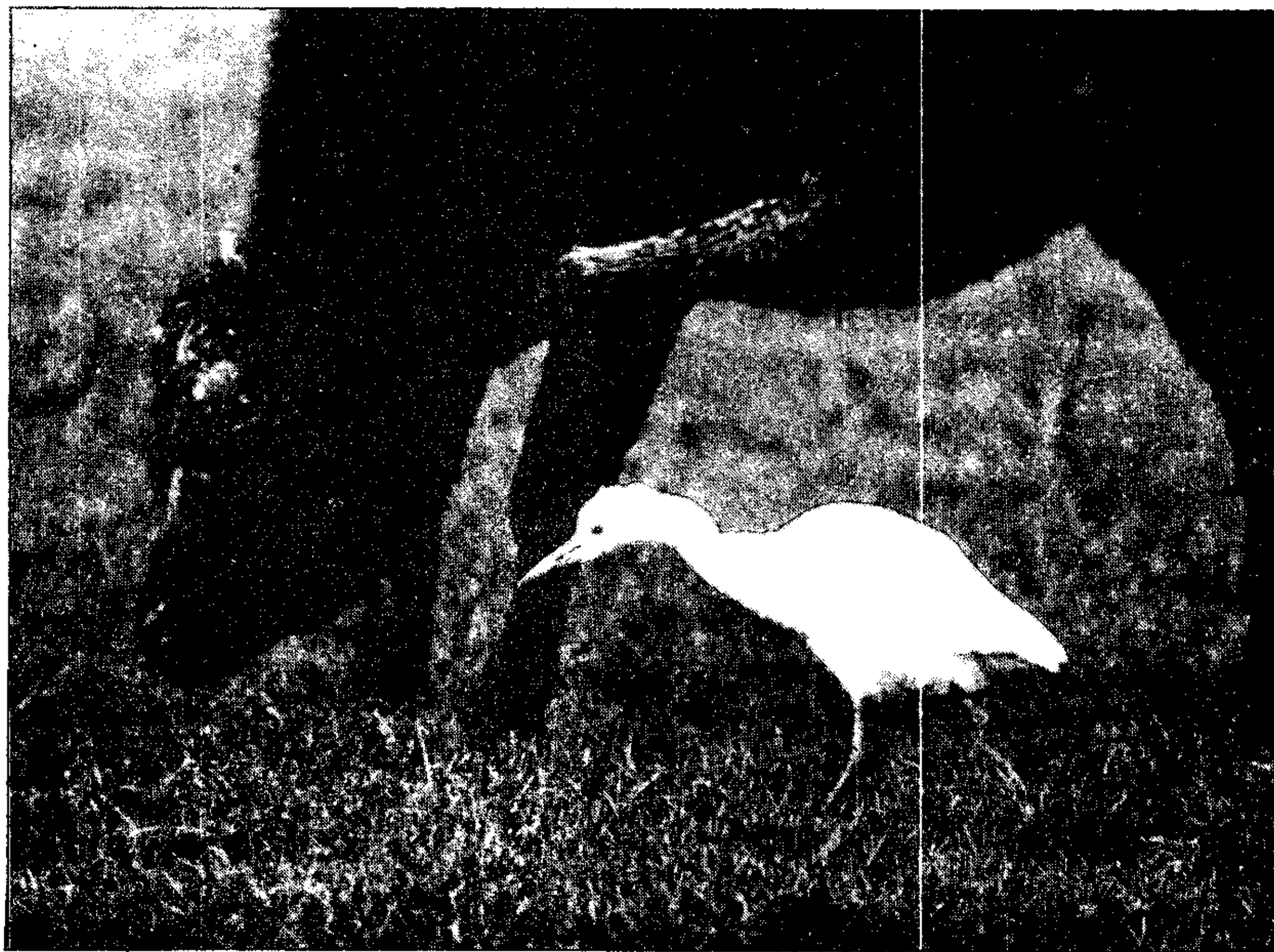


FIGURE 2 — Cattle Egret in New Zealand, 1977.

Photo: New Zealand Herald

feathers protruding at tips, suggesting immaturity. (G. A. Tunnicliffe) A badly decomposed bird found in Waihopai Valley, Marlborough, in May 1976, now in Canterbury Museum, was all-white; soles of feet yellow-green. Based on bones, a sub-adult. (R. J. Scarlett)

DISCUSSION

Birds on arrival in New Zealand completely lacked colour in the field (Fig. 2). By late August, occasionally earlier, a few birds were seen to have acquired a light yellowish wash on the crown, sometimes described as buffy. Sometimes this wash was on neck or breast as well. By early October, flocks were showing a wide range of colouring from brilliant orange plumes and orange-red bill to all-white with yellow bill. By late October, when birds were departing, many were medium to fully coloured and by mid-November most but not all were well coloured.

In the Sale area of Victoria, Chalmers (1972) noted that almost all birds, although they were not breeding in the area, developed nuptial plumage by early September, somewhat earlier than in New Zealand, and that on their return in April/May, they had shed their breeding plumes. Hollands (1972) mentioned that birds in eastern Victoria were in breeding plumage by late November. Several of the few birds which stayed over in New Zealand until March 1978 or returned before the end of March still showed traces of colour on chest or back, but their crowns were all-white and without elongated feathers. This contrasts with *B. i. ibis* where a buffy crown is retained in adults.

In South Africa, it has been shown that young birds of *B. i. ibis* in their first year develop nuptial plumes rather later than adults and a few may even breed without full plumes (Siegfried 1971). If this is true also of *B. i. coromandus*, it is possible that birds in New Zealand which develop nuptial plumes late are young of the year. For example, in early October, out of the 78 birds examined carefully at Waikato and Wairarapa localities, 27 were well coloured (35%), 14 slightly coloured (18%) and 37 wholly white (47%). Perhaps, therefore, at least 47% of these birds were immature.

There is much confusion and some error in literature on the colour of the soft parts of the Cattle Egret and this could profitably be studied in New Zealand, particularly with birds that stay over summer and pass through the rapid pre-breeding stages. In South Africa, it has been shown that the red bill, red facial skin, iris and legs are temporary colours, assumed for only the several weeks of intensive sexual activity before egg-laying. These colours then fade to yellow, the legs then finally returning to black (Siegfried 1971). However, at Ulmarra, New South Wales, in late November, the bills of adults were noted as leaden or greyish-black, some with yellow at the base, a few completely dull yellow. The legs were brownish, paler on the tibia (Sharland 1957). This stage has not been noted in New

Zealand. Hindwood *et al.* (1969), after several seasons of study at Ulmarra, described the peak of colour changes as follows. Bill fleshy-red with yellowish tip, changing through orange to yellow; iris red at peak of sexual activity, otherwise yellow; facial skin deep fleshy-red at peak of sexual activity, changing to yellow; legs, tarsus blackish with a dull red tinge, tibia flesh-pink to reddish.

In New Zealand, the bird at Pokeno Valley on 31 December had a deep red bill and dark yellowish-orange legs, fading by 12 February to yellowish-red and greenish-yellow respectively (D. A. Lawrie). The two Waitotara birds had on 19 December bright reddish-orange bills and brownish-yellow legs (R. M. Rees, pers. comm.). Before departing from other districts, birds were described as having often an orange-red bill and blackish legs. The Dargaville bird in July with red iris was unusual, as apparently were the various birds described as having pink bills.

It seems that confusion persists and that only an almost daily account of colours of individual birds over-summering in New Zealand can make clear the full sequence of colour changes that occur before and after the onset of breeding.

For the non-breeding period, Hindwood *et al.* (1969) gave the following description: bill yellow, iris pale yellow, facial skin yellow, legs dark slate on tarsus, shading to slaty-grey on tibia. Cramp & Simmons (1977), referring to *ibis*, stated bill, iris and facial skin yellow, leg dark green, foot darkest, tibia and sole yellowish; juvenile, leg black, dark green later. Baker (1929), referring to *coromandus*, stated bill yellow, iris golden-yellow, facial skin greenish-yellow, tarsi and feet black, the upper part of the tibia and soles yellow or greenish-yellow. In New Zealand, the bill and iris of all birds described after their arrival were pale or lemon yellow, facial skin yellow or greenish-yellow and legs described variously as slate-grey, greenish-grey or grey-green, paler on tibia (upper leg) and soles of feet. Yellowish on tibia or soles has been noted only on the Canterbury Museum skin and may not be apparent in the field.

HABITS

Cattle Egret behaviour was for the most part noted only incidentally and almost all aspects remain open for careful study in New Zealand conditions.

Birds associated chiefly with cattle, often with sheep, occasionally with pigs or horses. They were often loosely associated with other birds which in winter often feed on wet pasture with long grass, chiefly the White-faced Heron (*Ardea novaehollandiae*), the Black-backed Gull (*Larus dominicanus*), and less often the Spur-winged Plover (*Lobibyx novaehollandiae*) and the Pied Stilt (*Himantopus himantopus*). The egrets did not necessarily follow the mammals about in the classical

manner for disturbed insects, being seen often alone in fields or at a lake edge away from any herd. When with mammals, they tended to feed among or near them, seldom actually following them directly, taking food either from the ground, by snatching from the surface of tall grass or weeds or by snapping at flying insects. Although, for example, two birds were once seen at Turnbull's Lagoon chasing after a cattle beast, running after it as it broke into a trot, this was the only such occasion noted (L. J. Davies). There are many accounts of egrets in Asia feeding on the ectoparasites of mammals but in other parts of the world it is considered that this is an unimportant habit and that birds perched on beasts are using them as vantage points rather than as a food source. One bird near Lakeside in 1974 was noted to be apparently feeding on the flies on and around a Hereford bull while it was lying down, occasionally jumping on to its flank and sliding down again. This bird selected a Hereford bull on two farms in preference to a Jersey bull and an Aberdeen Angus bull on one farm and a herd of Friesian cows on the other. Perhaps this was because, with its longer hair, the Hereford was more tolerant of flies and thus a better food source for the egret (W. P. Mawson). There have been no reports of egrets feeding on cattle ticks in New Zealand. Near Lakeside, birds were noted to favour areas where spray irrigation was being applied. At Aka Aka, birds favoured damp hollows and drains on undulating pasture, places where docks were abundant. They moved to a herd only when disturbed (A. Habraken).

In general, because of the rough ground and long grass often favoured, little could be seen of their feeding habits. 5 birds at Paua in April were seen to take crickets in kikuyu grass (A. T. Edgar). At Lake Wainono (R. J. Pierce) and at Opiki (M. D. Dennison) birds were seen apparently taking water-boatmen from pools. At Lake Ngaroto a bird was seen to catch a mouse which it killed by crushing the head and then swallowed head first (J. H. Seddon). 6 were seen on two occasions extracting worms from wet pasture at Turnbull's Lagoon (L. J. Davies; M. D. Dennison). Neck-swaying was reported once, when two birds at Lake Ngaroto fed in this way beside a drainage ditch and in pasture; neck stretched upwards, then lowered until whole body horizontal, then head swayed from side to side, followed by a dart forward to snatch up prey (J. H. Seddon).

Aggressive behaviour was not seen except on one occasion at Turnbull's Lagoon when birds sometimes made a half-hearted lunge at another which had successfully picked up a worm. Magpies (*Gymnorhina tibicen*) showed hostility to egrets on several occasions. When disturbed, egrets would fly 20-30 m further into the herd, or to the top of the nearest line of macrocarpas or pines; sometimes to a water trough, to fence posts or to a hay shed roof; sometimes to the shore of the lake or pond that was often part of their habitat. In several cases the same piece of shore was used as a refuge. Night roosting was reported, mostly from farmer accounts, to be usually in trees with

White-faced Herons or in trees beside or overhanging a lake, lagoon or pond. The Pokeno bird in January and February 1978 roosted in macrocarpas near a small pool. The Lakeside birds were said to fly 2-3 km to a large area of willows on very wet ground beside Lake Ellesmere. The South Taranaki birds roosted in the end-most of a line of macrocarpas, the tree which overhung the water in winter; in April 1978, with the lake largely dry, they were roosting on fence posts in the water. Aka Aka birds were said to roost generally in macrocarpas and also to fly by day to a sandy bay on the Waikato River to bathe. Rangiriri birds were said to fly westward to roost, across the Waikato River to where there are many small lakes as well as the margins of the river itself.

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B. D. HEATHER, 10 Jocelyn Crescent, Silverstream



SHORT NOTE

WADERS AT SEA

The following records were made on voyages between Auckland and Suva during October 1977.

4/10/77 1600 hours Position 21°55'S 177°28'E.

One Knot (*C. canutus*) flew around the ship for about five minutes and then flew off to the westward.

22/10/77 1100 hours Position 27°27'S 176°38'E.

One Turnstone (*A. interpres*) tried to land on board for about twenty minutes, but the combination of the ship's movement and the wind prevented this. Direction of departure was not seen.

22/10/77 1600 hours Position 26°21'S 176°47'E.

One Golden Plover (*P. dominica*) flew around the ship three times and then flew away to the southward.

JOHN JENKINS, 14 Lochiel Road, Remuera, Auckland

ANNUAL GENERAL MEETING 1978



The 39th Annual General Meeting of the Society was held in Lower Hutt on 20 May. The President, Mr B. D. Bell, presented his report on the activity of the Society during the year. Rediscovery of the Chatham Island Taiko was seen as the year's ornithological highlight, while Australian vagrants, particularly terns and grebes, continued to prove interesting. The need for careful identification of these species was stressed. *OSNZ News* had served an important need in catering for the diversity of members' interests and encouraging co-operation in current ornithological projects. The publication of the provisional *Bird Distribution Atlas* by the Society was a major advance made possible by the individual contributions of many members. A Summer Course held at Papamoa in the Bay of Plenty had been well attended, as had a survey of birds on the Kaipara Harbour. Further field activity by members was indicated by reports from the Society's various research schemes which the President summarised. These reports are being published in full in *Notornis*. The meeting was informed that the Council was currently reviewing the role of the Rare Birds Committee, submissions being invited from members. Finally the President paid tribute to the Regional Representatives who are essential to the well-being of the Society.

The election of officers resulted in one new councillor, a new editor and secretary; details on the front cover.

Much of the meeting was devoted to a discussion on the role this Society should play in conservation issues. A wide range of opinions is held by members; this issue was again referred to Council for consideration. The normal programme for AGM weekends was altered this year, with both Saturday morning and afternoon being devoted to a symposium on the breeding strategies of native passerines. Six speakers contributed papers. This programme was well received and provided entertainment for members not involved with other meetings. However, it did result in the Regional Representatives having to meet on two occasions. On Sunday morning, David Crockett described the history of his search for the Taiko, illustrated by slides.

Once again our Wellington hosts provided a well-organised weekend, beneficial to the Society and enjoyable for all who attended.

P. D. GAZE, *Hon. Secretary*

TREASURER'S REPORT

For Year Ended 31 December 1977



During the year membership increased by 84 to a total of 1258. This is the largest annual gain since 1954, when the increase was 90. 165 new members were admitted, 44 left by resignation and 37 were struck off because of being unfinancial. The Society now has 1 honorary life, 76 life, 787 ordinary, 68 junior, 11 family, 113 corporate body, and 101 husband and wife members, counting as two, to make the total of 1258.

The income for the year was \$11 624, which is \$1916 less than the previous year's total of \$13 540. Subscriptions were \$646 higher. Sales of back numbers of *Notornis* totalled \$1367, the largest amount on record. Society ties to the value of \$325 were sold. The profit from the Christmas cards dropped from \$4391 to \$126. The price had been kept at the same amount as before but, although more cards were sold, increased printing charges and additional postage rates meant that costs were barely covered. It is obvious that there will have to be an increase in the charge per packet for this year. The 1978 cards were printed during the year and they are shown in the Balance Sheet, at cost price, as stock.

Expenses totalled \$12 388, an increase of \$2563. *Notornis* and *OSNZ News* printing and distribution increased by \$1484. *Notornis* costs increased by \$587 and the cost of *OSNZ News* for the full year was \$1227. Society ties cost \$667; the sales of \$325 are shown in the Income. Reprinting of out of stock *Notornis* back numbers totalled \$1223. It has been decided by Council that no further reprinting will be done.

As a result of the increase in the expenses and the decrease in income, a deficiency of \$764 resulted, as against a surplus of \$3715 the previous year. For this present year it is hoped that, with a better profit on the sale of the Christmas cards and no expenditure for Society ties or back numbers, a surplus for the year should result. However, it should be pointed out that it is impossible to estimate increases in the various items of expenditure.

During the year the Projects Assistance Reserve Fund was credited with \$1154, royalties on the revised Field Guide; also with the interest earned by the Fund, \$446. Three cash grants, as detailed in the Notes to the Accounts, were made.

Investments with The Perpetual Trustees Co. Ltd., amounting to \$2700, matured during the year and were repaid by the Company.

H. W. M. HOGG, *Hon. Treasurer*

THE ORNITHOLOGICAL SOCIETY OF N.Z. (INC)STATEMENT OF ACCOUNTS FOR THE YEARENDED 31 DECEMBER 1977

1976	<u>INCOME WAS EARNED FROM</u>	
6 796	Subscriptions	7 442
225	Transfer from Life Members	218 (Note I)
120	Donations	223
4 391	Profit from Christmas Card	126
323	Sale Back Numbers	1 367
16	Sale Car Stickers	34
-	Sale Society Ties	325
38	Biology of Birds	81
11 909	TOTAL ORDINARY INCOME	\$ 9 816
 <u>INVESTMENTS</u>		
1 601	Interest	1 808 (Note II)
30	Royalties	-
1 631	TOTAL INVESTMENT	1 808
13 540	TOTAL INCOME	\$11 624
 <u>LESS EXPENSES</u>		
<u>'Notornis' & 'OSNZ News'</u>		
7 502	Printing and Distribution	8 986
23	Annual General Meeting	-
85	Audit Fee	120
20	Donations	20
152	General Expenses	203
134	Library Expenses	98
36	Nest Record Scheme	30
190	Postages	281
222	Printing & Stationery	275
20	Royal Society Affiliation	20
-	Society Ties	667
474	Travelling Expenses	465
967	'Notornis' Reprinting	1 223
9 825	TOTAL EXPENSES	\$12 388
3 715 (Surplus)	DEFICIT FOR YEAR	764
	TRANSFERRED TO	
	ACCUMULATED FUND	

THE ORNITHOLOGICAL SOCIETY OF N.Z. (INC)BALANCE SHEET AS AT 31 DECEMBER 1977

<u>1976</u>	<u>CURRENT ASSETS</u>		
3 572	Cash at Bank of New Zealand	3 730	
373	Amounts owing to Society	255	
28	Bank of New Zealand Savings Account	68	
5 500	Term Deposits Bank of New Zealand	2 400	
100	Stock of 'Notornis'	100	(Note III)
	Stock of 1978 Christmas Cards	5 084	
<u>9 573</u>	<u>TOTAL CURRENT ASSETS</u>		<u>\$11 637</u>
	<u>INVESTMENTS</u>		
3 000	Local Body Stocks	3 000	
	The Perpetual Trustees Company		
7 000	Limited Group Trustee Investments	4 300	
	BNZ Finance Company Limited First		
5 889	Ranking Debenture Stock	6 288	
	Development Finance Corp. of NZ		
5 000	Secured Debenture Stock	5 000	
<u>20 889</u>	<u>TOTAL INVESTMENTS</u>		<u>\$18 588</u>
1 000	Library at Valuation		<u>1 000</u>
<u>31 462</u>	<u>TOTAL ASSETS</u>		<u>\$31 225</u>
	<u>LESS LIABILITIES</u>		
3 023	Amounts owed by Society	2 745	
656	Subscriptions in Advance	566	
	<u>Reserve Funds</u>		
5 340	Projects Assistance Reserve	6 295	(Note IV)
2 028	Life Subscriptions	1 968	
1 000	Publications	1 000	
<u>12 047</u>	<u>TOTAL LIABILITIES</u>		<u>\$12 574</u>
<u>19 415</u>	Value of Accumulated Funds as Below		<u>\$18 651</u>
	<u>ACCUMULATED FUNDS</u>		
15 700	Balance at 31.12.76	19 415	
3 715 (Surplus)	Deficit for Year	764	
<u>19 415</u>			<u>\$18 651</u>

THE ORNITHOLOGICAL SOCIETY OF N.Z. (INC)

- NOTE I Life members transfer: 10% of Balance at 31.12.77
- NOTE II The interest earned on the Projects Assistance Reserve Funds Investments has been credited direct to the Fund
- NOTE III Stocks of 'Notornis' and Valuation of Library are at Standard Values. No attempt has been made to value these assets accurately
- NOTE IV Projects Assistance Reserve
Movements in this Reserve Fund during the year are:

	\$	\$
Balance as at 1.1.77	5	340
<u>Plus</u> Royalty on Revised Field Guide	1	154
Interest earned by Fund		446
		<u>6 940</u>
<u>Less</u> Cash Payments		
Farewell Spit Training Course	260	
NZ Dotterel Survey	200	
Telescope	185	
		<u>645</u>
Balance as at 31.12.77		<u><u>\$6 295</u></u>

We report, that in our opinion, the foregoing accounts and notes attached of THE ORNITHOLOGICAL SOCIETY OF N.Z. (INC) for the year ended 31 December 1977 are in agreement with the books and reports of the Society and give a true and fair view of the Society's position at that date and the results of its transactions for the year. The Society has kept proper books and supplied all the information required.

DUNEDIN: 27 February 1978

THOMPSON & LANG
Chartered Accountants
Auditors

DONATIONS 1977

The Society gratefully acknowledges the following donations of \$1.00 or more received during the year.

Mrs G. Dudley \$4; W. M. Burrows \$2; Miss N. D. Tanner \$4; Dr & Mrs E. T. Dawson \$1; L. S. Rickard \$14; G. Guy \$1; E. St. Paul \$4; D. K. Hines \$4; Dr C. J. Ralph \$2.89; S. R. Emmens \$10; Mrs P. A. Howlett \$5; D. M. Cunningham \$4; C. J. Forman \$2; G. I. Hunt \$4; I. E. Cooksley \$2; Mrs N. Dyson \$2; Mrs L. Collingwood \$4; R. E. Satherley \$4; Mr & Mrs A. B. Cochrane \$1; J. D. Tulloch \$6; J. F. Castle \$4; J. C. Davenport \$4; Mrs J. S. Armstrong \$14; R. Jackson \$2; Mr & Mrs K. T. Taylor \$3; P. Warren \$4; R. G. Mueller \$20; Mr & Mrs R. Pullen \$1; A. H. Grootegoed \$4; M. Heine \$4; Mr & Mrs W. Davis \$5; Mrs P. M. Campbell \$1; G. Watola \$1; D. Robertson \$2; Mrs S. Gray \$2; I. W. Johnson \$4; R. A. Creswell \$3; R. Cometti \$4; G. Wightman \$2; Mr & Mrs W. P. Coleman \$3; Miss R. G. Harper \$5; Mr & Mrs C. H. Barfoot \$5; Miss D. A. White \$10; Mrs M. I. Taylor \$2; Mr & Mrs J. E. Morton \$2; Mrs S. M. Widgery \$24.69; Ms R. A. Spragge \$4.76.



NEST RECORD SCHEME

Report for Year Ended 30 April, 1978

12 363 cards covering 147 species are now on file. This year 52 members contributed 679 cards covering 71 species. The Cape Pigeon is recorded for the first time.

Chris Lusk, working in the Wairarapa, produced 107 cards of 29 species. This is a notable and consistent effort, as he supplied 78 cards in 1977 and 102 in 1976. The value of the Scheme in giving opportunity for individual activity is shown by the detailed observations Chris has made.

Members unable to take part in group or regional activities could contribute their personal observations through the Scheme and by so doing would be making a worthwhile contribution to such national schemes as the provisional atlas.

Notable contributors this year have been Paul Sagar (104 cards), Tony Whitaker (87), Ray Pierce (56) and Mary Bomford (46).

34 Colonial Cards were received covering Gannet, Black Shag, Pied Shag, Little Black Shag, White-throated Shag, Spotted Shag, New Zealand Dotterel, Pied Stilt, Black-backed Gull, Black-billed Gull, Black-fronted Tern, Caspian Tern and Chaffinch. During the year, cards on 16 species were lent to members for analysis.

It is encouraging to note the great increase in card contributions from 334 in 1977 to 679 this year; probably due to the encouragement from Regional Representatives and to the impact of *OSNZ News*.

My sincere thanks to all contributors, to those who have encouraged members to take part, and to my wife, Ruth, whose assistance has been most valuable.

DAVID E. CROCKETT, *Convener*

LIST OF CONTRIBUTORS

J. Batham, Ben D. Bell, M. Bomford, M. Buchler, D. J. Campbell, T. Crocker, R. Crockett, J. Douglas, K. Fletcher, G. Foreman, P. D. Gaze, R. Genet, B. J. Gill, A. Gordon, A. H. Gordon, J. H. Goulding, G. Halstead, M. Halstead, K. C. Harrison, R. Healey, Graeme Hill, Geoff Hill, J. E. Hilton, P. A. Howell, J. R. Jackson, G. Jellicoe, B. R. Keeley, M. E. M. Lane, C. S. Lauder, C. H. Lusk, M. McColl, M. Meads, K. Miller, P. Miller, C. Miskelly, G. J. H. Moon, H. Morgan, C. O'Donnell, V. O'Donnell, R. Pierce, M. H. Powlesland, R. G. Powlesland, S. M. Reed, M. Round, M. Rule, P. M. Sagar, J. H. Seddon, D. Shand, M. J. Taylor, C. R. Veitch, A. H. Whitaker, D. E. Widgery.

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LIBRARY REPORT

Once again we are most grateful to those who generously donated 46 items to the library this year. A supplementary list covering additions during the last two years will be available shortly.

Borrowing has remained steady at 146, but the abolition of 'book rate' in postal charges has penalised the private borrower. I feel that there is still a great need for people willing to review relevant material from some of the overseas journals, perhaps for publication in *OSNZ News*.

The exchange with the Ornithological Society of Bavaria has been reopened and we also received back numbers of *Anzeiger* dating from 1957. The exchange with *Vogelwarte Helgoland* has been closed owing to duplication of journals being received.

Our grateful thanks to the Director and Council of the Auckland Institute and Museum for the safe housing of the library, and to the Museum Library staff for their kind help at all times.

A. J. GOODWIN, *Hon. Librarian*

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RARE BIRDS COMMITTEE

Report for Year Ended 30 April, 1978

Members: F. C. Kinsky (Convener), B. D. Bell, Sir Robert Falla.

During the period June 1977 to April 1978 the Rare Birds Committee received four submissions which were considered, and the results are set out below.

A) The sighting of a Black Tern (*Chlidonias niger*), Nelson, 1 January 1978. This submission was rejected by the Committee on a unanimous vote.

B) Grey Phalarope (*Phalaropus fulicarius*), Bay of Plenty, June 1977. This submission was well documented, contained excellent photographs and was accepted by the Committee on a unanimous vote.

C) The sighting of two Whiskered Terns (*Chlidonias hybrida*), Lake Horowhenua, Levin, September/October 1977. This submission was unanimously accepted by the Committee.

D) The sighting of a Common Tern (*Sterna hirundo*), Lake Horowhenua, Levin, 11 & 14 December 1977. This submission was rejected unanimously by the Committee after considerable discussion.

F. C. KINSKY, *Convener*

MAPPING SCHEME REPORT

This year's report can be brief because the *Provisional Atlas*, published early in May 1978, summarises the results of the Scheme since it began in September 1969.

One thousand copies of the Atlas were printed; many of these were used to fill pre-publication orders, and remaining stocks continue to decline as new orders are received.

The present atlas is tagged "provisional" because Council believes that members will make strenuous efforts to detect and correct shortcomings in the maps, now that they are available for detailed study; another publication will then be needed to include the new information.

The publication of a definitive atlas in the near future will need both new information and money. The first depends on renewed enthusiasm among field observers and the second on selling all copies of the *Provisional Atlas*.

There is, however, a limit to the time that can be devoted profitably to improving the present atlas. While good coverage of all habitats in every square is an attractive objective, the advantages of this are offset to some extent by the fact that the longer the period of observation, the greater the chance of recording species that have briefly strayed outside their normal range; to map such records could be misleading. A further problem is that maps based on pooled observations, collected over many years, cannot reflect the rapidly changing distributions of species such as Spur-winged Plover and Black-fronted Dotterel. It has required a little over seven years to collect the information on which the present maps are based and, in my view, efforts to improve them should be restricted to the next two years (say to the end of 1979) so that the definitive atlas covers a period of approximately ten years. After 1979, new observations that require substantial revision of the maps could be published as short notes including, where possible, some indication of whether the change results from recent expansion or retraction of range, or merely from defects in the earlier information. A new atlas could then be prepared after a further 5-10 years of intensive field surveys, say in the 1990s.

Once again, it is a pleasure to thank Dr J. A. Gibb of Ecology Division, DSIR, and Dr G. R. Williams of the New Zealand Wildlife Service for the support of their respective organisations; without this help there would be no atlas. We are also grateful to a small group of Wellington ornithologists and their wives who, at very short notice, devoted their day of rest to converting 130 piles of pages into 1000 collated sets of the atlas. Others, whose professional help was essential to the undertaking, are listed in the Atlas itself.

P. C. BULL, *Convener*

BEACH PATROL — INTERIM REPORT

1977 was another average year with 2 451 kilometres of coast being patrolled to find 4426 dead sea-birds. This is an average of 1.81 birds per kilometre covered, the lowest recovery rate since 1972.

Patrols were carried out on all sections of coast except Fiordland. In some areas, patrols were not as regular as in past years. Totals for each section of coast are:—

<i>Coast</i>	<i>Km</i>	<i>Birds</i>
Auckland West	1276	2483
Taranaki	120	100
Wellington West	94	458
Westland	2	1
Auckland East	418	419
Bay of Plenty	88	64
East Coast N.I.	16	7
Wairarapa	50	11
Canterbury North	41	97
Canterbury South	63	218
Otago	11	17
Southland	75	171
Wellington South	160	331
North Coast S.I.	18	21
Outlying Islands	19	28

My thanks are due to all who took part in the Beach Patrol Scheme during 1977.

C. R. VEITCH, *Scheme Organiser*

CARD COMMITTEE REPORT

On behalf of the Society I extend our thanks again to Mrs Janet Marshall whose paintings of the Kakapo and Pied Tit featured on this year's cards. More than 6,700 packs were sold during the year including 2,500 packs of mixed cards from previous years. Proceeds from these sales, less postage and packaging costs, only just recovered total printing costs involved, so that the major profit from this year's venture will not be reaped until 1978/79.

The Pied Tit cards were in great demand and in view of their popularity an offer for a further supply at a reduced cost was accepted. These cards and the remaining Kakapo will be offered during 1978, together with a new design, the Pied Stilt. Regretfully, increased postage and distribution costs necessitate an increase to \$1.50 per pack in order to maintain a reasonable return on our undertaking.

I would also thank the Royal Forest and Bird Protection Society for addressing brochure envelopes, Wellington members who prepared brochures for distribution and all those Auckland members who readily assisted with the packing and despatch.

R. N. THOMAS, *Convener*

ABSTRACT OF A G M TALKS: NEW ZEALAND PASSERINES

BREEDING BIOLOGY OF THE NORTH ISLAND RIFLEMAN

The breeding biology of the North Island Rifleman was studied in the Orongorongo Valley 1973-76. 50-200 nest boxes were available each year and between one and eight were used each season. Breeding began in late September, with an average clutch of 4.5 eggs, the eggs being laid on alternate days. The eggs which weighed 22% of the adult weight were incubated for 19 or 20 days and the young stayed in the nest between 21 and 27 days. During the first three years 77% of the 53 eggs laid resulted in fledged young but in 1976 only 30% of the 37 eggs laid were successful since the others were deserted or preyed on. Only one second clutch was recorded and another pair relaid after their first brood was preyed on. These results were compared with those found for the South Island Rifleman. Daily weighings of the chicks revealed an initial period of rapid weight gain followed by about 12 days when the weight was sustained as the external features developed. During this second growth stage the female chicks remained significantly heavier than the males.

The long period that these birds are associated with the nest is characteristic of hole nesters but, combined with their relatively small clutch, it possibly indicates a scarcity of food available to the young.

P. D. GAZE, *Ecology Division, DSIR, Nelson*

BREEDING OF THE GREY WARBLER

In the summers of 1976/77 and 1977/78 I examined 77 occupied nests of the Grey Warbler (*Gerygone igata*) at Kowhai Bush, near Kaikoura. Before the breeding seasons I colour-banded adult warblers and found their territories to be 0.6 ha on average. Nearly all banded adults which bred the first year were alive in the second, and few young were recruited into the population, suggesting a low adult (but high juvenile) mortality. Only males sang; only females built nests; incubated and brooded.

Though the breeding season was long (nearly 6 months; August to January) each pair could raise only two successful broods because the breeding cycle was lengthy. Early nests were built and lined in 2-4 weeks, followed by a delay of 2-8 days before laying. Six weeks separated the earliest and latest first clutches. The incubation period was 17-21 days (mean = 19.5) and the nestling period 15-18.5 days (mean = 17.2). Juveniles were fed for up to 5 weeks after fledging, and the interval between fledging of the first brood and initiation of the second clutch was 10 days to 6 weeks.

Eggs of a clutch were laid at 48-hour intervals and the average clutch-size was 3.9 (range 3-5). The fresh egg weighed 1.5 g, or 23% of the adult's weight (6.4 g). Weights of nestling warblers followed a non-sigmoid curve — the maximum was reached at 13-14 days old, on average, and there was a recession in weight before fledging.

Every healthy nestling in every brood exceeded the mean adult weight by up to 40%.

Many facets of the warbler's breeding strategy are extremely unusual for a small song-bird which gleans invertebrates from foliage, and, as with the lengthy breeding cycle, are possibly adaptations to a scarce or unpredictable supply of food. The New Zealand climate lacks marked seasonality, and winters are mild. Even in summer on the east coast, cold southerly winds can develop suddenly. I suggest that the Grey Warbler's food-supply is nearly uniform all year, and that the bird's numbers are set at a high level by the equable conditions of winter. Under such circumstances warblers would have difficulty in obtaining the extra food needed to raise young.

BRIAN J. GILL, *Department of Zoology, University of Canterbury, Christchurch*

SONG AND SOCIAL ORGANISATION OF THE FERNBIRD

For many years it has been known that the two birds of a pair of Fernbirds sometimes call in duet so closely timed one after the other that it sounds like one bird. This has given rise to their name — the "U-tick" bird. However, there has been confusion because, to the unaided ear, the "U-tick" call can appear to come from a single bird.

I have been recording Fernbirds intensively in many North Island sites for two years and sonographic analysis shows that the A caller (presumed male) can have from 1 to 6 notes in its call while the response by the B bird is invariably one note of a very stereotyped form. The B bird never gives that call on its own — it is invariably given as an antiphonal response.

When the birds are highly motivated in defence of territory they also make a clicking sound between their calls.

The gap between the first note of the antiphonal duet and the second (the response) is sometimes as short as 80 milliseconds (0.8 secs). More than one B caller can respond to the one A caller and the A caller often calls without getting a response.

In any one area the A calls are invariably different from one bird to the next and each caller has a repertoire of A calls, from 1 to 4 different types.

There is some tendency towards regional dialects in the B calls but not in the A calls. The purpose of antiphonal singing is generally supposed to be for holding together the pair bond in very thick vegetation.

Dr P. F. JENKINS, *Zoology Department, University of Auckland*

SOCIAL ORGANISATION AND BREEDING STRATEGY OF THE BELLBIRD

The social organisation and breeding strategy of the Bellbird are related to the distribution and predictability of resources, especially food. Bellbirds have a wide diet including nectar, fruit and insects. Immediately before nesting they begin to feed mainly on insects and become more spatially localised although foraging trips to concentrated nectar sources outside their areas still occur. Both sexes announce their presence in their area by singing and they also countersing against

near neighbours. Playback at this time causes birds to move towards the intruder and sing. In border areas, males often join in communal choruses and chases. Females build the nest, lay, incubate, defend and feed the young, although most males assist with the feeding of young. On Tiritiri, many pairs had replacement nests and some were double brooded. After breeding and throughout the non-breeding season, Bellbirds move to concentrated nectar or fruit sources. However, most resident pairs remain on or near their breeding areas where they continue to countersing but only dominate incoming birds, rather than attempt to exclude them.

JOHN L. CRAIG, *Zoology Department, University of Auckland*

SOCIAL ORGANISATION AND BREEDING STRATEGY OF THE TUI

As breeding strategy and social organisation can be related to the distribution and predictability of food resources, the opportunistic feeding habits of the Tui greatly influence these. During the breeding season the diet consists mainly of insects and nectar, which are obtained from within an area used exclusively by each pair. The male is primarily involved in defence of this exclusive range by chasing and song. As well as having long range features this song includes elements associated with short range communication, possibly to maintain contact with the female.

Several nests are constructed by the female, but only one is finally used. Incubation and initial care of the chicks is the responsibility of the female. There is a trend (through season) toward increasing involvement by the male with the care and defence of the chicks. The incubation and fledging time is reasonably short which allows both parents and fledglings to move to nectar supplies. After the breeding season, birds become highly mobile, moving to clumped nectar and fruit sources but also taking insects. Access to concentrated food supplies is by dominance hierarchies.

ANN STEWART, *Zoology Department, University of Auckland*

SONG AND BREEDING BEHAVIOUR IN THE PIED TIT

Tomtits of both sexes actively defended the area in which they foraged and reared their young, against other tits of their own sex. One of the most important mechanisms of defence was song, proclaiming the individual's status, its species, and aggressive intention towards intruding males. This was reflected by the male song cycle which was closely linked to the breeding cycle. Spontaneous song and counter-song increased in intensity as the breeding season approached and declined markedly during the post-breeding moult. Males responded aggressively to Tomtit songs which were played back within their own territories. They could distinguish between the songs of their neighbours and non-neighbours and reacted more aggressively to songs of non-neighbours.

Other mechanisms of defence included chases, boundary patrols, and aggressive posturing which included the raising and lowering of the frontal feathers. Actual contact fights between birds were rarely observed.

JO BISSET, *Zoology Department, University of Auckland.*

SHORT NOTES

TRANS TASMAN SHAGS

On a recent cruise of RV *Tangaroa*, working in the south Tasman Sea between latitudes 37° and 46°S, immature Black Shags (*Phalacrocorax carbo*) were frequently seen near and on board the ship. Of particular interest was the return, Hobart to Wellington, leg of the cruise when a group of these shags appeared to stay near the ship for the trans-Tasman crossing. These observations were made in October-November 1977 during a regular daily bird-watching schedule.

All the shags seen were immature Black Shags and were identified by their large size and their facial markings. They had dark upper-parts and tail, black feet and mottled black and white breast and throat. The long slender bill was dark above, shading to light horn colour below with a bright yellow gular pouch. The head was black with a small crest, and the skin around the eye was yellow with a particularly bright yellow marking below the eye. The iris was green. Colour photographs were taken of one of these birds while it was on board.

Shags were first seen on the outward voyage. On 14 October 1977, at position 42.5°S 166.3°E, some 250 km off the south Westland coast, one shag rested for most of the day in the ship's rigging. On the following day two shags were seen near the ship. No shags were sighted on 16 October but on the next evening a shag was found sleeping in one of the lifeboats. This shag left the ship the following morning by which time our position was 43.1°S 159.4°E, close to midway across the Tasman Sea. No further shag sightings were made on the outward voyage.

On the return voyage the first sighting was late on 31 October at position 41.0°S 159.5°E some 240 km east of Tasmania, when one shag came on board. On the following day (1 November), three shags were seen and at least two slept on board that night. On 2 November, five shags were perched in the rigging most of the afternoon (position 43.7°S 155.3°E). Eventually another shag arrived and after circling the ship the others followed it in an easterly direction. On this day and the next, shags were frequently seen, seven being the most seen at one time. On the evening of 3 November five shags were seen close to the ship (position 43.1°S 157.2°E) and at least three slept on board. Over succeeding days while the ship worked a leg towards 38°S 162°E and then a leg towards Cape Farewell, shags were commonly sighted in twos or threes. A general pattern emerged, the shags congregating near the ship in the evening and coming on board to sleep after dark. They favoured a sleeping position on the forecastle deck among the

anchor gear. The last two shags were seen on the evening of 8 November at a position 39.9°S 170.3°E, some 160 km off Cape Farewell. By morning, land was in sight and presumably these shags made for the coast.

It is impossible to know if the same birds followed the ship across the Tasman but some of the behaviour suggests they may have. For example, the shags on occasions seemed content to swim near the ship while it was on station rather than to fly off. Also, the same sleeping positions were occupied each night, suggesting that the same birds returned to the ship. On occasions birds coming on board seemed exhausted and, while resting, were easily approached.

B. R. STANTON, *N.Z. Oceanographic Institute, DSIR, P.O. Box 12-346, Wellington North*



ADDITIONAL BIRD RECORDS FROM RAROTONGA

In his recent account of Rarotongan birds, Turbott (1977, *Notornis* 24 (3): 149-157) lists only three waders, which had all been previously recorded by Holyoak (1976, *Bull. Br. Orn. Cl.* 94: 145-150). My wife and I visited Rarotonga in August 1975 and noted two more waders.

Two Turnstone (*Arenaria interpres*) were seen in Natangia Harbour on 25 and 27 August 1975.

A Yellowlegs was seen on the reef at Avarua on 24 August and one in Ngatangia Harbour on 25 August. Since these birds are uncommon in the S.W. Pacific and unknown in southern Polynesia, the following identification data are provided from field notes. On both occasions the birds were estimated to be about the size of a Pied Stilt and rather larger than some Wandering Tattlers (*Tringa incana*) which were not far away in Ngatangia Harbour. The most conspicuous features were the long yellow legs, white tail, and mottled black/grey/white back. The beak was typically sandpiper-like and dark. There was a pale supercilium. The chest was dark, but one bird had a whitish patch beneath the chin; the abdomen and undertail were white. The wings were uniformly dark with no white patches in flight. Flight was rapid and erratic. On the shore they were busy birds and, when they ran, the tail bobbed. The call was a shrill piping. Whilst I feel that the records refer to the Greater Yellowlegs (*Tringa melanoleuca*), Dr D. T. Holyoak considers that the field description is inadequate to decide between this and the Lesser Yellowlegs (*Tringa flavipes*).

Most of Turbott's records of land birds are from the northern part of the island. The following birds were either seen or heard in the southern part of the island.

White-tailed Tropic Bird (*Phaethon lepturus*) — six birds around the cliffs of the prominent peak Te Kou.

Reef Heron (*Egretta sacra*) — at various places round the coast, but only the grey phase seen. One bird was disturbed 1 km beyond the end of the road up the Avana Valley (6 km inland) and flew further upstream.

Wandering Tattler (*Tringa incana*) — three in Ngatangiia Harbour.

White Tern (*Gygis alba*) — two birds near Ngatangiia and one near Titikaveka.

Pacific Pigeon (*Ducula pacifica*) — heard in the forest south of the Needle.

Rarotongan Fruit Dove (*Ptilinopus rarotongensis*) — one bird near a waterfall, Avana stream.

Long-tailed Cuckoo (*Eudynamis taitensis*) — one bird in forest remnant near Ngatangiia.

Myna (*Acridotheres tristis*) — common everywhere in the coastal cultivated country.

F. J. TAYLOR, *Marine Research Laboratory, Leigh*



THE CIRL BUNTING IN MARLBOROUGH

The Cirl Bunting (*Emberiza cirrus*) in the Ward district of Marlborough is common but not conspicuous. Its size, manner of flight and its inconspicuous colouring, particularly of the female, do not make it easy to find. Since its size is about that of the Yellowhammer and Greenfinch, it is difficult to pick out at a distance when there are so many birds present of similar size. The manner of flight is almost the same as a Yellowhammer's but with a slightly more dipping flight just before settling.

From October through summer to April, male birds are easily located by their clicking or rattling call. Calling is usually from a tree but often from such high places as power wires and poles. I have not heard them calling from the ground but have seen one call from a Matagouri bush less than a metre high. In this district the calling of males may be heard occasionally from about mid-August, slowly increasing to regular calling by the end of October. The most consistent times for calling are early morning and late afternoon to dusk. Calls may be uttered up to nine times a minute. Calling seems to be territorial but the first bird calling in September 1977 appeared to have no mate so that his early start may have been to attract a female. From my general observation, males seem to remain spread on their territories throughout the year.

Other calls of the Cirl Bunting are a very high-pitched *see* from a bird that is perched, apparently unoccupied; also a contact chatter when adults are attending juveniles that have left the nest.

Increased sightings in August of three or four birds in a group seem to be normal, though I do not know why this is so. The largest group I have seen was of six males and five females on 19 September 1977.

The Cirl Bunting mixes with Yellowhammer much less often than is often thought. It seems that their association is only by chance, when Yellowhammers happen to be feeding in their area. Cirl Buntings may then join them, fly off with them but apparently not stay long with them. Several times I have seen a Cirl Bunting feeding with Yellowhammers or a mixed flock of small birds and move off with them, only to find later that the Cirl Bunting has returned to the same spot.

Calling sometimes resembles the first part of the Yellowhammer's call. One particular male at the end of the 1976-77 summer would give four or five calls similar to a Yellowhammer and then continue with the rattling or clicking sounds. The rattling or clicking sound is much like part of a Greenfinch's song.

On two occasions I have seen fighting males, once on 29 August 1971 and the other date not recorded. I was attracted by their excited rattle calls; both birds were close enough to be almost touching and flying vertically, face to face. They rose to about 5 m, calling strongly, then dropped away in different directions.

The earliest I have seen juveniles out of the nest and attended by adults has been on 14 December. Nesting in this district is in December, January and February. The lowest nest I have seen was at one metre in a briar bush; the highest at 5 m in a macrocarpa tree. Eggs are from two to four per nest and include an infertile egg more often than other birds, in my experience. Other birds' nests are sometimes used either as a base or just by adding a small amount of lining. I suspect that of the two high nests, one at 4 m was of a Greenfinch, the other at 5 m was an old Song Thrush or Blackbird nest. A pair this summer used an old thrush's nest which was at least one year old as a base. A filler lining of moss and a final lining of fine grass and a little hair was used. Nests are sometimes built in sites ranging from thick bush to quite open pine trees. A nest built completely by Cirl Buntings is loosely constructed but not unduly untidy and is lined with horse or cow hair, sometimes a lot and sometimes only a small amount around the inside. The nests I have found have all been close to a patch of long grass such as on a road side, but this may well be coincidental as there is a lot of long grass about anyway. Both female and male bring food to the nest. The only food taken to the nest which I have recognised has been caterpillars and a moth.

I have twice seen a cock bird feeding on the seed of Barley Grass. He ate some without taking the seed head from the plant and some by nipping the seed-head off and then taking the riper seeds from each head. The seed, which was still in a fairly soft stage, was not swallowed but nipped several times, probably to get the soft inside.

This district has a lot of Barley Grass but I have not seen other species feeding on the seed.

Although I am most familiar with the Ward to Seddon area of Marlborough, I have found the Cirl Bunting fairly common from the Ure River to Blenheim and in some parts up to at least ten miles inland. I have not seen any in the Wairau Valley or from the Ure to Clarence Bridge but these should be suitable areas also. I have seen many more birds in the last five or six years but this probably reflects my improved ability to recognise them rather than a marked increase in their numbers. Through the main area of Ward, I would estimate conservatively there are two male Cirl Buntings per square mile. On our farm of approximately two square miles there were at least 12 calling males in the 1976-77 season. The average rainfall is 28 inches per year, with moderate to hard frosts in winter and summers usually very dry with fire restrictions from about Christmas to the end of February.

The areas which appear to suit the Cirl Bunting are open pasture with hedges or trees, and hilly country with scattered trees or gully scrub, through to quite rough country. I have seen them from sea level to about 300 metres.

T. J. TAYLOR, P.O. Box 22, Ward



BREEDING OF AUSTRALIAN LITTLE GREBE

A pair of Australian Little Grebe (*Podiceps novaehollandiae*) bred on the West Coast of the South Island in 1978, apparently without final success.

The site was a small pond at about 230 m a.s.l. on the Bell Hill State Farm, about 28 km east of Greymouth and about 10 km north of Rotomanu. The pond is about 100 m long by 60 m wide and is said to be no more than 2 m deep. It is surrounded by developed farm land. Reeds cover most of the west bank from the northwest corner to the southwest corner, and a few gorse bushes grow on the mostly clear and steeper east bank.

The adult grebes were first reported by Mr R. Webber of the West Coast Acclimatisation Society to DPM, who studied them on 28 February and 1 March. Description: bill black, eye yellow, pale yellow stripe from bill to eye, top of head and front of neck dark grey to black, face paler grey, back of neck chestnut brown, chest pale grey, back smoky grey, under tail white, some pale brown towards rear of sides. The birds were actively swimming and diving but one frequently disappeared for up to an hour at a time. A faint *cheep-cheep* was heard once.

On 12 March, CSL found that there were two small chicks, thought to be about two days old. They were dark brown or black and were seen both on the back of one of the adults and swimming independently. Their *peep-peep-peep* call was strong but that of the

adults was quite soft, reminiscent of the *click* call of the Fernbird (*Bowdleria punctata*).

The nest, made of reeds and water weeds, was found about 5 m out into the water. It was presumably a floating platform with no visible attachment to other plants or dead wood in the water. It was devoid of cover and was easily seen.

On 19 March, the chicks, now seen by CSL to be a rich brown, were spending much of their time on their parents' backs where they stayed during dives, although sometimes coming up alone. On 25 March, the chicks were seen by Ulrich Walthert to be diving on their own and the adults to be aggressive to Paradise Shelduck (*Tadorna variegata*). By 2 April, however, one chick had disappeared, cause of death unknown, perhaps Harrier (*Circus approximans*) or eel. The remaining chick now had light markings on the head and whitish on the rump and under-tail areas. The adults were heard to call *cheuk-cheuk* eight or ten times rapidly as they approached each other. On 9 April, the chick, now about half grown, had a yellow bill, a mottled, dark brown crown, white with dark markings on the neck, and a very light brown general body colour. Both adults were feeding it and it was also diving itself.

The local duck-shooting season began on 15 April. On 16 April, only one adult was present. The chick was calling frequently and demanding to be fed, and diving for up to 10 seconds at a time. It had a yellow bill, dark brown crown and back of neck, white on face and breast, pale greyish-brown body.

On 22 April, no grebes were present. The chick would almost certainly not have been ready to fly and the real fate of the birds is not known.

C. S. LAUDER, 9 Winnie Street, Greymouth; D. P. MURRAY, Wildlife Service, Dept. of Internal Affairs, 144 Jollie Street, Hokitika

[Colour photos of adult and 5-week-old chick leave no doubt as to identity. — Ed.]



YELLOWHEAD NOT ENTIRELY INSECTIVOROUS

Since all the literature points to the fact that the Yellowhead (*Mohoua chrocephala*) lives solely on a diet of invertebrates (e.g. the Field Guide says 'so far as is known entirely insectivorous'), the following observation may be of interest.

In the early afternoon of 16 April 1978, halfway down the track (in mixed silver beech/red beech forest) between the Routeburn Falis and Routeburn Flats huts, I was attracted by a noisy party of about eight Yellowheads. Initially they were feeding among epiphytes on trunks and branches at about sub-canopy level but, in response to

my imitation calls, gradually came lower. Then periodically two or three of the party would fly to near ground level across the track to ripe orange fruiting heads of a "bush lily" (*Astelia fragrans*), where each one swallowed whole two, three or four of the quite large fruits. Sometimes one more aggressive bird kept the others at bay while it fed; at other times two fed together. It seemed to me in the end that every member of the party had sampled the fruits.

Following this short interlude, they moved off into the shrub layer, resuming their more typical invertebrate-hunting behaviour.

The fruit-eating episode was watched in good light from a distance of only about 5 m.

PETER CHILD, 10 Royal Terrace, Alexandra



COMMON SANDPIPER IN MANUKAU HARBOUR

The annual summer census of shore-birds 'on the Manukau' took place on 13 Nov. 1977. Early in the day there was steady light drizzle and visibility was poor. Out from Westfield, Godwits (*Limosa lapponica*) and Knots (*Calidris canutus*) were dimly discernible till the rising tide forced them towards Harania Creek before they took off to cross the Isthmus by their traditional flight-lines over Otahuhu.

When we reached Tararata Creek, a short distance upstream from the new bridge, the tide was nearly full and an outer basalt reef which is a favourite resting place for shags, herons, waders, gulls and terns, was quite submerged. Not even a Pied Stilt (*Himantopus leucocephalus*) or an Oystercatcher (*Haematopus finschi*) remained. However, as we descended to a short, smooth beach we were surprised to see a single small wader with a clear white wing-bar rise and flit low over the water across the estuarine bay. The weather was now improving. The wader had the characteristic flickering flight of a Common Sandpiper (*Tringa hypoleucos*). It alighted on a boulder, the top of which was not quite covered by the tide, and within this limited space it ran, bobbed and appeared to search for food. From a distance of about 80 m we were able to watch it for some minutes. In every way it bore the stamp of a Common Sandpiper, a bird well known to us in many lands. Unfortunately, it was not heard to call as adults commonly do on their northward migration in spring. Even where they are numerous, Common Sandpipers are not strongly gregarious. It is a mark of the species to breed 'loners.'

The only wader which at all resembles *hypoleucos* is the American Spotted Sandpiper (*T. macularia*) in winter or sub-adult plumage. Though adults of the two forms in breeding dress are quite distinct, some authorities have relegated *macularia* to sub-specific status. *Macularia* has crossed the Atlantic on a number of occasions, but it does not appear to stray far out into the eastern Pacific, where its place

is taken by the much larger Wandering Tattler (*T. incana*). Neither in Munro's *Birds of Hawaii* (1960) nor in the Audubon Society's *Hawaii's Birds* (1967) is the Spotted Sandpiper listed among the casual and accidental species recorded between 1960 and 1966. On the other hand, Common Sandpipers of Asiatic origin commonly winter in the Solomon Islands; and in south-eastern Australia they may reach Tasmania.

We returned hopefully to Harania Creek on a calm sunny afternoon a few days later, but although we scrutinised every jutting rock or likely eminence as the tide gently flooded the flats, we could not find our Common Sandpiper. Nor was it subsequently reported by any local bird-watcher. Manukau Harbour has many quiet bays and creekmouths where a solitary Common Sandpiper might pass the summer unnoticed. Perhaps it moved on in search of a stony riverbed with fresh tumbling water.

This is the first record of a Common Sandpiper in Manukau Harbour, and apparently the sixth for New Zealand.

R. B. SIBSON, 26 *Entrican Avenue, Remuera*; J. A. F. JENKINS, 14 *Lochiel Road, Remuera*.



NOTES ON THE CHATHAM ISLAND FANTAIL

The authors were members of the 1977/78 Taiko Expedition, led by D. E. Crockett, to the Tuku Valley in the south-west of Chatham Island. This remote region contains the last large remnant of virgin forest on the island. The bush is fairly open, with a canopy primarily of *Dracophyllum arboreum*, *Coprosma chathamica*, *Pseudopanax chathamica* and *Hymenanthera chathamica*. The Chatham Island Fantail (*Rhipidura fuliginosa penitus*) is, with the Silvereye (*Zosterops lateralis*), the most common native bush bird. It differs from the New Zealand subspecies in possessing noticeably less black on the tail and being more robustly built.

A Chatham Island Fantail nest containing one egg was found, fifty metres from the bush edge near the Tuku Valley, on 19 January 1978. Observations on the pair were subsequently made from a tree hide nearby, and single birds were followed by observers on the ground. The nest was sited in a *Corokia macrocarpa* 5 m above a small clearing. In construction and position it resembled that of the New Zealand subspecies, possessing a distinct "tail." It seems likely that the pair was using the nest for a repeat clutch, the rim of the bowl being of fresh material, which had been added to the original structure.

On the 20th the nest contained two eggs; and hide observation revealed the pair to be already incubating the incomplete clutch. The following evening the bird sat tight when an attempt was made to check the contents of the nest. The next day the nest contained three eggs, the full clutch.

Both sexes incubated. Changeovers occurred at intervals of fifteen to twenty-five minutes, and followed a regular pattern even from an early stage of incubation. The sitting bird left the nest silently and flew a short distance away whereupon it preened vigorously. It then fed silently, high in the canopy, within a seventy-five metre radius of the nest. The feeding bird when returning to the nest began calling twenty metres away, a signal prompting the sitting bird to leave. The relieving Fantail settled quickly on the eggs.

Fantails in the area were noted to associate with other feeding birds, particularly the Chatham Island Warbler (*Gerygone albofrontata*) and the Silveryeye. Fantails were attendant on foraging warblers, feeding on insects they disturbed. On one occasion a Fantail was watched feeding vigorously under two Song Thrushes (*Turdus philomelos*) which were fighting in a *Pseudopanax chathamica*. Also Silveryeye family parties and Fantails were noted moving through the bush canopy, feeding as a group.

A different pair of Fantails with a single flying chick was watched feeding close to the ground. On the approach of an observer the juvenile and one adult moved up into the canopy while the other adult scolded noisily. Unlike the incubating pair this party called constantly as they fed.

Observations ceased on 25 January, so that the full nesting period of the Fantail could not be followed.

M. D. & T. C. DENNISON, 129 Renall Street, Masterton; H. A. ROBERTSON, No. 1 R.D., Aokautere Drive, Palmerston North



SWALLOWS AT SEA

During a voyage from the Ile des Pins, New Caledonia, to Whangarei between 2 May and 11 May 1978 on the yacht *Derwent*, several Welcome Swallows (*Hirundo neoxena*) were seen flitting round the boat when we were still some distance from the nearest land (Fig. 1). The birds were noted between Norfolk Island and the Northland coast well to the west of the area where John Jenkins has logged this species at sea.

My observations were as follows:

7 May, 1730 hrs, 31°38'S 168°35'E. Bird seemed to come in from the north-east, flew close to the boat, then flew off to the north-west.

8 May, 1530 hrs, 31°34'S 168°19'E. This bird appeared suddenly, attempted to land on the life lines round the boat, but did not seem to like so unstable a perch. It flew off to the west.

9 May, 1630 hrs, 33°08'S 170°02'E. A swallow appeared suddenly, then vanished.

10 May, 0730 hrs, 34°00'S 171°40'E, and 1035 hrs, three miles off West Island, Three Kings. These two birds also appeared suddenly, and I did not see where they headed when they left us.

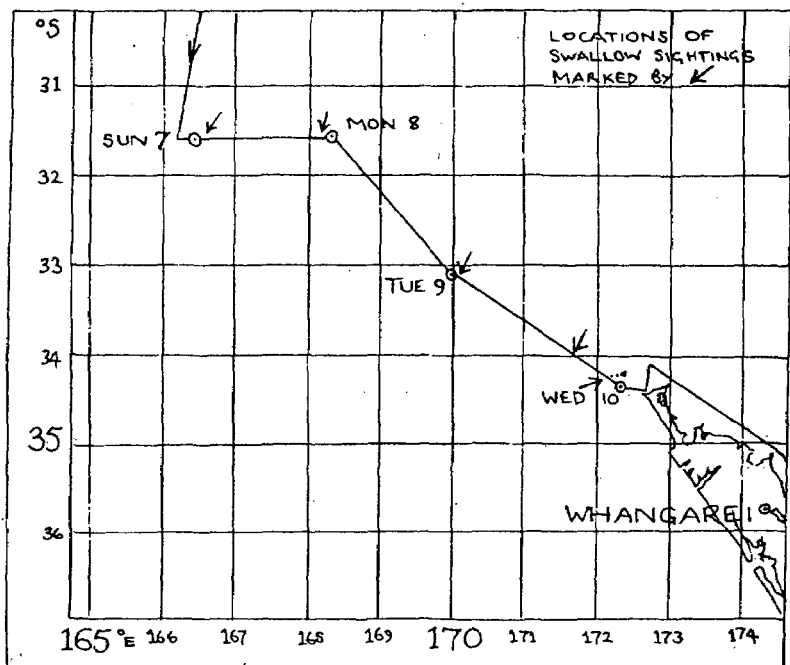


FIGURE 1 — Course of *Derwent* during latter part of voyage New Caledonia to New Zealand, showing locations of swallow sightings.

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LETTER

The Editor,
Sir,

I note the increasing use of the absurd term "breeding strategy" in referring to the breeding biology or breeding behaviour of birds. I do not know where this term originates, but suspect the U.S.A.

Both Webster and the COD define strategy as "generalship, the art of war"; in other words, the planning stage of a military operation; are birds capable of planning, other than perhaps in the selection of a nest site? Tactics, i.e. behaviour or action, begin where strategy ends, in military parlance, and it is in the tactics or behaviour of breeding birds that we are interested. So please let us have decent English in our journal, and no jargon.

A. BLACKBURN

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