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THE CATTLE EGRET IN NEW ZEALAND, 1978-1980

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ABSTRACT

Late-August censuses gave minimum New Zealand totals of 266 Cattle Egrets (*Bubulcus ibis*) in 1978, 624 in 1979, and 771 in 1980. This rising trend ceased in 1981 and 1982. The three years' records are given for each region, and the late-August distribution is mapped. Arrival of birds was conspicuous in late April and early May and probably continued into June. A bird banded as a nestling in northern New South Wales was recovered, and a second banded bird was seen. Arrival was widespread, mainly in the west, and by June most birds had moved to traditional farms. The main departure period seemed to be mid-October to mid-November, but many birds remained to December. A few overwintered each year and passed through breeding plumage.

In New Zealand, the birds are very shy of humans, even though they associate with various gregarious farm animals, mainly cattle and sheep. In the New Zealand winter, the main observed food of the egrets is earthworms. Differences of plumage from the nominate race and the development of breeding plumage are discussed.

Because of the interest of OSNZ members in investigating the number and distribution of the Cattle Egret (*Bubulcus ibis coromandus*) in New Zealand and the success of the 1977 study (Heather 1978), further national counts were made in 1978, 1979 and 1980. In all years, a late-August weekend was used for the counts, as in 1977. By late August, most egrets are settled and in fewer flocks than earlier

TABLE 1 — Numbers of Cattle Egrets in New Zealand, 1977-1980, from counts made in late August

	1977	1978	1979	1980
Northland	25	30	57	91
Auckland	4	9	22	18
S.Auck/Waikato	97	67	178	157
Bay of Plenty	7	3	9	0
Volcanic Plateau	0	0	0	0
Taranaki/Wanganui	35	8	24	31
Gisborne	5	17	26	26
Hawkes Bay	1	0	22	4
Manawatu	15	18	41	72
W.Wellington	0	0	2	5
Wairarapa	7	0	0	0
North I. totals	196	152	381	404
Marlborough	22	6	21	32
Nelson	20	34	44	55
West Coast	20	15	57	25
Canterbury	14	20	76	167
Otago	0	14	16	55
Southland	21	25	29	33
South I. totals	97	114	243	367
NZ Totals	293	266	624	771

and further movement does not occur for another month. In addition, notes were kept in many regions of the birds' arrival and dispersal and, whenever possible, their departure, overwintering, plumage changes, associated animals, and general behaviour.

Table 1 gives the results of the late-August counts by regions, including 1977 figures for comparison. Whenever bad weather affected counts in some regions, consistent numbers seen before and after the count weekend are used. The totals are minimum because in several places where new flocks were found, farmers reported that birds had been present in previous years. In 1977 ibises and other egrets were also counted, but they were not in 1978-80, when information was enough to show that no unusual influx or change of numbers occurred. Therefore, changes in Cattle Egret numbers were independent of the movements of other species.

The sharply rising trend of numbers up to 1977 ceased in 1978, birds returning to some localities in slightly higher numbers, to some in lower numbers, and to a few not at all, the overall 1978 total being slightly lower than that of 1977. In 1979, the rising trend resumed dramatically to a number more than twice those of the previous two years. In 1980, the trend continued with well over 100 more birds than in 1979. The reasons for these annual changes are not known but must be related to breeding or climatic events in Australia, where the birds breed and most disperse after breeding.

Although nationally co-ordinated counts were not made in 1981 and 1982, enough is known to show that, in 1981, the rising trend ceased again and in 1982, numbers fell sharply. Prominent localities with winter counts available for both years are, for 1981 and 1982 respectively and with 1980 numbers in brackets, Rangiriri 81-94, 84, (125), Awaiti 28, 15, (21?), Foxton 67, 22, (67), Grovetown 38, 19, (32), Appleby 2, 2, (17), Taumutu 48, 28, (91), Clandeboye 17, 6, (19). Other figures are Parakai in 1982, 30 (18) and Gisborne in 1981, 11 (22).

REGIONAL RECORDS

These records are given in detail because more can be taken from them than mere population numbers and because they give a base against which future events can be measured — for example, flock sites that are minor now may become traditional wintering and even breeding sites.

NORTHLAND

The site near Awanui continued to be important, and the Dargaville district emerged as a second major locality, the birds concentrating at Ruawai in July-October.

1978

Te Paki, up to 20 reported by farm manager in early April and 11 seen with cattle on 4 April; all had left by 22 April. Parengarenga, 2

briefly in early April, according to farm manager. Waihopo (Houhora), 5 in roadside paddock on 11 April. Kerikeri Inlet, 2 on farm paddocks 11-17 April; one, 30 April to 7 May.

Awanui: One from 30 March to 25 April, once in a sheep pen with domestic fowls; number built up to 25 by late May and decreased from 1 June (e.g. 12 on 11 June, 10 on 2 July, 14 on 6 July - 26 Aug). Sometimes with sheep, usually with cattle. At high tide on 6 July, they were in a field with no stock but with 60 Pied Stilts, 100 Red-billed Gulls, and 15 Caspian Terns. On 23 Aug, they flew from paddock to perch on a dead tree with Royal Spoonbills and White-faced Herons. On 4 Nov, 14 still; on 5 Nov, 5 present, in breeding plumage, two of them bowing as if in courtship ritual.

Dargaville: Awakino Point, 3 on 7 June, 7 on 10 June, when they left. Ruawai, on farmland east and west of Wairoa River, 3 from 4 April to 7 June; increased to 16 throughout Aug.

1979

Aupori peninsula, two singles in Aug. Hokianga: Waihou Valley, Rangiahua, 4 in late April, 7 on 6 May, 14 in June, none reported thereafter; Rawene, 2 for 2 weeks in April; Waima, 4 on 10 July.

Awanui: Six arrived in late April, moved several miles to Waipapakauri for about 10 days, and returned to Unahi, where 20 were present on 28 May. The flock stayed in this area, except briefly in July. At Unahi, 23-25 on 26 Aug and until early Oct, when the flock increased, by farmer account, shortly before departure later in Oct.

Dargaville: Two, later 4, in April. Parore district, 7 on 16 May. Rehutai, 1 in May. Arapaoa, 4 in April. Marohemo, 2 in April. All these birds probably congregated to form the flock at Ruawai, which began with 2 in April-May, built up to 32 by 26 Aug and c.40 on 28 Sep and also in late Oct. Time of departure not known.

1980

A few scattered sightings: Cape Karikari, 1 on 26 April; Aurere, near Doubtless Bay, 3 in May; Wainui, near Whangaroa Bay, 1 in May; Kerikeri, 2 in May, 1 in June; Waipu, 6 in early June; One Tree Point, Whangarei Harb, 2, May-Sep.

Awanui: Flock built up from 4 in April to 12 in June, 30 in July and Aug, 39 on 10 Nov; 5, in breeding plumage, on 15 Nov; none seen thereafter.

Dargaville: Baylys Beach, 1 dead on 5 April, 3 (live) on 25 April; Taingaehe, Pouto Pen, 4 on 20 April, 5 on 27 April; Matakoho, N. Kaipara, 2 in May; Awakino Point, 3 on 30 April, 7 on 23 Aug. Ruawai, 52+ on 23 Aug; by farmer accounts, birds left in early Nov.

(A. T. Edgar, W. J. Campbell, M. Hows)

AUCKLAND

Parakai (Parkhurst): As in 1977, this was the only site, apart from one freshly dead on Muriwai Beach on 26 May 1979.

1978: Eight on 15 July and through to 24 Dec.

1979: 16 on 25 April and, several days later, 6 more several kilometres away. These two flocks remained, always apart, until 20 Dec.

1980: One on 6 Jan and 27 Feb, presumably oversummering; 14 on 25 April and 19 May; 18 in late Aug.

(S. M. Reed)

SOUTH AUCKLAND/WAIKATO

Prominent developments were the continued growth of flocks at the Rangiriri site, which were the largest flocks in New Zealand every year, and the emergence of a new site in the Piako district and a minor one at Karaka.

1978

The bird that oversummered in Pokeno Valley was last seen on 10 April (D. A. Lawrie). Seagrove, near Karaka, south Manukau Harb, 1 on 23 July. Pukekohe, 1 on 24 May flying south. Lake Whangape, Waikato, 3 on 28 May.

Aka Aka: One on 14 May, the only sighting at this favoured locality of 1977. The few birds that returned to 1977 localities presumably moved on to join the bigger groups at Rangiriri. None seen at Lake Ngaroto, which was favoured in 1977.

Rangiriri: On 21 March, 3 at Henderson's farm; 23 on 28 May, but Mr Henderson reported 38, some since early April. On 4 June, three flocks of c.10, 26, and 7; 54+ on 15 July. Up to early July, most were on the Henderson farm, as in 1977, but thereafter all were together at Te Onetea Road, where there were 61-62 later in July, 67 on 27 Aug, and 50 nearby on 7 Oct. Many had left by 11 Oct, but 25+ were still there on 4-5 Nov and 6 on 18 Nov.

1979

New centres in this year of greater numbers were Karaka in south Manukau and Pipiroa near the Piako estuary, southern Firth of Thames; birds seen at or south of Miranda and near Waitoa (Te Aroha) may have been from the Pipiroa flock.

Miranda, 1 on 20 Jan and through to 3 June, 3 on 17 June, 4 on 3 July and through to at least late Aug. Meremere, 3 in late May, 4-5 on 8 July. Lake Whangape, 9 on 28 Aug. Te Kowhai, west of Hamilton, 1 on 28 Aug. Raglan, 1 on 22 Dec (oversummering?). Makomako, Aotea Harbour, 1 on 15 June, 2 later. Jory Rd, Ohaupo, 2, 15 Aug to 4 Nov. Lake Ngaroto, 3 in early June.

Karaka: Seven from at least July to late Oct; 1 stayed on for first week of Nov. Nearby, 7 flying east at Pokeno on 7 May and one at Wairoa estuary, Clevedon, on 30 April.

Pipiroa: Three on 29 Dec 1978, 4 on 7 Jan, 7 on 17 Jan to 15 March; 12 on 17 June; 27 on 28 Aug; 30 in Oct; 31 on 6 Nov. At least 7 of the Jan birds apparently overwintered in the district.

Aka Aka: 12-13 on 29 April, 14 on 5 May, 21 on 31 May, but thereafter down to 4 because main cattle herd was removed. Presumably most birds moved to Rangiriri. Nine on 25 Aug.

Rangiriri: H. Henderson reported first birds seen on his farm on 23 April; number rose to over 80 by last week of May. The flock at nearby Te Onetea Road was 16 on 25 April and 28 on 6 May. By June, flocks were 32 at Onetea and 86 at Henderson's. These flocks, some 10 km apart, came together for July and Aug; counts of 131 on 8 July and 119 on 25 Aug. None found in the district after 26 Oct.

1980

Pukekohe sewage ponds, 2 on 14 April. South of Kawhia Harb, 2 near Te Anga, 19 April, and 1 at Kiritihere, 20 April. Meremere, 5 on 11 Feb. Lake Ngatoro, 3 on 25 April. Lake Whangape, 8 on 28 May, 9 on 28 Aug. Jory Rd, Ohaupo, 1 on 3 May, 2 on 21 May. 3 on 31 May, 3 on 24 Aug, 4 on 1 Sep.

Karaka: Two arrived on 21 April and 2 more on 29 April. They left at the start of the duck-shooting season on 1 May. One at Mangere on 13 May and 2 at Manurewa on 2 May may have been some of these birds. Karaka, 1 from June to late Aug (J. Urquhart).

Pipiroa: Nine on 21 Jan, 3 on 31 Jan, 7+ on 3 Feb, 12 on 3 May. By July, they had moved west to near Waitakaruru; 28 from July to Aug. One at Kaiaua 4 April to 17 May.

Rangiriri: Reported to arrive in ones and twos from April onwards, later moving west across Waikato River to Huntly West Road. On 26 April, 13 at Te Onetea Road and 16 at Henderson's. On 3 May, 61 in groups of 26, 2 and 33. On 2 June, the groups were 23 and 100. On 24 Aug, 125 in flocks of 107 and 18. 106+ at Huntly West Road on 5 Oct. None seen on air search on 18 Nov.

Band recovery: A bird washed ashore dying on the morning tide of 4 May 1980, on Taharoa Beach south of Kawhia Harbour, had been banded as a chick by J. Willows on 24 Dec 1979 at a colony NW of Grafton, NSW; band no. 100-25054.

(B. Brown, JH & BH Seddon, *et al.*)

BAY OF PLENTY

Awaiti Wetland Reserve: Fields adjacent to this reserve remained the only known site in the Bay of Plenty and Volcanic Plateau regions.

1978: Three on 26-27 Aug, which had been there for at least several weeks. Seen up to 24 Sep but not found on 28 Oct.

1979: Eight on 11 Aug; 9 on 25 Aug, last seen 20 Sep.

1980: 11, up to 15 on 7 June; 21 on 22 June.

(P. C. Latham)

GISBORNE/WAIROA

The regular flock occurred on fields near the Waipaoa River, some 20 km from Gisborne.

- 1978: Five first seen in May, rising after several weeks to 8 and then by ones and twos to 17 in July/Aug.
 1979: Seven appeared on or about 20 April; up to 14 by 1 June and 26 by 1 July and through to at least late Aug.
 1980: On 23-24 Aug, 22 at usual site; also 1 at Tolaga Bay and, near Wairoa, 1 at Whakaki Lagoon and 2 at Awamate.

(A. Blackburn, J. C. Henley)

HAWKES BAY

No birds were recorded in 1978. In 1979 and 1980, the main localities were certain farms at Meeanee and Farndon, near Clive, but some confusing local movement occurred, especially to fields adjacent to the Ahuriri estuary at Westshore, and late-Aug counts were hindered by heavy rains and flooding.

- 1979: Two on 25 April at Horseshoe Lake, Patangata, east of Waipawa, with feral domestic geese. Meeanee, 10-12, May to July and from time to time up to Oct. Puketapu, west of Napier, 2 on 25 Aug. Ahuriri, 2 on 6 May, 14 on 30 Aug. Farndon, 3 on 25 Aug, 15 on 9 and 23 Oct, 11 on 9 Nov. Waipukurau (A. H. Gollop), 3 in July and on 21 Sep, 2 in Oct.
 1980: Even fewer birds. Three c.14 km west of Dannevirke on 30 May; gone by 1 June; Otape Road, Dannevirke, 1 on 25 April (J. Drake). Lake Hurimoana, 2 on 25 May. Farndon, 2 on 18 April, changing to a nearby farm where farmer had known them for two years; 4 from early July to at least 18 Oct. No further sightings until 1 on 7 March 1981 at Ahuriri.

(K. V. Todd, B. R. Keeley, M. Craven)

WAIRARAPA

This district of fine Cattle Egret habitat was ignored by the egrets, except in passing.

- 1978: Two on northern shore of Lake Wairarapa on 8 April.
 1979: One at Pirinoa on 20 April; found dead on 27 April. One at Monk's farm, north end of L. Wairarapa, a favoured place in 1977, on 22-23 April and on nearby farm on 29 April; did not stay. Three flying over flood gates at south end of the lake on 11 May.
 1980: One at Pirinoa on 3 May; 1 nearby on 3 June; 1 Lake Ferry on 6 Aug, 1 on 16 Nov, east side of L. Wairarapa, outside shearers' quarters where an OSNZ wader-study party was staying.

(D. Sim, B. D. Heather)

TARANAKI

Despite its abundant well-watered pasture and its prominence as a landfall, Taranaki has not been favoured by the egrets as a wintering place, except for regular small flocks at Waitara and Nukumarū, one or two birds regularly on a farm near Normanby, and an elusive flock in the Patea district.

1978

North Taranaki: Waitara River mouth, 1 on 6 May.

South Taranaki: Between Manaia and Kapuni, 4 in May. Normanby, 2 from May to mid-Nov. Nukumarū (Lake Waikato), the two that overwintered were presumably joined by 4 more as 6 were present on 27-28 Aug.

1979

North Taranaki: A spectacular influx began with 1 at Cape Egmont lighthouse on 17 April and continued as a flurry of reports up to 6 May of at least 50 birds spread along northern and western coastal Taranaki from Awakino to Warea and inland south of Waitara to Tikorangi and Tarurutangi. On 24 April, one even hit the vessel *Pacific Installer* in Port Taranaki (skin in Taranaki Museum). Localities were Awakino, Pukearuhe, Urenui, Waitara, Bell Block, New Plymouth, Oakura, Cape Egmont, Pungarehu, and Warea. Mostly ones and twos, but several groups of 3 and 4 were about Waitara, 7 were at Awakino, and 13 were at Tikorangi.

By mid-May, most birds had apparently moved on, apart from a temporary concentration of 12 at Toko, east of Stratford, on 22 May, down to 7 on 23 May, and a flock of 9 on the northern outskirts of Waitara. This Waitara flock remained to mid-Sep, increased to 12 by 19 Sep, and went by 23 Sep.

South Taranaki: One beside Opunake-Stratford road in last week of April. Maxwell, 3 in roadside field on 21 Aug, possibly from the Nukumarū flock. Nukumarū, 15 on 2 June, 28 Aug and 5 Sep (site not visited before 2 June). According to farm staff I. & J. Coombe, all left between 10 and 18 Nov after several absences lasting several days each.

1980

North Taranaki: Waitara, 7 on 15 April. Onaero (Urenui), 1 with White-faced Herons on 9 Jan; 6 on 27 April. Okau (Tongaporutu), 1 on 15 May.

South Taranaki: Normanby, 1 up to Nov. Mokoia, 3 in roadside field, 6 July. Nukumarū, first bird returned 29 March, 4 on 6 April, 12 on 9 April (I. & J. Coombe); no further observations made until 31 on 31 Aug.

(R. W. Wheeler, L. C. Edlin, B. D. Heather)

MANAWATU/WEST WELLINGTON

The birds tended to change from being in small flocks in widely spaced localities, mainly south of Palmerston North, to a concentration in the Foxton district, especially the first of the string of small dune lakes in farmland north of Foxton Beach. A farm at the southern end of Lake Horowhenua had 2-5 birds each year on the same fields with the same herds. Note the clear sequence of build-up and departure at Foxton No. 1 in 1980.

1978

Longburn (Hamilton's Line), 13 on 20 July, 16 from 23 July to at least 29 Aug; 13 went about 10 Nov; 3 still there on 12 Nov, none on 3 Dec.

Foxton: No. 1 lake, 1 on 6 Aug; 6 km further north, 2 on 27 Aug. Manawatu River estuary, 2 on 17 Dec.

1979

Lake Pukepuke, 3 on 4 May, 5 on 7 May. Marton district, 1 on 9 June. Lake Koitiata, Santoft, 6 on 25 Aug. Tiakatahuna (W of Palmerston), 1 on 20 June. Lake Horowhenua, none seen 13 & 20 April, although reported by farmer; 2 on 24 May and through to at least 25 Aug. Opiki, 4 on 25 Aug. Wellington airport, 1 on 17 April and for most of May.

Foxton: No. 1 lake, none on 13 March and 17 April (no May visits); 49 on 24 June, 31 on 15 July and 12 & 25 Aug; 25 on 29 Oct, 19 on 11 Nov. Manawatu estuary, 3 on 3 Feb, 1 on 11 Feb and 17 & 20 April, 4 on 5 May, 4 on 31 Dec. Flooded pasture south of Foxton, 1 on 13 & 20 May, 2 on 2-3 June, 4 on 11 June. These estuary and floodwater birds may well have been from the nearby No. 1 lake flock.

1980

Awahuri (Oroua River), near Palmerston North, 10 on 10 Aug. These probably moved to join the Foxton flock, which rose by 10 at this time. Moutoa Land & Survey block, between Foxton and Shannon, 5 on 24 Aug. Lake Horowhenua, none in April, 5 on 29 June and 24 Aug, 11 on 30 Nov, 12 on 1 Dec.

Foxton: No. 1 lake, none on 13 April, 4 on 20 April, 13 on 26 April, 20 on 27 April, 44 on 18 May, 57 on 20 July, 67 on 24 Aug, c.70 on 28 Sep, 60 on 12 Oct, 12 on 20 & 27 Nov. Then none until 5 on 10 May 1981. Manawatu estuary, 1 on 1 Jan and 20 April.

(L. J. Davies *et al.*)

NELSON

The two regular sites continued to be at Takaka, where the flock moved among farms between the township and the coast, mainly on the Rotatai flat, and at Appleby, near Nelson, where birds tended to favour the Waimea estuary early in the season and move later to nearby farmland.

1978

Takaka, 12 in May, 14 on 26-27 Aug. Appleby, 1 on 20 March, 6 on 6 April and in early May on Waimea estuary, and 6-7 all May on nearby fields; 20 on 23 June and through to 15 Nov.

1979

Big River, southern Westhaven Inlet, 3 on 19 April. Takaka, 18 on 25 Aug. Motueka, 1 on 20-24 April. Riwaka, 2 on 25 Aug. Appleby, 6 on 2 May, 11 on 18 June, 24 on 26 Aug, last seen 11 Nov.

1980

Many of the May dates coincide with observers passing through to and from Farewell Spit; these birds may have been new migrants or have been moving through from other regions.

Farewell Spit lighthouse, 1 with house cow on 16 May, stayed one day only. Pakawau, 4 on 12 May, 6 on 17-19 May. Takaka, 3 in mid-April, 19 by early May, 22 by 18 May, 31 on 23-24 Aug. Riwaka, 5 on 11 May, 6 on 19 May, 5 on 23-24 Aug. Motueka, 1 on 19 May. Appleby, 5 on 18 May, 17 on 23-24 Aug. Ruby Bay, 1 on 19 May. Mapua, 9 on 26 Aug. Rabbit I., 14 on 26 Aug. Wakefield, 2 on 23-24 Aug.

(J. M. Hawkins)

WEST COAST

This long narrow region with its complex pattern of high ridges and valley flats, forest, farmland, and lakes, cannot be fully watched all season. It was often the landfall for many egrets, most of which did not stay. Unlike most regions, the birds remained in widely spaced small flocks, but as usual most localities were regular, even after an absence of one or more years.

1978

Few 1977 localities had egrets back. Rotomanu, only 1 on 9 April. Matai (Grey River), 2 seen at end of June only. On 26-27 Aug, 15 birds only — 8 at Karamea, 6 in Kokatahi/Kowhitirangi district near Hokitika, and 1 at Okarito.

1979

At the same time as in Taranaki, a small but spectacular influx occurred in the second half of April. The observations of C. Burridge and others at Punakaiki were notable: At 5 p.m. on 16 April, 8 birds arrived on the Burridge farm. They were joined by a ninth on 22 April and 10 more early on 23 April. Late on 23 April, the number fell to 5, and to 1 by 26 April. Meanwhile, 10 at Barrytown on 25 April and 5 on 27 April and 7 on 29 April at Coal Creek may have been Punakaiki birds or further migrants.

Other early records by R. Weston, who was travelling through at the time, were of 6 at Ross, 3 near Harihari and 14 at Whataroa on 27 April and of 6 at Manukaiuia River and 8 at Paringa on 26 April.

Moana, near Rotomanu, 9 on 15 April. Camerons, south of Greymouth, 4 on 18 April.

Karamea, 9 on 25 Aug. Westport, 2 on 14 July. Barrytown, 10 on 25-30 April, c.20 on 7 May; none thereafter. Coal Creek, 8 on 5 Aug, 6 on 25 Aug. Matai, 8 throughout Aug. Rotomanu, 13 on 25 Aug. Arahura Valley, 11 throughout Aug, 2 on 2 Dec. Kokatahi/Kowhitirangi, 5 and 2 on 25 Aug, 8 on 11 Oct. Harihari, 3 on 25 Aug. Flocks counted in late Aug had been together most of winter, but some numbers were down.

1980

After an early influx in the second half of April and the first week of May, numbers diminished, and by the census in late Aug few could be found.

Early reports: Westport, 2 on 20 April. Punakaiki, 2 on 19 April. Greymouth district: Matai, 1 on 3 May; Rotomanu, 2 on 19 April; Kotuku, 2 on 19 April; Lake Kangaroo, 11 on 20 April. Hokitika district: Humphreys, 2 on 10 May; Hokitika, 9 in late March; Kowhitirangi, c.20 on 21 April; Totara River, 9 on 26 April; Mikonui River, 4, and also 3 at Shearer Swamp, 26 April. Whataroa, 1 on 19 April. Franz Josef (Potters Creek), 1 on 4 May. Fox Glacier to Jacob River, 4 in early May.

Later reports: Karamea, 12 on 24 Aug. Westport, 1 on 19 Aug. Coal Creek, 4 all Nov up to 22 Nov. Rotomanu, 4 on 23 Aug. Kowhitirangi, 8 on 25 Aug.

(S. C. Lauder)

MARLBOROUGH

The main site at Grovetown, near Blenheim, continued to be favoured, whereas Kaikoura, the other site in 1977, was rather neglected except early in the season.

1978: Grovetown, 6 on 11 June and through to early Oct. Kaikoura, 1 only, 16 June to 4 July.

1979: Grovetown, 3 on 8 May, 20+ on 18 June, 16 on 25 Aug, 4 on 2 Oct, 1 on 4 Nov. Kaikoura, rapid build-up in May, 5 to 7 to 8 by 22 May, 9 on 8 June, 5 from 25 Aug to 20 Oct.

1980: Linkwater, 3 on 7 April, none on 11 May. Grovetown, 15 in mid-April, 18 on 18 May, 32 on 23-24 Aug, 29 on 3 Nov, 16 on 6 Nov, 11 on 10 Nov, 5 on 25 Nov. None thereafter until 23 on 16 May 1981. Grassmere, 2 on 6 April. Kaikoura, 8 on 11 May, 2 on 31 May.

(P. Jenkins, J. A. Cowie, R. N. Holdaway, D. Bate)

CANTERBURY

Although the small flock at Waikuku persisted, the main flock at Taumutu, on the western side of Lake Ellesmere, continued to increase until it rivalled the Rangiriri flock in the Waikato. The Taumutu birds were often hard to count accurately, except late in the

day while herds were being milked. Many but not all were sometimes seen on the lake shore, and single birds and small parties were sometimes reported as much as 15 km away at Selwyn River and South-bridge. New centres of congregation developed in the Ashburton district at Ashburton Forks and on two farms at Eiffelton and in the Timaru district of South Canterbury at Clandeboye and Kingsdown.

1978

Waikuku: One, then 3, in April; 3 through to early Oct.

Taumutu: 13 from April to 1 July, when 15 present; 17 on 19 Aug and through to at least early Oct.

1979

Waikuku: None on 31 March and 1 April, 1 on 6 April, 4 on 27 April, 12 on 10 June, 15 on 7 July & 25 Aug, 12 on 29 Sep, none on 25 Oct.

Taumutu: None on 31 March, 1 and 27 April; 31 on 22 May, 40 in early June and probably through to mid-Sep; 17-18 on 25 Oct, last seen mid-Nov.

Ashburton: Ashburton Forks, c.30 km inland, two flocks of 9 and 14 on same farm, 10-16 May. Thereafter only the 14 remained, until 29 June. Eiffelton, farm east of township, 4 on 17 May, 8 on 18 May, 9 on 19 May through to 8 Aug, 10 from 13 Aug to 17 Oct, when very restless; not seen after 21 Oct. Eiffelton, farm south of township, 14 on 1 July and through to late Oct, number then fluctuating between 4 and 14, last seen 6 on 15 Nov.

Geraldine-Winchester highway, 3 on 25 Aug; according to farmer, 2 each winter for previous 3 years.

1980

Christchurch, Bromley sewage farm, 5 on 7 & 15 May. Haldon station, Lake Benmore, 2 on 13 May. Rakaia River mouth, 2 on 12 May. Kaiapoi, 1 on 23 Aug.

Waikuku: One on 18 April and 2 May, 3 on 11 May, 6 on 18 May, 7 on 23 & 30 May, 8 on 23 Aug and through to at least mid-Oct.

Taumutu: None on 18 April, 2 on 20 April and 17 nearby near Leeston, 1 at Prebbleton on 17 May, 70 in one flock on 27 May, c.80 in three flocks on 3 June, 91 on many occasions from June to Oct, including 23 Aug; 35 on 15 Nov. Not seen again until 18-19 in mid-Jan 1981; then not seen in Feb 1981.

Ashburton: Scattered sightings of varying numbers, flocks not settling except at Hinds and Eiffelton. Three on 30 March, 2 on 1 April, c.17 on 6 April, 8 following a plough on 2 July; all in different localities. On 16 Aug, 5 and 11 near Hinds, and on 23 Aug two flocks of 5 near Hinds, 11 at Eiffelton, and 3 at Rangitata Huts.

South Canterbury (Timaru district): Washdyke, 3 on 23 Aug. Otipua,

8 on 23 Aug. Clandeboye, 19 on 23 Aug; went in late Oct but 3 nearby on 20 Nov. Kingsdown, 13 on 23 Aug, 24 on 21 Nov, 16 on 27 Nov. According to farmer, 11 had been present in 1979.

(P. M. Sagar, W. Mawson, M. Lane, P. A. G. Howell *et al.*)

OTAGO

Two favoured localities developed, one about Berwick and the southern Taieri Plain, the other east and south of Balclutha; perhaps a third, in the Oamaru district.

1978

Waitopeka, south of Balclutha, 1 in late Aug. Chaslunds, 3 in May-June.

1979

Owaka, 3 on 25 Aug. Berwick, reported by farmer to be present all of June; 12 on 2 July, 13 on 3 July, 11 on 18 Aug, 13 on 25 Aug, 14 on 6 Sep, 13 on 13 Dec. Balclutha, small flocks of up to 9 in several midwinter weeks when birds had been flooded out of Berwick district; none found on 25-26 Aug.

1980

Otago Peninsula, 1 at Harrington Point on 12 April. Oamaru, 28 on 23 Aug. Two, 23 km north of Oamaru on 7 Sep. Maheno, south of Oamaru, 3 in July and Aug. Balclutha: Stirling, 9 on 15 Jan, 12 on 29 March; Kaitangata, 9 on 23 Aug; Paretai, 4 on 23 Aug. Owaka, 8 on 23 Aug.

Central Otago, 1-2 reported at Edievale in early May; Alexandra, 6 at Earnsclough on 14 June, 1 on 21 June (ground now frosted); farmer said 2 arrived on 22 May and 4 on 9-10 June.

(M. R. Foord, P. Child)

SOUTHLAND

Little set pattern was discernible from year to year in that birds tended to return to same general areas rather than precise farms. Notable stragglers on arrival were birds at Puysegur Point lighthouse, Stewart Island hotel, and the Penrod oil rig well away south of land. One wonders how many perish at sea, missing their landfall.

1978

Haldane estuary, 2 on 24-25 Nov; according to farmer, 3 present most of winter. Ones and twos reported between 2 and 15 May at Glencoe (Hedgehope), Kennington, Waimahaka, Tuatapere, and Invercargill (near Kew Hospital).

On 26-27 Aug, 11 at Gummies Bush (Riverton), 2 at the borstal farm (Invercargill), 5 in Seward Downs/Gorge Road district, 1 in Maitaia district, and 3 at Wyndham. In Sep, 20 arrived at Edendale, confirmed on 27 Sep. Te Anau, 5 on 4 Dec.

Penrod oil rig: One bird sent ashore in poor state from the rig, which

was some 280 km south-east of Stewart Island, on 13 April; it had been on the rig for 3 days before capture. A year before, on 30 April 1977, a bird was sent ashore very weak from the rig, then some 120 km offshore. Both birds died.

1979

On 25-26 Aug, 4 at Gummies Bush, 1 at Balfour, 17 at Wyndham, and 7 at Invercargill. Arrival dates and other information not recorded.

1980

Strong influx recorded in second half of April: Mataura Island, 1 on 9 April; Wyndham, 7 on 13 April; Otatara, 1 on 17 April, 3 on 4 May; Ohai, 2 on 24 April; Lorneville, 3 on 26 April; Charlton (Gore), 13 on 26 April; Te Anau, 5 on 26 April, 7 on 27 April, up to 13 from then to 26 May; Manapouri, 3 on 28 April; Tuatapere, 11 on 1 May.

On 27-28 Aug, 21 at Wyndham, 6 at Gorge Road, and 6 at Otatara.

Puyssegur Point lighthouse farm, Preservation Inlet: One on 16 April (seen to shelter under a cow when attacked by a NZ falcon). In this same place in 1973, one was present in last week of April and first week of May (P. Daniels).

Stewart Island (Halfmoon Bay), 9 on 16 April (1 dead), 7 in May, favouring lawns about the hotel and post office. Three seen at similar time in last two years (R. Thomas, ranger).

(R. R. Sutton, K. Morrison)

MOVEMENTS

Distribution

Figures 1-3 show where the birds were in late August of the three years. For the most part, they were in the same localities as in 1977 (and previous years), merely the numbers changing. The attachment of the egrets to traditional places was strong and no less remarkable than the development of such traditions in little more than a decade of migration. Usually the birds returned to the same farm or neighbouring farms year after year, sometimes after an absence of one or two years during years of lower numbers. Even when a locality was abandoned as an all-winter site, some birds returned to it early in the season, sometimes for just a few days. Yet most districts had huge areas of apparently equally suitable agricultural land available, which the birds ignored except in passing on first arrival. For example, in all the rich dairy-farming land of the Waikato, the birds have remained faithful to a few farms in the Rangiriri district, and in the equally rich farmland of Taranaki, which was a prominent landfall for them, only a few stayed on at Waitara, Normanby and Nukumarū.

Some changes did occur, however, in distribution after 1977. One was the break with tradition that saw Aka Aka abandoned as a regular site in Waikato and several sites near Palmerston North abandoned in favour of the Foxton district. Another was the growth

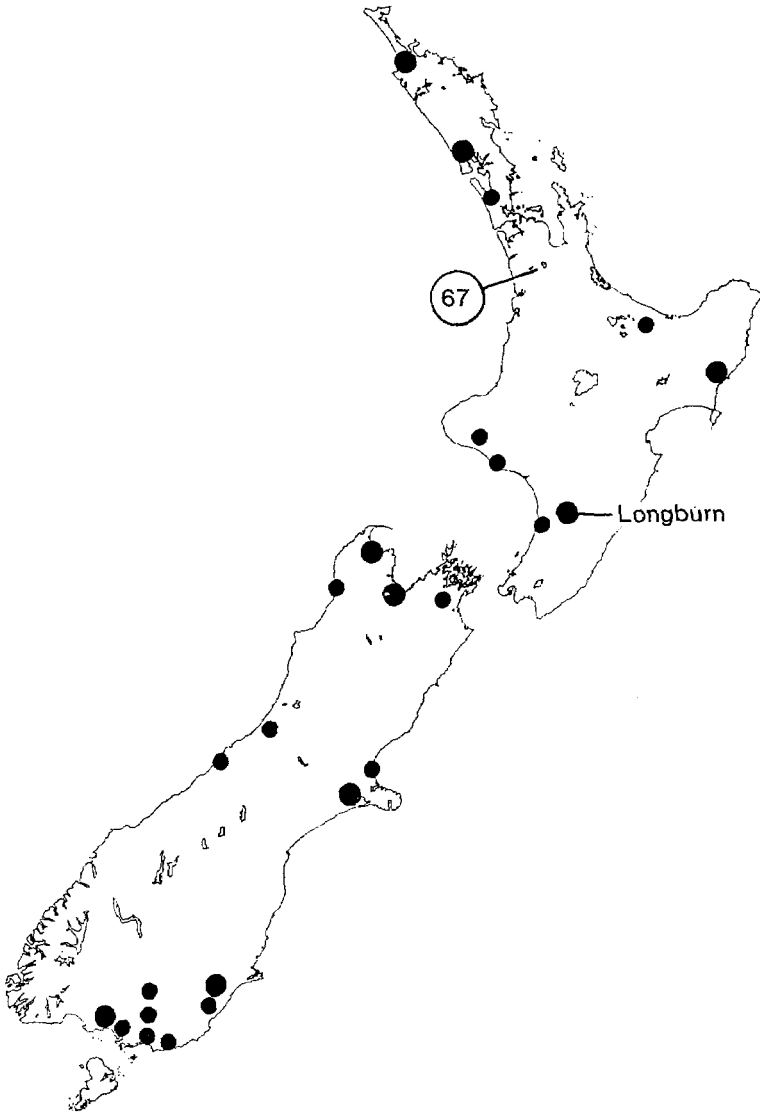


FIGURE 1 — Distribution of Cattle Egrets in late August 1978. Key as in Fig. 2.

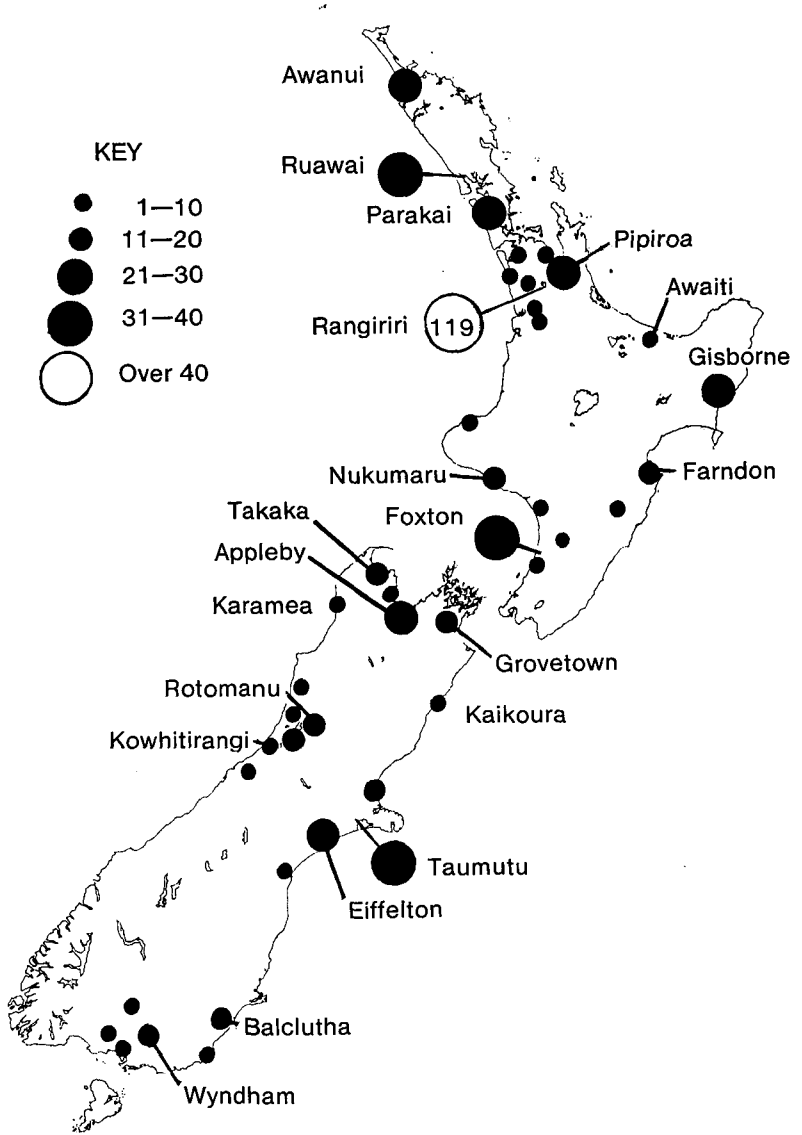


FIGURE 2 — Distribution of Cattle Egrets in late August 1979

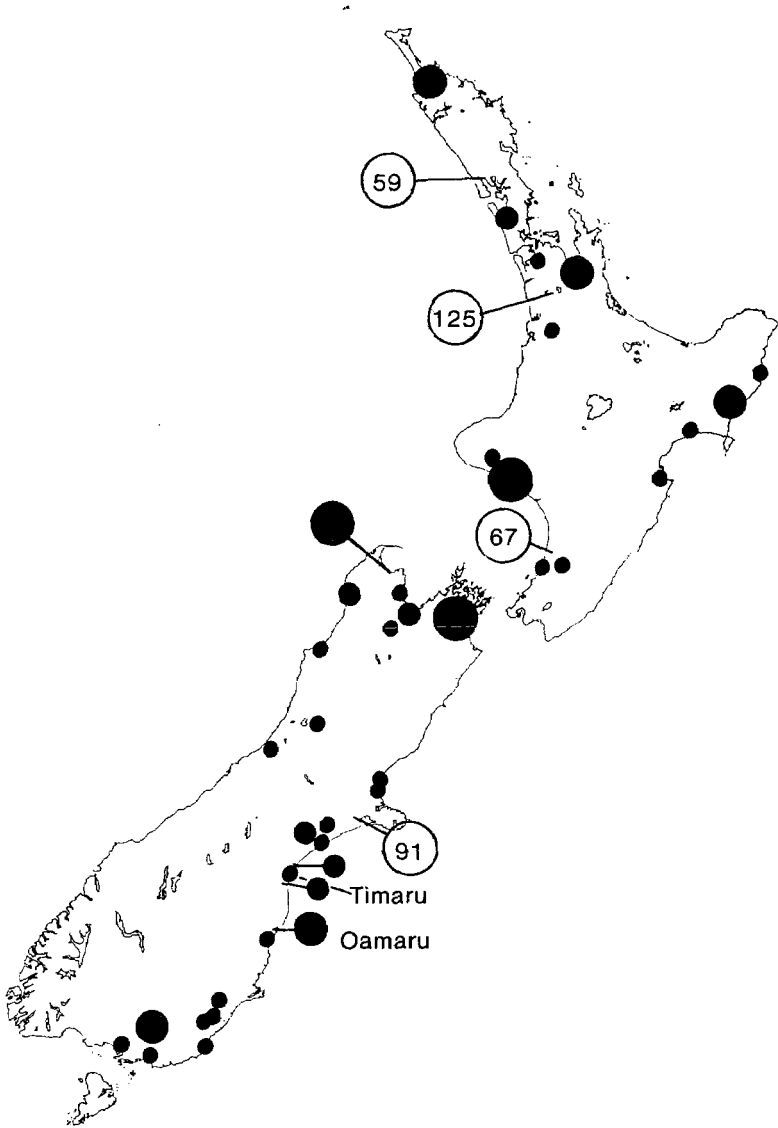


FIGURE 3 — Distribution of Cattle Egrets in late August 1980. Key as in Fig. 2

of numbers in the eastern South Island with important new sites near Ashburton, Timaru, Oamaru and Berwick/Balclutha, whereas the eastern North Island apart from Gisborne, in spite of its agricultural landscape, continued to be largely ignored. In Southland and on the West Coast, the egrets continued to be in widely spaced small flocks, but elsewhere the demands for the company of others of the species and for traditional places seemed to outweigh the wide choice of habitat.

Migration

Whereas in 1977 we could only assume (Heather 1978: 226) that the egrets were migrating from and to Australia, migration is now certain. The birds have a regular pattern of arrival and departure, coinciding with movements in eastern Australia (Morris 1979), arrival especially being prominent, widespread on the west, and in places where the birds do not stay, including some unexpected places such as far to sea south of New Zealand. A bird with a bright metal band was seen for several days in Southland in early April 1981, and no birds have been banded in New Zealand. Several were beach-wrecked on western coasts in the arrival period, including one that had been banded as a chick in New South Wales 4 months earlier. The birds then gradually assembled in traditional wintering places, where they remained for some 4 months. Although most had gone by mid-November, a surprising number stayed through to December, and some overwintered in New Zealand each year. Breeding in New Zealand is not known and there is no evidence to suggest that it has occurred.

Arrival times

Figures 4 and 5 show the recorded dates of arrival of Cattle Egrets in 1979 and 1980, divided into April and early May. Although the first birds arrived in late March and the first half of April (e.g. South Taranaki and Marlborough 1980), the obvious influx occurred in the second half of April and the first week of May. See especially Taranaki and West Coast in 1979 and Southland in 1980. Two of the three beach-washed birds were found fresh on 5 April (Dargaville) and 4 May (Kawhia). Landfall seemed to be haphazard and to occur anywhere on western coasts from Aupori Peninsula in the far north to Ross in southern Westland, except in Fiordland, where birds presumably flew over the forested ranges and landed at the first pasture they met, from Te Anau, Tuatapere and Puysegur Point to Stewart Island, stragglers being perhaps lost at sea south of Stewart Island. April birds seemed to arrive piecemeal, in ones and twos and small parties rather than as major flocks.

On arrival, many birds spent several weeks at or near the places of arrival and then moved on, as happened in North Taranaki in 1979. Some, however, must have moved promptly to familiar ground because April birds were sometimes recorded in eastern localities (e.g. Gisborne and Wairarapa 1979, Marlborough 1980 and Canterbury in all three years). Even though the early influx was sometimes con-

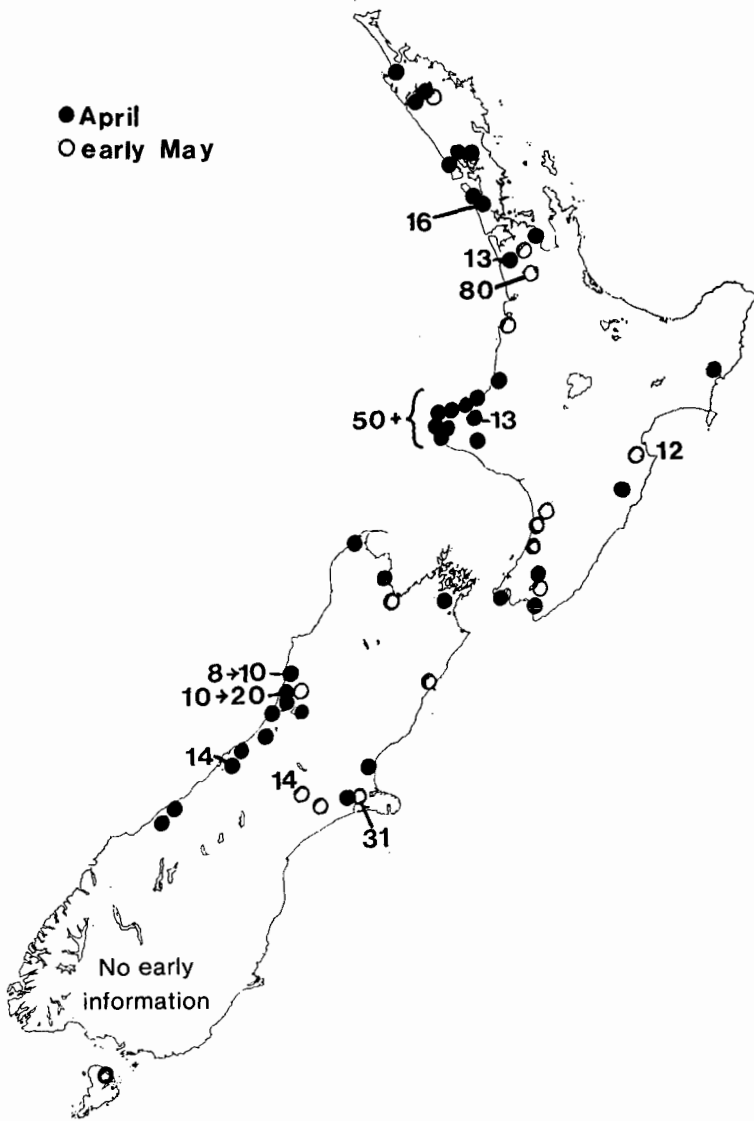


FIGURE 4 — Recorded places of arrival, April and early May 1979. Numbers are less than 10 unless given

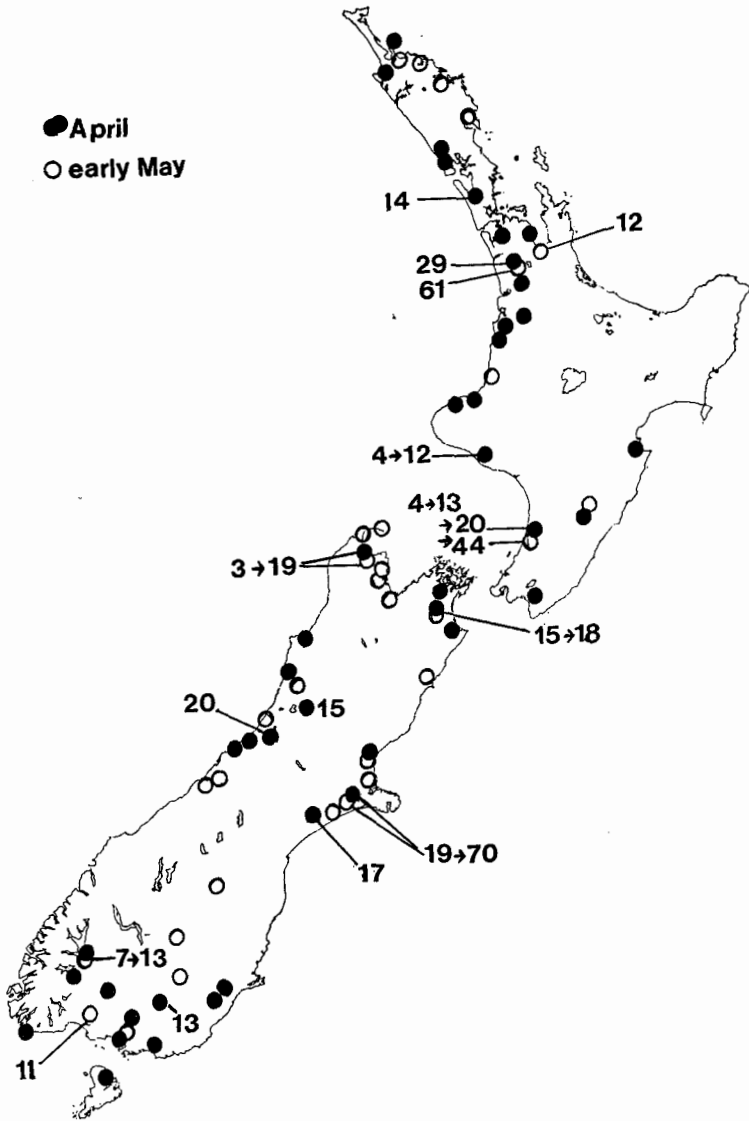


FIGURE 5 — Recorded places of arrival, April and early May 1980. Numbers are less than 10 unless given

spicuous, the numbers involved were far short of the numbers that did arrive, and so birds probably kept arriving throughout May and into June. Numbers kept rising at traditional localities until at least early June and often much later (e.g. Rangiriri in 1979 and 1980), and the third fresh beach-washed bird was found (Muriwai) on 26 May.

The records show that at first most birds were widely scattered and moving about, and so changes in numbers during May and June may have been due to a continued arrival of immigrants, to movement within New Zealand, or to both. This uncertainty obscures the full period of migration from Australia.

Departure

Enthusiasm for recording the egret flocks often waned after the late-August count weekends, and so the period of departure, which lacks the drama of arrival, cannot be clearly defined. In some places, the flocks remained more or less unchanged through winter and into spring from a peak in late May (e.g. Awanui 1978, Waitara 1979) or even in late April (e.g. Parakai 1979). However, in most major sites in most years, the flocks did not reach full size until well into June or even in July. As in 1977, July-September flocks were stable, minor fluctuations being attributable to some local wandering and to the difficulty of counting large flocks of egrets feeding among cattle or sheep, often among clumps of rushes and in hollows and ditches. Sometimes, flocks diminished or disappeared as early as September (e.g. Waitara 1979) but sometimes northern flocks increased in October (e.g. Awanui and Dargaville 1980, Pipiroa 1979), and so early movements may not have been migratory, especially as few birds were in breeding plumage by late September.

Table 2 shows localities where times of departure were noted with fair or full accuracy. It confirms the impressions of 1977 (Heather 1978) that departure was piecemeal and largely from mid-October to mid-November. This seems to accord well with the time of northward passage through inland New South Wales, given by Morris (1979) as "during October-November," and it would allow ample time for breeding in northern New South Wales and southern Queensland (see also Pratt 1979).

In two places where on-the-spot observers kept notes (Nukumaru and Eiffelton 1979), the birds showed the premigratory restlessness (*Zugunruhe*) typical of migratory birds, the whole flock disappearing for days on end, reappearing, and disappearing again, several times. Thus, when observers visit a site on a weekend in the likely departure period and see no birds, the birds may or may not have gone. For example, the last 12 birds at Foxton No. 1 lake in 1980 were last seen on 27 Nov, but at Lake Horowhenua, some 20 km further south, where 5 birds had wintered, the number rose to 11 on 30 Nov and 12 on 1 Dec. These may have been some of the same birds.

TABLE 2 — Recorded times of departure. None was seen after each final date

Place	Midwinter number	Final dates
Awanui 1978	14	14 still on 4 Nov 5 still on 5 Nov
1980	30	39 on 10 Nov 5 on 15 Nov
Rangiriri 1978	67	25+ still on 5 Nov 6 still on 18 Nov
Waitara 1979	9	12 on 19 Sept; all gone on 23 Sept
Nukumaru 1979	15	All left between 10 & 18 Nov
Longburn 1978	16	13 still on 10 Nov; left before Dec
Foxton No.1 1979	31	25 still on 29 Oct 19 still on 11 Nov
1980	60	Down to 12 between 12 Oct & 20 Nov
Appleby 1978	20	All last seen 15 Nov
1979	24	All last seen 11 Nov
Eiffelton 1979		
Farm (a)	10	All left 21 Oct
Farm (b)	14	14 up to 4 Nov 6 still on 15 Nov
Taumutu 1979	36	Dropped during Sept & Oct. Last left by mid-Nov
1980	91 max	35 still on 15 Nov
Grovetown 1980	32	29 on 3 Nov 16 on 6 Nov 11 on 10 Nov 5 on 25 Nov

Oversummering

Even less clear was the fate of birds still in New Zealand in late November and in December. It is tempting to assume that these birds were immature and migrated late, joining Australian breeding colonies without breeding. Many may well have done so because few were recorded in January-February. However, this simple picture is spoilt by some flocks that remained undiminished well into December at a few sites that were traditional and so could not have been occupied by immature birds only. For example, at Parakai the flock of 8 in 1978 was still there on 24 December and the flock of 22 in 1979 was still there on 20 December, and yet 1 in Jan/Feb 1980 was the only bird seen until late April each year. In Otago, the Berwick flock of 13 was seen up to 13 Dec and 9 were near Balclutha in mid-January. At Taumutu, 18-19 were seen once in mid-January, but these could have been non-breeding remnants of the 1980 flock of 91 birds.

In 1977/78 only three egrets were known positively to have oversummered and few were seen after mid-November. Although the number seen after mid-November was greater each successive year, very few were seen in Jan/Feb, and so few may really have oversummered. The three districts where summer birds were seen most were South Auckland/Waikato (Miranda, Pipiroa, Meremere, Raglan), Foxton (Manawatu River estuary), and Ellesmere (Taumutu). These are the districts where breeding has most been expected but where none is known to have occurred. As far as I am aware, all birds that oversummered went through a period of breeding plumage.

An earlier record of summering was given to D. A. Lawrie and A. Habraken by Mr Spicer, a farmer near Rangiriri, Waikato, of three birds in breeding plumage that stayed with his sheep throughout the summer of 1976/77.

BEHAVIOUR

In New Zealand, the egrets are notoriously hard to approach, even by car, and the following statement by Baker (1929) about them in India is inconceivable to us: "They are extraordinarily tame, allowing people to pass within a few feet without moving and then merely flapping lazily away or stalking solemnly off for a few yards before recommencing to feed." Perhaps higher populations of people and egrets than in New Zealand encourage such behaviour. Because of the birds' volatile nature, attempts to study their behaviour have often been frustrated and we can only make a few generalisations here.

The Cattle Egret's association with cattle and other animals is in New Zealand conventional rather than necessary. They associate loosely with cattle of any breed, both dairy and beef stock; almost as often with sheep, both with and without lambs; and are also recorded with pigs, farm deer, domestic geese, and even poultry. They often feed among these animals, moving about the fields with them, but they seldom really follow individual animals, looking for disturbed insects,

and they are just as likely to be on adjacent paddocks without stock. They are often on wet pasture among White-faced Herons (*Ardea novaehollandiae*), Black-backed Gulls (*Larus dominicanus*) and Black-billed Gulls (*L. bulleri*) and, by casual association, Spur-winged Plovers (*Vanellus miles*), Pied Stilts (*Himantopus h. leucocephalus*), and sometimes Pukekos (*Porphyrio p. melanotus*) and Black Swans (*Cygnus atratus*). On one occasion near Ashburton, eight were seen following the plough, together with Black-backed Gulls. If a lake or estuary is near a favoured farm, the birds sometimes resort to its margins, as at Lakes Whangape, Waikato (Nukumaru), Horowhenua and Ellesmere and estuaries at Napier and Foxton. The attachment to individual farms or neighbouring farms from year to year has remained a strong characteristic, and locality seems to be more important to most birds even than cattle or other animals.

South African studies have made clear that the Cattle Egret adapts readily to whatever food is locally and seasonally abundant and that its diet reflects what is available rather than any overall preferences. For example, in south-western Cape Province (Siegfried 1971b), insects were the main food, especially grasshoppers and caterpillars, and these were also fed to nestlings; but in the wet season (April to October), earthworms were the main food. In New Zealand, whenever I have been able to watch egrets feeding (lower North Island), they have been taking earthworms from damp pasture and especially in hollows and ditches. However, this is not likely to be universal, especially in dry conditions, and they will take whatever invertebrates are available, and sometimes even mice, frogs and small birds.

Some unusual feeding was noted by Marion Lane on several farms near Eiffelton in the Ashburton district. On one farm, five egrets associated with free-ranging farm geese and fowls (both with white plumage) and often fed together. Geese, fowls and egrets would start the day by gathering at two large grain-storage silos, feeding on the loose barley grain on the ground around the silos. During the day they would move about the farm together, and late in the day they would return to feed at the silos, before going to roost.

On another farm, eight egrets were regularly seen pecking at bales of lucerne hay and pea straw stored in the paddock. Whenever bales were being fed out to the sheep, the egrets would come with the sheep, often riding on their backs. As soon as the straw was dropped, the egrets would be among it, scratching at and shaking it, searching for the peas.

In the Canterbury winter, few invertebrates were likely to be in this plant material, but, as usual, the egrets were too unapproachable for their food to be seen with absolute certainty. This apparent feeding on grain and seed may have been acquired from the egrets' associate animals; if so, it is remarkable in that I am not aware of any mention in literature of vegetable matter in the Cattle Egret diet (Palmer 1962, Skead 1966, Siegfried 1971b, 1973, Cramp & Simmons 1977).

PLUMAGE

Racial differences

The Cattle Egret consists of two races. The nominate race, *B. i. ibis*, of Africa, south-western Europe and east to the Persian Gulf and the Caspian Sea, has during this century colonised South and North America, where it is now widespread; it has also been introduced in Hawaii. The eastern race, *B. i. coromandus*, of Asia from Pakistan east to southern Korea and Japan and south to Malaysia and the Philippines, has since the 1940s colonised northern and, later, eastern Australia, from where the New Zealand birds come.

There is a sizeable body of literature on the plumage and moult of the race *ibis*, largely from southern Africa, but little on *coromandus*. Without a good range of study skins, however, or studies of trapped and captive birds like those done in southern Africa, we cannot learn much about the plumage and moult of the birds in New Zealand.

Differences in breeding plumage between the two races are well known. In *ibis*, breeding colour is confined to plumes of the crown, chest and mantle (incorrectly shown as "breeding plumage" of *coromandus* in plate 17 of Falla *et al.* 1979) and is pale ginger-buff. In *coromandus*, however, the breeding colour is much brighter and richer (orange-buff, Baker 1929, Ali & Ripley 1968; more golden or rusty, Vaurie 1965) and more extensive, including the cheeks and throat. In the field the whole head, neck, breast and back look bright rusty orange. This is the plumage which many birds acquire, though often not with full intensity, before they leave New Zealand to breed, and which is seen best on some of the birds that oversummer. In the colonies, a few egrets breed in plumage with very little colour (Pratt 1979: 355), presumably young birds.

Differences in non-breeding plumage have not been described, the literature implying that the two races are alike, apart from measurements. As far as can be told from field observation, however, some differences do seem to exist and may deserve closer study. In *B. i. ibis*, adults of both sexes have a "permanent buffy wash on the head (Siegfried 1971a), expressed by Cramp & Simmons (1977) as "feathers of crown paler than breeding." In addition, males have creamy buff on chest and centre of mantle (e.g. Witherby *et al.* 1943), whereas females are white. Juveniles are like the adult female but their crown also is white, becoming slightly tinged cinnamon at 10 weeks and with a distinct brown forehead and crown at about 5 months (Siegfried 1971a).

In *B. i. coromandus*, as seen in the field in New Zealand, we have not been able to distinguish male from female or juvenile from adult. No birds have a coloured wash on chest and mantle until breeding-plumage colour starts to appear in spring, and so the sexes are alike. On arrival and after shedding any remaining breeding plumage, *all* birds seem to have pure-white heads. Whenever I have

been able to see birds closely and by telescope, this has been so. However, within a month of arrival, that is, by late May, some birds (and by late June probably all birds) have acquired a pale yellowish or straw-coloured wash on forehead and forecrown. This wash is not easily seen with binoculars, except at very close quarters. It is not a patch on the "crown," as described for *ibis*, but is a narrow band from the base of the upper mandible tapering on to the forecrown.

For example, all 13 birds at Kaikoura and Waikuku in late May 1979 had pure-white heads, whereas of two at Lake Horowhenua several days later, one had the forehead-forecrown wash and the other had only a few yellowish feathers in centre forehead; these are traditional wintering sites and so the birds cannot all have been juveniles. In late June 1980, all five birds at Lake Horowhenua had the same forehead-forecrown wash, and on 29 Aug 1978, all 16 near Palmerston North had it, the colour varying in intensity from bird to bird. Thus, all birds seem to follow the same pattern and we cannot tell juvenile from adult.

Another point of interest is that I have yet to see the yellowish upper leg and soles of feet described by all authorities for *ibis* and shown prominently in plate 37 of Cramp & Simmons (1977). Baker (1929, also quoted by Ali & Ripley 1968) said the same of *coromandus* in India. All the birds I have seen closely, some very closely, have had wholly greenish-grey legs, sometimes paler about the 'knees,' and slate-grey feet with black claws.

Visible changes

The only records of normal moult are those of A. Habraken, who on 21/1/80 saw, in a flock of nine that had overwintered at Pipiroa, mid-primary moult in all seven birds that still had some breeding colour and a second-primary gap in one of two all-white birds. At Rangiriri on 26/4/80, he saw some primary moult in only one of 29 birds.

The occasional reports of birds in non-breeding plumage having pinkish bills may perhaps be explained as a rush of blood to the bill, as in the following incident. While M. D. Dennison and BDH were watching two feeding egrets, one of which had a normal yellow bill and one a pinkish-yellow bill, the yellow-billed bird stopped and preened vigorously for several minutes. During the preening, its bill changed to purplish yellow, almost pink. When last seen, perched on a gate, both birds still had pinkish bills. Their yellow facial skin was not affected.

On arrival in late April and May, few birds, no more than 5%, still have traces of breeding colour. During mid-August to early September, colour begins to appear on some 10% of birds, and a few of these develop quite extensive but weak colour. By late September, about half the birds in the flocks are partly coloured, but only a few

are strongly coloured. Thereafter, colour intensifies rapidly in the most advanced birds, but up to half the birds in some flocks remain white throughout October. At this stage, however, with birds starting to depart piecemeal, not necessarily only those in good colour, the proportions of birds in various plumages have little meaning. In November, most remaining birds are well coloured, but a few are still white. The lower photograph on page 114 of Moon (1979) shows part of a flock in flight with birds in a wide range of colour intensity.

In 1979, Juliette Urquhart kept notes on general changes in plumage colour of the seven egrets at Karaka, from July to early November, when the birds left. On 4 Sep, the first colour was seen, a wash on the breast of one bird; by 23 Sep, three birds had breast colour. On 2 Oct, one had a ginger wash on the whole head, the breast and the back, three had coloured wash on breast and back, and three were white, apart from the strip over the bill. By 16 Oct, one was brilliant and with full plumes, four were coloured on head, breast and back, but not brightly, and two were pale. They were still the same on 28 Oct, shortly before departure. The sequence of colour development seemed to be breast, back, and head.

Siegfried (1971a) noted that, in *ibis*, the young growing plumes differ in colour from the older more advanced plumes. "When the plumes first break from their sheaths they are white, only later during their growth do they assume their characteristic buffy colour." This difference may explain the observed rapid intensifying of colour that begins as only a pale ginger wash and why, although many were extensively coloured, so few birds were brilliantly coloured before they left. Relevant here is my observation on 29/8/78 of two in a flock of 16 all-white birds that had prominent breast plumes in sheath protruding as white spikes from among the normal breast feathers. The bases of these plumes were bright blood-red.

THE FUTURE

After small casual beginnings in the mid-1960s, the migration of Cattle Egrets to winter in New Zealand, first noted in 1973, has been a regular event, the numbers growing rapidly to a peak of nearly 800 birds in 1980. This dramatic development of a new migratory habit has not been a steady rise of numbers, however, numbers falling somewhat in 1978, 1981 and 1982. As these fluctuations cannot be related to weather or food supply in New Zealand, it is unfortunate that no general account is available of breeding success and dispersal in eastern Australia for the years of our study. We should continue to record Cattle Egret numbers for publication in the annual Classified Summarised Notes, especially numbers in late August, for comparison with our 1977-1980 figures and in case a comparison with events in Australia does become possible.

Despite expectations, the egrets are not known to have bred in New Zealand, but oversummering birds should be watched in case

some do breed, as two pairs are known to have done in South Australia in 1971 (Parker *et al.* 1979). The birds seem to treat New Zealand as a normal part of their dispersal range from the colonies in south-eastern Queensland and north-eastern New South Wales, which, to judge by the recoveries (late April-September) reported in *Corella* and the annotations in Parker *et al.* (1979), includes New South Wales, Victoria, Tasmania, and South Australia.

Many aspects of the Cattle Egret are worthy of detailed study in New Zealand, for example, non-breeding plumages, moult, plumage changes of oversummering birds, foods and feeding habits, day-to-day habits of flocks, including roosting and behaviour in relation to associate animals.

ACKNOWLEDGEMENTS

I should like to thank the many members of OSNZ whose efforts and enthusiasm made this project as successful as it has been. I hope their interest in Cattle Egrets will not diminish and that we shall learn more, not less, now that nationally co-ordinated counts have been discontinued.

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