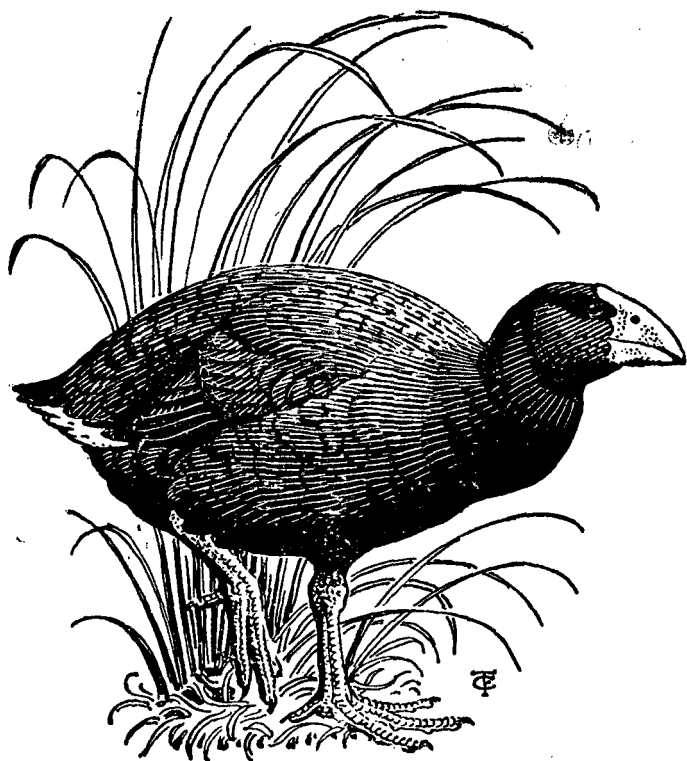


# NOTORNIS



QUARTERLY BULLETIN  
of the  
Ornithological Society of New Zealand



*Volume Ten, Number Seven, December, 1963*

# NOTORNIS

*In continuation of New Zealand Bird Notes*

VOLUME TEN, NUMBER SEVEN - DECEMBER, NINETEEN SIXTY-THREE

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## WHITE HERON INVASION, 1957

By I. G. ANDREW

From April, 1957, unusually large numbers of White Herons (*Egretta alba*) were seen in scattered areas of New Zealand from Northland to Southland. It appears that an extensive invasion from Australia occurred. This report summarises the records in the Wildlife files. Several other Australian breeding species appeared at the same time, and these are also discussed here.

### INTRODUCTION

H. G. Warburton (1957) has summarised the records of White Herons throughout New Zealand in 1951-1954. A notable feature of this report is the large number of reports (amounting to 82 birds) in May 1952, suggesting an "invasion" from somewhere. This number included a flock of about 18 at Rangaunu. Such flocking is not normal in New Zealand outside the breeding area, but has frequently been observed since at Rangaunu (1953, 1957, 1958, 1959, 1960), and was so much a feature of the 1957-58 invasion that the possibility of additional breeding colonies was entertained by residents in Northland, Hawke's Bay, Manawatu and Southland.

### 1957 INVASION

Records collected in 1957-58 and assembled by Mr. K. H. Miers, of the Wildlife Division, Department of Internal Affairs, suggest that the total number of White Herons in New Zealand in winter, 1957, was perhaps a little over 200. These appeared throughout the country, during April, at about the time when the White Herons from the Okarito heronry normally arrive at their winter grounds. However, not more than about 70 of these can have come from Okarito, since only 21 nests were constructed at the heronry in 1956-57, suggesting 42 adult birds, and 27 chicks were reared. This leaves about 150 birds which must have arrived from elsewhere. Presumably their origin is the same as that of the 1952 invasion of about 50 birds reported by Warburton (1957), and Australia seems to be the most likely source. There is as yet no evidence of any other breeding colony in New Zealand, and the various reports of young birds with their parents in areas apart from Okarito have proved to be Little Egrets (*Egretta garzetta*) associating with White Herons. A few Australian White Ibises and Glossy Ibises also appeared during 1957 and provide further evidence for the Australian origin of the invasion. Some of these have already been reported in *Notornis*. An influx of Royal Spoonbills in the north may have had the same origin.

Fairly detailed reports are available for certain areas at least during the early part of the invasion (April-May 1957), notably Auckland, Bay of Plenty, Ellesmere, Southland. Other areas, such as Parengarenga and Kaipara, in which sizeable flocks were present, have received very little attention, and no reports are available for fairly large areas such as the Wairarapa.

It is evident that considerable movement of the flocks occurred, and in adjacent or nearby areas where records are few and far between it is sometimes difficult to know whether one flock or two is involved. For example, flocks of up to 20 were reported from Lakes Wahi,

Whangape and Waikare in the Waikato, but no systematic records were made, and the one flock may well have moved from one lake to another. In estimating totals, care has been taken to allow for movement of the flocks and to exclude any records of birds which may have been recorded elsewhere. Although dates of arrival of birds in a locality are frequently well documented, departure dates are rarely known. Consequently there is a great paucity of records during the summer of 1957-58. Only 22 young were reared at Okarito in 1957-58, and 32 adults were at the colony. However, many were reported still present in winter 1958 in areas which they had frequented in winter 1957, but from which no reports regarding presence or absence were received during the intervening summer.

The invasion began about 19th April, from which date a rapid increase occurred simultaneously throughout the country. The chief flocks in April 1957 were 18 at Rangauunu, 9 at Matata, 4 at Gisborne, 12 at Ellesmere, 27 at Tuakitoto, and 15 in Southland. Others in various scattered localities bring the April total to 116. Additional flocks first reported in May, but probably present from the start of the invasion, were 10+ on the Waikato lakes, 10 at Whakaki, 12 at Napier, 14 in Marlborough. Also in May the total numbers reported in the Auckland province (excluding Gisborne) reached about 80, while increases in Canterbury (chiefly at Ellesmere) were accompanied by decreases first in Southland and later in coastal Otago. This was probably due mainly to a general northward movement, although a number (including 5 in Southland) are known to have died.

Altogether about 200 White Herons were present from May to July 1957. Since 14 are known to have died in May, the total number was probably nearer 220. For the rest of the winter, the birds did not move about much, and little change in numbers was recorded. From about October, 32 arrived at Okarito to breed, but the numbers

TABLE 1  
Approximate number of White Herons in New Zealand, 1957-58,  
arranged by district for each month.

	1957						1958
	Apr.	May	Jun.	Jul.	Aug.	Dec.	Sep.
Northland - Auckland -							
Waikato	30	59	55	55	55	45	35
Bay of Plenty - Rotorua -							
Taupo	14	20	20	20	20	13	17
Gisborne - Hawkes Bay ---	3	28	21	21	21	—	13
Taranaki - Wellington ---	4	6	1	10	10	3	—
Total North Island ---	56	113	97	106	106	61	65
Marlborough - Nelson -							
Westland	3	17	30	30	30	54†	—
Canterbury --- ---	13	29	46	34	31	23	28
South Canterbury -							
Otago - Southland	44	43	27	27	23	14	—
Total South Island ---	60	89	103	91	84	91†	28
Total New Zealand ---	116	202*	200	197	190	152†	93

\* May total probably nearer 220, as at least 14 died before June.

† Includes 22 young reared 1957-58.

throughout the country declined very substantially. The decline continued through 1958, till only about 100 were present in September-October. This decline may be partly due to slackening of interest among observers, since very few dead birds were recorded after the first few months.

Table 1 shows the approximate totals per district over the first few months after the invasion and at two subsequent times. Very few reports were received from south of Rotorua after winter 1957, and therefore the table could not be completed. Flocks were still present at Rangaunu Bay in winter in 1959 and 1960.

#### DETAILS OF REPORTS

In the following list, the occurrences of White Herons during the invasion are briefly summarised according to geographical district. Full details of all records are in the Wildlife Branch files.

Names of observers who sent in reports are too numerous to mention, and it is hoped that those who contributed will accept this as a personal acknowledgment. Figures given in parentheses are the highest counts reported for the particular locality.

**FAR NORTH** — 18 at Rangaunu Bay on 20/4/57, increasing to 30 in Oct. '57; 9 in Dec '57, 15 in Jan '58, increasing to 33 in Sept-Oct '58.

Other areas visited very rarely: Cape Reinga (3), Parengarenga (9), Houhora (1), Mangonui (2), Whangaroa (3), Rawene (2).

**NORTH AUCKLAND - AUCKLAND** — Mostly at Kaipara (18) and Whau Estuary by the northern motorway (up to 9, but 3-6 present May '57 to winter '58). Others at Waipu (1), Waiwera (1), Muriwai (1), North Shore (3).

**SOUTH AUCKLAND - WAIKATO** — Karaka (4-5 in winter '57), Waikato Est., (5 in winter '57), L. Waikare (up to 16 in May '57), L. Whangape (5 in winter '57, up to 12 in Mar '58), L. Wahi (present in summer '57-'58, up to 20 in May '58). Others at Mere-mere (3), L. Ngaroto (1), Thames (1).

**BAY OF PLENTY** — 1 at Matata on 24/4/57, increasing to 14 by 4/5/57, 10 in June-July, then 5 till Oct. — in the reserve, and ranging to Rangitaiki Rivermouth. 12 first reported from Little Waihi Estuary (Maketu) on 12/9/57, then present throughout summer, with maximum of 20 on 28/3/58. Apparently most birds from Matata moved to Little Waihi. The numbers were maintained throughout the winter till 13/9/58, when 16 were still present at Little Waihi and one at Matata. Other areas less favoured were Welcome Bay, Tauranga (11 in Sept. '57), Whangamata (1), and Ohiwa Harb. (1).

**ROTORUA - TAUPO** — Usually 2 at L. Rotorua, Apr.-Dec. '57. Also recorded at Rotoehu (1), Rotoma (1), Rerewhakaitu (1), Whakamaru (1), Upper Rangitaiki R. (1), Turangi (1).

**GISBORNE - HAWKES BAY** — 6 at Gisborne from 20/4/57, decreasing to 1 in December; 10 at Whakaki, May '57, decreasing to 4 in August; 12 at Napier, May '57, 1 shot, the other 11 possibly remaining somewhere in the district throughout the following summer and winter, as 13 were present in the Fernhill area in winter '58. Others at Te Puia Springs (1), Opoutama (1).

**TARANAKI-WELLINGTON** — Only odd birds except for a flock of 9 which appeared at L. Horowhenua in July '57, 3 of which were still present in December. Others at Awakino (1), Tongaporutu (3), New Plymouth-L. Rotokare (1), Opunake (1), Hawera-Naumai Park (1), Wanganui (1), Palmerston North (1), Foxton (3), Pauatahanui (1).

**MARLBOROUGH** — 14 reported through winter '57 at Vernon Lagoons, but number "nearer 30 for whole district" according to Wildlife Officers.

**NELSON** — Odd reports — Richmond (1 in May '57), Westhaven (2 on 11/3/58).

**WESTLAND** — Okarito heronry — 32 adults with 22 young in summer '57-'58 only. Odd reports elsewhere in April-May '57 — Westport (1), Ahaura (1), Greymouth (2), Hokitika (1), Harihari (1).

**CANTERBURY** — Centred around L. Ellesmere. 1 at L. Forsyth on 22/4/57, 12 at Selwyn R. from 23/4/57, 10 at Motukarara on 4/5/57, thereafter through winter, 2 separate flocks at Kaituna and about Selwyn R. (at the eastern and western ends of the lake respectively). Maximum count of 34 at Kaituna in Late June, probably included influx from the south. On 23/9/57 there were 9 at Rennies Bay (western end of lake) and 9 at Kaituna. The Kaituna birds subsequently disappeared, and may have joined those at Rennies Bay, which increased to 23 on 1/12/57, and remained till Oct. '58, when 28 were reported by a fisherman. Other reports from Aylesbury (1), Ashburton (1).

**SOUTH CANTERBURY** — Present through winter 1957 at Milford, Temuka, Opihi and Washdyke Lagoons, and up to Pleasant Point. Total not ascertained, but usually 3 or 4 seen. One report stated at least 12 through the winter, including up to 5-6 which were noticeably smaller, with darker bills. Another flock of nine stayed through the same winter at Lake Wainono, Waimate.

**EASTERN OTAGO** — Recorded at Oamaru (2), Waikouaiti (4), East Taieri (2), L. Waihola (12), L. Waipori (5), Tokomairiro R. (6), L. Tuakitoto (27), and single birds in a number of adjoining areas of coast. 12-13 White Herons were present in the district in March-April, 1958.

**WESTERN and INLAND OTAGO-SOUTHLAND** — Mostly reported during the early winter 1957 in ones and twos; Martin's Bay (1), Milford Sound (1), Cadrona River, Wanaka (1), Earnscliffe (1), L. Wakatipu (1), south of Kingston (4), Mararoa Station (1), Monowai (2), Dipton (2), Waikaka Valley (2).

**COASTAL SOUTHLAND** — Widespread reports during initial stages of invasion from Otautau to Haldane, but probably not more than 15-20 birds in the whole of Southland. First coastal records from Lower Maitara (1 on 18/4/57, 6 four days later) and Oreti Estuary (3 on 20/4/57). Reports came from estuaries, coastal and inland lagoons, paddocks, and backwaters of the Aparima, Oreti and Maitara Rivers. Most reports were of single birds, but up to 6 were seen together in the Fortrose area in April-May '57, and about the Oreti Estuary in Oct.-Dec. '57.

## OTHER SPECIES

Two species of ibis and the Little Egret were often present in company with the White Herons in the 1957-58 invasion, and presumably came with the White Herons. Royal Spoonbills also sometimes accompanied the flocks.

**LITTLE EGRET** (*Egretta garzetta*) — This species will form the subject of a separate note. Reports received during 1957-58 appear to refer to at least 12 birds, and certainly 10. The distribution pattern is similar to that of the White Heron, and the two species often associated together. Groups were sometimes mistaken by observers as "family parties," the smaller species being treated as a young White Heron.

**WHITE IBIS** (*Threskiornis aethiopica*) — The invasion of this species, coinciding with the White Heron invasion, has been reported by Falla (1958). A few additional records have appeared in *Notornis*, and the Wildlife files contain a few further previously unpublished reports. All these records are listed here. One bird arrived at Doubtful Sound on 12/4/57, and at least one other was recorded from Southland in May (Falla, 1958). One at Kawhia and one at Kaipara in May-June (*Notornis* 8: 56), four at Rangitikei River mouth in early June (Falla, 1958), and two at the Temuka lagoons from May to December bring the total to 10. Five reported to K. H. Miers on 20/1/58 as present for at least 5 months on "old McPherson's farm" at Okuru are probably additional. Other 1957 records are one at L. Ngaroto, Te Awamutu in Nov.-Dec. (*Notornis* 8: 201 (1960)) and one at L. Owhareiti, Pakaraka, Northland (*Notornis* 9: 73 (1960)); and in winter 1958, two at Arahura (*Notornis* 8: 201 (1960)) and one at Invercargill (*Notornis* 8: 90 (1959)).

**GLOSSY IBIS** (*Plegadis falcinellus*) — The scattered reports of this species are less well documented than the other species. Falla (1958) mentions two at L. Wairarapa on 26/6/57. One was present at Matata Lagoon, Bay of Plenty, from 14/8/57, probably till 28/3/58, although it was not seen during the intervening period from December to early March. Probably the same bird was seen on 3/5/58 at Little Waihi Estuary. One was present at Te Hapua, Parengarenga on 15/12/57.

**ROYAL SPOONBILL** (*Platalea leucorodia*) — An influx of this species in the Auckland province also occurred in 1957, suggesting new arrivals from Australia. This was not followed by a subsequent decline in the overall population in New Zealand, probably largely owing to further breeding success at Okarito in addition to low mortality. A separate note on this species will appear.

## ACKNOWLEDGMENTS

The material for this report was largely assembled by Mr. K. H. Miers, who also read the script. Thanks are due to him, to all others who assisted in compilation of the records, to all those who sent in reports, and to Officers of the Wildlife Division for making available their files.

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Warburton, H. G., 1957: The White Heron (*Egretta alba*) in New Zealand. *Notornis* 7: 98-101.



## CATTLE EGRET: A NEW BIRD FOR NEW ZEALAND

By E. G. TURBOTT, D. H. BRATHWAITE and F. W. WILKIN

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A bird feeding with the herd on a dairy farm at Belfast, North Canterbury, was seen and suspected of being a Cattle Egret (*Ardeola ibis*) by one of us (F.W.W.) in September, and the identification was confirmed by E.G.T. and D.H.B. on a visit on 28/9/63. Interesting details were given by the farmer, Mr. B. F. Johns, who had thought it was a White Heron (*Egretta alba*). The bird arrived in May, 1963. Mr. Johns had noted that it fed only close to his cows, food always being obtained from the grass close to one of the cows and the bird evidently depending on the disturbance of insects or other invertebrates as the large animal moved about. Alternatively, it would feed in association with the dairy cows on an adjacent farm, but when the two herds were driven in for milking the egret flew off to join non-milking cattle of which there were always some in the vicinity.

On our visit the bird was readily identified — bill yellow with very small dark portion at the tip; legs dark grey (but colour so far has been only unsatisfactorily identified); pure white plumage with no buff coloration visible (probably an immature in view of the lack of buff crown, but may have been a particularly pale individual in winter plumage). Build more stocky and neck thicker and shorter than in Little or White Egret; about one-third smaller than White Egret. In general appearance much like the Reef Heron, but has a characteristic upright stance unlike that of Reef Heron or the egrets; shorter bill than in Little Egret.

Its method of feeding in close association with the herd was as described by Mr. Johns, and as made familiar by descriptions of the species in various parts of its range. No food items were identified.

The trans-Tasman dispersal of this species in view of its current expansion in Australia is not unexpected. It may well have come from the New South Wales (Ulmarra, Clarence River) colony (Hewitt, 1960, 1961; Wheeler, 1962) or have straggled more widely from the larger Northern Territory or W. Australian populations.

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Hewitt, J. M., 1961: The Cattle Egret near Sydney. *Emu* 61: 137-138.  
Wheeler, J. R., 1962: Observations on the Cattle Egret in Eastern Australia. *Emu* 62: 192-193.

[In April 1963, Mrs. L. E. Walker, of Dunedin, wrote that she had received a telephone call from Mr. B. E. Kelly, Bay Road, Waitati, about a "young" white heron which had been seen frequently at the fish hatcheries, Waitati Valley; and had lived with the cattle. No details of the colour of bill or legs were given. Mrs. Walker looked for it at Easter, but did not see it, though it had been there two days before.—Ed.]

## LITTLE BITTERN AT MEREMERE

By P. J. HOWARD

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My notice was first brought to the possibility that there might be a Little Bittern (*Ixobrychus minutus novaezelandiae*) at Meremere by a query from Mr. G. Whitburn. He saw a bird closely resembling a Brown Bittern (*B. poiciloptilus*) in general conformation, though much smaller in stature, standing on a log on the landward side of a small lagoon, off the eastern side of the Waikato River while shooting in early May, 1963. Two cursory inspections from the Great South Road of the swamp area produced no sighting and the matter was shelved, because of the shooting in the vicinity and the recent occurrence of heavy flooding. Some time later, in mid-June, I had a further enquiry, this time from Mr. T. Clark, also of Meremere, who rather jocularly described an adventure relating to the attempted capture of a "kiwi," which, on being approached, flew away. A subsequent sighting proved this to be a not unreasonable misidentification.

What information was available pointed to its being a Little Bittern. Mr. Whitburn's description of its attitude and environment could have come straight from a text book, in that the Little Bittern is a solitary bird preferring a habitat similar to that in which he saw it and it will remain stationary for long periods in a particular attitude. This was borne out again by Mr. Clark in his observing its kiwi-like stance from a moving vehicle, which had to be brought to a stop so that the occupants could walk back to where the bird was sighted, and climb over a fence and drain before the bird was flushed and its true nature revealed.

In the late afternoon following Mr. Clark's report I sighted the Little Bittern standing "knee"-deep in water in a patch of grazed-off *Poa aquatica*, about six feet out in a small lagoon and barely 15 yards from the Great South Road. On the car's stopping, the bird adopted a somewhat crouched head-up freeze stance. This was the first noticeable feature apart from size. It made a very slow change of attitude, not as vertical or as quickly executed as by a Brown Bittern and no sudden blind panic flush, heedless of obstacles, which I have noted in the latter species in this area at times when approached, often no closer than 70-80 yards. In this attitude it appeared an overall light grey, the result of fine grey barrings over a buff ground colour. A widening dark line extended from the base of the bill to the shoulder and a full set of darker scapulars did not seem evident. After about ten minutes it came out of the crouch into a more relaxed looking position, with the head and neck extending away from the body, though with the bill pointing still above horizontal. This movement produced a change in feather pattern, the continuous line from mouth to shoulder noted in freeze stance becoming broken into a dark shoulder patch and an elongated dumbbell-like face patch. Legs were yellowish green and bill appeared horn coloured and darker towards tip. Three white shoulder stripes of irregular length were visible. As I did not want to disturb the bird and the light was failing, things were left at that.

The next sighting was about fifty yards from the previous one, at 1530 hrs. on 17/9/63. I made a quick trip home and two toll calls brought H. R. McKenzie and J. L. Kendrick to the scene just after 1630 hrs. Their faith in the sedentary habits of the Little Bittern

well justified their respective quick trips from Clevedon and Hamilton. After a few minutes of search H.R.McK. located it a few yards from the 1530 hrs. sighting and for the next hour or so we were treated to a magnificent display of Little Bittern habits, attitudes and general behaviour.

Any movement was conducted with the greatest stealth in a fluid gliding motion of extreme slowness. The movements in turn tended to produce changes in feather pattern and the bird was particularly well camouflaged in its surroundings of *Carex* tussocks and dead sticks, among which it was moving, up to knee-deep in water. It adopted various attitudes, some of which it held for several minutes. These ranged from a crouch with head drawn into shoulders to a more upright freeze stance. One was with body and extended neck at about thirty degrees forward from upright, with neck feathers puffed out, giving the impression that the neck was larger than the body. One was the remarkably kiwi-like stance noted by Mr. Clark. The more common attitude, which was seen with no obstruction whatever, was with the amazingly extendible neck at full length in a gently down-sweeping curve, roughly parallel with the water, with the bill touching, or almost touching the water and sometimes held rigidly half submerged, anywhere from left to right of the body. An attempt was made from this position, with the neck in line ahead, to catch some quarry unseen to us. From the position with the bill an inch or so from the water it made a sudden lunge, both feet coming momentarily clear of the surface and then hung back and tugged spasmodically but quite violently at a bunch of under-water weed stalks. A small silvery fish was wriggling among the little stalks, but whether it escaped or was swallowed was not determined. The bird came into a more upright position and gave the appearance of "whetting" its bill or "licking its lips," obviously to clean the edges of the mandibles with its knitting-needle-like pinkish tomato-coloured tongue. While it was doing this the tongue was once seen to resemble a wriggling worm.

Seen to better advantage than at the June sighting, both for lighting and posture, it provided the following description:— Crown and nape: an egg-shaped patch over the whole crown tending to brown or greenish brown from buff, with a definite small irregular brown patch at nape, side view when crouching. It appeared that this would later join up with the dark crown. Foreneck and upper breast, erect position: strong central chestnut vertical stripe on foreneck, wider towards bottom, tapering at both ends quite sharply, an outer crescent-shaped stripe each side tapering at each end and converging on centre stripe at top and bottom. A brown spot outside of each of these again as if the beginning of another chestnut stripe. Areas between chestnut stripes creamy white with same colour extending to chin and to breast area below vertical stripes. Above the light chin was a dark dumbbell-shaped patch from base of bill through eye with more colour below eye than above. Upper and lower surface: Dorsal surface and sides of neck buff with vestiges of brown smoky streaks radiating upwards from pronounced brown and buff vertically striped "alderman's collar" around breast at shoulder level. Back dark brown; wings buff barred with brown, somewhat resembling hen pheasant. Scapulars buff, barred with grey, the grey being wider than the buff towards the lower end. When it finally unhurriedly flew away over the tops of the swamp growth the back view was practically the same as that of the Brown

Bittern. The ventral area behind breast collar was buff, striped with light brown. Its "baggy pants" were light with very distinct wavy dark lengthwise lines about an eighth of an inch wide. Tail: straggly. Legs: bright green. Bill: horn coloured, with dark culmen; noticeably small.

It is thought that sufficient change of plumage and leg and bill colour from mid-June to Sept. 17 has been observed to merit the assumption that this bird, if the same one, may well be a young female changing into full feather. It must also be noted that every change of position causes a change of plumage pattern and that even the bill and legs can look different according to the light, so that a sighting at any one time may not necessarily appear quite the same as given in text-books. Dr. W. R. B. Oliver, "New Zealand Birds," p. 398, makes generous allowance for its difference from the species or subspecies in other countries.

[The Little Bittern is one of the most unknown birds on the New Zealand list. According to the Checklist (1953) and Oliver (1955), there is only one acceptable record for the North Island, viz. Tauranga 1836; and there seem to be no twentieth century records at all for the whole country.

The big swamps of the lower Waikato, now partly a forest of willow and alder, would seem to be an ideal habitat, seldom penetrated by man. It is of some interest therefore that Mr. R. T. Adams, an assistant game-officer, made the following report, dated 2/11/60, from which we quote with permission, to the Controller of Wildlife. "On 28/10/62 at about 9 a.m. I saw at Steed's Swamp, Kopuku, what I believe was a Little Bittern. . . . It was standing on some exposed mud. I had time for a quick look before the bird turned and stalked into a stand of spiked rush (*Eleocharis*). It appeared to be a little bigger than half the size of the common Brown Bittern; and the only difference I could distinguish was that the top of the head and the back of its neck were a darker colour. Many Brown Bitterns frequent this swamp and it may be that what I saw was an unusually small specimen. However the turning and stalking into the stand of spiked rush are not in my experience in keeping with the ordinary Bittern's habit."

Meremere is only a few miles from Kopuku, and swamps extend all the way. — Ed.]



## THE NESTING OF KEAS

By J. R. JACKSON

The nesting of Keas (*Nestor notabilis*) has been described by Potts (1882), Marriner (1908) and more recently McCaskill (1954). McCaskill indicates some of the earlier confusion by his remark that "until recently it has also been assumed that the nest always occurred in rocky country usually well above the bushline." This confusion has arisen through careless reading of the earlier work which exaggerated the difficulty of reaching the nests. In this paper I describe the nesting of Keas about Arthurs Pass as I have found it. During the last seven years I have found 36 Kea nests, have observed a Kaka (*Nestor meridionalis*) nest, Jackson (1936), and have also found a second Kaka nest.

## THE NEST LOCATION

Keas nest on the ground under a boulder, in a crevice, in a hollow log or among the roots of a tree. Most often the boulder is part of a Pleistocene moraine, now hidden within the forest; it may be an avalanche boulder carried down by the larger avalanches of the past; or a boulder at the top of an avalanche gully whose head has been captured by another stream. Crevices by rocky outcrops breaking the forest canopy, and especially crevices in the forest around a slip are used. Often around an active slip there is evidence of a larger slip, now clothed in forest: in crevices near the top of these slips Keas nest. Also at the very top of a slip there is sometimes an undermined earthen lip from whose end a tunnel often continues into the hillside. Keas use these tunnels.

One hen built her first nest on a ledge behind a tree on a cliff-face, but a month later found and built in a crevice 50 feet away. 3/12/61 I found a second-year cock "playing" at building a nest in a hollow tree. He entered on the underside of the trunk 4 feet up, where a branch had broken out, walked along a foot and dropped to the nest in the heart of the tree, a site similar to that of a Kaka nest.

As mentioned a slip nest is near the top of the slip, perhaps for good drainage or to obtain a wide view. Also a moraine nest is often under an odd erratic boulder, 10 or 20 feet above the general level of the moraine. The site may also be selected where the larger avalanches have left their trace in boulders on the hillside above the vertex of an avalanche fan.

At the entrance of a nest is a characteristic well-worn runway leading through a narrow entrance to a wider chamber 3 to 20 feet back, where the nest is built of the epiphytic lichens, *Usnea barbata* and *Anzeta*, moss and ferns, twigs, leaves and small rotten pieces of wood. When nesting in a log Keas use wood chips picked off the log, like Kakas in a hollow tree.

The cock uses a small stone around the side of the nest boulder as a roost while the hen is incubating, and when chicks are in the nest. Later, when the chicks are two months old the hen roosts here; she also roosts here before nesting. Often there is a large accumulation of droppings, 4 or 5 inches deep and in quantity about a cubic foot, around the stone — an accumulation of several years and perhaps of several successive birds.

By the nest boulder there is generally a rocky promontory breaking the forest canopy or less often a prominent dead tree. The hen when impatient for the return of the cock runs out on to the promontory, and looks and calls. Some hens, if the observer sits on their promontory while they are nesting, get very excited. They fly in a zig-zag flight close over or around under the promontory, swing out 100 yards on either side and call loudly all the time, perhaps a quarter of an hour. The cock during this display remains further back.

The nest is usually near an edge of the forest, by a slip, by an alpine meadow or a pakihi. Many of the feeding ceremonies, for preference, occur in this open ground rather than in the forest.

I have found nests between 2000 and 4000 feet above sea level; thirty-two nests were in mountain beech forest, one in Westland rain-forest and three in subalpine scrub. In the head of a Canterbury valley the beech-forest is perpendicular to the valley so it is often 1000 feet higher on the valley walls than on the floor. Upstream of

the beech forest sub-alpine scrub grows on the valley walls below 4000 to 4500 feet and tussock clothes the floor. The beech forest, *Nothofagus cliffortioides*, has not invaded the very head of the valley which is occupied by subalpine scrub, (*Phyllocladus*, *Coprosma*, *Dracophyllum*, *Hebe* and *Olearia* species). Keas nest in the beech forest and more sparsely in the sub-alpine scrub. In Westland Keas usually nest well down in the rata (*Metrosideros lucida*) forest and less commonly in the *Dracophyllum traversii*-*Libocedrus bidwilli* forest above.

They avoid cold localities as down near the stream in a narrow gorge, or a steep southerly face. Only two nests of the thirty-six have had a southerly aspect (actually both south-easterly). This preference for warm faces is confirmed by the many Kea hens which I have located but whose nest I have not found.

In two instances an old hen disappeared and was replaced by a new hen who selected her new nest within 25 yards of the old nest. Another nest I found by watching two young birds building. The next year a third-year hen built in the nest. This hen disappeared in the following spring and the nest has been used by another young hen during the last two years.

### NESTING STATISTICS

Laying occurs between July and January (Table 1):

**Table 1**

Month laid	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.
Number of nests	4	4	3	1	2	3	3

*The laying of Keas in different months.* The number has been deduced from the hatching of eggs or the age of chicks and partially confirmed by Table 2.

**Table 2**

Month	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apl.	May	June	July	Aug.
Number banded	4	5	17	16	5	31	27	6	4	1	1

*The banding of recently fledged Keas.* The entries in this table are 4, 5 or 6 months behind those of Table 1. Unfortunately the classing of a Kea as "recently fledged" is not as definite as the aging of nestlings so deductions from Table 2 must be made with caution.

Both tables show a protracted laying period, certainly from July to January inclusive and perhaps occasionally February and March. Keas do not seem to lay in late autumn. Both tables show an early peak of laying in July-August: Table 1 shows a gradual decrease of laying whereas Table 2 suggests that there is a constant rate of laying until the end of December and then a sharp decrease.

The clutch is between two and four eggs, with an average of 2.5 eggs per clutch. (Table 3).

**Table 3**

	Total					
Clutch deduced	---	---	---	2	3	4
Number of nests	---	---	---	11	8	1

*The clutch.* The clutch has been deduced from chicks and eggs in the nests so may actually be larger if chicks had already been lost, or addled eggs disappeared.

One complete clutch had not hatched 3 weeks later but had hatched in four weeks. The incubation period is thus more than 3 weeks. The nestling period is 13 weeks. The cock feeds the female fledglings for at least 6 weeks more, after they have left the nest. Young male Keas probably become independent about 4 weeks after fledging when they may have wandered two or three miles.

**Table 4**

					Number	Average	Rate %
Eggs	---	---	---	---	50	2.5	100
Chicks	---	---	---	---	38	1.9	76
Chicks fledged	---	---	---	---	32	1.6	64

#### The Success of 20 Kea Nests

The nesting success is shown in Table 4. If only the results from the 8 nests found with eggs are used the averages are 2.4, 0.9, and 0.8 respectively. The near equality of the clutch average and the difference in success may be explained either by the birds being disturbed when the nest is found early or because Keas may sit for a long time on infertile eggs, so there is a greater chance of their being found. Four of the 8 nests were failures. In two cases the eggs were eaten after the nests had been found. Other evidence suggests the Keas had been incubating these eggs for a long time. In the second two cases when the nest was found the eaten remains of the eggs were already there.

I have four instances of a hen nesting in successive years. Generally she adds to her nest, destroys it by scratching it out, perhaps urged by the many fleas, and builds again. One hen built for four years and nested in the fifth year.

A few of the older hens feed their husbands. The cocks are polygamous and feed their nesting wives and the chicks. They also feed the wives who are busy building. The activity of the hens at 36 nests is shown in Table 5.

**Table 5**

			Nesting	Building	Feeding the Cock
Hens per season	---	---	24	49	2
Fraction %	---	---	32	65	3

#### The Activity of Adult Hens

Young hens, at the end of their second year and the beginning of their third year, begin at least one year of building. This is the nest which they normally use for the remainder of their lives. Hens whose husbands have died — a quite common occurrence — spend the season building and other hens, who get little attention from their husbands may also.

If the fledging success and the activity of hens are compared the productivity per adult hen can be calculated:

$$\begin{aligned}
 \text{Productivity} &= \text{average fledging success} \times \text{fraction of hens nesting} \\
 &= 1.6 \times \frac{32}{100} \text{ fledglings per adult hen per season} \\
 &= 0.5 \text{ fledglings per adult hen per season}
 \end{aligned}$$

In a static population two average parents are replaced by two adult offspring. To produce two adult offspring the hen must fledge at least two chicks and this would require four or more seasons. When the two juvenile years are added the life of the average adult Kea hen must be at least six years.

*The Development of Chick Behaviour into Adult Mating Behaviour:*

As with many animals the behaviour is foreshadowed in the activity and play of juvenile Keas.

When hatched a chick is helpless, thrown against its brothers and sisters for warmth. If it hears its mother approach it can stand, supported by the other chicks but not yet raise its head. Its mother bends down and gently picks up its beak from one side and feeds it. When three weeks old the chicks still keep together in the nest but now when about to be fed a chick is more vigorous, standing and climbing with its wings as it begs for food. It is still reluctant to raise its head. And so is an adult hen when begging (Jackson, 1963). The wing pose is identical.

Fledgling Keas, just out of the nest, are fed by the cock. They fossick in the underscrub while their parents guard in the tree tops. After a week the hen loses interest; the cock goes further afield to forage; and the chicks play as they await their father's return. On the forest floor they look under boulders at possible nest sites. They select one and climb the trees to gather material for the nest. In the tree tops sunning they steal titbits from each other. Soon they begin flirting. They stand alongside and mutually preen. The sister begs and the brother crosses beaks as he pretends to feed her.

I have seen year-old birds attempt to copulate. Usually it occurs at the whip-end top of a beech tree. The young hen climbs up and stands alongside the cock. She edges up and pushes him further out on the arched-over whip-end. Eventually the cock flies a few yards to the next whip-end. She walks across the foliage to the twig underneath him. She pushes up with her crown against his belly, grasps his leg and bites lightly. He pulls away an inch or two. She follows along her twig under him, sings a nasal subsong and bites again. She straightens up, attempting to throw him on to her back.

On another occasion I saw a young hen fly from the ground to the cock perched on the whip-end. She landed on his back and stood straight-legged, like a circus performer standing on horseback. The cock struggled to keep his balance. She bent forward as if to catch his nape but the cock's movement prevented her. He overbalanced and swung around under the whip-end while she landed on the upper side. He climbed up and jumped into a similar position standing on her back. They separated but came together to preen mutually.

A pair of adult Keas before the laying of the eggs spend much time together in trees by the nest. And here copulation probably occurs.

The play and flirtation of young Keas does not result in the formation of adult pairs. At the end of her second year a hen usually begins following closely a high caste cock. The cock's older wives attempt to drive the young hen away. Together the cock and young



hen spend much time on the forest floor and look for a nest. Sometimes the hen's first choice of nest is poor and she soon moves to a better nest nearby, though occasionally a mile away. When the nest has been chosen and for the next year or two the young hen builds and the cock feeds her.

Other hens mate with a cock of their own age. In December a young hen who has spent two years and moved only five or six miles suddenly begins to wander. Within one or two days she may move ten miles; a storm may drive her back to familiar ground but she does not stay. She will meet a second or third-year cock and they will become mates. The same searching together and building takes place. But the young cock is more elated. When not with his mate he spends much time across the valley opposite her nest, watching. He will call frequently and excitedly as she builds. Sometimes she comes across to him and now the boss Kea of the neighbourhood will join them. The boss stands aside and looks disapproving at the young cock. His hackles are slightly raised. Many of the young cocks do not remain mated to their wives. He moves on but the hen remains, using the nest for her life.

Other less successful hens fail to mate in their second year. Such a hen often spends much time with a hen busy building. It is possible that the young hen learns much from watching the older hen closely.

### THE NESTING

After several years building her nest a Kea lays and immediately begins incubating. Indeed for a week or more before laying she spends much time on the nest. The cock may enter the nest to feed her or to shelter but the hen does all the incubation. She leaves the nest for an hour at daybreak and again at nightfall to feed and to be fed by her cock. He may get impatient and attempt to drive her back to the nest away from rich feeding. While she is incubating the cock will attend to his other wives. Or if the cock has only one wife he may feed her about mid-day also.

When the chicks hatch he is nearby and is greatly thrilled at their calls. He coos quietly in reply. For the first month he feeds the hen and she feeds the chicks. Gradually he feeds the chicks directly but he feeds the hen still. She also feeds the chicks. When they are fledged he does all the feeding and the hen soon ceases.

While the chicks are in the nest the hen feeds within twenty-five yards or straight across the valley near her tryst. When the chicks are about to be fledged she spends most of the day in the nest and he stands guard at the mouth. Then a chick escapes and flies a few yards on to a nearby rock gendarme. The hen follows, the chick climbs down into the scrub, while the hen guards. That night and next morning the parents and the fledged chick call and seek to entice the remaining chicks out of the nest, now less closely guarded. And there is necessity to guard the nest and fledglings. At least three of my seventeen nests with chicks have been discovered by falcons (*Falco novae-zealandiae*). The parents chase the falcons away. Also visiting Keas are very interested in the nestlings and the parents drive them away from the last five yards by the nests with much noise. I suspect that visiting Keas destroyed the young chicks two or three weeks old in one nest.

When two or three weeks fledged, the male chicks follow their

father and meet his other wives. Now a wife who has been building will guard the chick and be his stepmother. The chick begs from her though I have not seen her feed him. They, chick and stepmother, play in flight. She leads him away from danger, calling meanwhile and once in the air they play. The chick dives at her like a falcon. She rolls over and parries the blow. Then the tables are turned. They play in the gusts of a storm, swing around a spur, plunge down into the shelter of a gully and back into the wind on the turbulent air. Several times a day the father returns and feeds the chick.

While the first wife is incubating the cock pays more attention to his other wives. One cock certainly had two wives, both nesting at the same time, the second being four weeks behind the first. Another cock, the boss along three miles of the Bealey Valley, had seven wives. He would roost in the trees near an incubating hen. At daybreak he would feed for two or three hours nearby. During the next five hours he would spend half an hour with each hen, look at her nest to see the progress and feed her. For three or four hours he would rest in the early afternoon and then return to the incubating hen.

This life is very hard and he will be noticed losing condition. In January and February he will still be in old worn plumage, while his wives have new bright green feathers.

### HISTORY

Comparing the Kea with the congeneric Kaka there are many differences. And the evidence points to these birds becoming separate species in the Pleistocene, perhaps during the last Glaciation. As Cook Strait did not exist in the Pliocene there was no barrier to prevent interbreeding so separate species could not develop. In the Pleistocene the Kea evolved its specific habits among the glaciers of the South Island.

In the South Island during the Pleistocene Willett (1950) considered "the bushline reached sea level"; Fleming (1962) noted that sub-alpine daisy scrub managed to survive and Wardle (1963) advances reasons for believing a varied forest existed in Otago. This forest was necessary for the Keas' survival. Probably it was on the moraine headlands in small forest remnants that the Kea learnt to come down out of the trees on to the forest floor to feed and also to come out of the forest on to the alpine grasslands. The stunted trees were too small to nest in, but holes among the glacial erratic boulders were a good substitute. It was necessary to carry leaves and other material to build a nest so the Kea remembered an ancestral habit, a habit of *Calyptorhynchus viridis* and some *C. funereus* (North 1912).

At this time the Kea got its flea, *Parapsyllus n. sp.* This genus is a circumpolar genus of marine bird-fleas. In New Zealand these fleas have been found on penguins (*Eudyptula albosignata*), Spotted and Black Shags (*Phalacrocorax punctatus* and *P. carbo*), prions (*Prioniturus*) and muttonbirds (*Puffinus griseus*) besides Keas. It would be interesting to check Blue Ducks (*Hymenolaimus malacorhynchus*) and Kakapos (*Strigops habroptilus*). Among negative results it has been found that neither Kakas nor gulls have these fleas. How did Keas get their flea? Perhaps Black Shags carried it into the mountains but only coastal shags have been found with fleas. Also Mr. F. G. A. M. Smit of the Zoological Museum who identified these fleas, considers the Kea flea a very distinctive member of the genus, related to the muttonbird fleas. During the Ice Age the Kea and muttonbird were brought together

when both nested under erratic boulders in the forest remnants of the headlands. Then the Kea got its flea. And already the Kea was a separate species from the Kaka, which has no flea.

### THANKS

I wish to thank the Arthurs Pass National Park Board, Mr. E. G. Turbott and Mr. F. G. A. M. Smit for help and encouragement.

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## EXTERNAL FEATURES OF THE TONGUES OF NEW ZEALAND PSITTACIFORMES

By CHARLES McCANN

### INTRODUCTION

The structure of the tongue of birds frequently gives some clue to the principal diet and manner of feeding of the species. Its character has a bearing on evolutionary trends and relationships. Salvadori (1891) placed *Nestor* in a separate family, Nestoridae; *Strigops* he also placed in a separate family, Strigopidae, and *Cyanoramphus* in the family Psittacidae, subfamily, Platycercinae. Mudge (1902) classified the order Psittaciformes on the lingual myology and osteology. In his classification Mudge (1902) followed Salvadori (1891) in placing *Nestor* in a separate family, Nestoridae, but, *Strigops* and *Cyanoramphus* he placed in the family Psittacidae, subfamily, Cacatuinae. The *Check-list of New Zealand Birds* (1953) included all the New Zealand Psittaciformes in the one family, Psittacidae. Oliver (1955) placed *Nestor* and *Strigops* in separate families, Nestoridae and Strigopidae, respectively, and *Cyanoramphus* he retained in the family Psittacidae.

In view of the marked anatomical and biotic differences between the three groups of indigenous Psittaciformes of New Zealand, the retention of the three separate families, Nestoridae, Strigopidae and Psittacidae is, perhaps, desirable and a more meaningful classification.

As the main theme of this paper is based on the external morphology of the tongue, it necessarily hinges largely on the food of these birds and the means of obtaining it, the bill. In most authoritative works the food of the various species is described in fairly general terms. They are said to be phytophagous, frugivorous or melivorous, for lack of specific observations in the field and the laboratory. One of the great difficulties of analysing the crop or stomach contents of parrot-like birds is that the food is generally reduced to fine particles, before it is swallowed or in the case of fibrous foods, it is masticated and the fibrous material rejected, the juice alone being swallowed. Under such circumstances the determination of the food sources is often next to impossible. Nevertheless, the great differences in the

structure of the tongue and bill have an important bearing on the diet of each species and the niche it occupies in the economy of Nature.

Only once has the Kakapo (*Strigops habroptilus*) been known to have eaten lizards, *vide* Huegel (1875). The Kea (*Nestor notabilis*) has often been reported and known to eat the flesh of sheep, and has thus earned for itself a bad name, as a wanton carnivore. This 'habit' has been amply authenticated, but the charge of flesh-eating is not general; it has been fortuitously acquired by some individuals only. The impudence and curiosity of the Kea are well-known to most 'trampers' in the mountains of their habitat and it is probably the satiation of these two characteristics which has triggered off the flesh-eating 'habit' in some individuals. At first, the birds may have been attracted by the colour of open wounds (red or purple — the colour of some fruits), tasted the flesh and then subsequently acquired a taste for raw flesh. Be this as it may, the remarkable differences in the structure of tongues and bills between the two species, are undoubtedly significant and bespeak a difference in diet under natural conditions. The diets may overlap, in part, in some materials, but this does not negative the fact that the predominant food is of a particular nature and that each species is adapted to it.

In the course of years it has been my wont to salvage bits and pieces from the taxidermy department for study. In this way I was fortunate in obtaining the fresh tongues of *Strigops*, *Nestor notabilis* and *Cyanoramphus* spp. I was greatly struck by the disparity the tongues of these birds displayed in external features and in the shape of the bill, for which I have tried to find some plausible explanation. At first, it was my intention to contrast these structures of the Kakapo and the Kea only, but as I had the material for two species of *Cyanoramphus*, I have included them also. The accompanying drawings, with one exception (*C. unicolor*), were made from fresh material (before fixation) and show the remarkable differences between the species.

If this brief article, in spite of its short-comings, serves to create an interest in this fascinating aspect of bird study, it will have served its purpose in stimulating others.

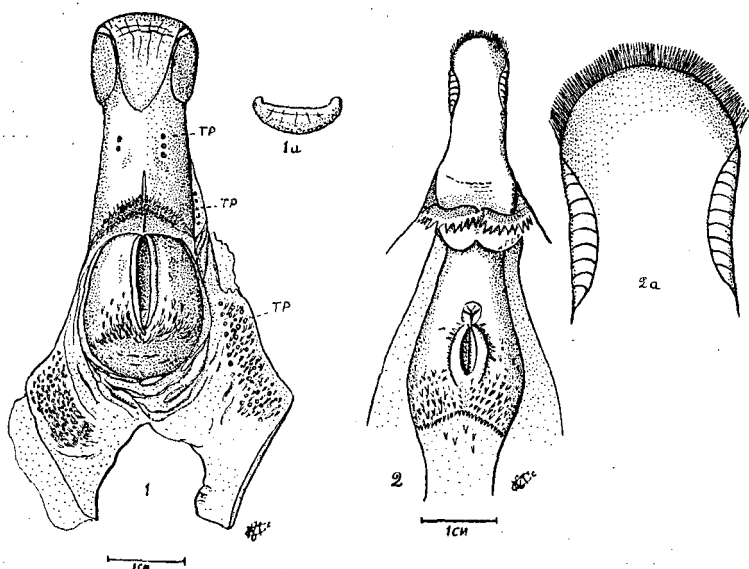
#### Tongue of *Strigops* — Figures 1, 1a

The apex of the tongue of *Strigops* is almost abruptly truncated (fig. 1a). Viewed dorsally, the anterior extremity is covered by a horny 'lobe,' somewhat ovoid posteriorly; on either side of this 'lobe' there is a horny 'flap,' the termination of the horny 'collar' embracing the ventral aspect of the tongue. The lateral margins are almost parallel but diverge slightly, posteriorly. The posterior margin or base of the tongue is bordered by an open, inverted V-shaped row of raised denticles or papillae, separated mesially by a short sulcus. On either side of the longitudinal mid-line of the tongue, there are some large pits (2 on the left and 3 on the right of this specimen) which appear as taste-pits (*papillae vallatae*).

The mucous membrane between the tongue and the rami is beset with several pits similar to those on the dorsum of the tongue.

Behind the tongue is the large (in comparison with that of the Kea) laryngeal 'pad' containing the glottis. The margins of the glottis are devoid of spicules. Posteriorly, on either side of the 'pad,' there are numerous large, horny denticles. Above the glottis, the buccal

membrane (divided in drawing) is beset with numerous denticles, with large taste pits interspersed between them.



Tongue of *Nestor notabilis* — Figures 2, 2a

The apex of the tongue of the Kea is rounded; its extremity is fringed with minute 'hairs' giving it a brush-like appearance; the lateral walls are slightly concaved towards the middle. Behind the fringe of 'hair,' the 'flaps' of the sub-lingual horny 'collar' appear dorsally, as in the Kakapo. The posterior margin or base of the tongue is bordered by two, somewhat lunate flaps of large, horny denticles.

A short distance behind the tongue is the laryngeal 'pad' with the glottis; the glottis is irregularly margined with large denticles and posteriorly of the 'pad' is beset with similar denticles interspersed with smaller ones between. This patch of denticles terminates in a broad inverted V-shaped row of denticles; behind the V there are a few irregularly scattered spicules.

In the Kea no denticles were observed in the buccal cavity, above the laryngeal 'pad,' as in the Kakapo, nor any large taste-pits.

#### DISCUSSION

The great disparity in the tongues of *Strigops* and *Nestor* clearly indicates that the food of these two birds, although it may overlap, in part, cannot be described in generalised terms, because both are Psittaciformes. This theoretical conclusion, although I have not had the opportunity of observing the birds in the field, appears to be supported by the differences in structure, habit and habitat.

The nocturnal or crepuscular habit of *Strigops*, coupled with its more terrestrial mode of life and progression, has called forth a greater need for tactility. This need is, perhaps, best expressed in the development of the long hair-like feathers surrounding the bill and, to a lesser extent, in the gular region. Although, similar 'hairs' are present



[M. F. Soper

XXXIII — Western Weka (*Gallirallus australis*) on nest in north-west Nelson.



[Walter E. Howard

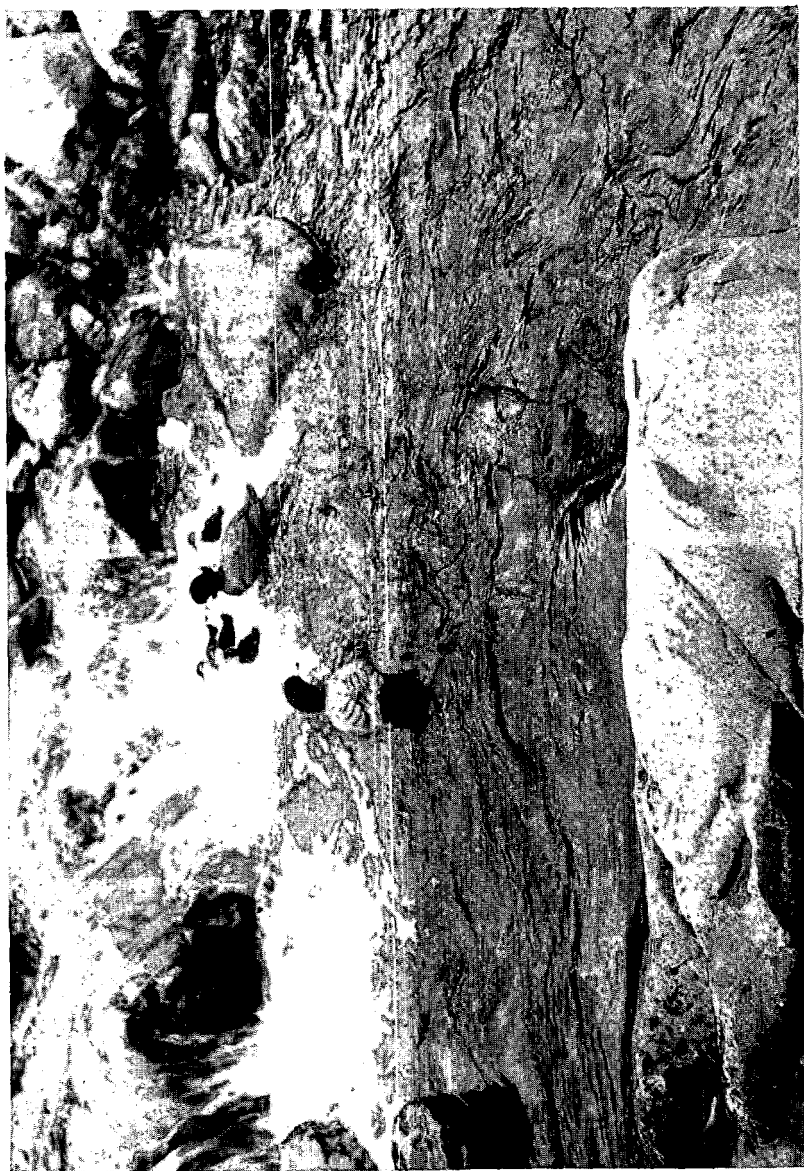
XXXIV — Mr. Harry Vipond, of the Forest Service, points to a Blue Duck's nest which he found in the Urewera National Park.



[Walter E. Howard

XXXV — Nest and eggs of Blue Duck (*H. malacorhynchus*) found on 17/10/62. Two eggs were chipping.





Ian R. Logan

XXXVI — A pair of Blue Ducks and their four ducklings in Taramakau River, Westland.



[Ian R. Logan

XXXVII — Family party of Blue Ducks in Westland. We are indebted to Mr. W. E. Howard, Animal Ecology Division, D.S.I.R., for the opportunity to publish photographs of Blue Ducks on mountain streams in both North and South Islands.





[S. Muff

XXXVIII — Female Kea at nest in hollow log, at noon on 14/1/62.





[S. Muff

IXL — She is joined by the male at 7 p.m. It had been raining hard and his plumage is wet.





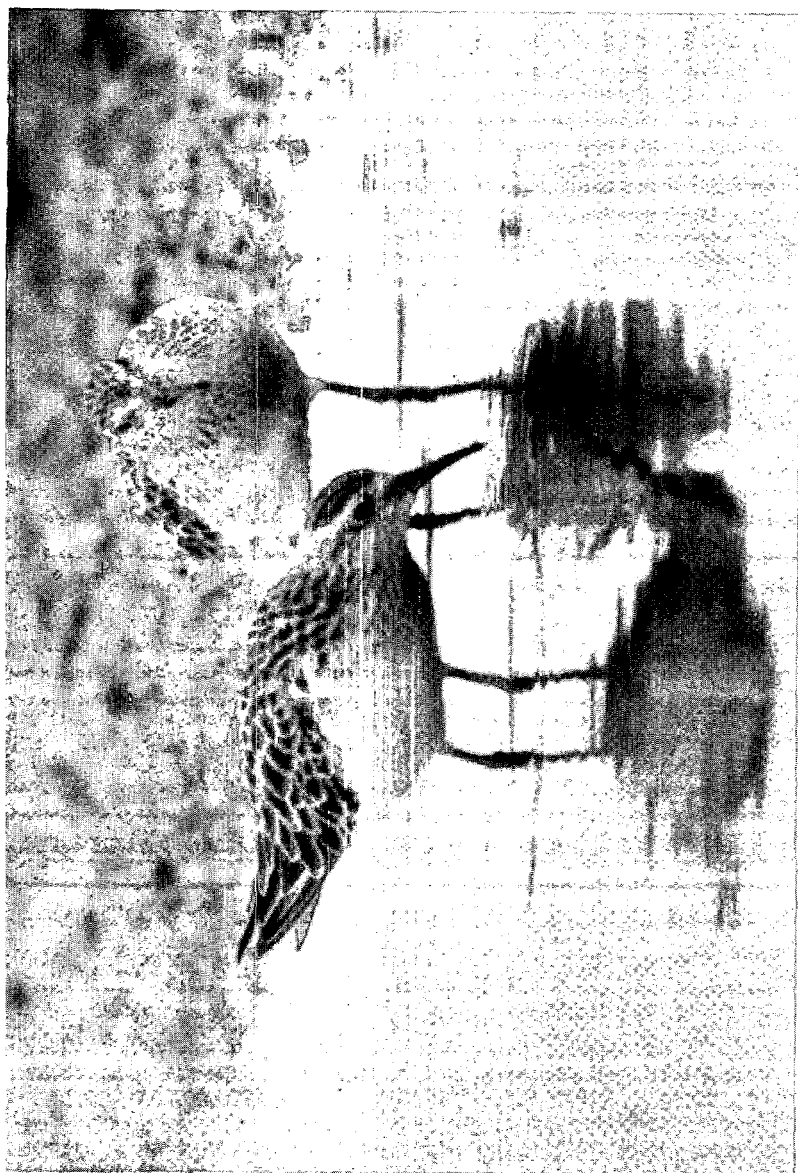
[J. R. Jackson

XL — Young Kea (**Nestor notabilis**) about five weeks old on 2/3/57.



[J. R. Jackson

XLI — Young Kea about 66 days old on 23/3/60.



[Les Shailer

XLII — Two of a flock of 15 Sharp-tailed Sandpipers (*C. acuminata*) at the Miranda pools on 3/1/63.





[Les Shailer

XLIII — Red-breasted Dotterel (*C. obscurus*) in the very pale plumage worn by adults in late summer and by young birds in their first winter.





[B. D. Heather

- XLIV — Photographed for the first time in New Zealand, the elusive Marsh Crane (*P. pusilla affinis*). Near Lochiel these small rails walk out from the flax on to the duckweed and floating dead stalks and leaves to feed.

around the bill of *Nestor*, they are comparatively short. Likewise, there is a great need for the development of the senses of smell and taste; this, too, appears to be expressed in the large nostrils and the presence of taste pits on the tongue and in the buccal cavity. Similar large taste pits are apparently absent in *Nestor* (cf figures). In *Cyanoramphus*, a few taste-pits appear in each of the two species examined and will be referred to below. The greater development of the three senses, referred to above, is linked with a possible reduction in vision and, adaptation to feeble light, or, perhaps, even partial myopia. The eye of *Strigops* is relatively small for the size of the bird.

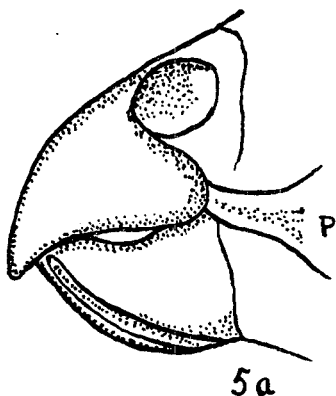
The more terrestrial and nocturnal habit of *Strigops*, in contrast to the canopy-frequenting *Nestor*, itself suggests a difference in feeding habit and menu. I have not referred to the sense of hearing, for, I believe, that most birds have a well-developed sense of hearing and, in the case of the birds discussed it has little bearing on the feeding habits.

Parrot-like birds, as is well-known, are, generally speaking, destructive feeders, for they destroy and displace more than they can comfortably eat. What they do swallow is normally so finely reduced that accurate determination of the food substances is often most difficult, if not an impossible task. Accordingly, *Nestor* and other diurnal canopy feeders drop much food on the forest floor (so do nocturnal canopy feeders also). Thus, the forest floor is often strewn with fruits or leaves, entire or partially eaten, which contribute to part of the diet of the terrestrial feeders, whether diurnal or nocturnal. (This knowledge was often used by me with considerable success when collecting specimens on various expeditions). It is, perhaps, common knowledge that the surplus from the 'tables' of diurnal, arboreal species constitutes the repast of many of the terrestrial feeders. Under the circumstances there is a probable overlap in the menu of *Strigops* and *Nestor*; the former feeding on the discards from the 'table' of the latter. This residual supply provided by the diurnal species is often supplemented by the nocturnal species with other substances, both vegetable and animal.

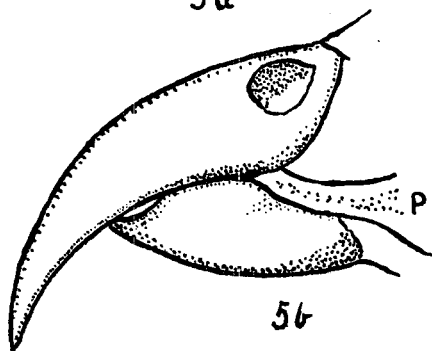
The bill of *Strigops* (fig. 5a), in contrast to that of *Nestor* is shorter, broader and thicker. The upward curve of the mandible of *Strigops* is markedly more vertical than in *Nestor*. A remarkable feature of the lower mandible of *Strigops* is that its horny sheath is longitudinally fluted (five ridges) whereas in *Nestor* the mandible is smooth. The fluting of the mandible obviously gives it additional mechanical strength. On the interior of the upper section of the bill, there is a large 'anvil' upon which the lower mandible operates. A similar 'anvil' is present in *Nestor* but it is far less developed. In short, the bill of *Strigops* is a veritable 'nut-cracker' or crusher, suitably adapted, mechanically, for dealing with hard food material, such as hard seeds and nuts, to obtain the kernel.

The bill of *Nestor* (fig. 5b) is not so admirably adapted as a nut-cracker. The upward sweep of the mandible is far more gentle and is not fluted to give it additional strength; it is mechanically weaker and obviously suited for another form of diet. The greatly elongated culmen is apparently more suited to excavation or removal of obstructions when in search of food. The shape of the bill suggests that the Kea feeds on softer foods, the pulp of fruits and soft-bodied animal foods. Likewise, the bill suggests that the hard stones of fruit are rejected.

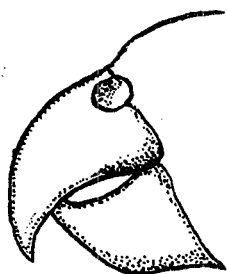
Without delving deeply into the cranial anatomy of the two



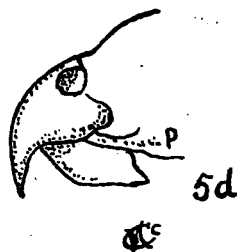
5a



5b



5c



5d

species under consideration, it will be observed that the mandible in *Strigops* is much heavier than in *Nestor* and that the palatines are larger and deeper in the former than in the latter — their points of contact with the bill also vary in the two birds (*cf* figures) and accordingly tend to greater strength.

Together with the truncated, leathery tongue, the bill of *Strigops* is more efficiently equipped to deal with hard food materials. As the seeds are dealt with in the mouth, the eyes play little or no part in the selection of the material actually swallowed. Discrimination by

taste to such "blind" feeders is of greater importance, hence the provision of large taste pits in *Strigops*. In *Nestor*, the selection of the food is apparently more visual, the food being selected by shape and size, and, perhaps, more important, by colour. As already indicated, *Nestor* apparently has no large taste-pits, for none was observed in any part of the mouth. Accordingly, it would appear that *Strigops* is predominantly nucivorous and *Nestor* frugivorous, feeding on the softer parts of the fruits alone.

Both *Strigops* and *Nestor* are stated to be, at least in part, melivorous or nectarivorous. There can be no doubt that both birds will take or accept honey or nectar when readily available, but this part of the diet is probably supplementary. Likewise, they will also feed on sap and gummy exudations from the trunks and branches of trees and shrubs which are palatable to them. However, if one may draw any conclusions from the structure of the tongue and terrestrial habit of *Strigops*, it is far less suited to a nectarivorous habit than *Nestor* with its fringed lingual extremity and canopy-haunting habits. The fringe of 'hairs' possibly assists the collection of the juice of the succulent fruits it feeds on. In any case, it seems more likely that the birds would destroy the flowers, with their 'crude instruments' in the quest for nectar, and not serve the role of pollinators. Their attention to the flowers would be largely detrimental to seed production.

That *Strigops* is in part graminivorous, feeding on portions of Snow Grass (*Danthonia* spp.) and other fibrous materials is well established. (It is believed to feed on mosses and tender shoots of plants also.) However, fibrous materials are apparently well-chewed, the juice extracted and the residual fibrous tissue rejected in the shape of 'pellets.' The stout bill and tough tongue can efficiently deal with fibrous materials; conversely, the bill and tongue of *Nestor* are adapted for a more succulent diet.

In passing, a point worthy of comment at this stage, although it is not directly connected with the subject in hand, is the comparatively large size of the laryngeal 'pad' (see figure) observed in *Strigops*. It is well-known that the Kakapo, in addition to a number of varied vocal sounds, from 'screeches' to 'grunts,' is also capable of producing a loud 'booming' or 'drumming' sound, audible over a considerable distance. This 'booming' is believed to be indulged in during the breeding season. This large laryngeal 'pad' and the gular air-sacs, possessed by the males alone, are undoubtedly linked in the production of the 'booming' sound. Henry (1903) described the air-sac as being almost as large as the bird itself, when fully inflated. The position of sacs is clearly visible when sought for, even on museum specimens; they are marked by patches of skin, devoid of feathers, on the side of the neck. However, Williams (1956) evidently doubted Henry's statement and overlooked the presence of the sacs himself, for, he wrote: "As we shall see later in the section on calls, there is some reason to accept this air sac-drumming hypothesis with reserve" (p. 40); and again on page 42: "Any one must be chary of challenging Henry's unrivalled observations, but his claim that this genus of the *Psittacidae* possesses an inflatable air sac as part of the vocal equipment should be treated with some scepticism at present, for such an organ is, to the best of my knowledge, unknown among the rest of the parrots." The Kakapo is such an aberrant member of the *Psittaciformes* and it has deviated so much in various directions from the rest of the order

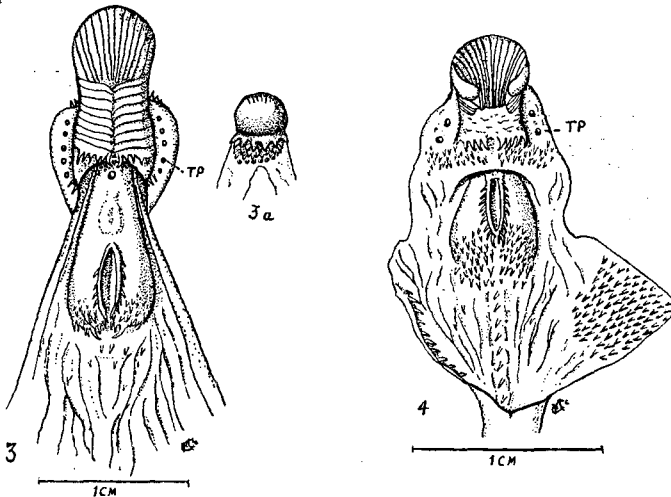
that we may expect to find some other departures from the more 'normal' Psittaciformes when the species becomes better known.

The inflation of the air-sacs to function as resonators in the Kakapo is somewhat homologous to use of the air-sacs in the Prairie-Hen (*Tympanuchus*). They may serve a similar role during courtship and sexual display.

Tongue of *Cyanoramphus unicolor* — Figures 3, 3a

The apex of the tongue is rounded; there is no fringe of 'hairs' as in the Kea. The lateral margins are slightly concaved. Dorsally, the anterior portion is marked by radiating 'sulci,' behind which other 'sulci' run transversely from the mid-line to the margins. The posterior margin is bordered by two groups of large denticles, separated from each other by a shallow median sulcus. Ventrally, five rows of denticles (fig. 3a) decreasing in size from the anterior to the posterior row, are present (see figure). Such denticles do not appear in either *Strigops* or *Nestor notabilis*. The mucous membranes between the tongue and the rami have five taste-pits on either side. In addition to these pits, a single large pit is found behind the tongue which apparently serves the same function.

The laryngeal 'pad' is somewhat elongate. Its posterior is echinate with denticles of varying size. The glottis is margined with a few denticles on either side. A few irregularly disposed denticles are present on the mucous membrane behind the laryngeal 'pad.' No denticles were observed in the buccal cavity above nor were any large taste-pits.



Tongue of *Cyanoramphus auriceps* — Figure 4

The apex of the tongue is rounded without a fringe of 'hairs' as in the Kea. Laterally, two horny 'flaps' of the ventral 'collar' appear dorsally. Dorsally, the anterior portion of the tongue (almost half) is sulcated somewhat fan-wise; behind the horny 'flaps' there are a few oblique 'sulci' also. Laterally, the margins are slightly concaved towards the middle. Posteriorly, the tongue is margined by two series of large denticles, separate at the centre. On either side, between the

tongue and the rami there are two large taste-pits. Numerous small denticles form an angular band between the tongue and the glottis.

The laryngeal 'pad' is somewhat similar to that of *C. unicolor*, but it is less elongated and more denticulate. The glottis is margined with largish denticles. A median row of largish denticles extends into the gullet. The buccal cavity has a considerable patch of denticles above. No taste-pits were observed other than those already mentioned. Beneath the free portion of the tongue similar transverse rows of denticles are present in this species, as in *C. unicolor* (fig. 3a).

#### DISCUSSION

In the genus *Cyanoramphus* the tongues appear to differ specifically. So far, I have been able to obtain the tongues of two species only — *C. unicolor* and *C. auriceps*. The consensus of opinion is that the food of *Cyanoramphus* spp. consists largely of seeds and soft fruits. That they are largely dependent on small hard seeds and grain is, perhaps, supported by the mechanical structure of the mandibles (figs. 5c., 5d) for the lower mandible, like that of *Strigops* rises abruptly to meet the culmen, and the bill, as a whole, appears as an efficient 'crusher.' In this respect *Cyanoramphus* differs from *Nestor*.

Of the two species illustrated and discussed, the Yellow-fronted Parakeet (*C. auriceps*) is an inhabitant of the forests, frequenting the lower and upper tiers of foliage, feeding on the berries of various plants. As many of the fruits are small seeded, it is likely that the seeds are also crushed and swallowed. As most of the fruits eaten are highly coloured when ripe, it is, perhaps, safe to assume that the birds are guided visually. The eye plays the more important role in food getting as in the case of the Kea (*Nestor*). When seeds are eaten, need for verification as to their edibility arises, and for this the requisite taste-pits are necessary. These we find on either side of the tongue (see, figure).

In contrast to *C. auriceps*, the Antipodes Island Green Parakeet (*C. unicolor*) is of necessity a ground feeder and nester, as the vegetation of the island is very stunted or composed of tussock. Under the circumstances, the birds appear to be largely dependent on seeds or other material washed up between the rocks of their habitat, for subsistence. The seeds are sampled in the mouth for their edible qualities, which necessitates the possession of a sense of taste. This requirement is fulfilled by the presence of five large taste pits on either side of the tongue, between it and the rami. In addition there is the large pit behind the tongue already referred to.

A remarkable feature in the construction of the bill of *C. unicolor* is that the posterior edge of the culmen, near the gape, is flexed slightly inwards, apparently making it a more efficient cutting edge to deal with graminaceous food. In common with the Kakapo, *C. unicolor* appears to be a "blind" feeder, depending more on the sense of taste than on sight for discriminating between its food substances.

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 \* For a comprehensive bibliography of the Kakapo see Williams (1956).

## ANNUAL LOCALITY REPORTS

### FIRTH OF THAMES

- BLACK SHAG** — 75 on 2/12/62 (summer census); 240+ on 28/4/63; 55 on 14/7/63 (winter census).
- PIED SHAG** — None on summer census; 21 north of Whakatiwai on 14/7/63.
- LITTLE BLACK SHAG** — Seldom reported. 9 on 2/12/62.
- SPOTTED SHAG** — Rare visitor from Hauraki Gulf colonies; 2 at Wharekawa on 25/5/63.
- WHITE-FACED HERON** — Numbers appear to be levelling out. 25 on 2/12/62; 22 on 28/4/63; 24 on 14/7/63.
- BLUE REEF HERON** — 1 at Kaiaua on 28/4/63 and 14/7/63.
- BITTERN** — 1 seen swimming in a loon-like attitude on 12/9/63.
- SHOVELER** — Max. 3 on any visit.
- MARSH CRAKE** (*P. pusilla*) — One seen closely near Hot Spring marsh by D. M. Walter on 27/10/63 — not previously recorded along the Miranda coast, though the Banded Rail is not uncommon.
- S.I. PIED OYSTERCATCHER** — Many, as usual, summered. 131 on 2/12/62. Big influx after Christmas. 1146 on 1/5/63; but only 710 on 14/7/63.
- VARIABLE OYSTERCATCHER** — Usually present, 2 black and one smudgy. On 25/8/63 a smudgy and a black behaving as if a pair.
- ASIATIC GOLDEN PLOVER** — 106 at Waitakaruru estuary on 24/11/62; c. 110 on 3/1/63. None seen on 28/4/63.
- BANDED DOTTEREL** — Breeding population down to 3 pairs at the most. Nest, c. 3 on 4/11/62; subsequently 2 flying young seen. On 3/1/63 a flock of 12 at Kairito contained only 2 juv. c. 50 on 28/4/63 at White Bridge. 82 on 14/7/63 (winter census).
- RED BREASTED DOTTEREL** — Always some. Nesting not very successful. One chick seen on 18/11/62; but nesting areas were abandoned by early December. 10 on winter census, 14/7/63.
- LARGE SAND DOTTEREL** — One studied closely several times between 5/11/62 and 3/1/63, when the band on the chest seemed to be developing.
- WRYBILL** — Probably c. 50 summered; viz. 40+ on 18/11/62 and 47 on 2/12/62. Usual influx after Christmas. 500+ on 3/1/63. 2000+, mostly at Waitakaruru on 28/4/63. Winter census, 1820 on 14/7/63; but 2100+ still on 25/8/63. 500+ at White Bridge on 14/9/63.
- LONG-BILLED CURLEW** — 21 on 24/11/62 and 3/1/63; 6 on 28/4/63; 3 on 14/7/63.
- ASIATIC WHIMBREL** — 1 on 28/4/63 at Waitakaruru estuary. It flew in at full tide; scarcely settled and was away almost at once.
- BAR-TAILED GODWIT** — Summer census, 6765 on 2/12/62; winter census 502 on 14/7/63. There was a considerable influx between 14/9 and 29/9/63.
- MARSH SANDPIPER** — 1 at Waitakaruru estuary on 28/4/63 (v. *Notornis* X, 235-236). Presumably the same bird on the lagoon and pools at Miranda the following September-November; photographed by G. J. H. Moon.
- TURNSTONE** — 40+ on 18/11/62; 61 on 3/1/63; 8 on 1/5/63; 4 on 14/7/63; 6 on 25/8/63; 11 on 14/9/63.

**KNOT** — Summer census c. 4500 on 2/12/62; winter census 170 on 14/7/63.

**SHARP-TAILED SANDPIPER** — 3 on 4/11/62, first return migrants seen; 7 on 17/11/63; 19 on 24/11/62; 15 on 3/1/63.

**CURLEW SANDPIPER** — 3 having wintered, stayed at or near Miranda most of summer. Up to 5 others with Kairito Wrybills in January.

**RED-NECKED STINT** — One wintered 1962. Then 4 on 3/11/62 and 3/1/63 over the summer. One wintered 1963, seen with Wrybills on 14/9/63.

**PIED STILT** — Scattered, but apparently rather unsuccessful breeding. Broods well-grown of 2, 2, 1 at pools on 24/11/62. Summer census 2/12/62, only 131. 2370+ on 24/3/63; 1600+ on 28/4/63. Only 1209 on winter census 14/7/63. On 28/4/63 there were 3 blackish stilts in Hot Spring marsh.

**BLACK-BACKED GULL** — Kairito shellbank colony on 24/11/62, 1 c/4; 34 c/3; 12 c/2; 4 c/1; 8 c/0 — 51 occupied nests but no eggs yet hatched; 2/12/62, 52 nests and some chicks. Miranda shellbank colony, 25+ adults on 14/9/63; one old nest being refurbished.

**BLACK-BILLED GULL** — A few may have summered. c. 400 on 28/4/63. 590 on winter census 14/7/63.

**RED-BILLED GULL** — c. 1000 at Kairito hovering over tall fescue taking insects on 24/3/63.

**WHITE-WINGED BLACK TERN** — Two sightings probably of the same bird as seen in 1961 and 1962; (a) flying along the coast near Kairito on 1/1/63 (P.D.G.S.). (b) in full breeding dress on 14/7/63 inland at Waitakaruru, flitting over wet paddocks in which many Pied Stilts were feeding.

**CASPIAN TERN** — 96 on summer census 2/12/62; more than usual but no evidence of local breeding. 120+ on 28/4/63, of which 80+ were looking for a high tide roost near Kairito. Only 58 on winter census 14/7/63.

**WHITE-FRONTED TERN** — 525 on 2/12/62, almost entirely at Kairito, where some nesting was in progress. Few young reared, to judge by subsequent counts viz. 1 among c. 100 adults on 24/3/63; 4 among 84 adults on 28/4/63. Winter census, 131 on 14/7/63. 150+ on 12/9/63 noisy and excited at Wharekawa.

**LITTLE TERN** — Numbers present this summer far surpassed all previous counts. 32 on 24/11/62; 35 on 2/12/62, the tally being checked and rechecked. The last seen were 6 on 28/4/63, when they were noisy and excitable; but their bills were still dusky (cf. *Notornis* X, 91-92).

— H.R.McK., R.B.S.

#### MANUKAU NORTH — OTAHUHU, MANGERE, PUKETUTU, IHUMATAO

**GANNET** — Often to be seen off the end of the airport and Ihumatao.

**WHITE-FACED HERON** — The biggest concentrations are in autumn and early winter, e.g. c. 70 near airport during latter end of March '63. After June the flocks tend to break up.

**BLUE REEF HERON** — Max. 4 at Puketutu on 28/6/63.

**ROYAL SPOONBILL** — Six resting on a reef among Caspian Terns, Pied Stilts and ducks at Spoonbill Pool (No. 4) on 10/5/63. Two throughout winter in vicinity of Puketutu; 4 from at least Sept. 1st to 13th. In rough weather the dammed creekhead beside No. 4 often provided shelter.



**BLACK SWAN** — Usually some on No. 4, e.g. 120+ on 20/11/62.

**GREY TEAL** — All reports from No. 4, e.g. few on 20/11/62; 30+ on 18/1/63; 50+ on 28/6/63. Local breeding not proved. There is probably a movement into the area from the Waikato, e.g. L. Whangape, where these teal were in pairs in mid-September 1963.

**SHOVELER** — Usually some on No. 4. max. c. 120 on 10/5/63.

**S.I. PIED OYSTERCATCHER** — Apparently increasing numbers feed on the flats of central Manukau off Ihumatao and Puketutu. Many roost near the tip of the airport, e.g. 1000+ on 17/2/63 and 12/4/63 and c. 1150 on 23/6/63. Exposed reefs on Spoonbill Pool are often visited, max. c. 400 27/7/63. Higher up the harbour roosting flocks, e.g. c. 125 on 19/10/63 used a small rocky bay with a beach, 'Road-end Bay,' one mile west of Mangere Bridge.

**BANDED DOTTEREL** — A drained and ploughed saltmarsh, formerly good Banded Rail country, at the head of Bull Bay, now backing No. 2 pond; and the close-cut lawns of the A.M.D.B. attracted a flock throughout the winter, c. 220 on 2/3/63; c. 300 on 27/4/63; 200+ on 1/5/63, at least 2 already in breeding dress; 250 on 22/6/63; 200+ on 14/7/63; 100+ on 27/7/63; 0 on 10/8/63.

A few also visited the airport, e.g. 5 on 23/6/63.

Inland at the head of Manukau Harbour up to 50 were seen on the grazing paddocks on the Sylvia Park side of Hamlin's Hill between July 26th and Aug. 12th.

**RED-BREASTED DOTTEREL** — 1 on bank between No. 1 and No. 2 ponds on 22/11/62. 2 at airport on 3/4/63.

**WRYBILL** — Single birds at Spoonbill Pool on 27/4/63 and 10/8/63. The end of the airport has become a regular high tide roost, e.g. c. 500 on 17/2/63; c. 400 on 12/4/63; c. 700 on 27/7/63. c. 50 on flats beyond Oruarangi sea-wall on 22/3/63.

**BAR-TAILED GODWIT** — Hundreds back in Harania Creek on 6/10/62. 2000+ above Mangere bridge on 17/1/63. c. 1000 near Puketutu on 20/11/62. 6700 on summer census 16/12/62 in upper Manukau, when total for whole harbour was 13,385. Airport 1800+ on 17/2/63; c. 500 (all gray) on 12/4/63; 1050 on 23/6/63. Oruarangi 300 (all pale) on 27/3/63.

**HUDSONIAN GODWIT** — 1 with Bar-tails at Spoonbill Pool on 9/11/63.

**KNOT** — 5 on 29/11/62 near Puketutu among c. 1000 Godwits. Airport, c. 1500 on 27/3/63, 80% being red; 200 on 3/4/63; 600 on 23/6/63.

**PIED STILT** — A few pairs bred successfully near the oxidation ponds. Flying broods of 2, 2, 3, 3 were seen on 20/11/62; also a nest c/4 and a pair with 2 downy chicks on Spoonbill Pool. On 29/11/62 there were c. 250 along the circulation channels, mainly non-breeders. Far fewer frequented Manukau above the bridge. 500+ on 17/1/63 and c. 750 on winter census 23/6/63. c. 1000 on 12/2/63, near Puketutu mostly in two groups at full tide, with a near albino among them; also seen on 27/3/63. Winter census, including airport, 1695. (Total for all Manukau, 4215). Aug.-Oct. 1963, 150-200 non-breeders at Spoonbill Pool or in adjacent Creekhead.

**RED-BILLED GULL** — Numbers in upper Manukau appear to be declining. 10,000+ off Ihumatao on 28/6/63. Hundreds of non-breeders throughout summer at oxidation ponds.

BLACK-BILLED GULL — 1 at oxidation ponds on 29/11/62; seldom seen in Manukau, though there are former records for Puhinui and Karaka.

CASPIAN TERN — Summer census for this area, 48 on 16/12/62; winter census 95 on 23/6/63. Numbers roosted on reefs at Spoonbill Pool, e.g. 22 on 20/11/62 and 50+ on 28/6/63; at Ihumatao, 17 on 19/10/63; at the airport, 190 on 27/3/63; 100+ on 1/5/63. On 17/1/63, 20+ were fishing above Mangere bridge.

PIPIT — 2 on dredgings at No. 3 pond on 10/8/63. — R. B. S.

#### MANUKAU SOUTH — KARAKA - PUHINUI

The report on the Karaka coast from Urquhart's Point to Yates' dam has greatly benefited from the presence on the spot of Mrs. Ian Urquhart (J.U.), who has been able to visit the best areas frequently at the best times. Her detailed notes on a breeding colony of White-fronted Terns were most valuable.

GANNET — 35+ between Kidd's and Seagrove on 26/4/63. Numbers frequently pass through 'The Narrows' at Weymouth to fish Pahurehure Inlet up towards Papakura, e.g. 6 on 3/8/63.

LITTLE BLACK SHAG — Biggest count c. 90 at Weymouth on 19/6/63.

GREAT WHITE HERON — 1 at Weymouth on 16/9/63 and 3/10/63.

LITTLE EGRET — 1 at Weymouth on 3/8/63. 2 near mouth of Puhinui Creek at least from 20/9/63 to 29/9/63.

WHITE-FACED HERON — Only 21 on summer census 16/12/62; March 1963, 82 on Urquhart's farm. 48 on winter census 23/6/63, of which 36 were at Yates' dam. 27 on 11/5/63 on the derelict jetty.

BLUE REEF HERON — 1 at Urquhart's Pt. on 25/1/63 and 23/6/63.

ROYAL SPOONBILL — 2 frequently seen between Kidd's Bay and Weymouth from 26/11/62 to end of year, when a third joined them. 3 at Urquhart's Pt. 11/1/63 and 3/3/63. 1 at Weymouth throughout summer and winter up to 3/11/63, often up Waimatia Creek. 2 at Yates' dam on 3/11/63.

PARADISE DUCK — 2, both dark birds, in Higham's marsh on 3/9/62.

SHOVELER — 2 at Yates' dam on 23/12/62.

GREY TEAL — 4 in Kidd's Bay at full tide, flat calm, on 12/1/63.

PIED OYSTERCATCHER — The number of summering non-breeders was very large. 1220 on 16/12/62 in two roosting flocks at Kidd's Bay and Pollok Spit. Winter census for whole of Manukau 4410 of which 3120 were along Karaka coast. Among them was a partial albino, still present on 2/11/63.

VARIABLE OYSTERCATCHER — 2, black, throughout summer: 5 black at Urquhart's Pt. on 25/5/63. 1 pied, on 16/12/62 and 23/6/63.

ASIATIC GOLDEN PLOVER — First recorded back on 30/10/62, 21; 67 on 11/12/62; 143 on 12/3/63; max. 162 on 26/3/63, many being in breeding plumage. None on 8/4/63; but one with injured leg on 26/4/63.

BANDED DOTTEREL — 2 pairs bred. Nests 1 c/3 on 30/10/62 and 1 c/2 on 13/11/62 were washed out by high tides. A nest on Kidd's beach still had 3 eggs on 24/12/62, all hatching by 28th. Flocking of immigrants began in late November, viz. 10 on 26/11/62; 14 on 14/12/62; 35 on 16/12/62; 55 on 23/12/62, of which all but a few were in good adult dress; 57 on 28/12/62 while local pair was tending

small chicks; 126 on 8/1/63; c. 250 on 16/2/63; c. 400 on 12/3/63; c. 300 on 18/3/63, 2 being strongly banded; c. 200 on winter census, 23/6/63.

**RED-BREASTED DOTTEREL** — 2 pairs nested; 2 chicks were seen on 26/11/63; another nest c/2 hatched about 1/1/63, but few if any young were reared successfully because of predation by Black-backed Gulls and Harriers. 9-12 regularly present in Kidd's Bay from mid-January to end of June; one very rufous on 22/5/63; 4 rufous on 25/6/63. On 26/3/63 one was seen to eat a wriggling cricket and another to capture a moth.

**LARGE SAND DOTTEREL** — 1 many times seen in Kidd's Bay after 11/12/62 and still present on 25/5/63 (v. *Notornis* X, 250).

**MONGOLIAN DOTTEREL** — The first to be recorded in the North Island frequented Kidd's Bay and marsh between 8/1/63 and 30/3/63 (v. *Notornis* X, 234).

**WRYBILL** — 30 on 17/9/62; 4 on 20/10/62; none noted in November; 1 on 16/12/62; 2 on 24/12/62; 24 on 28/12/62; 113 on 8/1/63; 350 on 12/1/63; 700 on 20/1/63 550 on 16/2/63; 1050 on 11/7/63.

**LONG-BILLED CURLEW** — 1 on 8/2/63.

**BAR-TAILED GODWIT** — 2000+ on 17/9/62 indicated return of first immigrants. Summer census of Karaka coast 6685 on 16/12/62; when tally for all Manukau was 13,385. 8/2/63 a few birds showing red. Winter census 408, when tally for all Manukau on 23/6/63 was 1458. 1 albino on 7/10/62; also a year later during October-November, 1963.

**ASIATIC BLACK-TAILED GODWIT** — 1 at Seagrove on 23/6/63; 3 at Yates' dam on 19/10/63, 3/11/63 and 17/11/63.

**GREENSHANK** — 1 seen on four occasions between 12/10/62 and 25/6/63.

**TEREK SANDPIPER** — 1, seen many times, usually with Wrybills between 16/12/62 and 26/3/63.

**TURNSTONE** — 17 on 17/9/62; c. 150 on 7/10/62; c. 330 on 30/10/62; 250+ on 16/12/62, summer census; c. 330 flew inland on 8/4/63; 10 on 26/4/63; 3 on 25/5/63; only 1 on winter census, 23/6/63.

**KNOT** — Several among Godwits on 17/9/62; c. 2620 on summer census 16/12/62; 3000+ on 12/3/63; c. 200 on 26/4/63 and 11/5/63; 7 on winter census, 23/6/63.

**SHARP-TAILED SANDPIPER** — 8 at Yates' dam on 11/12/62; 11 at Kidd's on 8/2/63; 13 on 18/3/63, sitting mostly in pairs in longer tufty grass on edge of saline area. 14 on 26/3/63; 9 on 31/3/63. Then none till 27/9/63, when one was back in Kidd's marsh among Banded Dotterels. 3 at Yates' dam on 19/10/63 and 17/11/63.

**AMERICAN PECTORAL SANDPIPER** — 1 arrived in October; not seen after 3/11/62.

**CURLEW SANDPIPER** — 3 at Kidd's on 1/11/63.

**RED-NECKED STINT** — 7 on 30/10/62; 28/1/63 and 8/2/63. 6 on 18/3/63 and 31/3/63 were reddening nicely. 3 on 8/4/63. One over-wintered, being seen on 22/5/63 and, probably the same bird, 27/9/63. 6 on 3/11/63. 7 on 17/11/63.

**PIED STILT** — 200+ on 20/8/62; then few throughout summer till May, except inland at Oakland's Road swamp c. 140 on 7/10/62; and at Yates' Creek and dam, 150 on 16/12/62; 80+ on 23/12/62. Odd pairs frequented Kidd's marsh during spring, apparently without breeding. Winter census, 2520 on 23/6/63, when total for Manukau was 4215.

**BLACK-FRONTED TERN** — One on derelict jetty at Kidd's on 30/3/63. Details of plumage carefully noted by J.U. Could not be found again. Apparently the first record for Manukau since 1886. (N.Z.B.N. 3, 10).

**CASPIAN TERN** — 30 on 30/10/62; 23 on summer census, 16/12/62; 230+ on 26/4/63; 112, on winter census, 23/6/63.

**WHITE-FRONTED TERN** — Very few seen in early spring; 4 had returned to shellbank on 3/11/62. Then things moved quickly. Nov. 13th 200+ nesting. 18 eggs. 17th, 250+. 81 nests c/1; 15 c/2. 26th, 300+. 113 nests c/1; 58, c/2. Dec. 4th. 325+ 110 nests c/1; 52 c/2. 5 chicks just hatched. 11th. 186 nests 88 c/1; 16 c/2; 47 with chick; 28 with 1 egg and 1 chick; 7 with 2 chicks; 1 chick running. Jan. 8th. Several young birds flying. 11th. 100+ adults left. 20th. c. 50 adults; 2 eggs still unhatched. Feb. 8th. Only 20 adults left with 3 young. By mid-February the shellbank was deserted; but up to 40 rested on the derelict jetty till the end of April. None in May or June.

**TERN (Sp.?)** — Small dark-billed terns, *albifrons* or *nercis*, were seen as follows in Kidd's bay: 2 on 30/10/62; 3 on 16/2/63, 3/3/63, and 18/3/63.

**SHINING CUCKOO** — 1 whistling strongly at Kidd's on 27/9/63.

**MALAY SPOTTED DOVE** — Has now reached Papakura as it spreads south.

**FERNBIRD** — The colony in the saltmarsh scrub along Kidd's bay continues to thrive.

— H.R.McK., R.B.S.

#### MANAWATU — (a) RANGITIKEI ESTUARY

**S.I. PIED OYSTERCATCHER** — 3 on 13/1/63 and 24/2/63; 4 on 24/3/63.

**N.I. (VARIABLE) OYSTERCATCHER** — 2 pairs breeding on sand-spit at the estuary on 17/11/62.

**GOLDEN PLOVER** — 8 through summer 1962-63; 12 on 24/2/63, 16 on 24/3/63.

**WRYBILL** — HIGHEST count 27 on 24/2/63.

**LONG-BILLED CURLEW** — One on 24/2/63.

**ASIATIC WHIMBREL** — One present January to March.

**BAR-TAILED GODWIT** — 145 on 17/10/62, mostly on passage; summer population fluctuated around 50.

**KNOT** — 11 on 17/10/62, 17 on 17/11/62.

**RED-NECKED STINT** — Present at least from September to March; highest count 6 on 24/3/63.

**BLACK-BACKED GULL** — 2 pairs defending territory in the estuary on 13/1/63, but nests not found; colony one mile north of estuary is still thriving.

— I.G.A., M.J.I.

#### (b) MANAWATU ESTUARY

**BLACK SHAG** — Up to 25 throughout year; breeding in the district.

**LITTLE BLACK SHAG** — One seen by I.G.A. on 15/6/63, at first perched on a dead tree with adult and juvenile Black Shag and one adult White-throated Shag, allowing excellent opportunities for comparison. It then flew down to the river beside an adult Black Shag. Its small size, relatively small head, and dark face and bill differentiated it from the Black Shag; while the narrow, dark bill and differently shaped head, short tail, prominent black feather margins

on the upperparts (much more conspicuous than in either of the other two species), and less streamlined appearance in flight distinguished it from the Little Shag. This appears to be the first record of this species at Manawatu Estuary.

**LITTLE SHAG** — One or two of either plumage phase usually present.

**SPOTTED SHAG** — One seen by M.J.I. on beach on 7/3/63 with a group of Black Shags. When approached, it remained when the Black Shags had flown off, until observer was within a few yards.

**WHITE HERON** — 2 or 3 reported in April-May between the Estuary and Foxton; one at Foxton on 15/9/63, with well-developed plumes.

**REEF HERON** — One on 6/3/63 at north heads.

**WHITE-FACED HERON** — Breeding in the district.

**BITTERN** — One on mudflat on 18/8/63; usually they keep out of sight in the swamps of the district.

**ROYAL SPOONBILL** — 9 on 3/11/62, at least 7 of which appeared to be first year birds; none seen in December though they may have been elsewhere in the district; 2 immature birds on 12/1/63; numbers in March gradually increasing from 4 on 2nd to 13 on 23rd; 37 on 21/4/63; 42 on 1/5/63; 25 on 15/6/63; 18 on 18/8/63, including several in full breeding plumage. Of 13 remaining on 15/9/63, 9 were adults in breeding plumage and 4 were first year birds.

**BLACK SWAN** — One on 12/1/63.

**GREY DUCK & MALLARD** — Few except in winter: 130 Grey Duck and 150 Mallard on 15/6/63.

**SHOVELER** — 7 on 22/12/63.

**HARRIER** — Resident.

**PUKEKO** — Resident, breeding at the estuary.

**S.I. PIED OYSTERCATCHER** — Further increase on last year, with a stable winter population of 65 from early March till late June. Summer population 1962-63 remained about 12. 21 remaining on 15/9/63.

**N.I. (VARIABLE) OYSTERCATCHER** — Maximum of 18 on 15/6/63.

**GOLDEN PLOVER** — Maximum 28 on 1/12/62; most departed during March 1963; on 7/3/63, 22 were seen, of which 14 had some black on the belly and 2 were almost in full breeding plumage. One seen distantly on 18/8/63 may have wintered in New Zealand, but appeared to be very white about the face and to have some black underneath. No return migrants had arrived by 15/9/63.

**BANDED DOTTEREL** — Pattern similar to last year.

**WRYBILL** — Numbers fluctuating, but seasonal changes not marked: 6 on 3/11/62, 1 on 22/12/62, 6 on 12/1/63, 13 on 6/3/63, 11 on 15/6/63, 10 on 18/8/63.

**LONG-BILLED CURLEW** — One on 13/10/63, appeared very shy and cowered when a White-faced Heron landed nearby. It was watched stalking crabs, with a much more stately gait than that of the Whimbrel.

**BAR-TAILED GODWIT** — Maximum 300 on 22/12/62; 226 still present on 23/3/63, but only about 6 wintered.

**KNOT** — 14 on 29/9/62, 24 on 3/11/62, 2 on 22/12/62, none in January, one very red on 2/3/63.

**SHARP-TAILED SANDPIPER** — 1 on 13/10/62, not located again till 12/1/63, when 2 were present; 2 on 6/3/63.

**AMERICAN PECTORAL SANDPIPER** — One first seen on 12/1/63, and still present on 7/3/63, the first recorded at this estuary. It

appeared surprisingly small by comparison with the two Sharp-tailed Sandpipers present, but had the very conspicuous gorget, fairly uniform brown streaked colouring above (without rufous on crown), and distinctive call of the American Pectoral Sandpiper.

CURLEW SANDPIPER — One seen on 2/3/63.

RED-NECKED STINT — One on 3/11/62 and one on 12/1/63.

PIED STILT — Pattern similar to previous years; highest count 204 on 15/6/63.

ARCTIC SKUA — 7 just offshore on 7/3/63.

BLACK-BACKED GULL — Usually about 100 in the estuary, and a few breed in rather isolated nests in the less accessible areas. In December 1962 a nest was constructed and vigorously defended just above the normal high tide mark on the exposed flats. Five pairs bred on the open beach three miles south of Manawatu Heads.

RED-BILLED & BLACK-BILLED GULLS — On 12/1/63 there were 35 Black-billed Gulls but only 10 Red-billed Gulls. Usually the latter predominate.

BLACK-FRONTED TERN — 3 on 6/3/63.

CASPIAN TERN — Maximum 35 on 22/12/62. No breeding colonies have yet been found in the district.

LITTLE TERN — One on 3/11/62, in typical eclipse plumage of *S. albifrons*. The first recorded at Manawatu Estuary, though one was seen at Rangitikei Estuary in 1960-61.

WHITE-FRONTED TERN — Common on this coast, 1500 within about three miles on 7/3/63.

— I.G.A., M.J.I.

## SHORT NOTES

### COOT BEHAVIOUR AT OKAREKA

I have been able to make some observations on the habits of the Australian Coot (*Fulica atra*) on Lake Okareka, Rotorua. These birds were first identified by Mr. Blomfield and Mr. Spens-Black in the spring of 1962. Since then, the original pair have been producing two broods, one of two and one of four, giving a total of eight birds altogether. About the end of July this year three disappeared, leaving five; and, so far, I have heard no mention of them on any of the other lakes about Rotorua.

On Lake Okareka itself these birds seem to have confined themselves to a reed-bed on the south-eastern side of the main peninsula. The reed-bed is about a hundred and fifty yards long by about twenty-five yards wide, broken here and there by strips of open water. Here the Coots spend their time with the Pukekos and a small flock of Scaup (*A. novaeseelandiae*), which they treat with a certain amount of contempt as they can both outswim and outdive them. An unsuspecting Scaup is frequently attacked from behind, if it should happen to be sitting in the Coot's line of advance; a flock of them is sometimes taken unawares when a Coot dives from the rear and suddenly reappears in their midst with a beakful of weed.

With their rich black colouring on the upper parts, shading into grey below, Coots look very handsome birds as they move through the water. At a distance when seen from the rear they could be mistaken for Scaup, but when seen from the front the conspicuous white shield above the bill, which shows up plainly over a distance of several hundred yards, leaves no doubt as to the bird's identity.

They obtain most of their food from the lake bed, often leaping from the water like a trout when they dive. They reappear on the surface dragging a bill-ful of water weed, which they shake up and down vigorously for several seconds. The portion that is held in the bill is generally swallowed; the rest is dropped back into the water, and whatever floats loose is quickly picked up off the surface. When they are swimming they may often be observed pecking at insects and bits of vegetation lying about on the water.

As swimmers I have seen no bird their equal; they can out-distance a Scaup with little effort. On one or two occasion I have seen them travel so fast through the water, that they almost swamped themselves with the wave of water that builds up in front of them. As they swim they bob their heads up and down, which seems to give them extra momentum, much like a runner moving his arms.

They seldom bother to fly, except when quarrelling with another member of their species. Then by dint of much flapping of their wings, they get themselves off the water, leaving their legs trailing behind. Their flight is generally not long sustained.

They have a screeching cry, which is not quite so ear-splitting as that of a Pukeko, but it is often kept up for a much longer period. I cannot say that I have found them to be as noisy as reputed. Their alarm note very much resembles the noise made by a cork when it is drawn from a bottle.

I have had no opportunity to observe their nesting. So far this season — it is now early October — the birds that are left do not seem to be showing any inclination to nest, as they are still keeping closely together in the same area.

— HAMISH LYALL

[On 27/10/63 a pair was feeding a brood of seven downy chicks. — Ed.]

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#### RED-CROWNED PARAKEET IN EXOTIC FOREST

On 22/2/62, Mr. C. D. Blomfield saw a Red-crowned Parakeet (*C. novaeseelandiae*) in the centre of the 30,000 acre block of conifer forest, consisting mostly of Monterey Pine (*P. radiata*) at Mihi, about 20 miles south of Rotorua. He was able to watch the bird at close quarters, as it fed among the cones. This may be the first positive record of the presence of this species in a man-made forest.

This occurrence prompted me to investigate the potentiality of the exotic conifer forest in relation to the economy of seed-eating birds. For the following information I am greatly indebted to Mr. A. J. Buchanan, Officer-in-charge, Training Centre, N.Z. Forest Service, Whakarewarewa. Mr. Buchanan writes:

"The influence of birds on the forest is a scientific study on its own. Only the more advanced forestry countries (Germany, Sweden, France, Czechoslovakia and, now recently, Britain) have made a serious study of the problem. As we in New Zealand become more sophisticated, more attention will have to be given to this facet of forestry. The following species are the main plantings in exotic forests and supply the most edible seeds for birds:—

1. Monterey Pine (*Pinus radiata*). From December to February, during the hottest days of the year, the seeds fall naturally from the cones of standing trees. The felled tree cones open any time of the

year after long dry periods, and when sun or fire open the hard resistant cone scales. Cones can remain on the standing tree for some years without shedding their seed.

2. Ponderosa Pine (*Pinus ponderosa*), also called American Yellow Pine. Seed falls December-January. Felled tree cones may open any time of the year, during and after a spell of dry weather.
3. Corsican Pine (*Pinus laricio*). Seed is shed during winter months, June-July.
4. Douglas Fir (*Pseudotsuga taxifolia*). February-March.
5. European Larch (*Larix decidua*). February-March. Like Douglas Fir the cone is soft, the seed being easily taken by birds. The cone is not retained long on the tree, as in the case of the Monterey Pine."

There are of course several other less numerous conifers, e.g. Thuya, Austrian Pine, Lodge Pole Pine, etc., which would doubtless contribute to the diet of seed-eating species, both introduced and indigenous.

— M. S. BLACK



### THE ORIENTAL PRATINCOLE, ANOTHER RECORD

In recording (Falla 1959) the occurrence of an Oriental Pratincole recovered in Nelson, I pointed out that Buller (1898) had undoubtedly been in error in recording the Australian Pratincole based on a specimen from Westport and that the record of Australian Pratincole should be expunged from New Zealand lists.

A third record in New Zealand of the Oriental Pratincole (*Glareola maldivarum*) can now be accepted as the specimen has been sent to the Dominion Museum. It was received from Mr. M. Macarthur, a resident Ranger of the New Zealand Forest Service at Stewart Island. Mr. Macarthur writes that the bird was seen apparently in an exhausted condition on the late afternoon of 29th April, 1963, on the rocky foreshore on the island of Tia off the mouth of Port Adventure. Seasonal muttonbirders were living on the island at the time. They picked up the bird but it died shortly afterwards and Mr. Robin Hopkins, a local fisherman, brought it back to Half Moon Bay and handed it to Mr. Macarthur, who prepared a study skin and determined by dissection that the bird was a female.

The specimen is in adult plumage similar to that of the specimen recorded from Appleby in 1959. Its Dominion Museum Registration number is D.M.10011, and the dimensions are:—

Wing 184;	Tail 66;	Tarsus 33;
Toe 25;	Culmen 13.5;	
Width at gape 13.5 millimetres.		

### REFERENCES

- Buller, W. L., 1898: Trans. Roy. Soc. N.Z., 31, 23.  
Falla, R. A., 1959: Notornis, 8, 5, 126-127.

— R. A. FALLA



### BATHING BY TUI

After a heavy shower of rain on the morning of 10/7/63, I observed a male Tui (*P. novaeseelandiae*) fly into the leafy top of a titoki, and dash about quite violently for five or six seconds in the dripping foliage before emerging. It again immediately flew into, or rather at, the canopy, and repeated the performance, doing this nine or ten times before being apparently satisfied that it was sufficiently wet. It appeared to be a novel or unusual method of taking a bath.

— A. BLACKBURN



## DOES THE BLUE DUCK BLUSH?

The Ruakituri River, which joins the Hangaroa River at Te Reinga, 47 miles south of Gisborne, has a good number of Blue Duck (*Hymenolaimus malacorhynchus*) throughout its length. On a day in January, 1963, a trip through the four miles of steep gorge above the Erepiti Bridge, 12 miles upstream from Te Reinga, produced 18 birds, in parties of twos and threes. This was between 5 a.m. and 8 a.m., whereas from 11 a.m. onwards not a Blue Duck was visible on the same stretch of water, for the reason that during the heat of the day, the birds take shelter in crevices among the boulders. In the late afternoon I stepped down a boulder bank in order to fish a pool, when a Blue Duck fluttered out between my legs and landed on the pool about ten feet away. The colour of the bill of the adult bird, at least in the breeding season, is very pale salmon pink, so that I was amazed to note that the bill of this particular bird was a brilliant "shocking" pink, with a few blotches of slightly paler colour. It is well known that the Little Blue Penguin (*Eudyptula minor*) "blushes" in its feet, which change from white to pale pink when the bird is agitated or upset; and Dr. R. A. Falla states (pers. comm.) that the feet and bill of the Royal Albatross (*Diomedea epomophora*) show a pink colour in similar state. The obvious explanation of the colour in the bill of this particular Blue Duck is that confusion or fright caused a rush of blood to the bill. Such an observation will be unusual, as the species is so completely unafraid of man. Unfortunately the bird flew after a minute or less, so that the recession of the colour was not observed.

— A. BLACKBURN



## COLOUR VARIATION AND LAYING SEQUENCE IN GULLS' EGGS

While carrying out field studies in the breeding of the Black-backed Gull (*Larus dominicanus*) at Napier in 1959, D.H.B. found that the variability of the ground colour and markings of eggs within a single clutch appeared to be consistent with the order in which the eggs were laid. Preston (1957) had previously observed this to occur in eggs of the Laughing Gull (*L. atricilla*) and the Common Tern (*Sterna hirundo*).

Unfortunately, a party of school children destroyed the majority of clutches under observation at Napier before sufficient data could be collected to justify statistical analysis. Nevertheless, based on 58 nests in which the order of laying of all eggs was known, and a further 11 in which the last egg was known, D.H.B. felt that the last egg could be identified in more than 90% of the clutches, though the variation between first and second eggs was less well-marked so that these could be separated with less confidence. In extreme cases, the ground colour of the first egg was brown or dark olive in tone, the markings consisting of dark blotches and spots, particularly at the larger end. The last egg, on the other hand, was almost invariably grey, the markings consisting of small spots and what Preston aptly calls "scribbles." The second egg was either intermediate between the first and second, both as to ground colour and markings, or else tended to resemble the first egg, sometimes sufficiently so to make it difficult to decide the order of their laying, had this not already been known. Occasionally the third egg in a clutch was found to resemble the second in certain other clutches, but in no case in the group of clutches under study were the "scribbles" found on any but a third egg.

In November 1961, E.W.D. and D.H.B. began a study of a colony of Black-billed Gulls (*L. bulleri*) on the Ashley River, Canterbury, a week or so prior to what proved to be the start of hatching. A variation in pigmentation similar to that noted in *L. dominicanus* was found to occur, and the eggs were then marked (with "Maruzen" ink) X, Y, and Z in what was judged to be the order of laying. This was on November 19, and the colony was visited frequently in evenings and week-ends up to December 3, and again on December 9, covering most of the hatching period. This proved to be a fairly difficult test of the theory, as there were only eight 3-egg clutches and 44 of 2 eggs only. Of these we were able to determine the hatching order of six of the former and 26 of the latter. In the 6 3-egg clutches, the hatching sequence proved to be XYZ in three cases, XZY in two cases and YZX in one case. In the 26 2-egg clutches, the hatching sequence was XY in 24 and YX in the other two.

Until it can be proved that the eggs in a clutch of Black-billed Gulls hatch invariably in the sequence in which they are laid, this test cannot be regarded as conclusive, but we suggest that it justifies further investigation by anyone with suitable opportunities to work with large colonies of gulls or terns.

#### REFERENCE CITED

Preston, F. W., 1957: Pigmentation of Eggs: Variation in the Clutch Sequence. *Auk*, 74 (1): 28-41, 4 text-figs., 6 tables, plates 2-4.

— E. W. DAWSON & D. H. BRATHWAITE



#### BLACK-FRONTED DOTTEREL NEAR OAMARU

On 9/10/63, laden with photographic gear, I was crossing the Kakanui River near its junction with the Kauru, a few miles from Oamaru, when I noticed a small dotterel which looked unfamiliar; but I gave it only fleeting attention. When I returned about 4 p.m. and was recrossing the river, I flushed the bird again. It had a distinctive flight and markings, quite different from those of a Banded Dotterel (*C. bicinctus*). I spent the next two hours watching it and trying to secure satisfactory photographs. Some of these I was later able to submit to Dr. R. A. Falla, who was able to identify the bird at once as a Black-fronted Dotterel (*C. melanops*).

— IAN L. MCVINNIE



### NORTH ISLAND FIELD STUDY WEEK-END ROTORUA, 25th - 28th OCTOBER, 1963

When the visitors arrived they learned with regret that the R.O. for Volcanic Plateau, Mr. C. D. Blomfield, had been ill for some time and had gone to hospital. However, Raymond Jackson had been appointed Acting R.O. and he and a band of local stalwarts had performed a prodigious amount of work and organisation and the situation had been well and truly saved. The use of the Tourist Dept's. Social Club Hall had been given free of charge and it was the rendezvous for meetings and the assembly point for outings. On the Friday evening when most members had arrived F. E. Gee welcomed the visitors and outlined the programme. Before midnight all of the thirty-three visitors

had assembled. They came from Wellington, Wanganui, Taranaki, Wairarapa, Hawkes Bay, Gisborne, Bay of Plenty, Waikato, South Auckland, North Auckland and Far North. Local members from Volcanic Plateau included two from Taupo. Thirty-eight members took the field each day.

On the morning of October 26th, with special permission, the party, guided by Raymond Jackson (of the Forest Research Institute) toured the Whakarewarewa exotic forest, the main object being to see to what extent native and introduced birds had adapted themselves to this environment. Stops were made in stands of timber of different kinds — larch-redwood; eucalyptus - pinus patula - pinus radiata (small and large mixed); pure redwood; and larch with coprosma and other native shrubby trees. Of the native birds the Whitehead led in numbers by far, being present at all stops. Others more or less in order of numbers were: Grey warbler, Silver-eye, Fantail, Kingfisher, Bellbird, Tui, Shining Cuckoo, and one pair only of Pied Tit. The Pied Tits had a nest on a ledge of a roadside cutting. The three large chicks were easily seen with the aid of a mirror and the party nearly wrecked the programme by staying a long time watching the parents feed their young. Of the imported birds the Chaffinch led easily. Sparrows, Hedgesparrows, Goldfinches, Blackbirds, Songthrushes and one Redpoll made up the rest.

In the afternoon the mixed colony of Red-billed and Black-billed Gulls at Sulphur Point was studied. Further along were 12 Grey Teal, several Scaup, Grey Shoveler and Mallard ducks, some Dabchicks, a few Black Shags, White-throated and Little Pied, and more than 150 Little Black Shags. Black-backed and Black-billed Gulls, Shags, Dabchicks, Black Swans and Scaup were seen on all lakes visited.

That evening J. L. Kendrick gave his unique tape recordings from Hen Island, off Whangarei, of the many calls of the N.I. Saddle-back and showed motion pictures of this rare bird feeding and displaying. This was a revelation to all, as was also the recording of the calls and wing noise of many thousands of Fluttering Shearwaters, Allied Shearwaters and Grey-faced Petrels, taken as they came to their burrows after dark or left them before dawn. Of individual birds, he showed flashlight photographs. The weird howls and moans of the Little Blue Penguin at night were better known to some. All of this was accompanied by instructive and engaging comment. Pictures of the work of the party were shown and comments given on their scientific pursuits.

The next day was spent at Lake Okareka, where the party had the valued privilege of the use of W. J. Broun's house as H.Q. Only a few yards away on the lake a pair of Australian Coots fed their brood of seven small young. These little ones were really outstanding with their richly russet heads, necks and upper bodies, with a golden "mane" from crown down to back of neck. Some members, using a boat, visited a Black Swan's nest and put up a Bittern. One White-faced Heron was seen and one Caspian Tern, both of these now being not unusual on inland lakes. On this lake there was a high proportion of "smudgy" small shags, coloured partly as White-throated and partly as Little Pied. In the north-east corner some Grey Teal and Shoveler were closely seen and in wet fields Pied Stilts were breeding, one nest of four eggs being found. A Fernbird was heard nearby.

In the evening Raymond Jackson gave a most interesting and informative talk, using slides and blackboard, on bird life in the main

Kaingaroa Forest, from the "cut-over" scrub stage to mature pines, describing the effects on the bird life as growth proceeded. He then showed a fine series of slides of birds and their habitat on the islands of Handa and Isle of May in Scotland. J. L. Kendrick showed "movies" of cave work which has produced many ancient remains of birds. He also showed a tramping trip over the Ruahine Range, where he hopes to find rare birds. Most of the viewers were content to admire this rather than to volunteer for the next trip.

The Secretary of the Society, Mr. A. T. Edgar, took advantage of this occasion to express on behalf of the visitors heartfelt thanks for all that had been done to make the project a success and to ensure the happiness and enjoyment of the participants. He appealed for help in the form of filling in schedules which give the range and distribution of birds for the compiling of the next edition of the Checklist and for work on the Nest Recording Scheme, for which large numbers of cards are needed to provide breeding patterns.

On Monday, 28th, some who had to leave early went to Hamurana, on the north side of Lake Rotorua, to see more of the lake birds and to photograph them. The main portion of the party went to Hongi's Track, between Lakes Rotoiti and Rotoehu, to carry out a bush bird census on the lines evolved and used by E. G. Turbott and P. C. Bull on Hen Island, Three Kings Islands and the Fiordland "Lake Monk Expedition."

Each party is armed with a chart, ruled in squares, with the names of the birds down the left-hand side, names of party, date and locality marked along the top and on the next line the numbers for the stops. At least eight stops are advisable. Each party moves into the bush on its allotted route. The first stop is made when well clear of the starting point. The party sits down in silence and waits for say five minutes to let bird movement become normal. In the next ten minutes or so all sightings or callings are noted and No. 1 column filled in before moving on. The distance to No. 2 stop is governed by the type of bush and terrain and must be far enough to be clear of calls heard at No. 1 stop. Individual loud singers, such as Tui or Thrush, can be ignored, if already recorded. Birds seen between stops, but not at either stop, are added to the next stop. Lures may not be used. Silence is essential, as is also a good knowledge of calls of all birds in the area. The numbers on the whole of the charts are then totalled and percentages worked out for each species.

Six parties set out and a large part of the Hongi's Track area of bush was well covered. Adding all the cards together the results in Checklist order were: Total 411. Harrier Hawk 2; N.Z. Pigeon 8; Shining Cuckoo 15; Longtailed Cuckoo 1; Morepork 1; Kingfisher 17; N.I. Rifleman 1 (plus ?1); Fantail 74; Pied Tit 5; Fernbird 2; Whitehead 8; Grey Warbler 66; Blackbird (some not in bush?) 27; Bellbird 25; Tui 82; Silvereye 54; Chaffinch 23; Parakeet sp., heard, ?1 in area, 2 outside area, not included.

Birds in clearings not included above: Pheasant 9, Californian Quail (some perhaps in bush?) 10; Skylark 5; Songthrush (some perhaps in bush?) 9; Goldfinch 1; Redpoll 2; Myna 14.

This exercise concluded the activities of the Week-end and the travellers set off for home well pleased with all they had seen and done, and grateful indeed to their Rotorua hosts.

— H.R.McK.

## REVIEW

*A Hand List of the Birds of New South Wales* — A. R. McGill. Published by the Fauna Protection Panel, 121 Macquarie Street, Sydney. 1960.

Published by the Panel primarily as a reference for conservationists on the occurrence and habitats of N.S.W. birds, this is, the Foreword states, the first such list. Just over 500 species are listed, which is approximately three-quarters of the species recorded from Australia. This figure emphasises the very wide variety of habitats in N.S.W., which has encouraged a high degree of speciation within many bird groups. Over 100 species are also on the N.Z. list, while many more have either close or distant relatives in N.Z.

It is of interest to note the similarity of the N.Z. and N.S.W. lists of waders and other water-bird groups, the greater richness of oceanic birds on the N.Z. list, and the poverty of the land bird list in N.Z. The comparison emphasises the quite haphazard representation in N.Z. of the land-bird groups of eastern Australia, and the small degree of speciation that has occurred in N.Z.

This is not a mere list of names. With each species is given a brief but clear summary of its distribution and abundance in N.S.W., its characteristic habitat and its breeding range outside the state, whether in Australia or overseas. The classification and nomenclature used closely follow those of the N.Z. *Checklist*. This publication is an interesting and useful reference for anyone who views N.Z. birds in terms of their strong relationship to the birds of eastern Australia.

— B. D. H.

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## NOTICES

### CONTRIBUTIONS TO NOTORNIS, 1964

As the Editor is expecting to be overseas for most of 1964, contributions should be sent to Mr. B. D. Heather, Heretaunga College, Upper Hutt. On a former occasion when the Editor was away in 1957, Mr. Heather kindly acted in his place.

### RARE VISITORS TO WESTLAND

Mr. P. Grant, 10 Hiatoa Road, Karoro, Greymouth, reports that Spur-winged Plovers and black birds, which may have been Rooks, have been seen in several places in Westland. He wishes to be informed of any further sightings and would also like conclusive evidence that the black birds are Rooks. The Australian Raven (*C. coronoides*) is a possible invader.

### PERSONALIA

When Joyce Grenfell visited Auckland and Christchurch in the spring, local members welcomed the opportunity to take her bird-watching. Many species were co-operative, but there were no Tuis for Miss Grenfell.

Another distinguished visitor has been Joy Adamson, the author of "Born Free" and "Living Free."

### OMISSION

The Editor regrets that the name of the contributor, C. J. Lindsay, was omitted at the foot of "Some Notes on the Birds of Norfolk Island" (*Notornis* X, 305).