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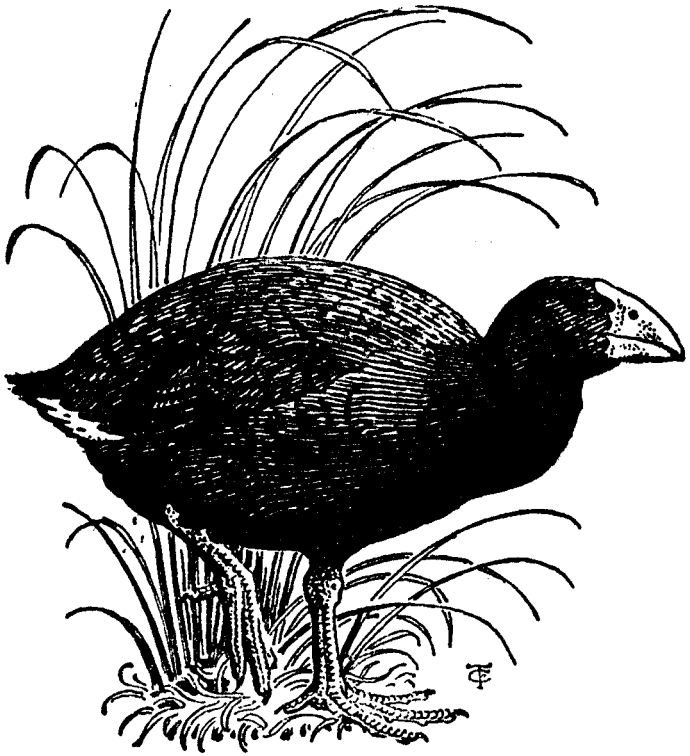
Journal of the Ornithological Society of New Zealand



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THE RELATIONSHIPS OF THE EXTINCT CHATHAM ISLAND EAGLE

By STORRS L. OLSON

ABSTRACT

The extinct subfossil eagle of the Chatham Islands is referable to the genus *Haliaeetus* rather than to *Ichthyophaga* wherein originally described. *Haliaeetus australis,* as it should now be known, is more similar to northern species of the genus, particularly *H. pelagicus,* than to the geographically closer species *H. leucogaster,* and its ancestors probably colonised the Chatham Islands from the Northern Hemisphere rather than from Australasia.

INTRODUCTION

Subsequent to his rediscovery (Dawson 1958) of the material of subfossil birds upon which H. O. Forbes had named several new species from New Zealand and the Chatham Islands, Dawson (1961) called attention to bones of an extinct sea-eagle from Holocene deposits in the Chatham Islands in the collections of the British Museum (Natural History). Although he refrained from naming this eagle, Dawson (1961) concluded that it was referable to the genus *Haliaeetus* but was not closely related to the Australasian species *H. leucogaster,* which geographically is the nearest representative of the genus.

In formally describing the Chatham Island eagle as a new species, *Ichthyophaga australis,* Harrison & Walker (1973) dwelt upon a single, very dubious character of the tarsometatarsus in attempting to show that this species belonged in the genus *Ichthyophaga* rather than *Haliaeetus.* In so doing, they overlooked the major points of difference between the tarsometatarsi of these two genera — differences that indicate beyond question that Dawson (1961) was initially correct on all counts.

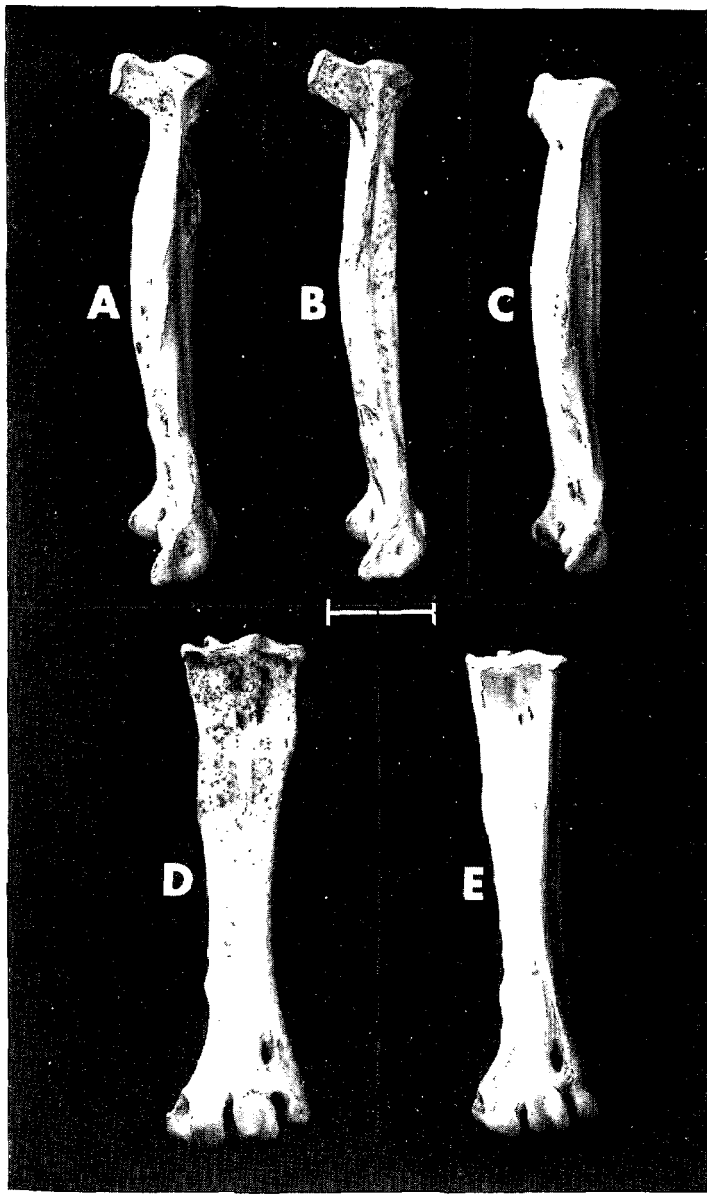

FIGURE 1 — Left tarsometatarsi of **Haliaeetus** and **Ichthyophaga** in medial (A-C) and anterior (D-E) views. (A) **H. pelagicus** (USNM 226265); (B, D) **H. australis** (BMNH A3729); (C, E) **I. ichthyaetus** (USNM 468555). Scale ≈ 2 cm.

The original material of *"Ichthyophaga" australis* consisted of three tarsometatarsi, two pelves, and a scapula, of which I was able to study a paratypical tarsometatarsus (BMNH A3729) and a pelvis (BMNH A3732). Comparative material examined included complete skeletons of 3 *Haliaeetus pelagicus,* 3 *H. albicilla,* 5 *H. leucogaster,* 1 *H. vocifer,* numerous *H. leucocephala,* 1 *Ichthyophaga ichthyaetus,* and 1 *I. nana.*

GENERIC AFFINITIES

Harrison & Walker (1973: 274) considered the Chatham eagle to be referable to *Ichthyophaga* " because of the position of the outer proximal foramen " but they did not make clear just what they intended by this, their " diagnosis " being rather muddled by uncertainty as to what they meant by " external " and " anterior." I can see no significant difference in the placement of the outer (=lateral) proximal foramen between *Ichthyophaga* and *Haliaeetus.* The position of the inner (medial) foramen is quite variable between and within species of these eagles, which would indicate that these foramina are probably not of much use for identification. Although *Ichthyophaga* and *Haliaeetus* are fairly closely related (Olson 1982), the overall structure of their tarsometatarsi is so different (Fig. 1) that confusion between the two could seemingly have arisen only by peering intently at a small hole while ignoring the bone that surrounded it.

The tarsometatarsus of *Ichthyophaga* differs from that of *Haliaeetus* in the following characters: (1) in lateral or medial view the medial calcaneal ridge of the hypotarsus is not nearly as produced plantad and (2) slopes much more gradually to the shaft distally, while in plantar view it is (3) distinctly longer; (4) the lateral surface of the shaft is much wider and flatter, even being slightly excavated, and (5) does not narrow as much proximally; (6) the outer trochlea, in lateral view, is much less elongated; (7) the wing of the inner trochlea is less distinct and (8) angled less plantad; (9) the middle trochlea is much shorter proximo-distally and (10) not as deep when viewed distally; (11) the two ridges of the middle trochlea are of equal distal extent whereas in *Haliaeetus* the lateral ridge extends noticeably farther distally; (12) the anterior surface of the shaft is much more excavated, producing a much sharper lateral ridge with (13) a deep excavation between this ridge and the scar for M. tibialis anticus; (14) the distal foramen is markedly larger; (15) in proximal view the medial cotyla is not as distinctly offset from the medial calcaneal ridge as in *Haliaeetus.* In all of these respects the Chatham Island eagle clearly agrees with *Haliaeetus.* Therefore the species should now be known as

Haliaeetus australis, comb. nov.

RELATIONSHIPS WITHIN *Haliaeetus*

The nearest living species of *Haliaeetus* to the Chatham Islands is *H. leucogaster,* the White-bellied Sea Eagle, which ranges from India

through southeast Asia, Indonesia, and Australia. It would be reasonable enough to assume that the ancestor of *H. australis* arrived in the Chatham Islands from Australasia, although the absence of any resident species of *Haliaeetus* in New Zealand, living or fossil, would be a bit puzzling if this were the case. Geography notwithstanding, the morphology of the tarsometatarsus precludes *H. leucogaster* being involved in the ancestry of *H. australis.*

The tarsometatarsus of *H. leucogaster* differs from that of *H. australis* as follows: although about the same length, the bone is (1) much more slender; (2) the medial calcaneal ridge of the hypotarsus is much more slender; (3) the scar for M. tibialis anticus is shorter, more prominent, and more laterally situated; and (4) the medial cotyla in proximal view is much more rounded and does not project as far medially. *Haliaeetus sanfordi* of the Solomon Islands has been assumed to be closely related to *H. leucogaster* (Brown & Amadon 1968). If this is the case, it can likewise be ruled out as a close relative of *H. australis.*

The closest resemblance of *H. australis* is to the northern sea-eagles such as *H. albicilla,* the White-tailed Sea Eagle, of Eurasia, and particularly *H. pelagicus,* Steller's Sea Eagle, of the coastal regions of northeast Asia. The length of the longest of the three known tarsometatarsi of *H. australis* (BMNH A3729; 97.4 mm) is within the size range of both of these species. The measurement given for this specimen by Harrison & Walker (101.5) appears to be inaccurate because, even if measured from the proximal end of the hypotarsus (rather than from the intercotylar prominence, as I have done), their measurement would be 2 mm too long. The other two specimens of *H. australis* were evidently markedly shorter than the one I examined, however long they may actually have been. The length of the synsacrum of *H. australis* that I examined was 113.7 mm, which is within the range of *H. pelagicus* but larger than in three specimens of *H. albicilla* (of which one was a particularly large individual of the Greenland race). The tarsometatarsus in *H. australis* is more robustly built than in individuals of *H. albicilla* of comparable size and its overall similarity is greatest to that of *H. pelagicus.* It would be very difficult to find any consistent difference between the paratype of *H. australis* that I examined and the small series of tarsometatarsi of *H. pelagicus* available to me, apart from the former being slightly less robust.

The best distinguishing character of *H. australis* that I found is the much wider median ridge between the anterior iliac shields of the pelvis, in which respect the Chatham eagle differs from other species of *Haliaeetus* examined. This character permits the continued recognition of *Haliaeetus australis* as a distinct species.

Thus it would appear that *Haliaeetus australis* could be added to the small number of species of birds that evidently established themselves in the New Zealand region by chance colonisations from

the Northern Hemisphere. Other examples are the so-called Auckland Islands Merganser *(Mergus australis)*, which is now known from subfossil material from the main islands of New Zealand as well as from the Auckland Islands (Kear & Scarlett 1970, Millener 1981), the New Zealand Scaup *(Aythya novaeseelandiae)*, and the Black-billed Gull *(Larus bulleri)*. *Mergus australis* has its closest relative in *Mergus squamatus* of China (Kear & Scarlett 1970), *Aythya novae-seelandiae* is related to the Palearctic Tufted Duck *(A. fuligula)* and the Holarctic true scaups *(A. marila* and *A. affinis)* (Johnsgard 1965), and *Larus bulleri* is more closely related to the Northern Hemisphere *L. ridibundus* group than to any of the gulls of the Southern Hemisphere (Falla 1953).

The above examples notwithstanding, the seemingly isolated position of *Haliaeetus australis* in the Chathams might also be an artifact of relatively recent man-caused extinctions. An extinct species of *Haliaeetus*, different from *H. australis*, is now known from Holocene deposits in the Hawaiian Islands and is believed to have been exterminated since the arrival of man in the archipelago (Olson & James 1982). If this and *H. australis*, which are the only populations of *Haliaeetus* in the Pacific yet known from east of the Solomons, were both exterminated prehistorically by man or man-caused changes in environment, it may well be that eagles of the genus *Haliaeetus* were once much more widespread in the islands of the Pacific and may be expected in fossil deposits from other islands.

ACKNOWLEDGEMENTS

I am grateful to A. Charig of the British Museum (Natural History) (BMNH) for authorising the loan of paratypical specimens of *Haliaeetus australis* for my examination, to P. Houde for arranging and transporting this loan, and to N. K. Johnson (Museum of Vertebrate Zoology, Berkeley, California) and R. W. Storer (University of Michigan Museum of Zoology) for lending comparative skeletal material. The photographs are by V. E. Krantz, Smithsonian Institution. I thank P. R. Millener and J. Yaldwyn for comments on the manuscript.

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SHORT NOTES

ADAPTABLE OYSTERCATCHERS

On 12 January 1983 I visited the shellbanks in the middle of Whangapoua Harbour, Coromandel Peninsula. The main bank is about 500 m long by 5 m wide at high water and is composed of loose cockle shells. It runs north to south. On the northwestern side are several juvenile mangroves *(Avicennia resinifera)* each covering about a metre of shell and on average 250 mm high.

On approaching the bank I noticed two pairs of Variable Oystercatchers *(Haematopus unicolor)* acting as if nesting. I searched the open shellbank without success but on inspecting the mangroves found first one nest and then a second, in separate mangrove clumps about 100 m apart. Both were just inside the perimeter of the mangrove bush, open to the sky, and had a clutch of two. This is the first time that I have seen oystercatchers nesting among living vegetation and wonder if the disturbance caused by holidaymakers and their dogs tramping over the shell and destroying nests has caused this habit. The plight of breeding oystercatchers on the Coromandel Peninsula's popular beaches was well described by the late Alan Jones in *Notornis* 26 (1): 47-52.

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YELLOW BELLBIRDS

In early September 1984, Ken Wright, a forest ranger with New Zealand Forest Service, told me of yellow birds seen in Golden Downs State Forest. Three yellow birds had been seen by a group of workers constructing a track through a 15 ha remnant of hard beech *(Nothofagus truncata)* which is surrounded by exotic forests. I visited the area and saw one Bellbird *(Anthornis melanura)* which closely resembled a canary in colouring. The body was uniform pale yellow with the tail, undertail coverts, primaries and secondaries white. The head and throat were paler than the body, contrasting with a dark brown eye. The pale yellow gape stripe characteristic of female Bellbirds would be indistinguishable in this colour form. The legs were pale pink and the bill also lacked the normal intensity of colour. The bird was seen to associate with others and it appeared normal in song and feeding behaviour. Colour variations of the Bellbird are mentioned briefly by Oliver (1955, *New Zealand birds*, Reed), and although each of the four specimens he described had aberrant white or yellow plumage, none was as vividly or completely coloured as this bird. One of the three birds was apparently a more brilliant yellow than the one described here.

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

BREEDING BY FANTAILS (Rhipidura fuliginosa) ON TIRITIRI ISLAND

By IAN G. McLEAN

ABSTRACT

Breeding by 11 pairs of Fantails *(Rhipidura fuliginosa)* was studied on Tiritiri Island during the 1981/82 breeding season. All pairs observed attempted to breed in late September or early October, but only three pairs laid eggs before November. Eight pairs each produced only one successful clutch. No new nests were begun after early December. I conclude that Fantails may have a shorter breeding season and lower overall breeding success on islands than on mainland New Zealand.

Although two detailed studies of the breeding biology of Fantails *(Rhipidura fuliginosa)* have been published recently (McLean & Jenkins 1980, Powlesland 1982), in neither were individually identifiable pairs watched closely for the whole breeding season. Blackburn (1965, 1966) studied one pair which successfully reared five broods and 15 young in one season.

Fantails are generally described as breeding from August to January or February (Oliver 1955, McLean & Jenkins 1980, Powlesland 1982). This time period is based on first and last sightings of active nests and may not represent the breeding activity of most birds within populations. Here, I describe the breeding activity of 11 individually identifiable pairs of Fantails on Tiritiri Island in the breeding season of 1981/82.

METHODS AND STUDY AREA

I visited Tiritiri Island for about four days twice each month from 1 October 1981 to mid-January 1982. Suitable habitat for Fantails occurs in valleys on both sides of the island and around the cliff edges. The forested valleys are separated by grassland, which Fantails seldom crossed. In 1981/82, each valley contained 1-4 pairs of Fantails. Some birds were colour banded early in the study, and others were identifiable by unusual colour patterns, broken tail feathers, or song. Three pairs were studied in the largest valley, two in each of three other valleys, and one in each of two valleys. The birds studied represented about one-third of all the pairs on the island. Vegetation on the island has been described by Esler (1978) and West (1980).

On each visit to the island I determined the breeding status of each pair by searching for nests or checking nests that had been found previously. I may not have found all nests that were started but abandoned soon afterwards, but I believe that I found most nests in

which incubation was initiated. Parent birds are easily followed to nestlings and fledglings, and I am confident that I found most nests in which eggs hatched and that I found all groups of fledglings.

RESULTS

Ten pairs were watched closely enough through the entire season for me to be confident that I found most nesting attempts. One additional pair that fledged two broods is included in the data on time of breeding because two was the most broods fledged by any pair. Four nests of pairs other than these 11 were found and are included in Table 1.

Success and time of breeding

I saw no dependent or independent fledglings when I first visited the island at the beginning of October. Thus any nesting attempts made in August were not successful. In early October, most pairs were either performing prebreeding behaviour such as courtship feeding or were nest building, suggesting that little nesting activity had taken place earlier in the season.

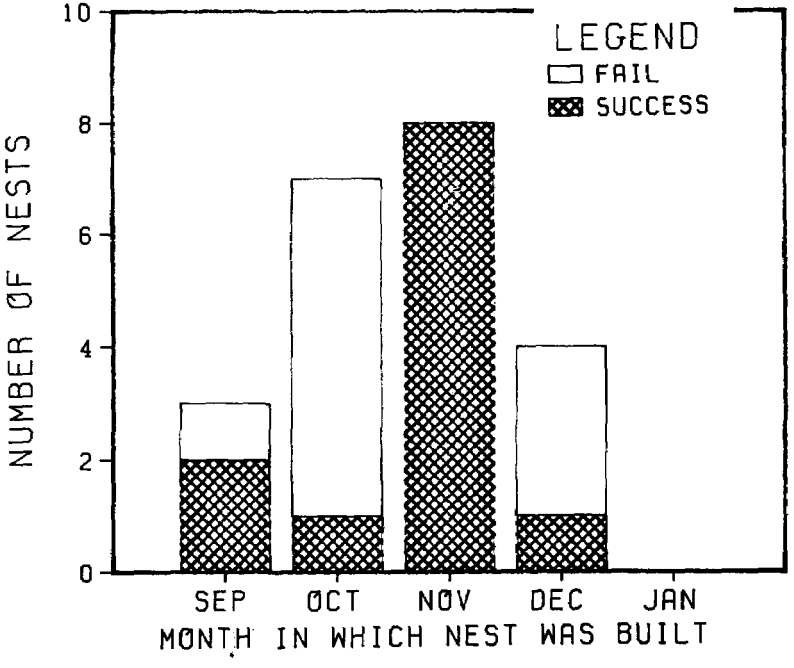

FIGURE 1 — Relationship between time of breeding and nest success for Fantails on Tiritiri Island

The maximum number of nesting attempts made by any pair was three. Four pairs made three attempts, of which one had no success and three had one success (defined as fledging at least one young). Six pairs made two nesting attempts, of which four had one success and two had two successes. One pair made only one nesting attempt, which was successful. The female of this pair had an injured leg when first seen in early October and, although the nest was completed in mid-October, she did not lay until late November. She also laid an unusually small clutch of 2 eggs.

I determined the month in which a nest was begun by observation of nest building, by backdating from known events using known periods of incubation or nestling stage (McLean & Jenkins 1980, Powlesland 1982), or by estimating fledgling age from tail size (see McLean & Jenkins 1980). The injured female is included in Fig. 1 as a November breeder as she did not begin incubation until late November.

All 11 pairs attempted to breed in October. Three nests were begun in late September and 12 nests had been started by the end of October. (Two more nests, which were not completed, were begun in October or November but a definite month could not be assigned). Only three of these nests were successful (Fig. 1), and seven of the 11 pairs had laid no eggs by the beginning of November. All eight nests in which clutches were laid in November were successful. Only one of four nests begun in December was successful. No nests were begun after the first week of December.

Clutch size and success per pair

Nine nests containing eggs were found: one (belonging to the injured female) with two eggs, seven with three eggs, and one with four. These values are minimum clutch sizes because no nests were checked immediately after all eggs were laid and so I could not determine the total numbers of eggs produced.

I determined the number of fledglings produced for all 12 successful nests. Three young fledged from each of two nests begun in late September; two young fledged from one nest begun in October; of the eight nests begun in November, one young fledged from one nest, two fledged from four, three fledged from two, and four fledged from one; three young fledged from the nest begun in December. Mean $\pm$ SD of young produced was 2.5 $\pm$ 0.80. There was no obvious relationship between when nest building started and the number of young produced.

Heights of nests and tree species used

Nest height and tree species used were determined for 25 nests (Table 1). All nests were built in species common in the forest understorey on Tiritiri Island except for one nest that was built in a macrocarpa near the lighthouse station. All but one were built in

TABLE 1 — Tree species used and nest heights for Fantail nests on Tiritiri Island

Tree species	Number of Nests	Height range(m)	Mean height	Use of each species (%)
Cyathea/Dicksonia sp.	6	1.2-3.0	2.0	24
Coprosma sp. (large leafed)	4	1.4-3.2	2.0	16
Coprosma rhamnoides	3	1.5-3.0	2.0	12
Melicytus ramiflorus	3	1.6-2.0	1.8	12
Dysoxylum spectabile	2	1.8-8.0	4.9	8
Macropiper excelsum	2	1.8-2.0	1.9	8
Leptospermum sp.	2	1.2-1.6	1.4	8
Metrosideros excelsa	1	1.2		4
Cupressus macrocarpa	1	2.0		4
Unknown	1	2.6		4
Totals	25	1.2-8.0	2.2	100

the lowest 3 metres of the forest. The high nest (8 m) was not successful. The mean (± SD) height of the other 24 nests was 1.9 ± 0.63 m. There was no significant difference between the heights of nine nests known to be successful (1.8 ± 0.65 m) and 13 nests known to be unsuccessful (2.4 ± 1.77 m; $p > 0.1$, Mann Whitney U test).

DISCUSSION

These results support the contention of McLean & Jenkins (1980) that " the start of breeding probably varies considerably between years and locations in this species." Fantails on Tiritiri Island did not attempt to breed until late September, most pairs did not lay eggs until November, most pairs had only one successful nest, and nests were not begun after early December.

The nest sites, nest heights, and clutch size reported here are typical for Fantails (McLean & Jenkins 1980, Powlesland 1982). Thus,

if the short breeding season and lack of success before November found in 1981/82 were unusual, weather may have been a factor. September and October were cool, wet and stormy, November was warm, and December and January were hot and dry. The areas of forest on Tiritiri are small, and four of the six valleys in which I worked are exposed to the prevailing southwesterly winds. Further study is needed to show whether the 1981/82 pattern of breeding is typical for Fantails on Tiritiri Island. Dennison *et al.* (1979) suggested that Fantails on the Chatham Islands have a shorter breeding season than do mainland New Zealand birds. A shorter breeding season and lower overall breeding success may be typical for island populations of Fantails compared with the mainland.

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SHORT NOTE

HELPER AT A GOLDFINCH NEST

At Queen Charlotte Sound on 24 December 1982, I noticed a pair of Goldfinches *(Carduelis carduelis)* nesting in a kowhai tree outside a window. I tied back some branches to give a clear view of the nest, which was 2 metres from the ground and 3 metres from the window. The nest was too close for binoculars to be effective, or needed.

Observation of the nest was usually from 06:45 to 07:30 and at irregular times during the day. One day I watched for most of the day.

I could tell the birds apart by some variation in the colour of

their bills, but I did not know their sexes. When first noticed the nest contained 4 eggs. Incubating was done by either bird. On four occasions the bird on the nest was fed a grub by its mate. On the third day of observation, I saw a third Goldfinch at the nest, and from then on it remained with the adult birds, taking a turn on the nest and feeding the chicks with the first pair of adult birds until fully fledged.

On 28 December, four chicks were being fed when I started watch in the morning. All food was regurgitated. At feeding times the adult birds stood around the edge of the nest. The first to feed the chicks would point its bill upwards, extending its neck until its whole body look elongated. Reverse peristaltic movements were easily seen in the crop and neck of the bird. The chicks were ready with gapes wide. Suddenly the adult would plunge its bill into the first gape, and then feed the second, third and fourth chick in rapid succession, with no more than 1-2 seconds between each chick. The second adult would then start to extend its bill and body upwards, and the performance would be repeated until all the birds had tried to feed the chicks. All adult birds, except the one feeding, twittered continuously during these episodes.

Feeding was done at intervals during the day. The adults were away from the nest for 10-15 minutes between each feed, and there would be either 4 or 5 feeds in each feeding interval. Every chick was fed at every visit to the nest. I could hear the birds returning to the nest for several seconds before they arrived, and the chicks would be alert and ready to be fed. All adult birds arrived, fed the chicks and departed together.

On three occasions one adult returned with a large green grub (twice) or a spider *(Dolomedes minor)* (once), which was passed between the adults as each took a turn to try and feed the chicks. Eventually the grubs and spider were swallowed by an adult bird.

On the sixth day after hatching, I watched the nest for a whole day. The chicks were fed at the following intervals: 06.50 to 08.05, 09.00 to 09.55, 13.30 to 15.00, 17.15 to 18.30. I did not see the adult birds cleaning or repairing the nest at any time, although they did clean around the eyes and bills of the chicks, usually after feeding. By day 9, the chicks were performing this task for one another. From day 5, the chicks were backing to the edge of the nest to pass faeces. By the time the chicks were fledged the nest was encrusted with faeces, as were the surrounding twigs and leaves.

The chicks were brooded occasionally for the first five days. I did not see the adults brood the chicks after that, nor did I see them on the nest at night, though I did hear them in the tree. On 11 January 1983, two chicks were out of the nest at 6.45 a.m. and the third left at 9 a.m. At 11 a.m. the nest was empty.

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FORAGING AND SOCIAL BEHAVIOUR OF THE WHITE-FACED HERON AT PAUATAHANUI INLET

By P. J. MOORE

ABSTRACT

During a study from January to June 1982, White-faced Herons *(Ardea novaehollandiae)* visited the mudflats of Pauatahanui Inlet in greatest numbers in summer and declined after April as they dispersed to farmland. When foraging, they were essentially searchers, usually wading and walking, but occasionally standing and waiting for prey. They also used more active feeding methods, disturbing prey by foot-stirring, wing-flicking, and false striking with the bill, and pursuing prey by running, wing-flapping and hopping. How they captured and handled prey depended on the prey species.

White-faced Herons maintained variable individual distances using several agonistic displays, including forward and upright displays, chases, fights, and associated calls.

The behaviour of various members of the Ardeidae has been closely studied, particularly in North America. Meyerriecks (1960, 1962) rationalised the terminology of heron social behaviour and classified the standard foraging methods of herons as ' stand and wait ' and ' wade or walk slowly,' and various forms of ' disturb and chase.' Kushlan (1976) reviewed the literature for North American herons and identified 37 distinct foraging techniques. Based on heron behaviour, morphology and ecology, Curry-Lindahl (1971) made a taxonomic revision of 42 species of herons around the world.

Among the few published descriptions of Australasian heron behaviour are studies of Reef Herons *(Egretta sacra)* in Australia (Recher 1972, Recher & Recher 1972) and New Zealand (Edgar 1978). The literature on the White-faced Heron *(Ardea novaehollandiae)* includes a study of stomach contents in New Zealand (Carroll 1967) and a study of feeding behaviour and diet in Australia (Lowe 1983). The ecology of White-faced Herons has been studied in New Zealand on the Kaikoura rocky coast (Spurr 1967a, 1967b), Akaroa Harbour mudflats (Louisson 1972) and Manawatu farmland (Lo 1982). My own study was done at Pauatahanui Inlet, north of Wellington (Moore 1982).

The aim of this paper is to provide a synopsis of the White-faced Heron behaviour that I observed at Pauatahanui Inlet and to relate this information to other studies of herons.

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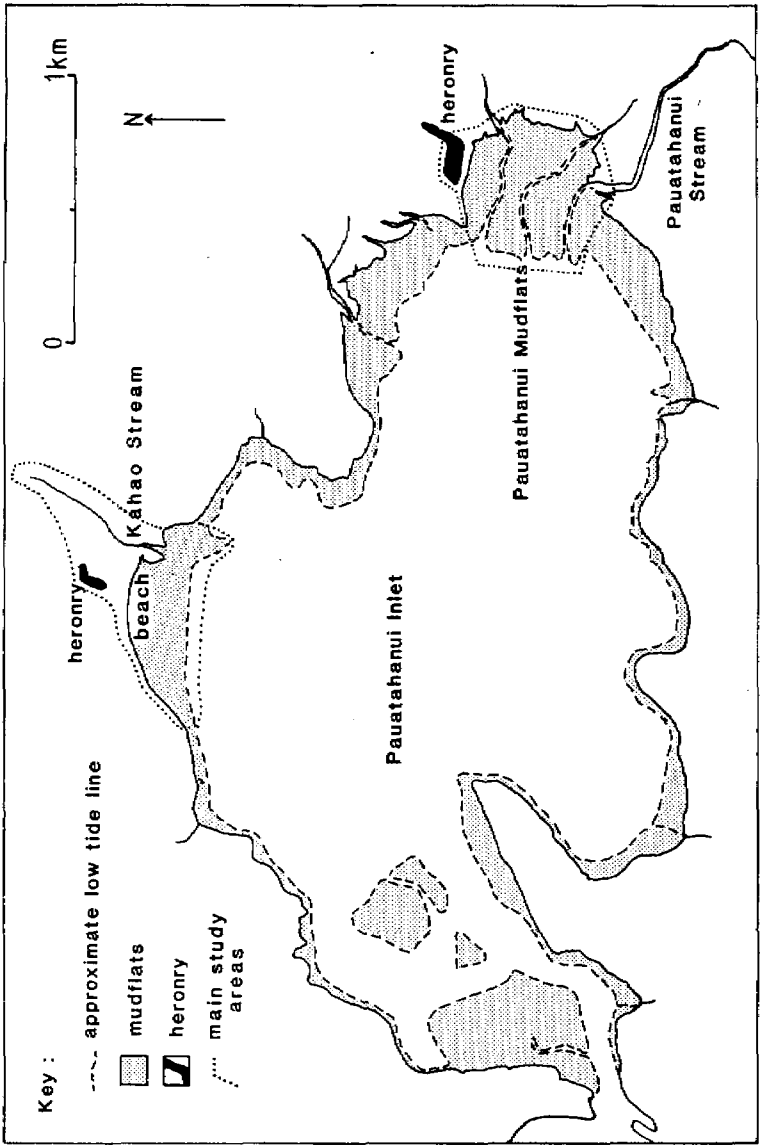

FIGURE 1 — Pauatahanui Inlet

STUDY AREA

Pauatahanui Inlet is the eastern arm of Porirua Harbour, situated north of Wellington on the west coast of the North Island. Because it is a tidal estuary, extensive mudflats are exposed in the main bays at low tide (Fig. 1). Stream channels dissect the mudflats, particularly in the east, at the head of the estuary. Aquatic vegetation covers the less frequently exposed mudflats and includes eel grass *(Zostera capricornii)*, red algae and sea lettuce *(Ulva)*. Small areas of sea rushes *(Juncus maritimus)* are found in northern and eastern parts of the estuary but roadways separate most of the inlet from farmland, and in the west, from city suburbs.

The main study areas were the Pauatahanui mudflats, at the head of the estuary, and the Kahao mudflats and adjacent farmland, on the northern side of the inlet (Fig. 1).

METHODS

Field work was done between January and June 1982, most intensively from late January to early March and during May. Observations were made with binoculars (8x30mm) and a telescope (25x and 60x).

I counted White-faced Herons from the roadside around the inlet and observed their behaviour at the main study areas for several hours each visit. I noted and sketched all heron behaviour. When studying the behaviour of individual herons in detail I used observation periods of at least 3 minutes and used a written code to describe the activity. For this purpose I had categorised 31 actions, for example, walking, standing still, attempting to capture prey, and stirring the substrate with the foot.

SEASONAL AND DIURNAL USE OF THE INLET

At low tide during the summer, between 13 and 42 White-faced Herons foraged on the estuarine mudflats around Pauatahanui Inlet. The highest numbers of herons were attracted to the inlet in calm conditions and when the mudflats were exposed to their greatest extent. Heron activity was influenced by the combined effects of winds and the lunar cycle on the state and timing of the tides and by such direct effects of the weather on feeding conditions as strong winds buffeting herons and stirring up the water.

The Pauatahanui mudflats at the eastern end of the estuary were the most popular feeding ground, especially during summer low tides when up to 31 herons were present. The herons foraged by walking on or wading over mud or beds of aquatic vegetation and wading in stream channels on the mudflats. During high tide, when the feeding areas were flooded, some herons roosted beside the rushes bordering the mudflats, but up to 21 herons gathered at a beach near Kahao Stream on the northern side of the inlet.

At night, herons gathered in trees near the main feeding and

roosting areas. As many as 18 birds roosted at the 'Pauatahanui Heronry,' a grove of tall kanuka *(Leptospermum ericoides)*, while another 16 occupied the 'Kahao Heronry,' a line of macrocarpas *(Cupressus macrocarpa)*. Apparently requiring a certain level of light to feed, herons usually arrived one at a time at the heronries, on average, 21 minutes (SD = 15.1, n = 144) after the official sunset time, and left, on average, 26 minutes (SD = 17.1, n = 93) before sunrise.

After April, the numbers of White-faced Herons that visited the inlet declined and in one count in June only five birds were seen. During this period, herons used pasture adjacent to the estuary more often than in summer.

FORAGING BEHAVIOUR

The White-faced Heron is a predator that depends on vision and captures prey with a variety of methods. Foraging can be divided into searching for prey, disturbing, pursuing, capturing and handling prey.

Searching

When foraging at Pauatahanui Inlet, the White-faced Heron was very much a searcher, using two main techniques.

Wade or walk slowly: Most foraging was done by wading and walking slowly. When walking the heron used a smooth leg action and in shallow water the feet were lifted above the surface with each step. However, when the water was deeper than about 9 cm (the length of the tarsus), the feet usually remained underwater. As a heron walked, the head was moved back and forth, periodically exaggerating the neck movement to search for prey.

Stand and wait: In the least active method of foraging, the White-faced Heron stood still and waited for prey to come into sight or within reach. The stance varied from upright with the neck extended to crouched with the neck retracted. These postures were occasionally used when fishing in or at the edge of deep water or when strong winds made normal foraging difficult. Herons also stood and waited when prey were plentiful and easily caught, such as when flies were attracted to dung-piles or sheepskins.

Disturbing prey

As well as the searching methods of foraging, White-faced Herons used active methods which disturbed prey so that they could be seen and captured.

Foot-stirring: The most widely documented form of active foraging used by the White-faced Heron is foot-stirring. At Pauatahanui Inlet, herons, while looking down into the water, would slowly extend a leg forward, raking or vibrating with the foot, and then withdraw it. Sometimes the same foot was used successively to stir in a small area

TABLE 1 — The use of some foraging methods by White-faced Herons and their feeding success

	Number of Observation Periods	Percent Feeding ± SD Success	Percent Occurrence	
No disturbance	387	50.7 ± 25.3	62.3	
Foot stirs	95	40.3 ± 19.9	15.3	25.1
Foot stirs + False strikes	61	39.6 ± 19.9	9.8	22.4
False strikes	78	46.4 ± 20.5	12.6	
	621			

but usually both feet were used alternately while moving slowly ahead with each stir. Foot-stirring usually occurred over eel grass or algae, and especially in the mudflat stream channels. On one occasion a heron foot-stirred to agitate some high tide debris after it had dropped an insect.

Herons, including juveniles, foot-stirred independently but sometimes several birds in a feeding area foot-stirred at the same time.

Of 621 periods where a White-faced Heron was observed for 3 minutes or more, foot-stirring occurred on 25% of occasions (Table 1). These particular herons caught prey in only 40% of their total capture attempts, which is highly significantly less ($p < 0.01$) than the 51% success for herons that did not use disturbance techniques.

False striking: Before striking at prey with the bill, herons made at least small head movements, presumably because they had seen prey or prey movement. Sometimes, however, I concluded that bill motion had occurred when the heron had not seen prey. I called this activity *false striking*. Typically, a heron would make a series of rapid vertical stabs at the water or substrate when foraging over exposed or submerged eel grass or algae. When a heron did see prey, of course, it often made rapid successive strikes also, but it would be more alert, as shown by eye and head movements, and the strikes would be directed not at one spot but in a sequence and direction that showed it was following an escaping animal.

A characteristic of false striking was that the beak was often opened wider than usual (Fig. 2) and remained open in both downward and upward movements of the head, which was not apparent during normal strikes. The speed of false strikes sometimes varied. For example, in deep water herons slowly immersed the beak and head several times in succession.

False strikes were often associated with foot-stirring and some herons alternated both actions for several minutes at a time. Being nearly as common as foot-stirring, false striking occurred in 22% of observations. Herons which used false striking alone captured prey in 46% of attempts, which is less successful (although not significantly so) than herons which did not disturb prey. However, this level of success is significantly higher ($p < 0.05$) than for those herons which foot-stirred only or those that foot-stirred and false struck in the same observation period.

Wing-flicking: The use of quick wing movements to disturb prey was rare. One wading heron quickly extended and withdrew its folded wings, repeated the action several steps later, and by its quick head movement showed that it had seen prey, which it then tried to catch. Another wading heron flicked its wings twice in quick succession, the second being a full extension. In several minutes, it made three such movements.

Pursuing prey

Once a White-faced Heron had found prey it often had to pursue the animal before it could be caught.

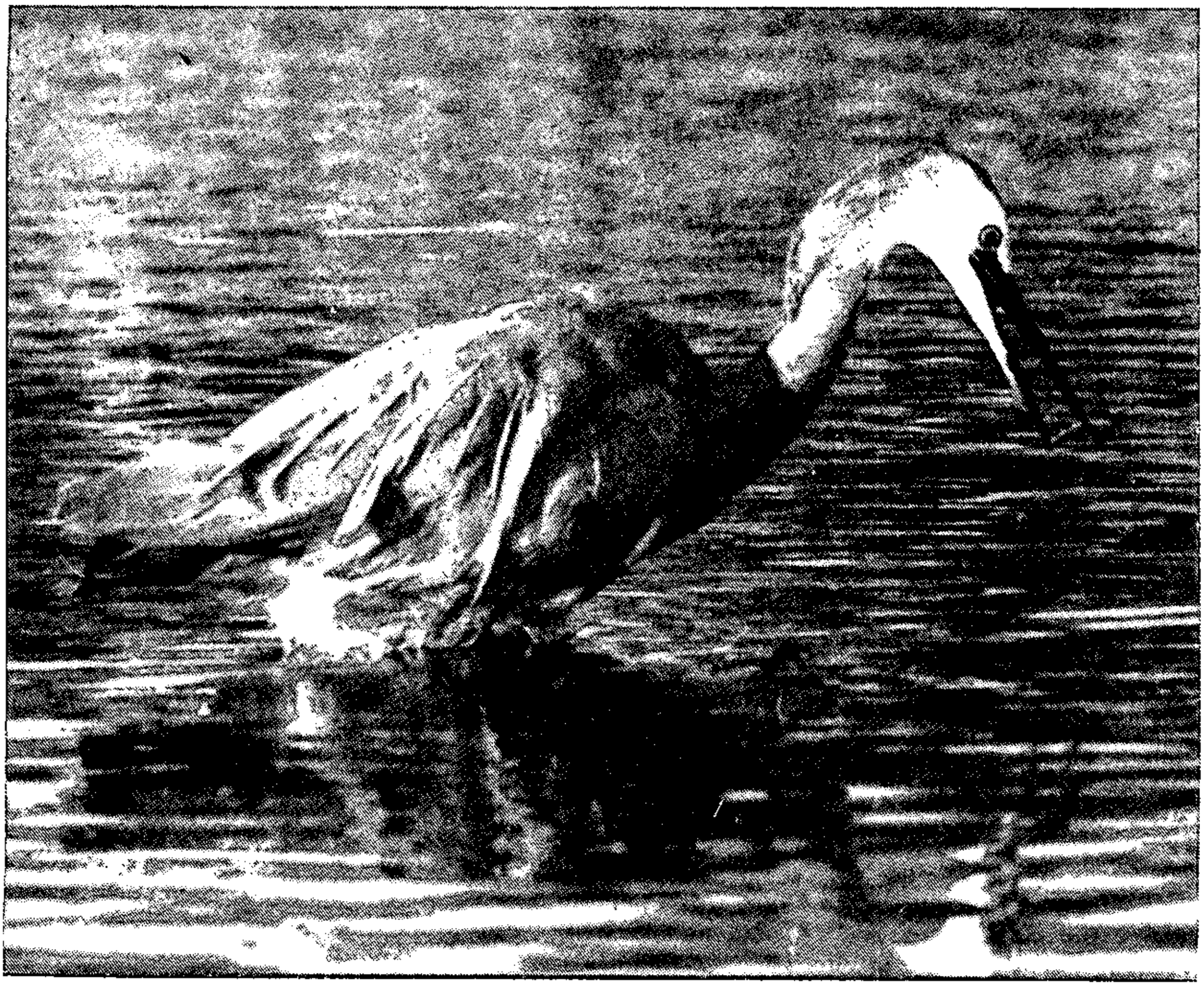

FIGURE 2 — White-faced Heron 'false striking.' The bill is held open wider and for longer than in normal attempts to capture prey

Running: Herons sometimes ran up to 20 paces after detecting prey, in deep water usually lifting their feet above the surface to increase speed. Fish, the largest and most active prey, often had to be chased. Characteristically, the heron ran an erratic, twisting path before attempting a capture, usually a deep thrust of its head into the water. If unsuccessful, the heron would quickly raise its head, scan for the prey, and resume the chase.

Wing-flapping: Occasionally, herons pursued fish in spectacular fashion, running through the water and flapping their wings horizontally. A school of fish was a major attraction and several herons at once would chase prey in this manner.

Hopping: Herons made short jumps or flights (' hops ') while wing-flapping to keep up with escaping fish. At times, this came close to aerial feeding. For example, a heron chasing a large fish flew close to the water with dangling legs, following an erratic course before striking successfully as it landed.

The most unusual example of ' disturb and chase ' foraging that I have seen was a heron on exposed eel grass which made a short erratic flight (' hop ') with trailing legs, looking down as it did so. When it landed it closed its wings, flicked them, made a false strike, and ' hopped ' again. It repeated similar sequences several times but did not capture anything.

Capturing prey

The amount of stealth shown by herons when they saw prey and attempted captures by striking with the bill depended on the prey type. Little happened if the prey was small or lacked special means of escape. This was the case for oligochaete worms in damp pasture, which were struck at as soon as a heron saw them. Usually, though, strikes were preceded by an orientation of the heron towards the prey (e.g. Fig. 3) while walking or after a short run. If interest was sustained, presumably because the prey remained visible and within striking range, the heron leaned forward with the neck curved, poised to strike. This posture varied from looking vertically down, when foraging for polychaete worms in eel grass or algae, to a stealthy, almost horizontal, stance with the body held close to the water, when fishing. When stalking insects above the high tide line or on farmland, herons often swayed the neck slightly while leaning forward.

Depending on the activity of the prey, a strike could occur as a continuation of the orientation movement or after a pause. The neck was rapidly extended and the prey was grasped between the mandibles. The most vigorous strikes were made to catch crabs and, particularly, to catch fish in deep water. The heron usually ran a few steps and plunged its head into the water as it lifted the folded wings away from its body.

FIGURE 3 — White-faced Heron leaning forward and looking down after seeing prey in front of it

Handling prey

After capture, food was usually tossed back into the heron's throat by a quick backward motion of the head, particularly small prey such as insects. Sometimes food was lost in this movement. They had to juggle long prey, such as worms, to get them in the mouth. Herons usually shook crabs, probably to re-position them in the beak before swallowing. They often held larger crabs by the legs and broke the body off with a quick shake of the head, repeating this several times before swallowing the crab's body. Large fish, especially flatfish, were usually carried above the waterline to be dropped and re-oriented before swallowing.

Prey with defence mechanisms had to be subdued. One type of polychaete worm would wrap itself round the heron's beak, and once a heron dropped and struck a worm 16 times before it could be swallowed. Eels acted similarly and writhed vigorously when captured, and on one occasion a heron struck and prodded an eel 425 times in 9 minutes before it was subdued and swallowed.

SOCIAL BEHAVIOUR

Social aggregation

At Pauatahanui Inlet, White-faced Herons generally foraged independently as part of scattered flocks at the major estuarine feeding areas. They were aggressive to one another, maintaining variable individual distances (spacing between birds). Although most herons did not consistently defend foraging areas, one heron in a flock was usually more aggressive than the others. Close aggregations sometimes formed when herons were attracted to within a few metres of each other by a school of fish or the sight of a heron pursuing prey.

In contrast to their almost solitary foraging, White-faced Herons roosted together at high tide during the day. They also gathered at night to roost and sleep at two heronries adjacent to the estuary. especially in summer. A family group roosted some distance away from the Kahao heronry.

Agonistic display

White-faced Herons used several displays to keep others away. The intensity and apparent causes of displays could vary. Figure 4 shows the various agonistic displays, divided into those tending toward attack and those tending toward escape. The lines joining the actions allow for different combinations of displays in any social interaction. Aggressive displays could result in the other heron displaying aggressively also or, more often, submissively.

Aggressive behaviour often caused disorder among a flock. For example, a heron supplanted from its position at a day roost could displace a neighbour, resulting in a chain reaction. However, a social hierachy was not apparent because a supplanted heron would sometimes return to its position and displace the original antagonist.

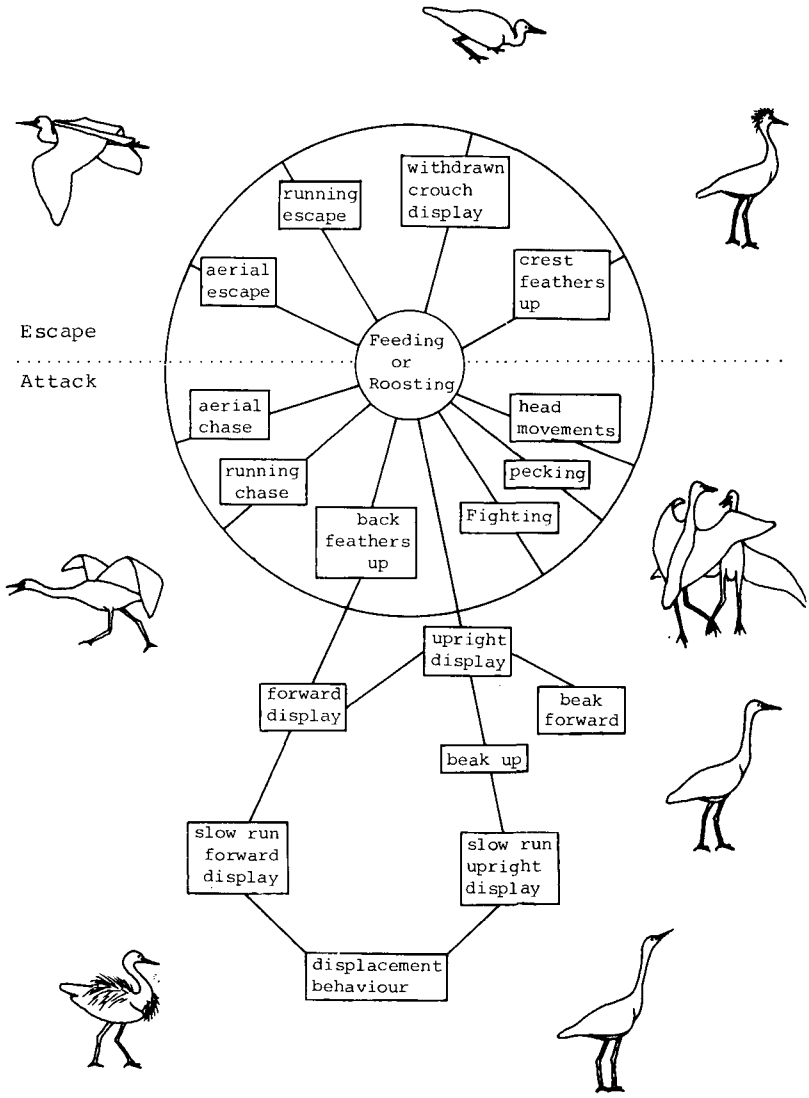

FIGURE 4 — Agonistic displays, showing corresponding attack and escape tendencies. Lines indicate sequence of events and the many combinations of displays.

Forward display: When a heron came too close to another, the defender erected the long plumes of its back and the feathers of its chest (Fig. 4), and the intruder usually moved away. The distance between herons could be less than 1 metre when the herons had congregated during high tide, or more than 10 metres when feeding on the estuary.

In a more intensive version of the forward display the chest was held further forward and down than normal, the wings held out from the body and down slightly, and the neck curved back over the body with the beak pointing forward, usually toward the intruder. This intimidatory posture increased the apparent size of the heron.

Normally, in response to the forward display, the neighbouring heron raised its crest feathers (Fig. 4) before moving away, but if not, the antagonist, while still in the forward posture, walked towards or parallel to its neighbour. The second heron might then retreat, but sometimes it became equally aggressive and both would begin a slow strutting run parallel to each other.

Upright display: Apparently as an alternative to other aggressive displays, the heron extended its neck upward without raising any feathers. The approach of a heron to a day roost was sometimes prevented by the occupant rapidly extending its neck with its beak pointed forward. Occasionally, successive forward head movements were exchanged before one heron moved away.

Another upright display was used when two herons were equally aggressive, sometimes displaying up to 20 metres apart on a feeding ground. Both birds fully extended their necks with the beaks inclined upwards and took small steps forward and back perhaps expressing a conflict between attack and escape tendencies. Once, two herons were observed running parallel to each other in this upright posture. One heron then ran in small circles and began a forward display while making slow, apparently ritualised strikes and foot-stirs. Although these seemed an integral part of the display, they may have been irrelevant displacement behaviour resulting from the conflict situation. Often, after an encounter, the birds would repeatedly peck at twigs and the substrate.

Upright displays were highly aggressive and, although they look similar to alert postures, the latter were used in response to disturbance by humans or Australasian Harriers *(Circus approximans)* and seemed to have in them a strong element of escape as well as being a means of watching the intruder's progress. Perhaps the clear signals of the alert postures have been ritualised into the upright displays.

Chasing: Less stylised interactions included chases. When a heron ran directly at another it usually extended its neck forward and flapped its wings. At other times an antagonist flew at another heron and chased it away or relentlessly pursued it with its neck outstretched. The escaping heron always flew with its neck retracted and tried to

evade the antagonist by turning and circling. Whenever herons were grouped while foraging, they would eventually be dispersed by an aggressive heron sweeping over them. Once, in response, a heron crouched close to the substrate with the head withdrawn (Fig. 4), a submissive posture.

Fighting: Actual combat was rare. Two herons would face each other, wings flapping, and rise up a few metres while jabbing at each other with their beaks. No contact was apparent and the encounters soon ended with one heron leaving. Roosting herons sometimes pecked at their neighbours.

Vocal display: The main call has been described as a repeated guttural *graaw* (Moon 1967). There were subtle differences in pitch and note within and between calls, depending on the individual and the situation. Herons often advertised their arrival at feeding grounds, particularly at dawn, by making three or four long, loud calls. The calls were softer as herons flew from a heronry but were loud strangled cries as they flew after a fight or disturbance.

Social calls also varied and were most often heard at heronries. When a heron landed near another, it called a version of *griaaw graaw bock bock bock.* Sometimes both herons then uttered short high-pitched sounds best described as loud chattering. Another call, a high screech, was heard whenever a heron flew into a heronry and was apparently repulsed by another heron. At dawn, when herons awoke and gradually became active, they made short and high *garik* calls which were probably contact calls.

Juvenile behaviour

Several juveniles were seen regularly at Pauatahanui Inlet in summer. They were easily distinguished from adults by their lighter grey back, wings and breast feathers; very little white on the face, apart from feathers around the eyes and chin, continuing as a thin line down the throat; white downy abdominal plumage; and the lack of plumes on the back.

At the Pauatahanui mudflats, a juvenile and an adult came and went together several times during most feeding periods in February. Two other juveniles which were usually in the vicinity of the Kahao Stream-mouth also interacted with an adult, presumably their parent. These juveniles often fed together in the stream or around drying sheepskins on the farm nearby and therefore had a different activity pattern from many adults that responded to the estuary tides. However, when not feeding they sometimes joined the adults on the beach at high tide.

The parent also foraged in the stream and on the farm, probably because it needed to forage at high tide to sustain itself and its offspring. Several times a day it landed, calling loudly, near a juvenile, which responded by opening its beak widely, revealing the bright

red mouth, and 'begging' with its wings slightly open and its legs bent and well spread. The adult usually erected its crest and ran off, scattering nearby herons, with the juvenile in close pursuit, until it managed to grasp its parent's beak and stimulate it to regurgitate a meal.

Courtship

In May, I observed two herons that regularly foraged together on a small area of pasture and at a dump of sheep carcases, and that roosted in the same stand of macrocarpas at night. During the day, they spent 40% of their time resting and preening on pasture, fence posts or tall trees, especially in the late morning and again in the early afternoon.

During these roosting periods the herons' social behaviour suggested pair-bond formation. One heron would raise its back plumes when close to the other and usually move a few paces away. Sometimes the other heron delicately snapped its beak at the first's back or tail. Once, the first heron then picked up a twig and dropped it at the feet of its companion, which also grasped the twig. When they moved apart the first heron began pecking at a grass stem in apparent displacement behaviour.

DISCUSSION

Function of foraging methods

Foot-stirring, one of the most important methods that White-faced Herons used at Pauatahanui Inlet to disturb prey into movement, is widely documented for other heron species. A heron should forage in a manner with the least cost in energy while gaining the most energy in the food available. Therefore, although foot-stirring herons captured less food than those that did not disturb prey or those that false struck, the method must have been more efficient in other ways, for example, for capturing favoured types or sizes of prey or for foraging under certain environmental conditions. Imitation of relatively successful feeding methods may also be involved because foot-stirring flocks sometimes occurred.

False-strikes may also be used by White-faced Herons to disturb prey, particularly as foot-stirring was often used at the same time, and as they were used only over aquatic vegetation, where prey could be hidden. Alternatively, this use of the bill may be a displacement activity because sometimes a heron which had apparently seen prey movement ran forward, stared down for several seconds as if the prey had gone, and made several false strikes. If these strikes are acts of frustration and can accidentally disturb prey, birds may come to use them for deliberate foraging.

False-striking herons were more successful than foot-stirrers except when both methods were used. This suggests that in situations when feeding success will be low, false striking has less effect on that success than foot-stirring.

Although false striking has not been recorded for White-faced Herons before, it is not localised, as I have seen them doing it at Waikanae, Whakaki Lagoon, Lake Wairarapa and in Australia. This behaviour may be more widespread in herons than is realised because Willard (1977) described a similar activity in a study of five North American herons as ' sandpiper-style pecking ' or ' repeated rapid striking with no apparent orientation toward individual prey items.' However, the herons were not particularly successful using this feeding method.

Wing-flicking probably disturbs prey into movement by casting shadows over the water. Meyerriecks (1962) believed that more complex wing movements, ' open wing,' ' underwing ' and ' canopy feeding,' reflect an evolutionary sequence in herons. If this is so, the White-faced Heron has apparently developed only as far as wing-flicking. Spurr (1967b) believed that the pursuit activity that I have described as ' wing-flapping ' was actually ' open wing feeding,' although other species hold a wing out and whirl the body to disturb prey. The White-faced Heron behaviour seems more akin to that of the Louisiana Heron *(Egretta tricolor)* whose flapping wings seem to herd fish as the herons run (Jenni 1969).

Rare foraging methods that have been described for the White-faced Heron but were not seen at Pauatahanui Inlet include ' foot-dragging,' ' hovering ' (Spurr 1967b) and ' head tilting ' (Lowe 1983). Future studies in varied habitats are likely to reveal the use of other techniques.

Social behaviour

The variety of agonistic displays used by White-faced Herons serves to reduce dangerous fighting while maintaining their individual distances. This aggressive behaviour at the feeding grounds probably reflects the compromise between the need for spacing out to prevent undue prey disturbance and the advantage of flocking to locate prey patches, as described for the Great Blue Heron *(Ardea herodias)* (Krebs 1974).

Comparison with other herons

Kushlan (1976) listed 28 foraging methods that were used in various combinations by 12 North American species of heron. By using at least 9 methods the White-faced Heron has a more varied behaviour than bitterns and most night herons; uses a similar number of methods to inactive day herons such as the Great Blue Heron; and less than active herons such as the Snowy Egret *(Egretta thula)*, which uses 17 methods.

In North America, where many heron species live sympatrically, they use different foraging zones and feeding methods and thus take different prey, which presumably has the effect of reducing interspecific competition (Willard 1977). The influence of competition on White-faced Heron behaviour is unknown, but since there are few sympatric heron species in Australasia this factor may be less important

than in North America. This may explain the White-faced Heron's generalist diet.

In general, smaller heron species (e.g. Snowy Egret, 64 cm long) have very active courtship, agonistic and foraging behaviours, whereas larger herons (e.g. Great Blue Heron, 127 cm) are rather inactive (Meyerriecks 1960). In contrast, the White-faced Heron (66 cm) seems to be inactive for its size, foraging mainly by slow walking and seldom being violently aggressive.

The White-faced Heron could be regarded as ' semi-social ' because it roosts socially but is relatively solitary when feeding and breeding. This is the reverse pattern to that characteristic of North American semi-social herons which are normally solitary but form colonies to breed (Meyerriecks 1960). Because the Reef Heron is usually a solitary nester, and the White-necked Heron *(Ardea pacifica)* in Australia sometimes is also (Hancock & Elliot 1978), the breeding colony may be less important as an anti-predator device in Australasia than in North America, where few sites are free of avian and mammalian predators (Jenni 1969).

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A BIRD IN THE HAND: ANDREAS REISCHEK AND THE STITCHBIRD

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ABSTRACT

Early accounts of Little Barrier Island by Andreas Reischek emphasise that the Stitchbird was very rare there in the 1880s. Re-examination of the original accounts, in conjunction with dated specimens, suggests that the Stitchbird was in fact very rare in 1880 and 1882 but increased markedly in 1883 and 1885. The rarity of the species on Little Barrier in 1880 and 1882 coincided with its extinction on the mainland and may have been due to introduced disease. However, several fluctuations in population size have taken place since. At least 78 and up to 130 of the 181 extant 19th-century specimens were taken by Reischek.

INTRODUCTION

The Stitchbird *(Notiomystis cincta)* once occurred throughout much of the North Island and on Great Barrier, Little Barrier, and Kapiti Islands. In the 1870s it declined rapidly, and by the mid-1880s it had vanished, except for a remnant on Little Barrier. The last mainland record was of one seen in 1883 in the Tararua Range (Buller 1888). The Stitchbird was thus one of the first passerines to disappear after the arrival of Europeans. Its extinction in the North Island preceded by several decades those of the Huia, Piopio, and Bush Wren. The causes of the Stitchbird's decline are unknown, but predation and disease have been suggested.

If predation was the cause, the black rat *(Rattus rattus)*, an arboreal nest-predator, is most likely to have been responsible because its spread through the North Island in the 1870s (Atkinson 1973) coincided with the period of the Stitchbird's greatest decline. Of the other potential predators Norway rats *(R. norvegicus)* and feral cats *(Felis catus)* were widespread early in the 19th century, well before the Stitchbird's major decline, and mustelids were not introduced until the mid-1880s, after the species had gone (Wodzicki 1950).

Oliver (1955) suggested that the Stitchbird was swept away by disease. Between 1860 and 1880, 90 species of exotic birds were introduced to New Zealand (Wodzicki 1950). The Stitchbird could have been vulnerable to pathogens brought in with these birds.

The Austrian collector Andreas Reischek visited Little Barrier several times between 1880 and 1886. In his early accounts (Reischek 1885, Buller 1888) he emphasised the rarity of the Stitchbird. Reischek's observations contrast markedly with those of both earlier and later

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visitors to Little Barrier, most of whom found the Stitchbird to be not uncommon.

Little Barrier remained free of black rats and other European predators except for feral cats. Stitchbirds coexisted with cats on Little Barrier for over a century and, despite cats, had recovered by the 1890s. Cats alone are unlikely to have caused a reduction of the extent described by Reischek. If a decline did occur on Little Barrier in the 1870s or 1880s introduced disease is the most likely cause, carried there by the House Sparrow, Greenfinch, Blackbird, or Song Thrush; all had reached Little Barrier by the 1880s (Reischek 1886).

Because it may be relevant to the Stitchbird's decline on the mainland, I review here the sometimes contradictory accounts of Reischek and others on the status of the Stitchbird from the 1860s to the present. I also present information on Stitchbird specimens in New Zealand and overseas museums, many of which were collected by Reischek, and compare it with the original accounts.

THE ACCOUNTS

The first record of the Stitchbird on Little Barrier was that of Hutton (1868), who spent four days on the eastern side in December 1867 and found the species to be "not uncommon" (Buller 1873, Reischek 1885). Hutton is not known to have collected any specimens.

Among Reischek's first-hand accounts of bird species on Little Barrier in *Transactions of the New Zealand Institute,* one dealt with the Stitchbird (Reischek 1885). Additional information on Reischek's expeditions appeared in Buller's second edition (1888) of the *Birds of New Zealand.* Buller said that "Mr. Reischek has communicated to the New-Zealand Institute . . . a short account of his expedition in search of [the Stitchbird]; but I prefer to give, in my own words, the more detailed information obtained from him immediately after his return."

In addition, some of Reischek's letters in German to Julius von Haast mentioned his trips to Little Barrier. One of these, dated 29 December 1883, goes into some detail on his observations of the Stitchbird (see Appendix 2).

Reischek died in 1902; in 1924 his son, Andreas Reischek junior, published *Sterbende Welt,* an account (in German) of his father's New Zealand work derived from the senior Reischek's original field notes and diaries. A considerably rearranged and edited English translation by H. E. L. Priday appeared later under the name *Yesterdays in Maoriland* (Reischek 1930). Both books contained considerable information on the Stitchbird.

The exact dates of Reischek's trips are difficult to determine. His original accounts are often vague and are sometimes contradicted by *Sterbende Welt* and *Yesterdays in Maoriland.* In addition, the latter are sometimes internally inconsistent, probably because they were compiled many years after Reischek's death (King 1981).

Reischek made five trips to Little Barrier (Reischek 1886), not counting two occasions when bad weather prevented his landing. On his first trip, in October 1880, he searched the "western and south-western parts of the island" (Reischek 1885) for three weeks (Buller 1888, Reischek 1883) or six weeks (Reischek 1924), but did not see any Stitchbirds at all. He did not penetrate the central part of the island at this time.

In May 1882 he sent his assistant Dobson to the island. After three months Dobson succeeded in shooting a pair but "knocked them to pieces with heavy shot" (Buller 1888). Reischek twice tried to join Dobson, in June and July, but was prevented by heavy seas (Reischek 1924, 1930). However, in the 1924 account Reischek later described collecting a Kaka's nest and four small nestlings with Dobson on 17 June. Because Kaka are normally summer breeders I suspect this date must be an editor's error and that the incident took place on some other trip.

On 15 October Reischek finally landed, and he and Dobson immediately set off for the interior from the southeastern side. Reischek did not hear a Stitchbird until 23 October and did not see one well until the 25th, which "disappeared before [he] attempted to use [his] gun" (Reischek 1885). Although he often heard them after this, he did not see another until 7 November and succeeded in shooting a pair the following day. Reischek collected an unfinished nest nearby, which he presumed to belong to this pair. Buller exaggerated the time Reischek searched unsuccessfully, saying that "[a]fter five weeks' continuous search . . . he was at length rewarded by the sight of [a Stitchbird]." In *Sterbende Welt* Reischek specified that he was able to shoot only four specimens on this trip. By this account he left the island on 10 December, but according to the von Haast letter he stayed until January 1883.

In early December 1883 Reischek returned to Little Barrier and once again visited the central part of the island. He spent only 10 days in the field, during which time he had very bad weather (Reischek 1883). The 1930 account reads in part: "I went partly at the request of Sir Walter Buller, for whom I procured specimens of which his collection was deficient. To my great joy I found this rare bird [the Stitchbird] had increased since my last visit, which I put down to the fact that I had on that occasion shot a number of wild cats and the older male birds. I was able to watch whole families of them . . . ." He also noted that he "often" found the remains of Stitchbirds in the crops of Moreporks he had shot. It is unlikely that Moreporks take Stitchbirds out of proportion to their abundance; if Reischek's remark is true it implies that Stitchbirds were very common. On 19 December he returned to the small Maori settlement on the southwest coast and several days later went back to Auckland.

Buller's (1888) account of this trip differs somewhat. Buller stated that he asked Reischek to collect Stitchbirds for him in 1884,

not 1883. According to Buller the Stitchbird was still rare at this time, and although Reischek " was fifteen days on the island [he] did not even hear [it] till within the last three days of his stay." Reischek's earlier accounts (1883, 1885) also made no mention of an increase of Stitchbird numbers in 1883.

Reischek revisited Little Barrier on 8 April 1885 " to procure specimens for the use of New Zealand museums " and remained until mid-May (Reischek 1930). Both the 1885 and 1930 accounts state that this was his last expedition to the island. However, elsewhere Reischek said that he " visited [Little Barrier] five times, spending in all about ten months " (Reischek 1886). The four visits described above account for between five and eight months, depending on which of the versions is followed. Several specimens dated 1886 suggest that Reischek revisited the island in that year (see below), although these do not bear his name on the labels. Reischek was employed by the Auckland Institute and Museum in 1885 and 1886 and would have had opportunity to revisit Little Barrier. This final trip postdated the 1885 account and was evidently overlooked by Reischek's son in compiling *Sterbende Welt.*

According to Buller (1891), no collector went to Little Barrier between Reischek's last expedition and 1892, when an " Auckland collector " visited the island " for a few hours only, for the purpose of getting specimens [of the Stitchbird], several of which were obtained " (Buller 1892, 1905). Charles Robinson, who served as temporary ranger on Little Barrier from 1893 to 1896 (Hamilton 1961), remarked that at that time the birds were in " an unmolested state " and ". . . the song from the tui and bell-bird is a perfect ding-dong " (Robinson 1895). Boscawen (1895) found Stitchbirds to be " not uncommon up the head of the Weka-weka [probably Awaroa] Creek. One hears them, but they are hard to see in the thick bush."

The Auckland Institute Annual Report for 1895 recorded that, although Robinson and the resident Maoris were unaware of any collectors visiting Little Barrier that year, there were persistent rumours that such visits had occurred. Inquiries failed to prove or disprove the rumours (Auckland Institute 1895).

R. H. Shakespear was the first permanent caretaker on Little Barrier. He and his family arrived on 19 January 1897 and made several trips to the interior during the first few months of their stay. His sons saw a Stitchbird on their second trip inland on 7 February. Shakespear himself glimpsed a Stitchbird on 24 February but did not get a " good view " of one until 25 April (Shakespear 1897). The frequency of sightings suggests that, although Stitchbirds were rather uncommon, they were not as rare as in 1882. No collectors were known to have visited the island between 1897 and 1907 (Auckland Institute 1897, 1899-1904, Drummond 1907).

Drummond visited Little Barrier for two weeks in early 1907. He saw no Stitchbirds until he climbed to the central parts of the

island. He then saw seven females in one day on a track near " Herikohu " peak. He reported that Stitchbirds favoured the north of the island, keeping to the " rugged parts." They were numerous there, up to 15 being counted " at one time." Shakespear, still caretaker, was then of the opinion that Stitchbirds were increasing (Drummond 1907).

Guthrie-Smith (1925) visited the island from October 1919 to January 1920. He saw Stitchbirds on his first day on the island and later found five nests. Oliver (1922a, b) noted that in " certain places . . . a few can nearly always be seen." Robert Nelson, caretaker from 1911 to 1932, wrote in 1930 that " there was a time when it was difficult to find a single Stitchbird, but ' I counted four on one particular morning, and on another occasion I saw fourteen in two hours ' " (quoted in Gordon 1938).

Sibson (1947) found that Stitchbirds were easily seen and located in December 1946 and considered the species to be " flourishing." McKenzie (1948) heard them near the caretaker's house every day during his trip in June 1947. Dawson (1950) saw Stitchbirds every time he went into the Te Waikohare Valley behind the caretaker's house during a visit in November and December 1949.

Kikkawa (1964) saw Stitchbirds regularly in 1959 and conservatively estimated the population at 200 pairs. Gravatt (1969, 1971) studied the Stitchbird in 1967 and 1968 and agreed with Kikkawa's population estimate. However, Kikkawa and Gravatt both worked primarily in areas that were relatively poor habitat for Stitchbirds. From March 1982 to April 1984 I ran transects, similar to those used by Kikkawa and Gravatt, in a representative sample of forest types on the island at intervals of six weeks. Using the census data in Kikkawa (1964) and Gravatt (1969), I recalculated population densities based on present knowledge of Stitchbird distribution in different forest types. A more likely population estimate for these years is in the order of 800-1200 birds. In the mid-1970s the population appears to have been about 1000 (C. R. Veitch, unpublished data). In the late 1970s and early 1980s, the population increased dramatically, perhaps six-fold (Veitch 1980 and unpublished data; Angehr unpublished data), from c. 1000 to c. 6000.

THE SPECIMENS

I have located 181 19th-century Stitchbird specimens (skins, mounts, and skeletons) worldwide (see Appendix 1). In common with most old museum specimens, the data on these is often lacking or questionable, and few labels carry information simultaneously on locality, date of collection, and collector. Frequently labels have only the year the specimens were registered by a museum or collection, rather than the actual date of collection or acquisition, and bear the name of the owner of the collection rather than that of the collector.

With the exception of 6 skeletons and 13 skins in Vienna

(Naturhistorisches Museum Wien), no specimens still bear Reischek's original labels. However, 55 specimens from Little Barrier (counting those from Vienna) have dates coinciding with Reischek's trips. The six skeletons in Vienna are all dated 1882. Twenty specimens are dated 1883 (16 of them December), and 29 are dated 1885 (one of them April). In addition, two skins originally in Buller's collection are labelled March 1882, apparently too early for Dobson's arrival in May of that year. I suspect there has been some confusion of dates, either in Reischek's account or on the labels, which may not be originals.

Six Little Barrier specimens are dated 1886 (two of them July) and probably were taken on Reischek's fifth trip (see above). Four more without specific dates, in the Auckland Museum and the Oberosterreichisches Landesmuseum in Reischek's home town of Linz, Austria, can also be attributed to Reischek with some confidence. Eleven more Little Barrier specimens were originally in collections (Rothschild, Buller, and Spencer) to which Reischek is known to have made major contributions, although these lack collector's name or date.

There are eight more specimens from Little Barrier, one of which rather puzzlingly bears the date March 1893. This date seems too late for the trip referred to in Buller (1892), unless this is a registration or preparation date. One specimen labelled " North Island 1892 " could be the last mainland bird collected but is more likely from the trip to Little Barrier mentioned by Buller.

Two skins collected in 1875 " near Wellington " are the only specimens from a specific mainland locality. However, owing to the difficulty of landing on Little Barrier it is likely that most specimens taken before 1880 were from the mainland. Twenty-five specimens have collection or registration dates between 1839 and 1877 but no specific localities, although some of these are labelled " North Island." Another 14 specimens are labelled " North Island " without dates.

Fifty-three specimens lack any good information on dates, locality, or collector. Mainland specimens have significantly greater wing-lengths than those from Little Barrier (Angehr, unpublished data), although there is a great deal of overlap. Measurements are available for 35 of these " orphan " specimens. Three can be identified as mainland birds by measurements, but none can be identified unequivocally as Little Barrier birds. However, the overall distribution of available measurements suggests that a large majority of these specimens were collected on Little Barrier.

DISCUSSION

In all, 78 specimens can be assigned to Reischek with some degree of confidence (including the 63 dated between 1882 and 1886, four attributed to Reischek without dates, and 11 undated specimens from the Rothschild, Buller, and Spencer collections).

Of the eight remaining Little Barrier specimens, only one can be assigned to a collector other than Reischek (the one dated 1893). Up to 50 of the 53 specimens with inadequate data could also be from Little Barrier. Many, if not most, of these poorly documented specimens were probably collected by Reischek as well, judging by the proportion of documented specimens that are his. I estimate that between 100 and 130 of the 181 known 19th-century Stitchbird specimens were collected by Reischek.

The number of Stitchbirds shot on Little Barrier would have been even greater because some (such as the ones blown to pieces by Dobson) would have been unsuitable for specimens and others may have been unretrievable in the heavy undergrowth. In addition I may have missed some specimens in smaller museums or private collections, and many specimens have surely been destroyed in the past 100 years. Johannes Andersen, in a letter to the Department of Internal Affairs in 1924, stated that Reischek killed 150 Stitchbirds on Little Barrier (Andersen 1924, and quoted in King 1981). The source of Andersen's information is unknown, but his figure may not have been an exaggeration.

Reischek erred in identifying the nest he collected as a Stitchbird's. All 19 known Stitchbird nests have been in holes in trees (Guthrie-Smith, Sibson 1949, Parkin 1956, Angehr 1983, Angehr & G. Rasch unpublished data), whereas the nest found by Reischek was "placed in a bunch of mangimangi creeper hanging from a low tree . . ." (Buller 1888). Reischek's only evidence that the nest belonged to Stitchbirds was that he had seen a pair nearby. The nest was possibly a Bellbird's; Potts (1869, 1870) had previously described and figured a Bellbird's nest and egg as those of a Stitchbird. (Potts' erroneous description of the egg was repeated in Oliver 1955.)

It is difficult to reconcile Reischek's accounts of the extreme rarity of the Stitchbird with the large numbers of specimens he collected. Perhaps Reischek tried to inflate the value of his specimens by exaggerating their rarity. Most telling in this regard is the difference between his own and Buller's accounts of the 1883 expedition. As described above, Reischek evidently told Buller that he did not even hear a Stitchbird until the last three days of his stay, and yet the specimens reveal that he collected at least 16 birds in 10 (or 3!) days.

When the number of dated specimens from each trip is compared with the trip's duration, however, it becomes apparent that Reischek's fortunes varied considerably from year to year. Although many specimens are undated, it is likely that the number of dated specimens is at least correlated with the actual number collected on each trip.

No specimens are known from a trip of (probably) three weeks in 1880, in agreement with Reischek's statement that he found no birds that year. In 1882 Dobson spent five months on Little Barrier by himself and then was joined for (probably) 11 weeks by Reischek.

Despite this prolonged stay there are only eight dated specimens from this trip (if the two from March were in fact collected by Dobson). Four others dated 1883 with no month could possibly have been collected in January of that year but are more likely to have been from December. Although Reischek may have taken more specimens than the four mentioned in *Sterbende Welt,* it does appear that he and Dobson were rather unsuccessful.

At least 16 and probably 20 dated specimens were taken in 10 days of very bad weather in December 1883. This seems to support Reischek's assertion that Stitchbirds increased between 1882 and 1883. Stitchbirds were apparently reasonably common in 1885, when at least 29 were collected in six weeks.

Reischek's failure to find Stitchbirds in October 1880 could have been partly due to local seasonal movements. Reischek searched the west and southwest of the island, second growth manuka and kanuka forest where Stitchbirds are uncommon even today. In addition, in October *Alseuosmia macrophylla* blooms heavily in the stream valleys and central parts of the island, attracting Stitchbirds into these areas and away from the coast (Angehr 1983). However, it is unlikely that Reischek would have completely failed to find Stitchbirds if they were as common in 1880 as they have been in the recent past.

More difficult to account for is the apparent increase between 1882 and 1883. This increase is not mentioned in any of the original accounts (Reischek 1883, 1885, Buller 1888); it only appears in the later versions by Reischek's son (Reischek 1924, 1930). In 1921 the junior Reischek attempted to sell his father's manuscripts to the New Zealand government. This offer was rejected largely on the advice of Johannes Andersen, who in his recommendation to the government cited the large number of Stitchbirds collected on Little Barrier as one example of the senior Reischek's rapacity (King 1981). Reischek's son may have been trying to show that his father's activities on Little Barrier, namely the killing of several cats, moreporks, and the "older male birds," had ultimately been of benefit to the species.

However, the difference in the numbers of specimens traceable to the 1880, 1882 and 1883 expeditions, in conjunction with Reischek's account, leads me to believe that there were real differences in Stitchbird abundance between these years. Reischek had far more difficulty finding Stitchbirds in 1880 and 1882 than those who visited Little Barrier immediately before and after. Hutton in 1868, the "Auckland collector" of 1892 (Buller 1905), and Boscawen in 1895 found them to be not uncommon, at least in the central parts of the island.

Since the 1880s there seem to have been several other fluctuations in Stitchbird numbers, although none so severe as the one described by Reischek. Stitchbirds were not uncommon in 1895 (Boscawen) but uncommon in 1897 (Shakespear); by 1907 they had increased (Drummond). They were again hard to find in the early 1910s, but they had increased by 1919 (Guthrie-Smith 1919, Gordon 1938).

The population increased dramatically in the late 1970s (Veitch 1980). This last increase took place at the same time as the eradication of feral cats by the New Zealand Wildlife Service and may have been partly due to reduced predation. However, the foraging habits of Stitchbirds should not make them particularly vulnerable to ground predators such as cats because the Stitchbirds do not often feed near the ground (Angehr 1983). Their nests, in tree cavities with small entrance holes, are well protected against cats. The mean height of 13 measured nests was 5.7 m. Fledglings usually perch and feed at least 5 metres up shortly after leaving the nest (Angehr & G. Rasch, unpublished data).

There is no evidence to link the earlier changes in Stitchbird numbers with changes in the numbers of cats, although a connection cannot be ruled out. These fluctuations could have been due to differences between years in the flowering or fruiting of Stitchbird food plants. The amount of food available can vary markedly between years (Angehr, unpublished data), possibly due to climatic effects.

Although other changes in abundance have occurred, the reduction in 1880 and 1882 is the most severe on record. Possibly it is only coincidental that this reduction took place at the same time as the Stitchbird was dying out on the mainland. However, if Oliver's (1955) speculation that disease caused the mainland extinction is correct, disease could have affected the species on Little Barrier as well. More difficult to explain is the survival of some birds on the island when none survived on the mainland. Perhaps a small percentage of birds were immune. If the mainland population was at a lower density than that on Little Barrier, owing to black rats and other predators, the few survivors of an epizootic may have been too scattered to re-establish a viable breeding population.

Andreas Reischek exemplified an attitude prevalent among many naturalists in the 19th century: if a bird in the hand was worth two in the bush, a museum cabinet of birds was worth an island full. Reischek's collection of large numbers of Stitchbirds from their last refuge, when the species was already gone from the mainland, was certainly irresponsible. Yet at the same time this enigmatic man was genuinely concerned about the preservation of threatened species; for example, he attempted (unsuccessfully) to transfer Kakapo from the South Island to safety on Hen Island (King 1981). Fortunately, Reischek's activities on Little Barrier seem to have had little real effect; Stitchbirds increased in the mid-1880s in spite of them.

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APPENDIX 1

Location of 19th-century specimens of *Notiomystis cincta*.

New Zealand: Auckland Museum 12; National Museum, Wellington 12; Canterbury Museum, Christchurch 20; Otago Museum, Dunedin 4; Wanganui Regional Museum 1. (In addition Auckland and National have 5 and 3 recent specimens respectively, and Canterbury has skeletal material from cave deposits). United States: American Museum of Natural History, New York, 33; National Museum of Natural History, Washington D.C. 4; Museum of Comparative Zoology, Cambridge, 5; Carnegie Museum, Pittsburgh 3; Peabody Museum, New Haven, 1. United Kingdom: British Museum of Natural History, Tring 17; Cambridge University Museum 4;Merseyside County Museum, Liverpool 4; Oxford University Museum 2; Royal Scottish Museum, Edinburgh 1. Austria: Naturhistorisches Museum, Vienna 21; Oberosterreichisches Landesmuseum, Linz 2. Federal Republic of Germany: Staatliches Museum fur Naturkunde, Stuttgart 2; Niedersachsisches Landesmuseum, Hannover 1. Democratic Republic of Germany: Museum fur Naturkunde, Berlin 4; Staatlisches Museum fur Zoologie, Dresden 2. Australia: Australian Museum, Sydney 3; Museum of Natural History, Adelaide 1. Canada: Royal Ontario Museum, Toronto 15. Netherlands: Rijksmuseum van Natuurlijke Historie, Leiden 5. Belgium: Institut Royal des Sciences Naturelles, Brussels 2 (type specimens of Dubus).

APPENDIX 2

Translation of a letter from Andreas Reischek to Julius von Haast, dated Auckland, 29 December 1883:

[The letter opens with conventional salutation and season's greetings, followed by a two-stanza poem on the New Year. Then it proceeds:] Today I arrived back from Little Barrier Island. I was not very lucky because of the bad weather: nothing but rain and storm. It is very bad climbing over the slopes when it is wet; one slips too much. These slopes are very steep and over 2000 feet high. The nights were so cold I had to burn a fire all night. This time I spent only 10 days on the heights inhabited by **Pogonornis** [= **Notiomystis**] **cincta**, the Stitz Bird [**sic**], which can only be taken by surprise before dawn. It is found on the higher ground overgrown by supplejack, mange-mange, and other creepers. It is a very agile bird, daily roaming through its favourite spots, the male occasionally piping very beautifully. His piping consists of several sounds, like " Ti-au-i." The female, which is seen very rarely, only utters a call like " Tyk-Tyk." When these birds are scared, the male hops [away] quickly. The young and the female hide on the ground under ferns and other dense growth, until they think the pursuers have disappeared, then the female appears cautiously from her hideout and leaves the spot. I believe that the breeding season of these birds starts in October, as I found a partially built nest in some low bushes in the same month of 182 [**sic**] where I observed a male and female of **Pogonornis** nearby. In December 183 [**sic**] I found 3 young adult birds. I found these birds only in the higher mountain ranges in the centre of Little Barrier Island. They are very timid and rare; I think wild cats, which are in abundance here, destroy these and many other birds which inhabit these remote islands. I investigated the island from all sides and, I believe, from all high ridges and

from West to East, and found the paths of the feathered inhabitants: [There follows a list of bird species which Reischek observed on Little Barrier]. Then I found nothing but very large petrels which I saw for the first time in New Zealand: above dark brown, below ash-grey. I will show it to Dr. Buller, which I anticipate [doing] in a few days. I am writing from my house. During his absence I have [obtained] a beautiful pair of **Pogonornis** for him. He may also again copy my notes for his book. [In the margin:] I visited Little Barrier in October 1880 for three weeks, then in October 1882 to January 183 [**sic**] and in December 1883. [There follows a conventional closing and a request for a reply.]

★

SHORT NOTE

A PARADISE SHELDUCK IN THE CHATHAM ISLANDS

In January 1984, while on South East Island, we visited on 20 January the Fur Seal colony at the southern end of the island near The Clears. Our attention was drawn to the presence of a male Paradise Shelduck *(Tadorna variegata)* by the repeated mobbing activities of Red-billed Gulls. Mobbing occurred continuously, whether the Paradise Shelduck was in flight or settled. The bird flew rather weakly, appearing to be tired, and had dishevelled plumage.

Williams (1971) gave three records of bone finds from the Chatham Islands, all related to pre-European occupation. He considered that a small local population may have existed on the Chatham Islands and had perhaps been exterminated by hunting.

B. D. Bell (pers. comm.) and M. Campbell (pers. comm.) have reported unconfirmed sightings of vagrant Paradise Shelduck by local people on a few occasions. However, this seems to be the first dated record.

The mobbing activity of Red-billed Gulls promotes some speculation as it does not widely occur on the mainland of New Zealand, except near gull colonies. The gull activity could be simply a reaction to a stranger. However, gulls frequently mob Southern Skua, which breed on South East Island, and the prominent white wing-coverts shown by the Paradise Shelduck may have provoked the attacks, being suggestive of the skua wing flashes.

Advice given by E. G. Turbott is appreciated.

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A CENSUS OF THE SOUTH POLAR SKUA AT CAPE HALLETT, ANTARCTICA

By JONATHAN G. PASCOE

ABSTRACT

Two counts of skuas at Cape Hallett were made between 17 and 20 January 1983: in one 85 pairs and 83 non-breeding birds, total 253 birds; in the other, 83 pairs and 79 non-breeding birds, total 245 birds.

South Polar Skua numbers remain low, suggesting a continuation of the 1960s decline or the influence of climatic factors such as heavy snowfall during critical stages of skua breeding.

INTRODUCTION

At Cape Hallett (72° 18′ S, 170° 19′ E) in Northern Victoria Land, Antarctica, South Polar Skuas *(Catharacta maccormicki)* breed close to the rookery of Adelie Penguins *(Pygoscelis adeliae)*. This rookery is on the site of the joint United States-New Zealand scientific station, which was established in December 1956; closed in February 1973, and has remained unoccupied since. During the period of human occupation the skua breeding population declined steadily from 181 pairs in 1960/61 (Maher 1966) to 98 pairs in 1971/72 (Trillmich 1978). This decline coincided with an overall decline of Adelie Penguins from 65 000 breeding pairs in 1956 to 37 000 pairs in 1968 but then an increase to 50 000 pairs in 1972/73 (G. Wilson, pers. comm.).

Maher (1966) thought that the breeding habits and schedule of the skuas depended almost completely on the penguins. Johnstone (1971) attributed the decline to human activity.

Whether the skua is influenced more by people or by penguins is debatable, and so the present status of the skua at Cape Hallett, after the 10-year absence of human occupation, is of much interest. Therefore, a skua census was one of the objectives of the New Zealand International Survey of Antarctic Seabirds expedition to Cape Hallett during the 1982/83 summer season.

Description of area: Cape Hallett consists of a 300-metre-high headland to the north and east of a 20-ha hook-shaped gravel spit (Seabee Spit, Fig. 2), on which the Adelie Penguins nest. The disused base is at the outer end of this spit. The main skua nesting area (Fig. 3) is at the base of cliffs along the eastern end of the spit. The nesting area is elongated, triangular, and rather flat, 500 metres long and bounded by the penguin colony to the north and Willett Cove

to the west. It extends up a steep moraine to an ablating icefall to the east (Fig. 4).

The skua nesting grounds also incorporate the Specially Protected Area No. 7 (SPA), where mosses and lichens abound. These 'specially protected areas' are areas considered to be of outstanding scientific interest and accorded special protection by the participating governments of the Antarctic Treaty in order to preserve their unique natural ecological system.

METHOD AND RESULTS

To do the skua census, I made two separate ground counts between 17 and 20 January 1983. I classed as breeding birds the pairs that I saw nesting with eggs or young and the pairs that were obviously guarding territories but whose eggs or young I did not see.

I subdivided the area into the Moubray Bay Beach, the Spit and Isthmus, the SPA flat, and the SPA moraine. By systematically walking in a grid pattern through each area, I could make observations as far as the ablating icefall above the moraine to the east. I also

FIGURE 1 — South Polar Skua at Cape Hallett

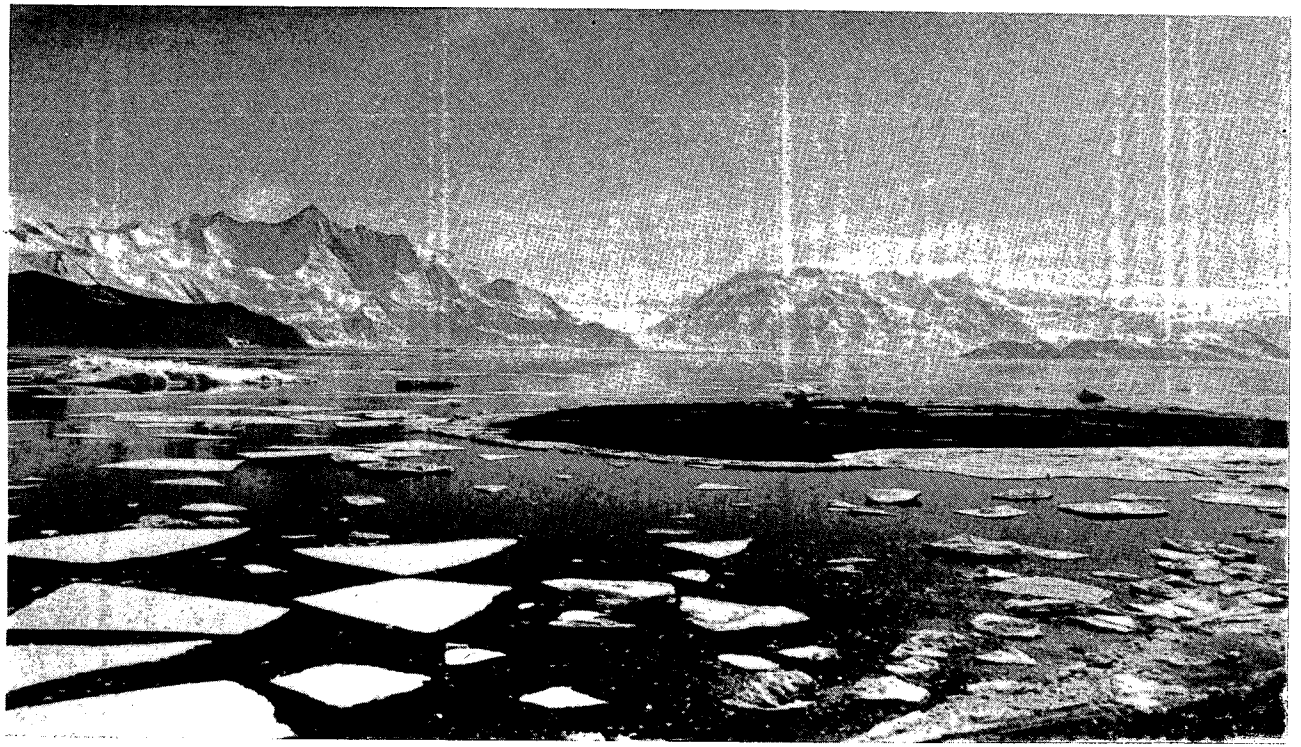

FIGURE 2 — Cape Hallett environs looking west with Seabee Spit and Moubray Bay, and Mt Herschel in the Admiralty Range in the distance

FIGURE 3 — Seabee Spit from Hallett Peninsula. The skua nesting area is in the foreground. The Adelie Penguin colony and disused Hallett Station are on the Spit. Admiralty Range in the distance.

explored the rock cliffs of the Cape Hallett headland by sidling around at sea level and from above 300 metres by climbing on to the Hallett peninsula and skirting the cliffs from above.

Table 1 summarises the results. The two counts gave 85 and 83 pairs. Most birds were on the moraine 50 metres a.s.l. but below the ablating icefall (45 pairs) or on the SPA flat (33 pairs). Only 5 pairs were noted on the spit and isthmus, the area occupied by the penguin colony. One breeding pair on the rock bluffs several hundred metres south of the main skua rookery I have included in the moraine count total. I saw no breeding birds on the Cape Hallett headland.

The breeding birds on the SPA flat both with or without eggs or young were easy to count — 16 and 20 pairs in count 1 and 17 and 16 pairs in count 2, totals 36 pairs on count 1 and 33 pairs on count 2.

On the moraine, territories were fairly easy to find but nests were harder to find. I found more nests on the second count probably because I was more familiar with the area — 26 pairs with eggs or young and 17 pairs without eggs or young in count 1 and 34 pairs and 11 pairs in count 2, totals 43 pairs on count 1 and 45 pairs

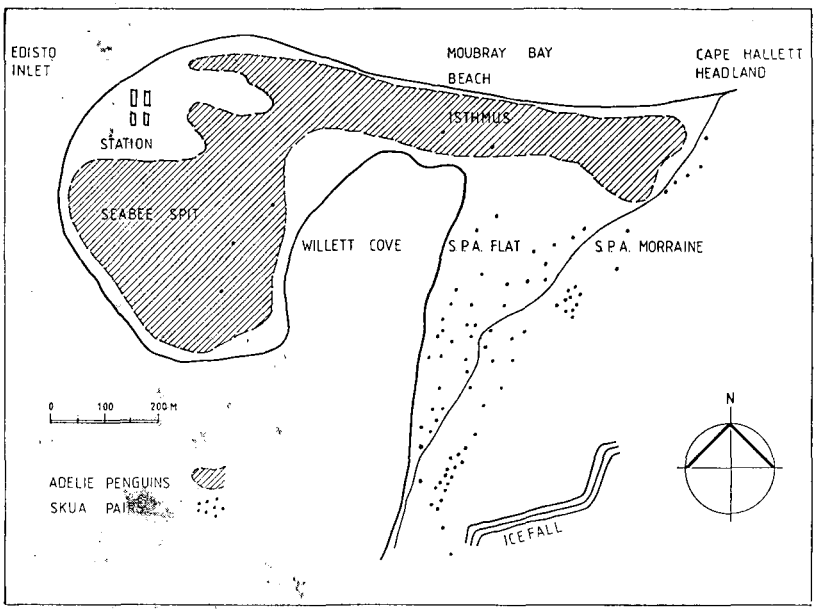

FIGURE 4 — Map of Cape Hallett Adelie Penguin rookery with nest territories of 83 skua pairs, 19-20 January 1983

on count 2. The non-breeders or club birds (83 total in count 1 and 79 total in count 2) mainly congregated 300 metres south of the penguin colony near a pond on the SPA flat, and on the adjacent lower moraine. The total skua numbers in the rookery were 253 in count 1 and 245 in count 2.

I made a third count on 3 February 1983 to determine how many of the breeding and non-breeding birds were banded. As territories were beginning to break down at this time, only 71 pairs were still on breeding sites. Of these, 44 birds were banded and 98 were not. I also saw 92 non-breeding birds. Of these, 20 were banded and 72 were not.

DISCUSSION

Between 1960 and 1972, the skua population at Cape Hallett declined by 54% from 181 pairs in 1960/61 to 98 pairs in 1971/72 (Table 2). The relative influence of human disturbance and the declining penguin population on the skua population has been debated over the years. Maher (1966) thought that skua breeding habits depended almost completely on the penguin population and on long-term predator-prey adjustment. According to Young (1981), however, skuas breeding with penguins are forceful opportunistic scavengers, few of which are active predators. Johnston (1971) thought that skuas declined because adults abandoned the Cape Hallett colony as a result of human activity, although he also thought that the relationship between skuas and penguins as a proximate cause needed further evaluation.

In the 1983 skua census the breeding population has continued to fall to about 84 pairs, despite 10 years without human occupation at Cape Hallett. Are skuas, therefore, continuing to abandon Cape Hallett as a place for breeding ?

Recently, the status of the Hallett penguin rookery has been assessed from aerial photographs taken by Ecology Division staff in 1981 and 1982 (R. Taylor, pers. comm.) and from ground observations (G. Wilson, pers. comm.). Photographs show that both the skua and the penguin breeding grounds at Cape Hallett were heavily covered by snow in December 1982. The ground was snow free, however, in November 1981 (R. Taylor, pers. comm.). This abnormally heavy snow cover at a critical time in the breeding cycle of the South Polar Skua may perhaps have contributed to the fewer skua pairs counted in the 1983 census. Further long-term information will clarify the position at Cape Hallett.

As skuas were last banded at Cape Hallett in 1972/73 (Baker 1973), the observations suggest that at least 30% of the breeding population is over 10 years old, although banded immigrants from other colonies may be augmenting the tally. Capture of all birds is therefore important in future ISAS work.

TABLE 1 — Summary of skua census, Cape Hallett

Location	Breeding birds on territories 17 - 18 January 1983			Non-breeding Birds	Total Birds	Breeding birds on territories 19 - 20 January 1983			Non-breeding Birds	Total Birds
	Pairs With Eggs or Young	Pairs Without Eggs or Young	Total Pairs			Pairs With Eggs or Young	Pairs Without Eggs or Young	Total Pairs		
Beach	Nil	Nil	Nil	8	8	Nil	Nil	Nil	7	7
Isthmus and Spit	2	4	6	10	22	3	2	5	10	20
S P A Flat	16	20	36	49	121	17	16	33	58	124
S P A Moraine	26	17	43	16	102	34	11	45	4	94
Total	44	41	85	83	253	54	29	83	79	245

TABLE 2 — Numbers of the South Polar Skua (**Catharacta maccormicki**) during 11 years of human occupation at Cape Hallett, Antarctica

YEAR	NUMBER OF PAIRS	AUTHOR
1960 - 1961	181	Maher 1966
1963 - 1964	161	Johnston 1971
1965 - 1966	147	"
1966 - 1967	113	"
1967 - 1968	105	"
1968 - 1969	98	"
1971 - 1972	98	Trillmich 1978

ACKNOWLEDGEMENTS

I thank Graham Wilson and Peter Harper for their advice and help in preparing this paper. The expedition was organised under the auspices of the NZ International Survey of Antarctic Seabirds and financed by a grant from British Petroleum NZ Ltd. Captain P. K. Taylor and the crew of the USCGC *Glacier* provided transport, and logistic support was supplied by Antarctic Division, Department of Scientific and Industrial Research.

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SHORT NOTES

EXTENSION OF THE KNOWN RANGE OF SOME SEABIRDS ON THE COAST OF SOUTHERN CHILE

The Totorore Expedition spent a full year on the coast of Southern Chile from May 1983 to May 1984, recording observations of seabirds and other avifauna. This work describes the most important new information.

GENTOO PENGUIN *Pygoscelis papua*

One observed closely in the bay east of Cape Horn on 28 March. The only previous record for this species in Chile was of two in the same locality in November 1981, seen by Carlos Mansilla (Venegas 1982).

Our attempts to find a suspected small colony mixed with the large numbers of Magellanic Penguins *Spheniscus magellanicus* in that area were unsuccessful.

ROCKHOPPER PENGUIN *Eudyptes chrysocome*

A small colony on Isla Solitario (47°42'S, 75°42'W) in the Gulf of Penas is the northernmost record in Chile. In January 37 adults and 6 chicks in down were seen.

Previously, the northernmost confirmed breeding place was a small colony on an island of the Verposten Group (49°22'S, 75°42'W). Another suspected small colony, unconfirmed, is in the Notables Group (48°54'S, 75°41'W) (Venegas 1978).

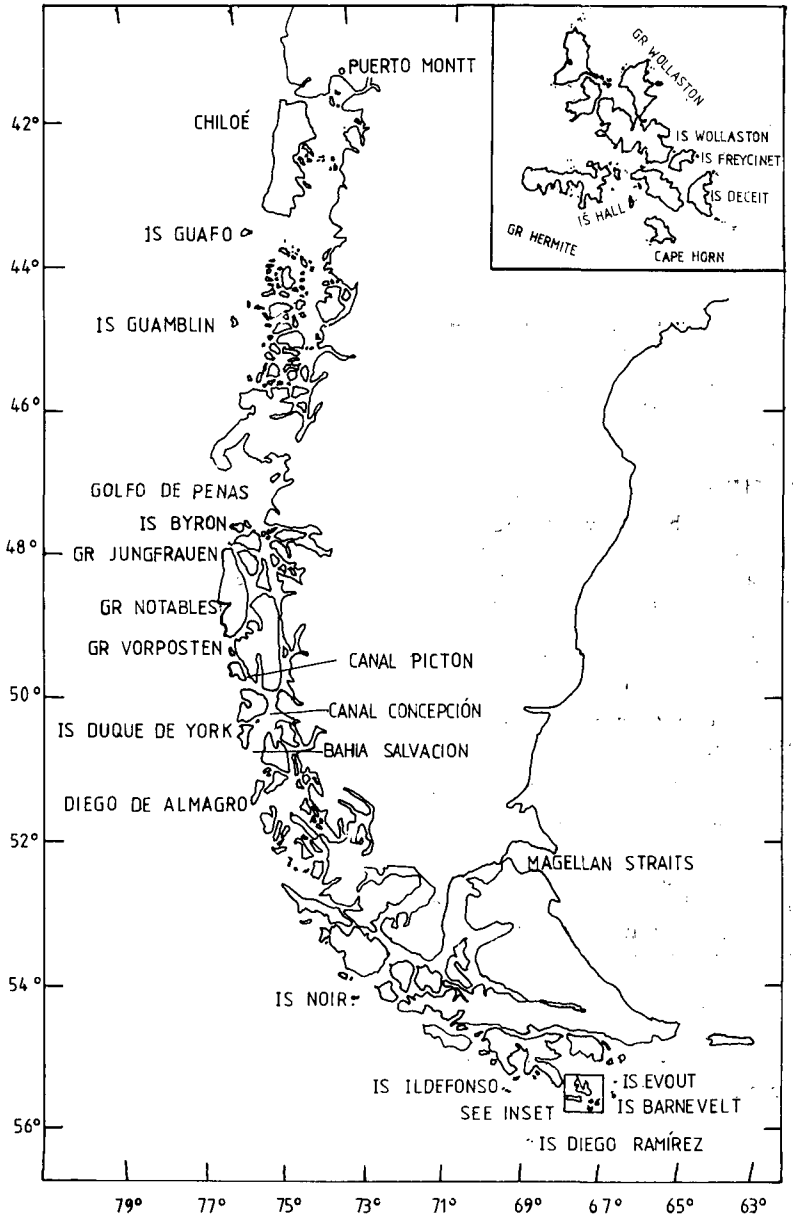
The Totorore Expedition found a colony of about 1000 birds on Isla Buenaventura (50°45'S, 75°09'W) in Canal Concepcion also in January. This colony was mixed with lesser numbers of both the Magellanic Penguin and the Macaroni Penguin.

MACARONI PENGUIN *Eudyptes chrysolophus*

The colony of 50-100 birds in a large colony of *E. chrysocome* on Isla Buenaventura in January (see above) is the northernmost breeding record for this species.

Breeding on Isla Noir (54°28'S, 73°04'W), previously suspected (Reynolds 1935), was confirmed by Venegas in December 1983.

We found a large mixed colony of c.40% *E. chrysolophus* and c.60% *E. chrysocome* on the north coast of Isla Noir and a colony purely *E. chrysolophus*, containing an estimated 25 000 birds, near Cabo Noir in February. This colony was in a penguin-made clearing in dense scrub on low land behind a shingle beach. About half the birds were in moult (20 Feb.).


PUERTO MONTT
CHILOÉ
IS GUAFO
IS GUAMBLIN
GOLFO DE PENAS
IS BYRON
GR JUNGFRAUEN
GR NOTABLES
GR VORPOSTEN
CANAL PICTON
CANAL CONCEPCIÓN
IS DUQUE DE YORK
BAHIA SALVACION
DIEGO DE ALMAGRO
MAGELLAN STRAITS
IS NOIR
IS ILDEFONSO
SEE INSET
IS EVOUT
IS BARNEVELT
IS DIEGO RAMÍREZ
GR WOLLASTON
IS WOLLASTON
IS FREYCINET
IS DECEIT
IS HALL
GR HERMITE
CAPE HORN
42°
44°
46°
48°
50°
52°
54°
56°
79°
77°
75°
73°
71°
69°
67°
65°
63°

BLACK-BROWED MOLLYMAWK *Diomedea melanophrys*

We found a large breeding colony with chicks in down on the west coast of Isla Diego de Almagro on 30 January.

An approximate distribution of this colony was

Offshore islet near Cabo Toplas (51°20'S, 75°13'W)	500
Cabo Gruta and offshore islet	10-20 000
Two points SW of Punta Negra (51°33'S, 75°18'W)	c. 11 000
Two small islets and two points NW of Cabo Jorge	1-2 000
Approximate total	30 000 birds

The nests were mainly on steep cliffs, more or less vegetated, 15-170 m above the sea.

Previously known colonies in Chile are on the islands of Ildefonso (55°47'S, 69°27'W), Diego Ramirez (56°32'S, 68°44'W) and Evout (55°34'S, 66°47'W).

SOUTHERN GIANT PETREL *Macronectes giganteus*

In February we found a breeding colony on a west-facing hillside towards the western end of Isla Noir. This confirms a report by Agostini (Reynolds 1935). We counted over 200 well-grown chicks in down, but the number was probably greater as they were hard to find in the scrub. Surprisingly for this species, the colony was widely spread over an area of about 3 by 1 km, with a few loose groups of up to 20 nests.

The only other known breeding colony in Chile is on Diego Ramirez Islands (Schlatter pers. comm.).

BLUE PETREL *Halobaena caerulea*

We found moderate to large numbers occupying burrows on Cape Horn on 31 March and up to 5 April, when we made our last excursion to the top. Some birds were in burrows during the day, and many flew in after dark and out to sea again before daylight. According to Watson (1975), some adults return to breeding grounds and occupy burrows in April to June. Most burrows were in soft ground under tussocks on the peak and the sides of Cape Horn down to about 200 m, but some were found under rocks, and a few in scrub.

One bird which was caught had the measurements: bill 26.5 x 9.7 mm, wing 229, tail 82 (worn), tarsus 36.6, mid-toe 46.5.

On 12 April three possible Blue Petrels were seen by spotlight at night near an island off the north-east point of Isla Freycinet (55°46'S, 67°10'W), where old skua middens contained remains of this species. Bad weather prevented further investigation, but one apparently recently occupied burrow was found on a rocky islet just to the south.

On 21 April, burrows were seen under tussocks on a small headland on the south-east coast of Isla Hall (55°53'S, 67°24'W). At night at least 100 Blue Petrels were seen by spotlight flying over the area, and one bird caught measured: bill 24 mm, wing 209, tail 88, tarsus 33, mid-toe 44.5. This was appreciably smaller than the Cape Horn bird.

At Cape Austin on Isla Deceit, c.10 Blue Petrels were seen by spotlight on 26 April.

From our observations we concluded that, in addition to the Cape Horn colony there seem to be many smaller colonies scattered among other islands in the Hermite and Wollaston groups. The only other previously known colony in Chile is on Diego Ramirez Islands.

NARROW-BILLED PRION *Pachyptila belcheri*

In February, we found a very large breeding colony of unknown extent on Isla Noir. The burrows were under dense scrub at 100-200 m a.s.l. on the same west-facing slope as the colony of Giant Petrels. Vast numbers of birds flew to and from this colony during the night.

Many skuas *Catharacta chilensis* and skua middens indicated heavy predation on the prions. Average measurements of nine birds caught were: bill 25.3 x 10.5 mm, wing 183, tail 85, tarsus 33, mid-toe 42.5.

This is the first confirmed record of prions breeding in Chile.

PINK-FOOTED SHEARWATER *Puffinus creatopus*

In addition to occasional sightings on the coast further north, this species was positively identified in the following localities:

One on 22 Jan. SW coast Isla Duque de York (50°41'S, 75°29'W)
One on 29 Jan. Bahia Salvacion (50°55'S, 75°15'W).
These are the first records south of the Gulf of Penas.

GREAT SHEARWATER *Puffinus gravis*

This has been considered only a rare and accidental visitor to the Magellan area (Venegas 1978, 1982). We saw a total of 18 in Paso del Mar, Magellan Strait, on 2 February, including a group of 12 near the eastern end. One was seen east of Cabo Froward on 15 March.

SOOTY SHEARWATER *Puffinus griseus*

In September 1983, we found a large breeding colony on Isla Guafo (43°46'S, 74°43'W) of an estimated 200 000 birds and, in November, a smaller number breeding on Isla Guamblin (44°50'S, 75°07'W).

In Chile, Sooty Shearwaters were previously known to breed only in the Cape Horn region.

MAGELLAN DIVING PETREL *Pelecanoides magellani*

We did not extend the range of this species, but on 1 March a movement of Magellan Diving Petrels was observed in Paso del Hambre, Magellan Strait. The birds were widely spaced in a band about 5 km wide, flying straight and steadily southward less than 1 metre above the water. During a transect across the flight line we counted over 300 birds in 30 min, but obviously, as only those birds which passed closely were within visible range, the number must have been very much larger.

GREY PHALAROPE *Phalaropus fulicarius*

Formerly reported south to the Isla Chiloe with only a very few sightings of single birds further north (Venegas 1982), this species was one of the commonest birds we saw from Isla Guafo to Bahia Salvacion. At Isla Guafo in September, we counted a gathering of over 5000. Other large concentrations included the following:

c. 300 on the shore of a saltwater lagoon on Isla Byron (47°49'S, 75°12'W), where they associated with, and behaved like, Sanderlings *Calidris alba* and Baird's Sandpipers *C. bairdi*, and were seen flying overland to an inlet in the centre of the island.

c. 1000 in the channels between the Yungfrauen Islands.

c. 690 in Canal Picton.

c. 3000 in south Canal Concepcion.

The southernmost positive record was offshore in 51°10'S, 75°03'W on 31 January. On 24 February, 7 phalaropes observed south of Isla Noir in 54°40'S, 72°24'W could have been of this species.

ACKNOWLEDGEMENTS

The Totorore Expedition received some financial assistance from the New Zealand Minister of Internal Affairs, the Ornithological Society of New Zealand, and northern branches of the Royal Forest and Bird Protection Society, as well as many private donations in New Zealand. Our grateful thanks to all of these and also to Dr Roberto Schlatter of the Universidad Austral de Chile, and Sr Claudio Venegas of the Instituto de la Patagonia who gave the expedition advice and encouragement. We are also grateful to the Armada de Chile for its constant interest and considerable help throughout. M. J. Imber and C. C. Venegas read this manuscript and C. R. Veitch gave advice on the preparation of the figure.

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SOUTHERN SEABIRDS IN NEW ZEALAND COASTAL WATERS, JULY 1984

Mid-July was a period of strong southerly winds over New Zealand. Figure 1, the mean sea level analysis for noon 16 July NZST (160000Z), shows why. The high in the Tasman Sea and the deep lows to the east of New Zealand produced a steep pressure gradient across the country and with it very strong southerly winds. The gradient had been even steeper on 15 July, when the low-pressure areas were closer to the east coast.

Figure 1 shows that the winds were strong southerly down to and beyond 60°S, from where birds could have been collected and blown up to the New Zealand coast, the shape of New Zealand tending to funnel them towards the east coast of the North Island or through Cook Strait.

On 17 July, *Kuaka*, on passage from Marsden Point to Timaru, was off East Cape at 0815 (Fig. 2). The wind was SSW 30 knots with a rough high sea and heavy southerly swell. The wind, sea, and swell increased throughout the day.

Fewer birds than usual were about East Cape, as was to be expected in the heavy weather. Those seen, generally being blown rapidly northwards, were birds normally in the area — Shy, Salvin's, and Black-browed Mollymawks, Giant and Grey-faced Petrels, Fluttering Shearwaters, gannets, prions, and one Black Petrel. This was the

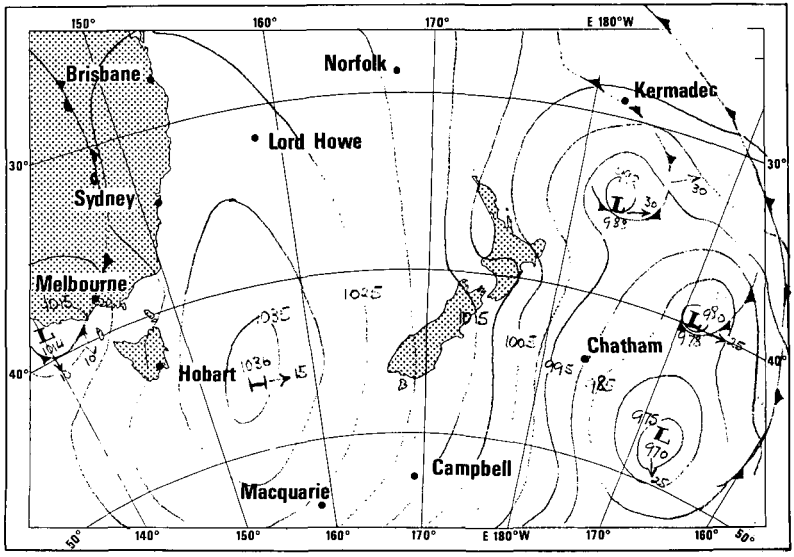

FIGURE 1

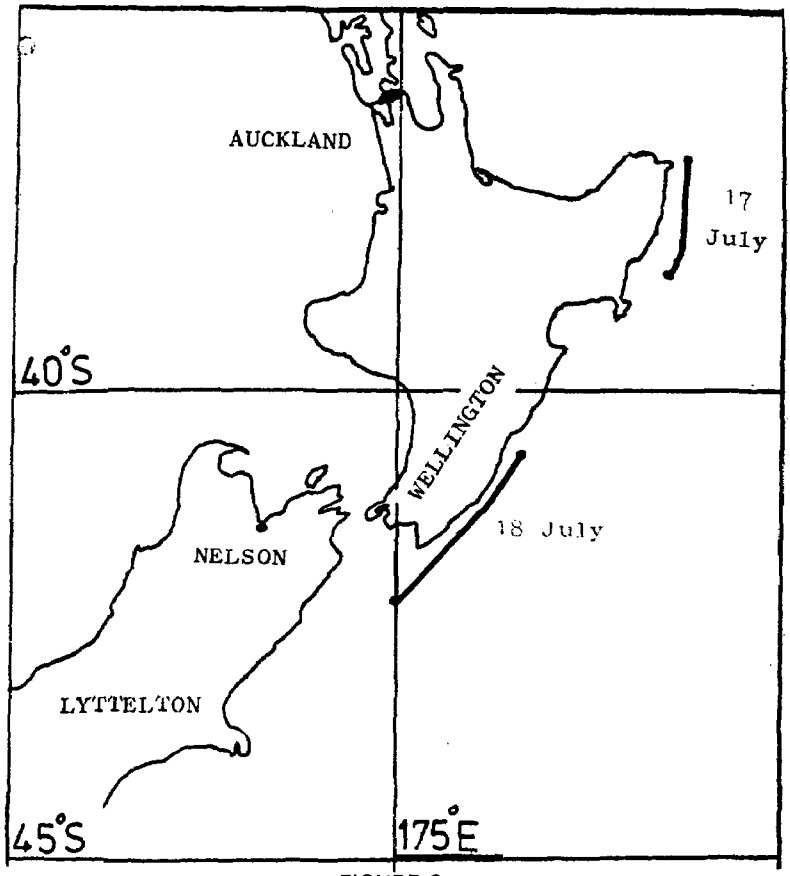

FIGURE 2

situation throughout the morning, but at 1315 a Blue Petrel *(Halobaena caerulea)* was sighted among the " regular " birds, and from then on Blue Petrels were in sight until dark. We had plenty of time to study them and found them easy to distinguish from the prions about the ship. The Blue Petrels looked larger and their flight was higher, being more active like that of the smaller gadfly petrels. The white bar at the tip of the upper tail was prominent and could easily be seen with binoculars from over 500 metres. This, their white-looking undertail, and their flight made them easy to separate from the prions. Some of the Blue Petrels flew along with the ship, seeming to be sheltering in the disturbed water caused by the ship's bow wave, but most flew by on their wind-assisted passage.

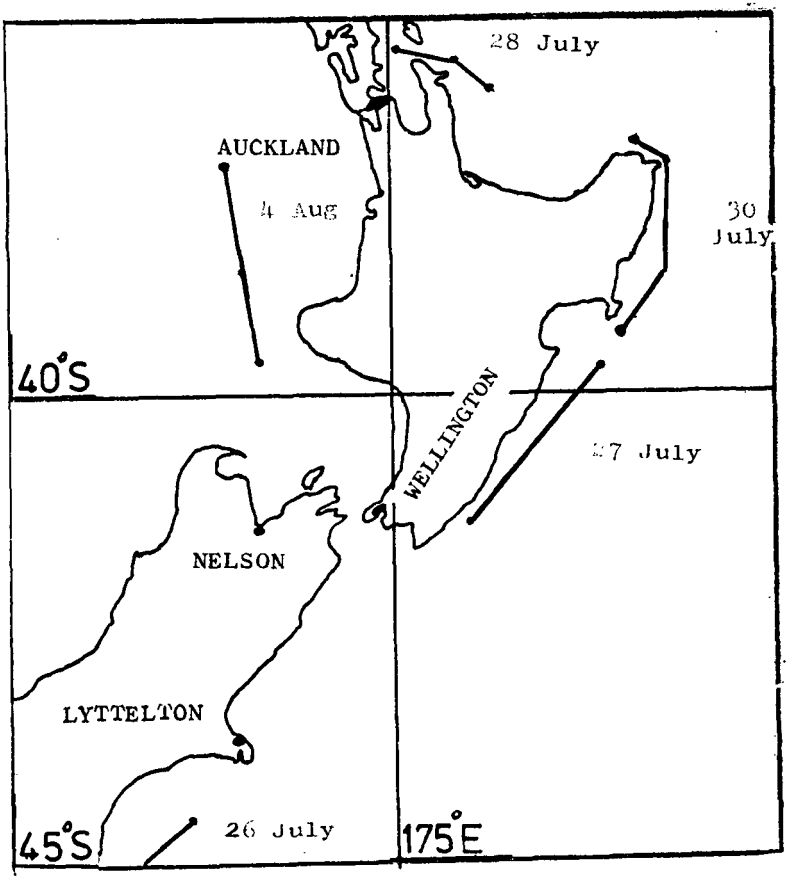

FIGURE 3

Though Grey Petrels *(Procellaria cinerea)* are irregularly seen in the Bay of Plenty and the East Coast region during the winter, their numbers are usually low (1-3 birds). On 17 July, after the first was seen at 1330, Grey Petrels were in sight until dark. They did not attempt to follow the ship but were blown past, often flying as high as 30 metres.

At 1400 on 17 July a white Giant Petrel *(Macronectes giganteus)* flew past the ship.

On 18 July, with the weather much moderated, the vessel was off the Wairarapa coast and in the eastern approaches to Cook Strait. Although we kept a careful watch, we saw no Blue Petrels and only one Grey Petrel. However, among the " normal " birds of that area we saw (at 0830) one Grey-backed Storm Petrel *(Garrodia nereis)*

TABLE 1 — Sightings of Blue and Grey Petrels, 17 July

Time	Position	Blue Petrel	Grey Petrel
1315	38.4°S 178.6°E	1	-
1330		1	1
1345		2	3
1400	38.5°S 178.6°E	1	6
1415		8	5
1430		10	6
1445		10	2
1530		4	4
1600	38.8°E 178.5°E	2	3

TABLE 2 — Sightings of Light-mantled Sooty Albatross, 18 July

Time	Position	Number in Sight
1030	41.3°S 176.1°E	1
1100		1
1200	41.6°S 175.8°E	1
1245		1
1300	41.8°S 175.6°E	3
1315		5
1330		7
1345		12
1400	41.9°S 175.4°E	16
1445		3
1530		14
1600	42.3°S 175.0°E	15
1630		19

and, at 1030, the first Light-mantled Sooty Albatross *(Phoebetria palpebrata)*. The numbers of Light-mantled Sooties increased throughout the day, as shown in Table 2.

The ship seemed to ' collect ' Light-mantled Sooties all day until, just before dark, the highest numbers we have seen about the New Zealand coast were present. Even at the breeding islands 19 together would be a lot.

On 30 July, when in the East Cape-Portland Island area again (Fig. 3), we found Blue and Grey Petrels still there (Table 3). In the good weather we noted that the Grey Petrels tended to be attracted to the ship, flying in the wake and up alongside, whereas the Blue Petrels ignored the ship.

Apparently, when the wind died away during the night of 17/18 July, many Blue Petrels and Grey Petrels were becalmed in the East Coast region, and some of them had made little effort to move back south by 30 July.

In early August there was a wreck of Blue Petrels and Kerguelen Petrels *(Pterodroma brevirostris)* on the west coast of the North Island. We saw no Kerguelen Petrels between 17 July and 5 August. The other areas in which we made observations during this period may be of interest: 20 July, Nugget Point to Bluff; 23 July, Bluff to Nugget Point; 26 July, Dunedin to as in Fig. 3; 27 July, see Fig. 3; 28 July, see Fig. 3; 1 August, Napier to Cape Palliser; 4 August, see Fig. 3; 5 August, North Cape to Marsden Point.

TABLE 3 — Sightings of Blue and Grey Petrels, 30 July

Time	Position	Blue Petrel	Grey Petrel
1130	38.1°S 178.6°E	-	1
1200		1	2
1300		1	4
1315		4	4
1330		2	2
1345		2	2
1400	38.8°S 178.5°E	4	3
1415		2	4
1430		1	3
1445		1	3
1530		5	2
1545		1	1
1600	39.2°S 178.1°E	5	1

We saw no Blue Petrels or Light-mantled Sooty Albatrosses on any of these passages and Grey Petrels only on the afternoon of 27 July, when we saw a maximum of three together.

During the afternoon of 5 August, between Cape Brett and Bream Head, the ship was struck by very strong westerly squalls, which must have been even stronger on the west coast of the North Island. It is possible that some of the Blue Petrels that had arrived in New Zealand coastal waters on 16/17 July had by 5 August been weakened by their inability to find proper food — possibly the reason why they do not normally occur in local waters — and were driven ashore by the squalls.

We thank Bert van Krieken, Port Meteorological Officer, Auckland, for his help with met. information, and Barrie Heather and Ralph Powlesland for their comments on this note.

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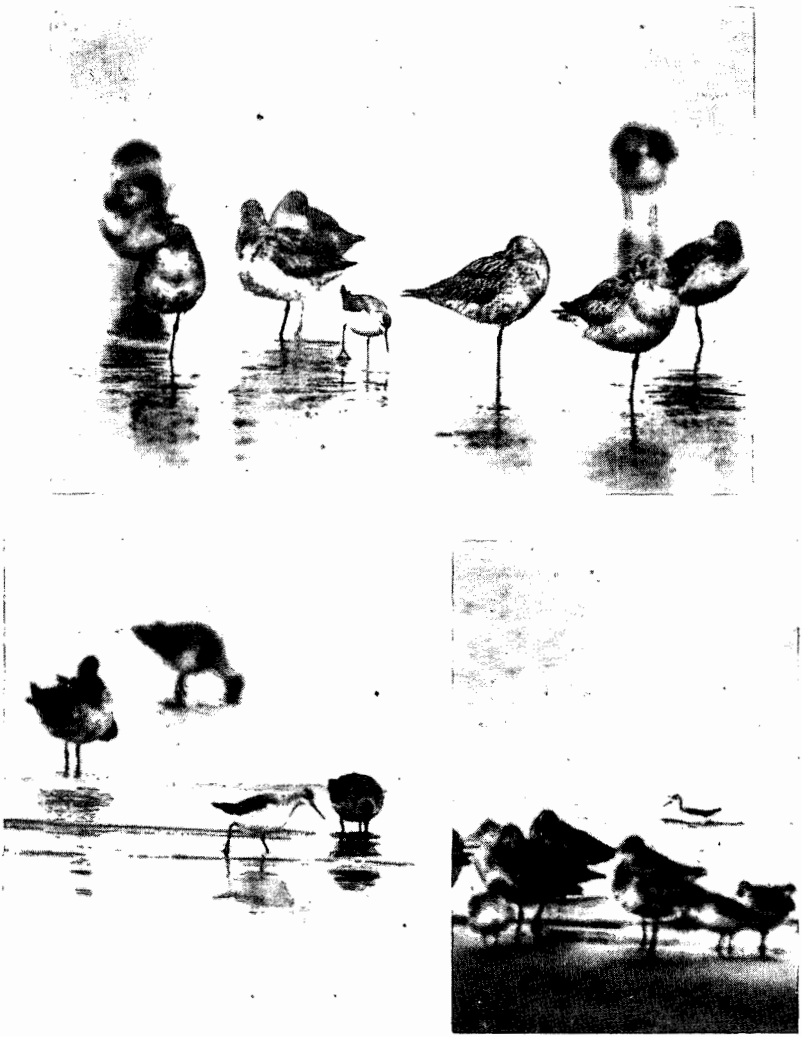
WILSON'S PHALAROPE AT MANAWATU RIVER ESTUARY — A NEW BIRD FOR NEW ZEALAND

On the morning of 25 September 1983 a count of waders was made at the Manawatu River estuary. It was evident that an influx had occurred since the previous day as Wrybill *(Anarhynchus frontalis)* had increased from 10 to 57, Bar-tailed Godwit *(Limosa lapponica)* and Knot *(Calidris canutus)* had increased slightly, and four Least Golden Plover *(Pluvialis fulva)* had arrived.

Among the feeding waders on the exposed mud was an unusual bird clearly different from any of the 27 wader species which we had previously encountered at the estuary. Close observation for other than short periods was difficult, owing initially to the bird's position on the open mudflats and later, as the tide rose, to disturbance as yacht racing began. By midday, when M. K. Tarburton arrived in response to a phone call to the Manawatu RR, repeated disturbance had forced the wader flock to quit their normal high tide roost for a small sandspit close to the bar. Here the bird was found again, seen better, and photographed at a rather long range.

First impressions of the bird — yellowish legs and distinctive flight pattern with square white rump, lack of wingbar and feet protruding beyond the tail — suggested a Lesser Yellowlegs *(Tringa flavipes)*. However, certain features were not entirely consistent with this species, particularly the lack of spotting on back and wings, the distinct head pattern, and the very thin bill.

When studying the literature in the next few days, we could not fit these points within any of the plumage variations for the Lesser Yellowlegs. We therefore had to examine other possibilities, including species not previously recorded in New Zealand. Of the three other



Wilson's Phalarope at Manawatu River estuary
Photos L. J. Davies

species that seemed possible — Greater Yellowlegs *(Tringa melanoleuca)*, Stilt Sandpiper *(Micropalama himantopus)* and Wilson's Phalarope *(Phalaropus tricolor)* — only the last fitted the observed characteristics. This revised identification was passed to L. J. Davies (the Manawatu RR) who, together with S. E. and R. A. Creswell, saw the bird on 29 September and obtained additional field notes and photographs which confirmed this identification.

Several Wellington OSNZ members travelled to Foxton Beach on 1 and 2 October, but the bird had gone, probably because of disturbance from other activities on the estuary. M. Falconer reported that on 10 October the waders at the high-tide roost were deliberately put to flight on several occasions by trail bikes ridden by youths who are attracted to the area by a special off-road course set aside for their use in the adjacent dunes.

The bird was not seen again, but after RRs had been alerted to the possibility of other birds arriving in New Zealand, a second bird was reported at L. Ellesmere in mid-November, which was joined by a third in December (Sagar & Harrison, this issue). As both of these birds were reported as being in adult winter plumage and the bird seen at the Manawatu River estuary had the brownish underparts and dark crown of an immature, we believe that three birds were concerned.

Wilson's Phalarope is a bird of the Americas, breeding on the North American prairie lands from central California north to British Columbia and east to Indiana and Ontario, and migrating to Chile, Argentina and the Falkland Islands for the southern summer. Over the past 25 years it has been recorded as an occasional vagrant to Britain and western Europe and since 1966 has been recorded on three occasions in Australia.

The detailed description which follows has been compiled from submissions made to the Rare Birds Committee by L. J. Davies, R. A. Creswell and J. L. and M. Moore.

Size: Compared with Knot, it looked very slightly shorter in overall length but of a much slighter build with a longer, more slender neck, a smaller head and a markedly longer, finer bill. Legs slightly longer but more flexed, giving a similar overall height.

Head: Crown dark grey-brown, becoming lighter grey on the nape and hind neck. A dark grey eyestripe starting just in front of the eye and extending back to merge with the grey nape. A narrow but well-defined white superciliary meeting over the bill but not extending on to nape. Lower cheeks, chin and front of neck white.

Upperparts: Mantle, back, scapulars and wing-coverts medium grey-brown shading to grey on the scapulars and to brown on the wing coverts; the paler grey of the hind neck extending as a light band down the centre of the mantle and on to the back. Primaries dark grey-brown, looking black at a distance.

Underparts: Neck, breast, belly, flanks and undertail uniform clean white except for a smudgy off-white area at sides of breast separated from the folded wings by a small white recess.

Soft parts: Eye dark and rather conspicuous. Bill black, very fine and thin, length about 1.5 x head. Legs, although at distance appearing brownish, at close range were greenish yellow tending to orange-yellow in bright light. Feet of similar colour and rather large and heavy for size of bird.

Flight pattern: Squarish white area on rump and upper tail not extending up the back between the wings. Wings uniformly dark with no wing bar, feet projecting beyond tail. Flight buoyant and rapid, usually above, or at the front of, the wader flock of about 150 birds.

Behaviour: A very active bird feeding almost continuously, even among the roosting Godwit and Knot, but occasionally resting on its belly on the sand. Used quick purposeful strides and rapid head movements to take food from the surface, more often to the side than to its front, and twice seen to take insects in the air. Also seen to wade in the shallow water and on several occasions to swim but not seen to 'spin' for food. Several roosting Godwits were seen to react antagonistically to close approaches by the feeding bird.

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WILSON'S PHALAROPES AT LAKE ELLESMERE

On 19 November 1983, Jason Hopkinson, Geoffrey Woodley and PMS were counting waders at the southern end of Kaitorete Spit, Lake Ellesmere, when we observed an unfamiliar wader. The bird was feeding actively in water up to its belly and was associated with Curlew Sandpipers *(Calidris ferruginea)*. Our initial impression was of a very pale, active, medium-sized bird with a needle-fine bill. Both the feeding action and pale features of the bird were reminiscent of the Marsh Sandpipers *(Tringa stagnatilis)* we had seen at Lake Ellesmere in 1981. However, we eliminated this species when the bird eventually walked out of the water and we saw its relatively short-legged appearance. From observations to within 50 m for 40 min, using a 20-45X telescope, we identified the bird as a Wilson's Phalarope *(Phalaropus tricolor)*.

Size and appearance: Slightly larger, more slender and elongate than a Curlew Sandpiper. Throughout the observation period the bird maintained a horizontal posture.

Plumage: White forehead, chin and lores. White supercilium, and dark grey line from behind eyes to nape. Grey crown, nape and neck, becoming light brown-grey on the back, upperwings and tail. Wing coverts finely edged with white; in the folded wing, the outer primary looked dark grey-black. The underparts, including undertail coverts, were white, except for a grey wash on the sides. It was noted that the white feathers of the flanks and sides extended over the leading edge of the folded wing. When the bird stretched its wings the underwing 'armpit' looked very pale but the other feathers were grey. In flight, a small, square, white rump was obvious, and the uppertail was grey. No wing bar was observed.

Bare parts: Bill black, needle-like and straight. The legs were oval in cross-section and yellow-brown, and the feet looked dark green, with yellow margins to the toes.

Subsequently, the Wilson's Phalarope remained at Lake Ellesmere until at least 25 April 1984, providing an attraction to many OSNZ members. During this period, observations indicated that more than one phalarope was present. This was eventually confirmed on 22 December 1983, when KH and Peter Wilson saw two feeding together at a ponded area near the lake edge. At this time one bird was feeding along the pond edge, while the other fed by spinning around in deeper water, in typical phalarope fashion. No plumage differences between the birds were evident, but the legs of one were noted as yellow-green and of the other as smoky grey. Subsequently two birds were seen together on 24 December 1983 (George Glover), 2 January 1984 (Frank Hollay and Wilf Mawson), and 8 & 28 January 1984 (George Glover). On 2 January both birds were feeding while spinning around on the surface of a pond. These are the second and third records of this species in New Zealand, the first being reported from the Manawatu Estuary in September 1983 (Moore & Moore, this issue).

Wilson's Phalaropes breed in the temperate zone of the North American interior and winter in South America from Peru and Bolivia to Chile and Argentina (Cramp & Simmons 1983, *The birds of the Western Palearctic)*. They are rare vagrants to Australasia, there being only three records from Australia (Pizzey 1980, *A field guide to the birds of Australia)*, in addition to those from New Zealand.

The extended stay of at least one phalarope at Lake Ellesmere allowed plumage changes to be noted. When one bird was seen on 19 February 1984, it was still in winter plumage with worn flight feathers and wing coverts, but the dark line behind the eyes seemed more distinctive. By 3 March a slight chestnut was on the flanks and the black line behind the eyes extended down the sides of the neck. When next seen, on 15 April, the bird was in full breeding plumage and identifiable as a female.

The feeding habits of the phalaropes were distinctive, the birds adopting a horizontal posture while snapping insects or spinning around on a pond and pecking insects from the water. When wading, the phalarope would snap insects flying over the water or peck rapidly at the water surface. While feeding along the shore the bird walked slowly, rapidly snapping flying insects.

Phalaropes are rare wanderers to New Zealand but now all three species have been recorded from Lake Ellesmere — a Grey Phalarope *(P. fulicarius)* was collected in 1925, and a Red-necked Phalarope *(P. lobatus)* was recorded in 1929 (Falla, Sibson, Turbott 1979, *The new guide to the birds of New Zealand)*.

P. M. SAGAR, *38A Yardley Street, Christchurch 4;* KATHLEEN C. HARRISON, *50 Athol Terrace, Christchurch 4*

REVIEWS

A field guide to Australian birdsong. Bird Observers Club, 1983.

This first cassette of a series covers species from Emu to the Striated Heron and is a most welcome addition to the commercial recordings available.

It covers 70 species, most of which are seabirds, many of them rarely seen let alone heard by the average ornithologist. The localities in which these recordings were made range from Antarctica in the south through many subantarctic islands to New Zealand, Australia and Great Britain on a great variety of field equipment. The oldest recording on the tape was made in 1959, the most recent in 1979.

It is inevitable in a production like this that some species are not available owing to a lack of suitable recordings. One hopes that a future tape will cover those that eventually do become available. In this instance 24 species have been omitted, some of which this reviewer could supply.

The recordings themselves are generally of a high standard, given the original field conditions, and run for an average of about a minute each. The booklet that comes with the cassette gives all the data most users would require: the common names, the scientific names, who recorded the sounds, and when and where the recording was made. The spoken identifications are by Len Grice and the compilation and editing are by Rex Buckingham and Len Jackson, who are to be congratulated on doing a difficult job well.

For the price of $A10.00 this is well worth having as it presents many species previously unavailable here or in Australia. Available from The Bird Observers Club, Box 2176T, GPO, Melbourne 3001, Victoria. This review copy has been placed in the Society library.

L. B. McPherson

Animals of the Estuary Shore, by Malcolm B. Jones and with contributions by S. Bloomberg, R. Holdaway, P. Richard, M. Tate and J. Robb, University of Canterbury publication No. 32, 162 pp., 1983.

This fine, though unusual, publication is, as stated by Professor George A Knox, "a resource with multiple uses." It describes "a unique ecosystem that provides aesthetic enjoyment."

The thing that strikes the reader is the versatility of the publication because it includes almost the entire animal life to be found at an estuary in New Zealand. It begins with a concise description of the estuarine environment, followed by a short description of minor phyla such as flatworms and insects. This chapter is followed by the phylum of molluscs, beautifully illustrated, and with a key to major groups. Reading their descriptions, one is taken by the wealth of animal life in the Avon-Heathcote Estuary. This chapter is followed by a description of Polychaeta or marine bristle

worms and the chapter on Crustacea, a diverse and successful group of arthropods, which is again clearly illustrated.

The last chapter is devoted to birds, and about one-third of the text is devoted to this group of estuarine animals. The text is followed by a Glossary and Index of Animals. One is impressed by the excellence of the illustrations which, although mostly in black and white, provide ways of unmistakably recognising the birds. A total of 76 bird species has been recorded, together with a description of their appearance at the estuary, feeding, etc.

The authors of this publication have provided a great asset by including an account of the biology of so many animals at this estuary. The only possible shortcoming may be the failure to mention the amphibians and reptiles. May we hope that in other estuaries where the bird fauna is already known, studies of other animals will follow — after all, birds are dependent on other animals in the same habitat.

Kazimierz Wodzicki

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