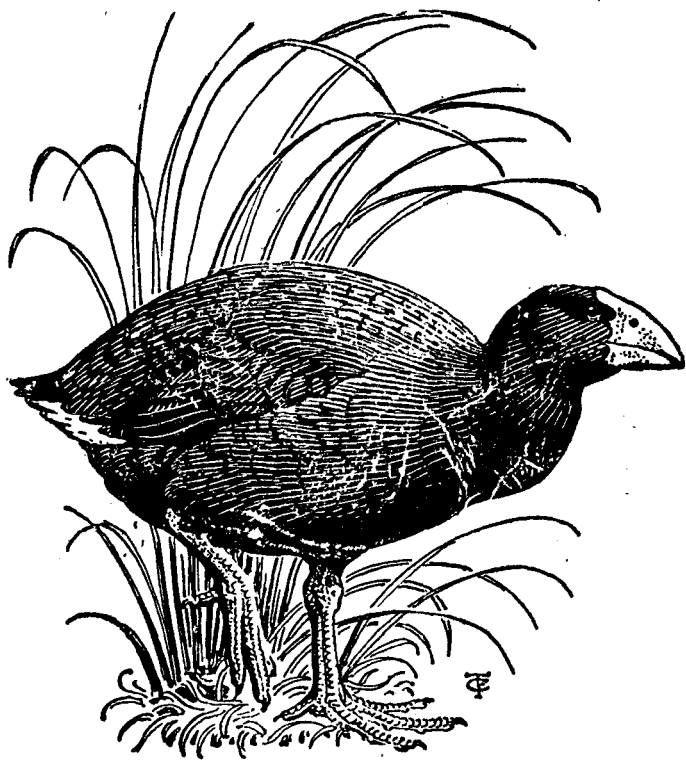


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FAREWELL SPIT AND GOLDEN BAY, JANUARY, 1967

By IAN G. ANDREW

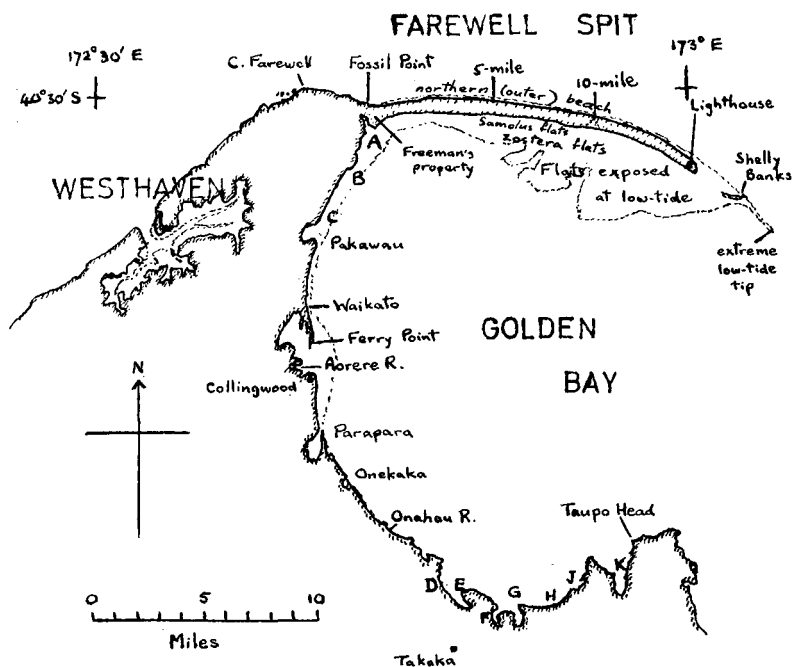
In January, 1967, some sixty members and friends attended the second O.S.N.Z. summer course to be held at Farewell Spit. The first of these biennial one-week courses was held at Farewell Spit in January, 1961, and it and the subsequent courses in Southland and at Kaipara were so successful that a more ambitious programme was decided on for 1967. The 1967 course was spread over three weeks, 10th - 31st January, and the participants were divided into three groups, each staying for one week. With the increased participation in the 1967 course, the whole of Golden Bay and Westhaven Inlet were also able to be included in the study area, thus making possible a more integrated picture of the bird population of the district.

As in 1961, the Wildlife Division of the Department of Internal Affairs kindly provided transport for the course, and this time ten Wildlife officers and trainees were seconded to the course. Organisation was on a joint Wildlife-O.S.N.Z. basis, with Brian Bell in command. Particular thanks must go to Brian Bell for the smooth running of the course, to "Goldie" Hartley-Smith and Alan Wright, the two transport officers, to Mr. S. W. Freeman and family, on whose property we camped, making use of their fine new woolshed for our headquarters, and to Mr. and Mrs. F. Soper for material assistance and hospitality.

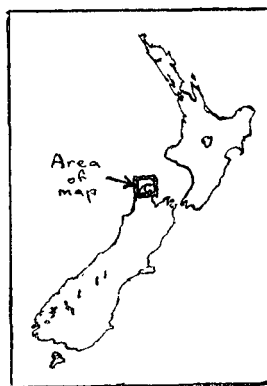
The history of ornithology on Farewell Spit has been reviewed in *Notornis* by B. D. Bell et al. (1961). Recent observations have been reported by Bell et al. (1961) (an account of the 1961 O.S.N.Z. course), Edgar (1962), Bell and Zumbach (1963), Bell (1964 and 1966), and Blackburn and Bell (1965). The first two of these accounts also describe the geographical features of the Spit, which are in part reproduced here in the form of a map. On this map, mileages are taken from the point where the vehicle track strikes the base of the outer (northern) beach. The 10-mile point, formerly erroneously described as the 12-mile, marks the breakthrough point of spring high-tides, where the sea washes right over the Spit. The whole of Golden Bay and Westhaven Inlet are also shown on the map, to indicate the chief points mentioned in the text. To my knowledge, there have been no systematic accounts of the birds of Westhaven Inlet or of Golden Bay itself, although occasional records from these areas have appeared in *Notornis*.

The chief aims of the present course were (1) to provide further information about the birds of Farewell Spit and Golden Bay, including a full census, and (2) to train observers in the identification and counting of waders. The three weeks were accordingly organised to fulfil these aims as far as possible.

In each week, parties visited the principal bird areas of the Spit on the first two days, to get to know the layout of the land and the birds they would be counting, as well as to get practice in counting. Activities for the rest of the week were governed partly by the state of the tides. In the first week, tides were quite high. A census of Westhaven was made on 13th, a partial census of Farewell Spit on



- | | |
|---|------------------------|
| A | Puponga Inlet |
| B | Taupata R. |
| C | Onetaua |
| D | Takaka R. |
| E | Takaka Wharf |
| F | Rototai |
| G | Motupipi |
| H | Tarakohe |
| J | Ligar Bay |
| K | Wainui Inlet |
| L | North Head, Westhaven. |



14th, and a census of the eastern half of Golden Bay on 15th. On 16th, a preliminary census of the whole of the Spit was conducted, but the high-tides were already insufficient to cover the inner (southern) flats. Many Godwits and Knots remained through the high-tide out on these flats, which could not be covered during the census, and were therefore not counted. In the second week, neap tides prevailed, and only one census was attempted — of the western half of Golden Bay on 20th. The remainder of the week was occupied with diversionary activities such as filming (J.F.K.), looking for rarities, "sea-watching"

(for petrels and albatrosses), and outings (Westhaven and Collingwood). A short film covering the course was made during the week by J.F.K., and appeared later on television.

In the third week, tides were really high again, with spring tides on 27th, 28th and 29th. A complete census of the Spit was divided over two days. The "big stuff" (Oystercatchers, Godwits, Turnstones, Knots and Black-backed Gulls) were counted on 28th, and the "small stuff" (other waders, terns and small gulls) on 29th. Finally, the Wildlife personnel counted the Shags and Herons on the rising tide on the inner beach on 30th, while other members of the course relaxed and studied rare birds. Each week, unorganised time was mainly spent on or about Mr. Freeman's property — at places within easy walking distance; Swallows, Wekas, and many other species were an ever-present attraction.

The attempt was made during the three weeks to obtain a reliable estimate of the numbers of all shorebirds and water-birds in the entire area of study, using the same methods as in 1961. For most of these species the estimate finally arrived at is considered highly accurate, but the numbers of Godwits and Knots were not satisfactorily determined. The high estimates of these two species on 14th were not approached on either of the two census days, 16th and 28th. The finding of three immense flocks at 4-5 miles on 30th, comprising about 10,000 Knots and 5000 Godwits (E.J.S.) — in an area where none were reported on census day, 28th, and only 1500 total on 16th — is perhaps indicative of the extent to which these flocks can move about. It is possible, therefore, either that the numbers found on 14th remained in the area but that some flocks were missed, even on the high-tide of 28th, or that several thousand birds left the Spit entirely after the 14th.

On census days, the participants were generally split up into groups of one, two or three, with at least one experienced observer in each group. On Farewell Spit, each group was given a different beat, as described by Bell et al. (1961), so that the whole Spit was covered. Nine groups were formed on 16th, five on 28th, and six on 29th. On the Golden Bay coast and in Westhaven, groups were assigned to specific points or stretches of coastline, several groups covering more than one beat each. The eastern half of Golden Bay was covered by nine groups on 15th, and the western half by thirteen groups on 20th. Parapara and Onekaka were covered on both days to minimise any errors due to movements of birds along the coast. Westhaven was covered on 13th by four groups, one of which had the singular misfortune of finding no birds, and a final check was made by car on 23rd.

All census counts were timed to take place in the interval between half an hour before high-tide and one and a half hours after high-tide. The names of the members of all the groups, and the census figures obtained for each beat, are being lodged with the O.S.N.Z. recorder. The total number of each species counted on each census day was worked out, and totals obtained on other days have also been worked out and will be lodged with the O.S.N.Z. recorder. Table I shows a week by week analysis of the census totals for Farewell Spit; where higher totals were counted on non-census days, and where no census was conducted (second week), the highest total obtained for each species in the relevant week is given. Totals reported in Table I for Golden Bay and for Westhaven are census figures. The totals for

TABLE I —
CENSUS TOTALS

Species	Previous		January 1967					
	Farewell Spit		Farewell Spit			Gold Bay	West-haven	Total
	Jan 1961	May 1962	Week					
		10-17	17-24	24-31				
Gannet	12	150	10	+	12	11		
Black Shag	+	25	35		42	128	40	210
Pied Shag						9	4	13
Little Shag	90	250	33	37	33	58	29	124
Spotted Shag						28		28
White-faced Heron	+	435	122	+	190	230	101	581
Little Egret						1		1
Blue Reef Heron						1	3	4
Bittern	3							
Royal Spoonbill		8						
Black Swan	+	+	+	+	7000	-	85	7000
Grey Duck	+	500	{113}	37	91	200	42	350
Mallard	+	+		+	9		6	15
Shoveler		26	3	10	4	24		34
Harrier	+	13	3	+	+	9+	+	20+
Pukeko	+	1	+	10	+		10	
S.I.P. Oystercatcher	2048	4000	2514	+	4126	3458	630	8214
N.I.V. Oystercatcher	1							
Black Oystercatcher	42	22	33	23	37	25	17	79
Golden Plover	30	-	26	35	40	-	-	40
Grey Plover	1							
Banded Dotterel	1088	1255	930	+	1458	296	-	1754
N.Z. Dotterel	5	5	-	2+	2	-	-	3
Mongolian Dotterel	1	-	2	-	3	-	-	3
Wrybill	29	7	4	-	3	1	-	5
Curlew	18	7	35	31	30	1	-	35
Asiatic Whimbrel	21	1	25	24	26	-	-	26
Little Whimbrel	1							
Bar-tailed Godwit	17,720	2000	19,000	+	12,077	1780	200	21,000
Black-tailed Godwit	1							
Greenshank			-	-	1	1	-	1
Grey-tailed Tattler		1	4	1	3	-	-	4
Turnstone	808	20	700	+	658	-	-	700
Knot	27,370	730	26,000	+	16,000	50	300	26,000
Sharp-tailed Sandpiper	2	-	7	1	3	-	-	7
Curlew Sandpiper	2	-	2	4	3	-	-	4
Red-necked Stint	9	6	19	38	17	-	-	38
Sanderling		1						
Pied Stilt	18	21	18	13	39	41	6	86
Black Stilt	1							
Skua spp.	6	1	3	2	4			4+
Black-backed Gull	200	500	219	+	271	416	19	706
Red-billed Gull	199	454	300	+	310	580	56	950
Black-billed Gull	101	61	100	+	160	60	15	235
Black-fronted Tern	5+	23	3	2	10	-	-	10
W.W.B. Tern			1	-	-	-	-	1
Caspian Tern	86	39	200	+	122	116	34	350
Little Tern			2	2	3	1	-	3
White-fronted Tern	1085	42	165	+	185	54	7	200+
White-capped Noddy	1							

Golden Bay were derived from the totals for the eastern and western halves, with an appropriate adjustment for the overlap at Parapara and Onekaka. The highest totals for Farewell Spit in January 1961 and May 1962, but not other visits, are included in the Table for comparison. Further details on all species, including those not listed in Table I, may be gleaned from the species list.

This course, and the results reproduced here, have made clear to all members who attended just how important Farewell Spit is as a sanctuary for migrant waders. There is now little disturbance by man, and the few grazing animals present (reduced from their 1961 population by the erection of a fence across the base of the Spit) may well do more good than harm, by keeping open the central flats used by the smaller waders, and possibly preventing the spread of lupin and rush (B.D.B.). Bell et al. (1961) suggested that the animals may help in consolidation. Earlier writers, quoted by Stidolph (1948), referred to the vast changes in the vegetation of the Spit, and the reduction in the number of birds which occurred in the past, but the extent of these changes is poorly documented, and the effects of man cannot be assessed; certainly the actual numbers of migrant waders which visit the Spit now compare very favourably with those in other parts of New Zealand.

The number of rare species which turn up, and the extent of migration and dispersal movements on the Spit, together with its isolation from humanity, would well justify the establishment of an observatory there, as soon as finance can be raised. The participants in the first week of the 1967 course accordingly proposed that a fund be set up for this purpose. A small hut somewhere on the Spit, with a supply of water, would be extremely valuable during the spring and autumn migrations, when unusual visitors are particularly likely to arrive. Farewell Spit is probably the chief departure point for arctic migrants from the whole South Island, and is well situated to receive any stragglers from Australia, such as Crested Tern and Tree Martin.

The following is a list of the participants of the course: J. S. Adams* (Wgton.), J. H. Addison (Nelson), I. G. Andrew (Palm. Nth.), Dr. C. R. Barnicoat (Nelson), B. D. Bell* (Wgton.), K. Bond (Auck.), Dr. E. A. Bowie (Auck.), Mr. and Mrs. J. Brown (Papakura), Mr. and Mrs. R., Michael and Gillian Bysouth (Palm. Nth.), Dr. E. Collier (Nelson), Mrs. D. Crockett (Wanganui), M. Crombie* (Wgton.), R. Cunningham (Dunedin), M. Davis (Auck.), Miss J. Edgar (Chch.), Miss N. Finn (Chch.), Mrs. E. L. Fookes (Auck.), Dr. E. Gibbons (Wgton.), E. J. Gibbs* (Wgton.), Mr. and Mrs. T., Robin and Lynley Hartley-Smith* (Greymouth), B. D. Heather (Upper Hutt), R. N. Holdaway (Blenheim), Miss V. S. Hudson* (Wgton.), Miss A. Hutson (Petone), M. J. Imber* (Wgton.), Miss P. Insley (Nelson), J. A. F. Jenkins (Auck.), J. L. Kendrick* (Wgton.), Miss J. Key-Jones (Auck.), F. C. Kinsky (Wgton.), Miss H. Larsen (Nelson), Mr. and Mrs. I., Peter, Helen and Donald McKellar (Dunedin), Miss M. M. Neill (Wgton.), J. F. O'Brien* (Wgton.), Mrs. H. Oliver (Wgton.), Mrs. S. M. Reed (Auck.), M. Rendle (Nelson), Mr. and Mrs. P. Rider (Wgton.), E. J. Sharpe* (Wgton.), R. B. Sibson (Auck.), Dr. R. F. Smith (Dunedin), J. C. Smuts-Kennedy* (Wgton.), Mr. and Mrs. F., Gael and Elizabeth Soper (Takaka), Mrs. M. and Margaret Soper (Tapanui),

Mrs. G. Syme (Auck.), Miss K. Todd (Hastings), I. Townsend (Nelson), Miss A. Walker (Nelson), P. Ward (Greytown), Mr. and Mrs. L. Wintle (Mangawhai), A. Wright* (Haast).

An asterisk * denotes a member of the Wildlife Branch.

SPECIES LIST

A. T. Edgar (1962) has listed all the bird species recorded from Farewell Spit up to 1962. Succeeding visits have added to this list the Greenshank (Bell, 1964, 1966), Western Sandpiper (Blackburn and Bell, 1965), American Whimbrel and Wandering Tattler (Bell, 1966). Species recorded on Farewell Spit for the first time in January 1967 were White-winged Black Tern and Little Tern, while at the base of the Spit and on Freeman's property Californian Quail, N.Z. Pigeon, Shining Cuckoo and Bellbird were added to the list. In addition, the following species not listed by Edgar have been found in Golden Bay, but have not been reported from Farewell Spit: Little Shearwater, Pied Shag, Reef Heron, Banded Rail, Tui, Fernbird.

In the following list I have included all species that I know to have been reported from Farewell Spit, Coastal Golden Bay and Westhaven Inlet. Records prior to 1967 are given only where not mentioned by Bell et al. (1961) or by Edgar (1962). January 1967 records are generally listed by locality, using the following abbreviations: F. = Farewell Spit (including Freeman's property), G. = Golden Bay (excluding Farewell Spit), W. = Westhaven. Observers' initials, where relevant, are given in brackets. Census totals and estimates for most species are also included in Table 1.

BLUE PENGUIN (*Eudyptula minor*).

F. Two or three found moulting in caves at Fossil Point; identified as Cook Strait subspecies by F.C.K., who examined a young male, dark phase. One corpse at tip of Spit. G. Burrows at Ligar Bay and at Taupo Head.

WANDERING ALBATROSS (*Diomedea exulans*)?

F. Two large albatrosses with white backs seen far offshore from Fossil Point on 20th may have been this species.

MOLLYMAWK (*Diomedea* sp.).

F. one seen offshore at Fossil Point on 20th; one at tip on 28th.

FAIRY PRION (*Pachyptila turtur*).

F. Two old corpses found on Spit (14th and 21st).

DARK PETRELS.

F. unidentified large dark petrels, apparently slightly larger than Sooty Shearwater, and with dark underwing, were frequently observed, usually singly, offshore, especially at lowtide tip on 21st.

SOOTY SHEARWATER (*Puffinus griseus*).

F. small numbers frequently seen offshore, e.g. 6 at tip on 27th.

FLUTTERING SHEARWATER (*P. gavia*).

F. Small flocks sometimes feeding quite close inshore; e.g. 30 to 50 at lowtide tip on 21st. A particularly heavy offshore movement appeared to be taking place at 1730 hrs. on 18th, when 82 birds were counted flying east in the space of five minutes.

LITTLE SHEARWATER (*P. assimilis*).

G. One corpse on 15th at Wainui Inlet. In size it resembled the small race *tunneyi* (R.B.S.).

Other petrel species previously reported are GIANT PETREL (*Macronectes giganteus*), BROAD-BILLED PRION (*Pachyptila vittata*), BULLER'S SHEARWATER (*Puffinus bulleri*), and DIVING PETREL (*Pelecanoides urinatrix*).

GANNET (*Sula bassana*).

F., G. Mostly off the northern beach, at tip of Spit, and well out in Golden Bay. Maximum number seen in one day was 12, but no census of the area could be attempted.

BLACK SHAG (*Phalacrocorax carbo*).

F. This is the common shag of the Spit. 42 counted along the length of the inner beach on 30th. At high-tide, a few were also sometimes present at the 2-6 mile pools. On 18th, one from the pools flew around several times carrying a large stick in its beak.

G. In Golden Bay, the main congregations were at Rototai (28), Takaka Wharf (30), Takaka Rivermouth (12) and Aorere Rivermouth (20). W. 40.

PIED SHAG (*P. varius*).

G. Not recorded from Farewell Spit, and a rare visitor in Golden Bay, where 9 were counted on the census of 20th (7 of these on the coast north from Pakawau) and only 2 in the eastern half of the Bay on 15th. Misidentification of the rather commoner Spotted Shag was a problem with inexperienced observers. W. 4 on 13th.

LITTLE BLACK SHAG (*P. sulcirostris*).

W. One possible sight record on 13th (H.H.-S.).

LITTLE SHAG (*P. melanoleucos*).

The roost in the kanuka trees (*Leptospermum ericoides*), overlooking the large pond on Freeman's farm, was much reduced in size from the 90 in 1961. Only 33 were counted during the first week, and 37 during the second week. When disturbed at the roost, the birds flew to an alternative roost, half a mile distant, in trees overlooking Golden Bay. Most of the birds from this roost must have fed in Golden Bay and in the various ponds in the district. Only 8 were counted on the Spit (census, 30th), but 58 were counted in Golden Bay on 15th and 20th. These were fairly well distributed around the coastline, the biggest group seen numbering only 10. W. 29 on 13th included 20 at Banjo Creek.

SPOTTED SHAG (*Stictocarbo punctatus*).

Frequently seen on the rocky coastline and wharves of Golden Bay, but not on Farewell Spit. One at Puponga Inlet on 24th. 26 seen at Onekaka Wharf on 15th, but only one there on 20th, and 3 on 31st.

WHITE-FACED HERON (*Ardea novaehollandiae*).

The numbers of this species are difficult to assess accurately because it does not stick to the coasts, and commonly roosts in trees at high-tide. Special care was therefore taken, and the figure of 581 is probably not far short of the total population in the area. The Golden Bay count is likely to be the least accurate. The heaviest concentrations here were 59 at Puponga Inlet (20th) and 84 at Takaka River (15th). The number on the Spit (190) was well below that in May 1962 (435).

WHITE HERON (*Egretta alba*). Not seen 1967.

LITTLE EGRET (*E. garzetta*).

F. One first seen by B.D.H. at Pakawau on 12th, whence it moved to Puponga Inlet and stayed till 20th. It was at Puponga that B.D.H.

had seen one in March 1958, almost nine years earlier. The 1967 bird carried two delicate white head plumes, and slightly buff- or ivory-tinged plumes on its back; the bill, legs and feet appeared wholly black (no yellow visible on soles of feet) and there was a patch of yellow between the eye and the upper mandible. During its stay, it frequently flew with the White-faced Herons, when its faster wing beat and smaller size were very noticeable.

BLUE REEF HERON (*E. sacra*).

Three at Westhaven North Head on 13th, and one at Tarakohe Beach, Golden Bay, were the only records.

BITTERN (*Botaurus poiciloptilus*). Not seen 1967.

ROYAL SPOONBILL (*Platalea leucorodia regia*). Not seen 1967.

BLACK SWAN (*Cygnus atratus*).

The entire Golden Bay population was on Farewell Spit, where they fed principally on the *Zostera* flats. They are more or less evenly distributed along the whole length of the Spit, perhaps more densely towards the tip, where the flats are greatest in width. An estimate of 7000 birds was based principally on two counts covering a total of 8 miles, made by I.G.A. and M.D. on 21st, and by I.G.A. on 29th.

GREY DUCK (*Anas superciliosa*).

Still the common duck in the area. A few hybrids with Mallard were also present, and probably included in the total as Grey Ducks.

MALLARD (*A. platyrhynchos*).

F. 9 counted with 91 Grey Ducks and 4 Shovelers at the 2-4 mile pools on 25th. G. None. W. One duck with 5 young (T.H.S.).

SHOVELER (*A. rhynchotis*).

F. 10 at the 3-mile pools on 22nd (B.D.B.). G. 24 at Takaka Rivermouth on 15th (B.D.B.). W. None seen.

HARRIER (*Circus approximans*).

F. Probably only about 4 or 5 on the Spit. They did not disturb the wader flocks during censuses as they did in May 1962. G., W. Present in small numbers only.

CALIFORNIAN QUAIL (*Lophortyx californica*).

F. Seen only near the base where the road crosses through the scrub to the outer beach. G., W. Common.

WESTERN WEKA (*Gallirallus australis*).

F., G., W. Common everywhere. On the Spit itself, the estimate of "probably hundreds" made in January 1961 may be a bit high, but certainly parties sitting to lunch at any point on the Spit were very frequently the centre of attraction of at least one inquisitive Weka. A nest with two eggs was found on the Spit in the dried *Zostera* bank at high-tide level, and young chicks were seen on the farm.

BANDED RAIL (*Rallus philippensis*).

G. Recorded by a number of observers in the swamps around Collingwood and Puonga (R.B.S. and others), but a calm night out listening for them during the course was rewarded only by mosquito bites.

PUKEKO (*Porphyrio melanotus*).

Two or three pairs, with at least two broods, on Freeman's farm, and two or three sometimes encountered at the 3-mile pools. Probably widespread in the area, although 10 at Westhaven were the only others recorded.

SOUTH ISLAND PIED OYSTERCATCHER (*Haematopus ostralegus finschi*).

F., G. Distributed throughout the entire area. The highest count for the Spit (4126), made during the census, was higher than the May figure in 1962 (4000) and twice as high as the figure for January 1961. This increase is in line with that reported by R. B. Sibson (1966) for wintering birds in northern New Zealand. Some of the Golden Bay birds (total 3458), counted during the lower high-tides, may have been included in the Farewell Spit total, as a movement from Golden Bay to the Spit was observed at spring high-tides. Further indication of daily movements was afforded by an albino bird, which was seen both at the 6-mile and at the 12-mile. An accurate census would therefore probably require all areas to be covered on the same tide; however, the total for the three areas (F., G., W.) on this course was probably close to 8000. The above-mentioned albino bird, obviously this species by its size and behaviour, was filmed by J.F.K. It had a little buff on the head and neck, while another bird, seen in Golden Bay, near the Onahau River, was less white and more buff-coloured. W. All 630 at Westhaven roosted at North Head.

On Farewell Spit, the Oystercatchers seemed to spend much of their time at low-tide just sitting around, while the arctic waders were busy hunting for food. A group of about 100 birds at the extreme tip, however, provided an exception to this observation. On the very narrow strip of sand, 3 miles beyond the lighthouse and exposed only at low-tide (designated on the map as low-tide tip), the S.I.P.O. would rush out into the receding waves, probe with their bills, and each would bring out a tuatua (*Amphidesma substrangulatum*), the two valves of the shell wedged open with its bill. The shellfish was carried to the middle of the spit, as far from the water as possible, and consumed. The birds appeared to select a standard size of tuatua (40 x 22 mm.) and extracted the animal without making a hole in the shell (I.G.A.).

BLACK OYSTERCATCHER (*H. unicolor*).

F. 37 included 6 juvenile birds in 3 family groups along the northern beach. As on previous occasions, a flock was sometimes seen near Fossil Point, but birds were at times dispersed along the whole length of the Spit. G. 25, mostly in pairs, with one group of 10 at Taupata Creek. W. 17, including one half-grown young, all on the North Head. Total 79.

PACIFIC GOLDEN PLOVER (*Charadrius dominicus fulvus*).

F. 40 present on census day, 29th, were probably present the whole time, but with some missed during the previous counts because of the lower high-tides. This is the highest number yet reported from Farewell Spit, which does not appear to offer much suitable habitat for this species. Golden Plovers in New Zealand generally prefer either estuarine flats or drier flats than are available on the Spit. None seen at Westhaven or Golden Bay.

GREY PLOVER (*C. squatarola*). Not seen 1967.

BANDED DOTTEREL (*C. bicinctus*).

F. 1458, the majority of which were non-breeding birds in various stages of juvenal, eclipse, or post-nuptial plumage, but at least two pairs were exhibiting territorial behaviour. With one of these pairs

(at the 6-mile on 24th) were a recently hatched chick and two flying birds apparently from an earlier brood. One egg was also found near the 6-mile. G. 296, and one deserted egg on a *Salicornia* bed at Motupipi. W. None. Total for area, 1754.

NEW ZEALAND DOTTEREL (*C. obscurus*).

F. Records probably refer to three individuals, all seen about the 6-9 miles. One of these was very darkly coloured, and the other two were rather pale. They were not seen in the first week, and judging from their behaviour in the second week they could scarcely have been overlooked, and hence were probably new arrivals.

MONGOLIAN DOTTEREL (*C. mongolus*).

F. Two were first seen by B.D.H. at the 11-mile on 14th, but owing to the poor visibility and the scariness of the birds on that occasion, their identity could not be confirmed until they were relocated during the spring high-tides of the third week. Three individuals were then seen by many of those present on the course. A detailed account of observations made then will be presented separately. This is the third recorded occurrence of this species in New Zealand, and the second at Farewell Spit.

WRYBILL (*Anarhynchus frontalis*).

F. Fewer than in 1961 — only 4 seen; they moved about somewhat, but three were seen on a number of occasions at the 11-mile. G. One at Motupipi on 15th.

LONG-BILLED CURLEW (*Numenius madagascariensis*).

F. The highest count of 35 on 16th (J.A.F.J./C.R.B.) is just short of the record figure for the Spit of 37 seen on 19/9/62 (Bell and Zumbach, 1963). An odd bird at Onahau River, Golden Bay, on 15th, may have subsequently joined those on the Spit, as only 30 had been seen on the Spit on 14th, and individual birds were frequently observed away from the main flock. The flock spent most of the time at the 10-mile, on the *Samolus* flats, but during spring high-tides they moved into the central flats, sometimes to the 5-mile. They were very scary, and visitors to their high-tide roost were frequently first greeted by the sight of the Curlews already on the wing.

ASIATIC WHIMBREL (*N. phaeopus variegatus*).

F. 26 counted on 26th, but, as with the Curlews, individuals were frequently breaking off from the main flock at the 12-mile, so that smaller counts were obtained. Apparently all birds possessed the pale back which distinguishes this race from the American race.

AMERICAN WHIMBREL (*N. p. hudsonicus*).

One seen April 1965 (Bell, 1966). None seen 1967.

BAR-TAILED GODWIT (*Limosa lapponica*).

The census figure of 12,000 on 28th is well below the preliminary census figure of 15,000 on 16th and the estimate of 19,000 on 14th, suggesting that some birds left the area following the earlier estimates. Large roosts at spring high-tides were spaced about one to two miles apart, generally on the open central flats, but sometimes also on the outer beach, and were distributed from about the 2-mile to beyond the lighthouse. At neap high-tides the flocks were more dispersed, and most stayed on the inner *Samolus* flats. G. 1780, generally distributed, and roosting at Onetawa, Pakawau, Aorere Rivermouth, Parapara, Rototai and Motupipi. W. 200, all roosting on North Head.

BLACK-TAILED GODWIT (*L. limosa*). Not seen 1967.

GREENSHANK (*Tringa nebularia*).

One at Puponga Inlet, 20th to 24th (filmed by J.F.K.). On 30th, after an absence of a few days, it was sighted on the Spit, flying over the inner flats at the 12-mile, and out to the outer beach at 14 miles, where it was finally located feeding at the edge of the waves, running after unidentified food objects rolled in with the water (I.G.A., M.J.I.). I have seen many Greenshanks in various countries, but never before have I seen one on an exposed ocean beach. Two Turnstones were also feeding at the water's edge near the Greenshank — possibly attracted by the same tidbits. When put up, the Greenshank flew to roost with a group of White-fronted Terns, whose unalarmed presence made it very approachable.

GREY-TAILED TATTLER (*T. brevipes*).

F. Identified by the characteristic double note call, described by Edgar (1962). Four were seen on 14th, and three on 30th, and although not all individuals were heard to call, their plumage and their association together suggested that they were all of the Siberian form (*brevipes*). They were seen at various areas on the Spit, from 6-mile to 14-mile, frequently feeding at the edges of pools or creeks on the incoming tide or at high tide.

WANDERING TATTLER (*T. incanus*).

One seen April 1965 (Bell, 1966). Not seen 1967.

TURNSTONE (*Arenaria interpres*).

F. The census figure of 658 compared unfavourably with the 1961 total (808). In 1961, large numbers of Turnstones were commonly encountered on the outer beach, but in 1967 the outer beach was almost deserted by Turnstones, probably owing to a shortage of cast-up seaweed with its associated fauna. G., W. None seen.

KNOT (*Calidris canutus*).

F. 26,000 estimated at high-tide on 14th. This number could never subsequently be found on any high-tide counts, although an estimated 16,000 were seen between miles 6 and 15, on 26th, and on 30th an estimated 10,000 at 4-5 miles. There appeared to be considerable changes from day to day in the positions of the high-tide roosts of Godwits and Knots, as well as in the relative proportions of the two species. A census of the entire Spit at the same high-tide is therefore necessary to check their numbers. Although this was attempted on the course, the limited number of people available on the census day (fifteen, in five groups of three) may have meant that one or two large flocks of birds were missed. This could have happened if the birds had flown to an unexpected roosting site on census day. The discrepancy between the earlier estimate and the count on 28th might alternatively be due to the unobserved departure of a number of Knots (and Godwits) from the area. The actual census day count was 50% down on the first estimate, and also on the census figure of 1961. Such changes certainly warrant further investigation into the movements of the Farewell Spit birds. H. R. McKenzie (1967) noted an influx of about 6000 Knots at Manukau Harbour about 31/1/67, which might have accounted in part for the Farewell Spit changes.

G. 50 at Rototai, none elsewhere. W. 300 on North Head. It

appears that the Knot is more restricted in its habitat than the Godwit, a fact which was commented on by McKenzie (1967).

SHARP-TAILED SANDPIPER (*C. acuminata*).

F. Seen either singly or in small groups, from about 7-mile to 13-mile; the highest count of 7 on 16th included groups of 5 and 2.

CURLEW SANDPIPER (*C. ferruginea*).

F. 2 or more present throughout the three weeks at the 6-mile; maximum 4. The highest count recorded from the Spit to date is 7 in April 1965 (Bell, 1966).

RED-NECKED STINT (*C. ruficollis*).

F. A record number for the Spit of 38, seen at the 6-mile on 18th; the previous highest for the Spit, 31, was seen by B.D.B. in October 1964. The Stints frequently dispersed over a wide area from 5 to 8 miles, mostly on the drier middle flats, but also on the *Samolus* flats on the inside of the Spit. One markedly brown bird seen on 21st and 24th may have been additional to the 38. Slight behavioural differences between this individual and the others were noted by F.C.K., R.B.S. et al, but these may well have been physiologically related to the early assumption or late loss of its nuptial plumage, and there appear to be no grounds for suspecting that it was a different species.

WESTERN SANDPIPER (*C. mauri*).

One seen October 1964 (Blackburn and Bell, 1965. Not seen 1967.

SANDERLING (*Crocethia alba*). Not seen 1967.

PIED STILT (*Himantopus leucocephalus*).

F. Maximum of 39, all at the 2-5 mile pools; G. 41, all in the vicinity of Motupipi, Takaka and Aorere Rivermouths; W. 6 in paddocks.

BLACK STILT (*H. novaezealandiae*). Not seen 1967.

ARCTIC SKUA (*Stercorarius parasiticus*) and

POMARINE SKUA (*S. pomarinus*).

F. Probably 5 or 6 individuals, usually seen flying over the inner flats. Both species were evidently present, although difficult to separate, as size appeared to be the only useful differentiating feature. The twisted, blunt central tail-feathers of the Pomarine Skua could at no time be seen, although on a number of individuals projecting tail feathers were seen, and in one bird seen closely these were distinctly pointed, and hence the bird was an Arctic Skua. Plumage features were not found useful in identification. One dark phase bird, evidently a juvenile, with a markedly pale rump (a reported character of the Pomarine), harassed Red-billed and Black-billed Gulls and attempted to take on a Caspian Tern; the latter, however, turned on it and chased it away. The size of the Skua suggested that it was an Arctic. All its pursuits of gulls were fruitless, and it eventually disappeared, "a sadder and a wiser bird." Experience on Farewell Spit shows that, in the present state of our knowledge, plumage characters alone cannot satisfactorily separate the Arctic and Pomarine Skuas, and more field work is needed if we are to be sure of our identifications when the central tail feathers are not seen.

BLACK-BACKED GULL (*Larus dominicanus*).

F. 271 on the Spit was rather more than in 1961, but well below the winter count of 500 in 1962. Large flocks sat on the sand around the 9-11 mile mark, as in 1961, and in other areas the first alarm at the arrival of humans was given by these gulls. Pre-flying

young were distributed over the full length of the Spit, and these were pursued over sand-dunes and flats by enthusiastic banders.

G. Recently fledged young were present and old nests found at Ferry Point on 20th.

RED-BILLED GULL (*L. novaehollandiae*).

An exact census of the small gulls on the census days was not possible, since the rather close approach needed to separate the two species on the ground would, in some cases, have caused too great a disturbance of the other birds to be counted. However, of the total of 460 small gulls counted on Farewell Spit, it was estimated that the Red-billed outnumbered the Black-billed by about 2:1. Most flocks were mixed, but sometimes almost pure flocks of one species or the other were found. A number of first-year birds were present on the Spit. Evidence of nesting was obtained at the colony at Ferry Point in Golden Bay, where 5 unfledged chicks were present on 20th. Also at Shelly Banks, where breeding has been recorded (Bell et al, 1961; Stidolph, 1948).

BLACK-BILLED GULL (*L. bulleri*).

F. Mixed freely with Red-billed Gulls, but were especially partial to the 2-mile pools, where a flock of 80-100 of this species was frequently observed with only 2-3 Red-billed. A number of first-year birds were present and begging. Some may have bred at Shelly Banks. G., W. Numbers relatively low.

BLACK-FRONTED TERN (*Chlidonias albostratus*).

F. Small numbers visit the Spit on their way north in January (Bell et al., 1961), although some probably stay for winter (Edgar, 1962). The same pattern emerged in 1967, with the numbers of Black-fronted Terns seen increasing in the third week of the course, reaching a maximum of 10 in one day (29th). They were frequently observed hawking over the marram grass, and one common prey which they were seen taking appeared (although not positively identified) to be the very numerous cicada (*Melampsalta cruentata*), which was very easy to catch here and would even sing on ladies' sunhats.

WHITE-WINGED BLACK TERN (*C. leucopterus*).

F. One was seen (by I.G.A.) on 14th, near the Shelly Banks Tern colony, quietly flitting against the wind and then dropping to rest on the sand before taking wing again. It was in nearly full breeding plumage, generally blackish above and below, with white wings, a plumage seen by me only once before, in Europe in May. This is a new species for the Spit.

CASPIAN TERN (*Hydroprogne tschegrava*).

F. The 200 present during the first week of the course was well above the total in January 1961, but some of these birds evidently departed during the succeeding weeks. Two young chicks were noted at the Shelly Banks colony during the first week, and their subsequent growth was followed over the rest of the course. A few emaciated corpses of fledglings were also found at the colony. G. 4 chicks and 26 adults at the Ferry Point colony on 20th.

CRESTED TERN (*Sterna bergii*). Not seen 1967.

LITTLE TERN (*S. albigrons*).

F., G. A new species for the Spit. Two on the Spit first seen at the tip on 16th, and one at Pakawau, Golden Bay, on 20th. These

three were subsequently seen on frequent occasions. Three (probably the same three) were seen together at 8-10 miles on 29th. All were in winter plumage.

WHITE-FRONTED TERN (*S. striata*).

F. A number of newly fledged birds were about, and, even on 21st, some of these could almost be caught when they were taking off in a strong wind. One egg found was the only sign of breeding at the Shelly Banks colony. Parties of 50-100 frequently feeding just offshore, sometimes roosted on the Spit at high-tide. The census was made from a vehicle on the outer beach at low-tide, and the figure of 185 tallied well with counts made at high-tide. It was very much lower than the 1961 census total.

WHITE-CAPPED NODDY (*Anous minutus*). Not seen 1967.

NEW ZEALAND PIGEON (*Hemiphaga novaeseelandiae*).

F. Two on Freeman's farm, none on the Spit. G., W. Not seen.

SHINING CUCKOO (*Chalcites lucidus*).

One seen on Freeman's farm on 29th.

LONG-TAILED CUCKOO (*Eudynamis taitensis*). Not seen 1967.

KINGFISHER (*Halcyon sancta*).

Probably breeding in Golden Bay. Two juveniles observed with an adult near Collingwood. Not normally venturing on to the Spit proper in January, but one seen at 1-3 miles on 14th.

PASSERINES

As in 1961 and 1962, passerines were generally noted only in passing. An idea of their relative abundance is given in this list. On the Spit, most species were largely confined to the more vegetated areas, where some were quite common, although not in numbers comparable with the more numerous waders.

SKYLARK (*Alauda arvensis*). F., G., W. Common throughout, singing.

WELCOME SWALLOW (*Hirundo neoxena*).

First recorded by B.D.H. on 25/11/55 (Notornis VI, 247), this species has in recent years become established in the Cape Farewell-Puponga area (see Bell, 1966). In January, 1967, small groups of Swallows were encountered over much of Freeman's property (especially at the two dams and about the hilltops), at Puponga, on the Spit itself (especially up to the 6-mile), at Fossil Point, and at a small dam near Cape Farewell, where an old nest and a half-constructed one were found by local boys and shown to us. Groups of 6 to 8 Swallows were seen in all these areas, and bigger groups (up to 12 and probably 15) were frequently met with on Freeman's property, but were difficult to count because of their incessant aerial activity. Several first-year birds were seen. The above-mentioned nest was situated under an overhang over a 10-foot deep dam, 3 ft. above water level, and 2 ft. in from the edge of the overhang. It was attached to the rock, and loosely surrounded with thin rata vine branches. Cup-shaped, made from numerous mud pellets stuck together, it was lined with fine grass and then feathers. Evidence of recent use was the presence of droppings on ferns beneath the nest and a little on the nest itself. A half-built nest was under the same overhang about 6 ft. from the used nest, and the same height above water.

AUSTRALIAN TREE-MARTIN (*Hylochelidon nigricans*).

Not seen 1967.

FANTAIL (*Rhipidura fuliginosa*).

F. Present at 6 and 10 miles. G., W., and Freeman's farm, common, Black and Pied.

TOMTIT (*Petroica macrocephala*). W. Present.FERNBIRD (*Bowdleria punctata*).

G. Quite numerous and easily approachable in the swamps at Collingwood.

GREY WARBLER (*Gerygone igata*).

F. Present at 6-mile. G., W. Quite common.

SONG THRUSH (*Turdus philomelos*).

F. At base only. G., W., common, singing.

BLACKBIRD (*T. merula*).

F., G., W. Present throughout, common.

HEDGE SPARROW (*Prunella modularis*).

F. Present in the lighthouse area and at 14-mile. G., W. Quite common throughout, singing.

NEW ZEALAND PIPIT (*Anthus novaeseelandiae*).

F. Present. G., W. Common; especially Westhaven, where 65 were counted along 10 miles of road (T.H.S.).

BELLBIRD (*Anthornis melanura*).

Common throughout, except on Spit; present at base of Spit.

TUI (*Prosthemadera novaeseelandiae*).

G., W. Present throughout, but not common in coastal areas.

SILVEREYE (*Zosterops lateralis*).

F., G., W. Present throughout, common in some parts; observed at 14 miles on the Spit.

GREENFINCH (*Carduelis chloris*).

F., G., W. Common throughout, singing.

GOLDFINCH (*C. carduelis*).

F., G., W. Common throughout, but fewer on Spit; singing.

REDPOLL (*C. flammea*).

F., G., W. Common throughout, but fewer on Spit.

CHAFFINCH (*Fringilla coelebs*).

F., G., W. Common throughout, singing.

YELLOWHAMMER (*Emberiza citrinella*).

F., G., W. Common throughout, singing.

HOUSE SPARROW (*Passer domesticus*).

F., G., W. Common throughout.

STARLING (*Sturnus vulgaris*).

F. Large flocks about 11-12 miles. Total count on 14th, 430. G. Common throughout.

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ECOLOGICAL OBSERVATIONS ON STANLEY AND GREEN ISLANDS MERCURY GROUP

By A. C. THORESEN

INTRODUCTION

The geology, topography, botany, and species of bird present during the first week of September have been described for Stanley Island by Edgar (1962), and for Green Island by Skegg (1963), and Atkinson (1964). However, no reports for longer periods during the later spring and early summer have been published. Complete knowledge of the annual sea bird activity on islands would be dependent upon visits made almost every week of the year.

It was my privilege to camp on Stanley Island (Kawhitihu) from 14 September to 9 October, and on Green Island from 11 October to 17 December, 1966. Visits were also made to Green Island every second week from the first of April to mid July, 1967.

METHODS

My purpose in visiting the Mercury Islands was to study the Diving Petrels. I discovered that the small colony previously reported by Edgar to be on Stanley no longer existed, and since we could not contact transportation until the prearranged date, we spent time exploring every corner of the island in search of the Divers. We found only a very few widely scattered occupied burrows and none were in a position to study in detail. However, a few observations on other species are of interest. Later, I returned to spend the night of 27 November on Stanley Island.

On 9 October, Mr. Dave Clark of Whitianga arrived to move us to Green Island. Instead, we spent a day in Whitianga to reorganize and replenish supplies and I went to Green Island alone on 10 October. My arrival was just in time to find many Diving Petrel's eggs beginning to hatch. Some chicks up to ten or twelve days old were also found in burrows at this time. Then, if the suggestions that the incubation period is about 55 days is correct, the earliest eggs were laid in mid August.

My movements around the islands were now inhibited only by the weather. I had rented a small dinghy to enable me to contact fishing boats in good weather and I soon made several new friends among the fishermen who watched over my welfare with interest.

My camp on Green was set up on the terrace at the foot of the western slope in a position from which I could view an area dense with burrows. Vegetation cover included kawakawa (*Macropiper excelsum*), karo (*Pittosporum crassifolium*), taupata (*Coprosma* sp.), pohutukawa (*Metrosideros excelsa*), mahoe (*Meliccytus ramiflorus*), and milk tree (*Paratrophis banksii*).

The populations of Divers and Shearwaters were estimated by first counting the numbers of occupied burrows in a measured area and multiplying for the total estimated burrowed area, and secondly, by counting individual adults which entered about a $\frac{1}{2}$ acre area during the evening. The two methods gave figures fairly close to each other.



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Plate XXVIII — An adult Diving Petrel taken in July on Green Island.

THE BIRDS

NORTHERN BLUE PENGUIN (*Eudyptula minor*)

This species was found to be common on Stanley Island. At least seventeen different birds left tracks on the sandy beach on the west side of the island every night. The number of tracks was the same on 27 November on which date they were found incubating eggs. In September pairs were sometimes found in cavities under flax bushes during the day and at night pairs were so engrossed in courtship and copulation that we could watch them in the light of our head lamps. Only eight pairs nested on Green Island.



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Plate XXIX — View of the Northern aspect and Western shoulder of Stanley Island. Pohutukawa and mahoe groves dominate and many burrows of Grey-faced Petrels and Fluttering Shearwaters are located in this area. Diving Petrels and Northern Blue Penguins nest on the rock stacks at the North end.

FLESH-FOOTED SHEARWATER (*Puffinus carneipes*)

Skegg (1963: 160) indicates that this species was probably active on Ohena Island of the Mercury group on 25 November, 1962, but did not find any in the burrows. The reason for this I was able to discover on Green is due to a temporary evacuation from the breeding area.

The species was very active at night on Green Island when I arrived on 11 October and during the day individuals or pairs were occasionally discovered in the burrows. Nocturnal activity begins very

soon after sundown and is rather general all night although they tend to sleep between 11.00 p.m. and 2.30 a.m. Their noise is deafening as soon as they touch the ground. I was able to identify 15 different variations of vocalizations which made in chorus gave the impression that a hundred children were loose in a doll shop — all squeezing the “ma-ma” dolls simultaneously. The sounds are made by alternating forcing air inward and outward.

1. A choking “kuk-kuk-kuk-kuk-kuk” (with several variations).
2. A low “hi-cup-kukuku” uttered at different speeds.
3. A loud “ku-hooowo-kuhoowo, -kuhoowa-kuhoowa.”
4. “Kuhooowa-ooowa-kahoowa, -kahoowa.”
5. A soft guttural “ghu ghu-ha-ha.”
6. A low soft “hicup-hicup-hicup.”
7. A quiet cooing sound during active billing.
8. A low “ghu-ooaha-ghuooowa-wha-wha.”
9. “Gra-gra-gra-kuhoowa-kuhoowa.”
10. “Gha-ha-gha-a-ha.”
11. A high pig-like squeal when fighting.
12. “Aah-aah-aah-aah.”
13. “Karaka-kiterel-karaka-kiterel.” This sound was first heard by a bird flying and was immediately copied by others on the ground.
14. “Ka-ka-ree-el.” Also heard from birds in flight.
15. A loud mixture of many sounds when disputes between two birds take place.

The silence was welcomed when the first light of dawn enticed them from the island.

In the $\frac{1}{4}$ acre area behind my tent I counted 52 burrows of Flesh-footed Shearwater size. A few seemed to be vacant, but underneath, the soil was riddled with old tunnels with no entrances. Most of the birds arrived within a half hour after sundown. On 22 October I counted 36 drop through the canopy to the ground within the area. A few of these were greeted by mates in burrows. Others came in pairs. According to my estimate about three acres of the total six or seven on Green is utilized by Flesh-footed Shearwaters. If there are 50 per $\frac{1}{4}$ acre we have a total of about 600 birds on the island. I believe this to be a fairly liberal estimation of the total number nesting there.

Activity during October includes vigorous burrow digging with bill and feet (the debris is kicked as far as 3 or 4 meters). Others engaged in territorial squabbles, copulation, billing and nibbling neck feathers.

By the middle of November only a few individuals were coming to the island. By 28 November it was rare to hear one and except for the softer noises of the Diving Petrels the nights were restfully silent. Suddenly, on 9 December, they all returned again and on 12 December fresh eggs were found for the first time. One wonders why the temporary evacuation, also apparent in other species, is necessary. Some observers have suggested it to be a “build-up” feeding period spent at sea. On 27 April, 1967, four pairs were found still raising young which still retained considerable quantities of down.



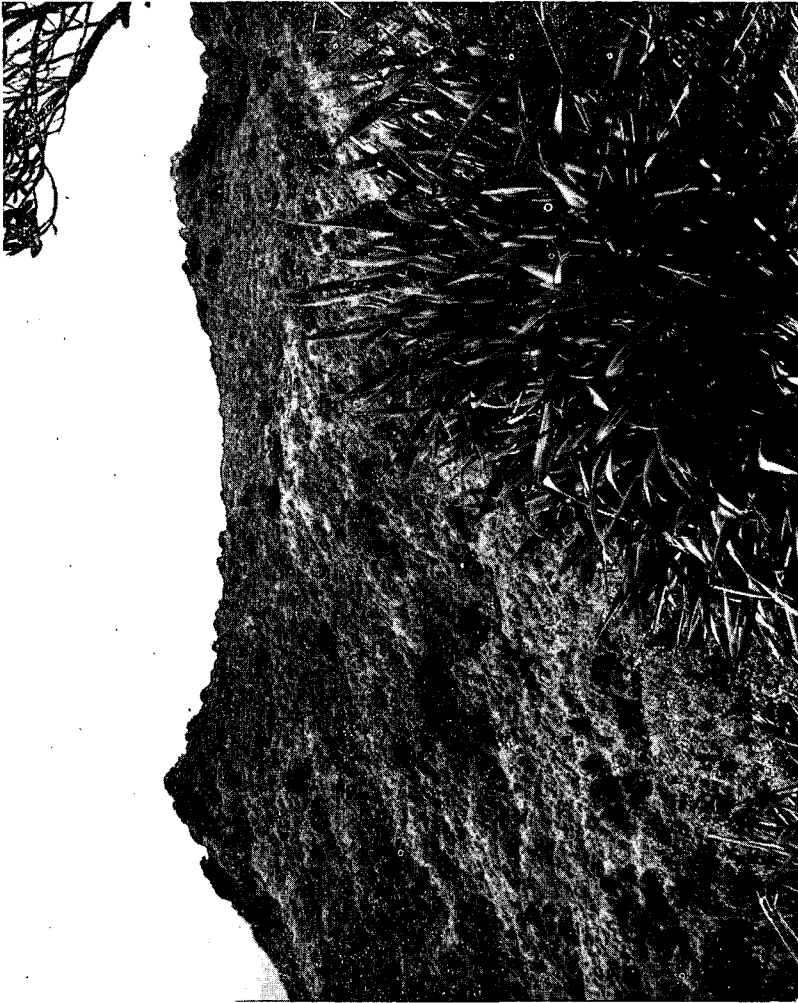
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Plate XXX — The Eastern side of Stanley Island as viewed from the Saddle. The dark trees are pohutukawa. Lighter patches of mahoe and mixed scrub fill in the spaces. The mahoe groves were particularly favoured by the Grey-faced Petrels for burrow territory. Double Island is seen in the background.

FLUTTERING SHEARWATER (*Puffinus gavia*)

This species was seen frequently on Stanley, but I did not find it to be present in large numbers. Four pairs had burrows along the bank behind the west beach, and scattered nests were located in the mahoe groves on the island.

On Green two pairs were noted in October and early November. On 7 December the species was numerous all over Green Island and many were scratching in burrows or sitting in pairs in or just outside their holes. However, by 14 December only an occasional bird was



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Plate XXXI — Southeast view from a high midpoint on Stanley Island. Dense manuka and Kohuhu predominates this area with very few burrows present.

seen or heard. I was unable to determine the reason for these periodic invasions. Two were banded by Mr. John Jenkins and me on the night of 26 April.

ALLIED SHEARWATER (*Puffinus assimilis*)

Although considered to be a winter breeder I discovered an occasional bird on Stanley and on Green Islands in September and October. Early in November it was usual to see 3 or 4 individuals on the saddle of Green Island at night. They proved to be a quiet



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Plate XXXII — A Fluttering Shearwater visits its burrow on Green Island.

amiable bird and I was able to stroke one of them after photographing it. None were observed on Green Island between April and the middle of July.

GREY-FACED PETRELS (*Pterodroma macroptera*)

The Mercury Islands are well known for the large numbers of Grey-faced Petrels which nest there. They are numerous on Stanley Island and their burrows were of greatest density in the clear spaces in mahoe groves. The young were leaving Stanley at the end of November. Only two individuals were discovered on Green Island

in October. One was heard on Green on 10 April and on 25 April. Six pairs were seen on Green Island. One pair was attempting to copulate on that date and this behaviour was frequent through July.

After rains the soil in the burrow areas became sticky and adhered drastically to the feathers of the birds. Some were so caked with balls of mud, I did not see how it was possible for them to fly. One sad looking specimen was found gradually making its way down to the sea where I imagine it took considerable bathing and preening before it could fly efficiently again. Diving Petrels also had the same problem in June and July.

WHITE-FACED STORM PETREL (*Pelagodroma marina*)

Skegg (1963: 161) found no evidence of this species breeding on Green Island. Although I found no live birds, the dried remains of six specimens was found in the burrowed area on the saddle of the island.

DIVING PETREL (*Pelecanoides u. urinatrix*)

Edgar (1962: 12) reported that a colony of over 100 burrows was located on Stanley Island just south of the eastern landing and on a steep slope. I found no trace of this colony in 1966 and no sighting or sound of the Diving Petrel could be found on the main part of Stanley although I searched very diligently for it. A few widely scattered pairs may still attempt to nest there.

Two empty shells of fresh eggs were found, one at the south end and one at the north end of the western beach. Both shells were almost complete, but with a hole in one end and the shell membrane very moist with egg-white. It seemed evident to me that these were not hatched eggs but that some animal had robbed them and sucked out the contents. I suspected the kiore rats (*Rattus exulans*) that were also eating our groceries. They chewed on everything we left exposed including two bars of soap which they completely consumed. A freshly caught fish was voraciously chewed one night and hen's eggs were eaten when left cracked open as bait. Walker (1964: 904) also mentions the omnivorous habits of this rat which is commonly reported to eat only vegetable matter and Kepler (1967: 426) more recently mentions rather drastic predation by *Rattus exulans* on Laysan Albatrosses and other birds.

Just north of Stanley are two rocky stacks one of which is accessible at low tide. I found Divers nesting on both of these stacks but rats were also present on the one connected by the reef. On this stack about 25 pairs of Divers were located under slide rock and soil beneath taupata scrub. Early one evening I was sitting quietly waiting for the birds to return when I saw a kiore come out of a Diver's burrow. It scuttled down by my feet and disappeared between some boulders. I examined the burrow and extracted a Diving Petrel adult with a wet empty shell adhering to its feathers. There was no trace of the spilled egg contents in the burrow. This has lead me to suspect that it is possible for a rat to suck on eggs while the bird incubates.

On the second stack off Stanley I estimated more than 100 occupied burrows.

It has been indicated by Skegg (1963: 161-2) that the species is abundant on Green Island. He estimated about 15,000 pairs. My figures for 1966-67 are considerably more conservative.



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Plate XXXIII — The Western Slope of Green Island viewed from the reef at low tide. The study area and camp site were located under the trees on flat ground at the foot of the slope.

There is no doubt that up to 200 holes to 100 square meters may be found on Green and that an average of 50 is a reasonable figure. However, I discovered that more than one third of the holes are unused and estimated that approximately one third of the island is uninhabited or not suitable for Diving Petrels.

On 24 October I divided the island into six zones and estimated the numbers of occupied burrows for each sector.

Sector	Approximate number occupied burrows
1. Western slope and terrace	250
2. Northern-northwest cliffs	25
3. Southwest talus slope	25
4. Eastern slopes and cliffs (including shoulders)	500
5. Saddle	100
6. Plateau (including northern and northeastern shoulder)	250
TOTAL	1150

This total represents the entire island and is the figure for the number of pairs or a total population of about 2300 individuals.

Using the second method during the incoming flight time on the evening of 21 October, I counted 129 Divers that dropped to the ground in about a $\frac{1}{4}$ acre area. At this date most of the birds were feeding young so the 129 probably represents both male and female birds. Assuming that about 5 acres is inhabited more or less uniformly, then 2580 birds come to the island each night during the last week in October.

By 17 December only a very few adults were coming to the island at night and most of the juvenals had left for the sea.

On 10 April, 1967, a few adults were back on Green clearing out burrows. I counted only 40 birds within the first hour of the evening arrival around the N. W. -S. perimeter of the island and all seemed to be present as individuals, not as pairs, and all were in new plumage with the moult complete. On 26 April, 110 individuals were counted in the same area in approximately the same unit of time. On this date pairs were active billing and burrowing and one bird was found in a burrow during the day on 26 April. This activity continued all through June and July. Although the burrows were complete with fresh nesting material no eggs could be located up to 17 July. The frequency index had stabilized to 270-290 birds during July.

PIED SHAG (*Phalacrocorax varius*)

On the western side of Stanley Island Edgar (1962: 12) records four nests of this species. In 1966 the number of nests had increased to twenty-eight. Our interest developed in a flightless bird that roosted alone in low trees along the west beach quite close to our camp. It became quite tame and would walk within a few feet of us and clamber every evening to a pohutukawa tree, perch about 8 or 9 feet above the rocks and would leave for the sea in the mornings just after sunrise. On 27 November it was still flightless and coming to roost in the same trees. It watched with interest other members of its species flying high and perching on trees overhanging the cliff nearby. I also noticed that it played with twigs, plucking them and attempting to place them in the forks of the branches as if to satisfy the nest-building urge. It looked quite frustrated when a twig fell to the ground, peering at it for several minutes before plucking another one. Apart from a few unoccupied birds which rested on small off-shore rocks, no shags nest on Green Island.



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Plate XXXIV — Dead and dying karo and taupata trees on the Western Slope of Green Island. Notice the claw marks on the rock in the foreground.

SOUTHERN BLACK-BACKED GULL (*Larus dominicanus*)

Twelve nests were built in various locations around the edge of the island but possibly due to my presence only two nests had eggs deposited in them. One of these contained two, the other only one, well incubated eggs on 17 December when I left the island. Three other pairs of birds remained in the area but did not continue nesting activities while I was present.

WHITE-FRONTED TERN (*Sterna striata*)

It has been reported by Michael Delamore in Skegg (1963: 164) that this species nested in large numbers on the rocks at the western most point of Green Island. In 1966, although they frequented the rocks for roosting, none nested. However, they nested abundantly on an ice-plant covered rock at the north end of Korapuki (Rabbit Island). Here I estimated a colony of at least 300 pairs.

THE LAND BIRDS

Previous reports on land birds seen on the Mercury Islands have been made (Edgar 1962 and Skegg 1963) so it is sufficient here to list the species and numbers seen on Green Island during my stay.

Red-fronted Parakeet	8 pairs, resident.
Long-tailed Cuckoo	1 seen on 10, 11 and 14 December.
Kingfisher	1 pair, resident.
	5 individuals in April - July.
Fantail	1 seen on 14 December and
	2 seen frequently between 10 April and
	17 July.
Grey Warbler	4 pairs, resident.
Blackbird	6 individuals seen frequently.
Dunnock (Hedge Sparrow)	2 pairs with 7 young seen being fed.
Bellbird	8 pairs appear to be resident.
Tui	2 individuals were feeding on pohutu-
	kawa blossoms on December 12 and 13.
	I watched both TuIs attempt to fly
	against a strong wind toward Great
	Mercury on the evening of 12 Decem-
	ber and both were blown back on to
	Green. I did not see them after the
	wind calmed during the night of 13
	December.
Silvereye	Frequent in small flocks but I am not
	sure if they bred on Green Island.
Goldfinches	A small flock occasionally visited the
	southern slopes.
Chaffinch	An occasional one or two were seen.
Starling	A flock of up to 100 roosted in the taller
	trees on the saddle and some nested
	in the rocky cavities along the cliffs.
Harrier	One pair frequented Green Island and
	feasted upon the occasional Diving
	Petrel. Remains of petrels were found
	often on the ground at the summit
	especially in December when juvenals
	were leaving their burrows.



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Plate XXXV — A mud-balled Grey-faced Petrel on Green Island after July rains. One wonders how it is possible for birds to survive under such conditions.



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Plate XXXVI — Dead karo trees along the edge of Green Island where burrowing is also very dense.



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Plate XXXVII — Grey-faced Petrel in clean normal plumage.

OTHER VERTEBRATES

Rats and rabbits are numerous on Stanley but none exist on Green. However, on the westerly terraces of Green, tuataras, geckos and skinks are conspicuous. Atkinson (1964: 399) has made mention of the species present. The most abundant species is the black skink which has a very high population along the edge of the terraces. Two species of skinks are less common and found more under the scrubby taupata, under loose rocks and among the leaf litter higher up the slopes. A large grey gecko (*Hoplodactylus duvauceli*) is sometimes seen and under almost every flat piece of rock on the upper terrace the common Pacific gecko is numerous.

Thirty individual tuataras were counted on Green Island. I found them in both Shearwater and Diving Petrel burrows and in one instance an 18-inch specimen was found in the same burrow as a 10-day old Diving Petrel chick. I found no evidence that they bother the birds or their eggs although they may on occasions, as commonly suggested.

A Flesh-footed Shearwater dashed off in fear when a Sphenodon scuttled towards it one night, and on 10 April, I saw a tuatara walk over a sleeping Diving Petrel which jumped about 3 feet in the air with fright. Hen's eggs placed near the dens of several tuataras were ignored during a week's test to see if they would take them. After that, I opened several eggs to expose the contents, but they were still ignored by the tuataras. Black skinks ravenously cleaned out eggs when exposed to them.

One day I set up my camera to photograph a tuatara sunning itself near one of the opened eggs in case it took interest in it. It peered at the slowly spilling contents of the egg shell but dashed quickly after a passing skink, but missed it. I captured three skinks and placed them one by one in a partly stunned condition near the den entrance. Within seconds they were devoured even to the wiggling tail of one which dropped off from the body when I tossed it in front of the Sphenodon. Sharell (1966: 32) also mentions that tuataras in Cook Strait eat geckos and skinks.

Each night the tuataras were found foraging among the rocks of the exposed terraces where thousands of these skinks lived, but I was never able to witness a tuatara actually catching one at night. A few fecal pellets found contained parts of the exoskeleton of beetles.

One tuatara I noticed had an open sore on its body just anterior to the right rear leg. A whitish fungus was advancing into the sore around the edges and yet the animal's mobility did not seem to be impeded. Tuataras were also active through the winter months and showed no indication of hibernations.

INTERSPECIFIC RELATIONSHIPS AMONG THE SEA BIRDS

Very little active competition exists between the birds using the island for burrowing. Competition for burrow space is relatively passive since the various species have fairly staggered nesting periods. The larger shearwaters obviously destroy some of the cavities made by smaller birds by digging them bigger and deeper. Blue Penguins were found inside burrows of the shearwater holes. However, I believe these to be accidental associations. Shearwaters digging on burrows in October and November would easily break through an occupied Diver's tunnel and per chance continue digging on beyond, either creating a side branch situation, or in some instances, kicking the young diver chicks



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Plate XXXVIII — An argument session between Flesh-footed Shearwater neighbours on
Green Island.



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Plate XXIX --- Tuatara eating a Black Skink on Green Island.

out of the holes with the debris. I found seven young Diving Petrel chicks destroyed in this manner in my study area.

Individuals of either species, plunging through the foliage suddenly, may cause momentary panic and a scuttle among those on the ground, but apart from this, I saw no active threats between species.

Black-backed Gulls, of course, will torment and kill Diving Petrels if the opportunity arises. This is especially true with juvenal divers, which do not fly well, when they fall from cliffs and become food for the gulls. Dead ones floating are also pecked to pieces by the gulls or swallowed by fish. Twice I caught snapper with whole juvenal Diving Petrels in their stomachs and once a large fish, which I thought looked like a snapper, took a dead diver from between two gulls which were attempting to peck it apart in the water. The surprised gulls immediately took to flight. Men at the fisheries processing plant in Whitianga informed me that Diving Petrels were frequently found in the stomachs of fish.

EFFECTS OF THE BIRDS ON VEGETATION

Heavy burrow density about the roots was the obvious cause of the death of a large number of karo and taupata trees. During my stay on Green Island I witnessed at least six karo trees gradually wilting and many taupatas were barely able to produce a green leaf. Others lay uprooted and rotting on the ground. Even in areas on the summit where burrow density was not great very little regeneration of seedling trees is apparent but this is probably due to the density of the thick canopy above. It seems apparent that if the burrow density continues to develop it will not be long before the virgin vegetation on Green Island succumbs and the soils which are so attractive to the burrowing petrels will erode quickly into the sea. Then surface nesting seabirds utilizing the denuded rocks will begin the cycle over again.

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DISTRIBUTION OF THE McCORMICK SKUA (*Catharacta maccormicki*)

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Part 1 — GENERAL DISTRIBUTION

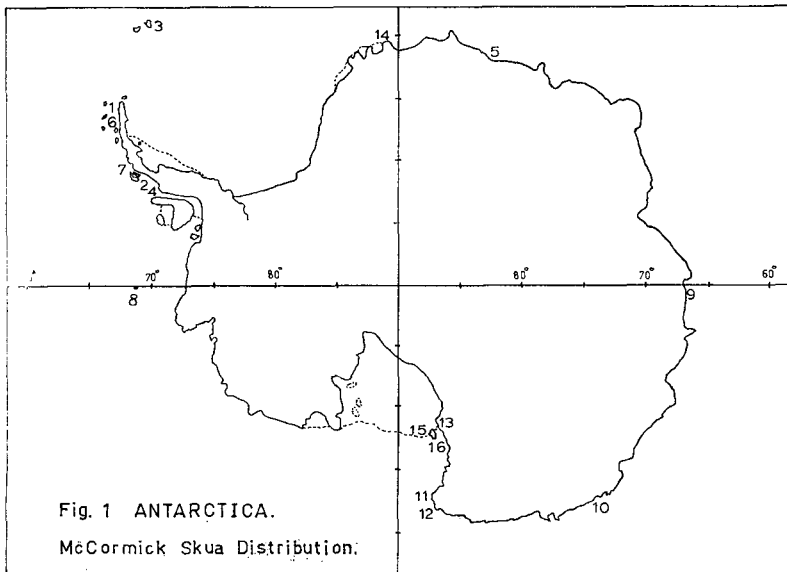
(a) *Breeding Range*

The McCormick Skua breeds on suitable shores around the whole Antarctic coast and on the offshore islands (Fig. 1).

Murphy (1936, p. 1017-1018) summarises the conflicting reports on the northern distribution of this species in the regions of the Antarctic Peninsula and the Antarctic Archipelago. It is in this region that *C. lonnbergi* and *C. maccormicki* overlap; and there is a problem in the distribution of the two species, as to the precise (or imprecise) boundary or overlap between them.

FIGURE 1

Since Murphy's (1936) summary there have been a few reports on the northern distribution. Bagshawe (1939, p. 280) has described Brown Skuas (*C. lonnbergi*) breeding at Water Boat Point on the Danco Coast, but as he records the chicks as slate coloured the birds seem to have been the McCormick Skua, as Brown Skua chicks are buff coloured (Stonehouse, 1956). Holgerson (1950, p. 615; 1957, p. 62) observed two McCormicks, probably a nesting pair, on Peter Is., Lat. 68° 50' S., Long. 90° 35' W., in February 1945, and at Port Lockroy. Burton (pers. comm.) reported that the only certain sighting of a McCormick in the South Orkneys was one seen at Signey Island



in 1961. He also noted that, during a biological survey of the South Shetlands in the summer of 1965/66, two pairs of breeding McCormicks were found breeding, one each at Robert Island and at Nelson Island.

MCCORMICK SKUA BREEDING REPORTS (post Murphy 1936)

Map Reference	Authority	Locality
1	Bagshawe (1939)	Danco Coast, Antarctic Peninsula
2	Bryant (1945)	Stonington Island. Lat. 68°12'S. Long. 67°03'W.
3	Eklund (1959a)	Laurie Island, South Orkneys.
4	Friedmann (1945)	Red Rock Ridge. Lat. 68°17'S. Long. 67°12'W.
5	Gosse (pers. comm.)	King Baudouin Base. Lat. 70°26'S. Long. 24°19'E.
6	Guttman & Cavedes (1964)	Lat. 64°49'S., Long. 62°52'W.
7	Holdgate (pers. comm.)	Marguerite Bay. circa. 67°46'S., 68°53'W.
8	Holgerson (1950)	Peter Island
9	Korotkevich (1964)	Mirny.
10	Prevost (pers. comm.)	L'Archipel de Point Geologie. 66°40'S. 140°01'E.
11	Reid (1964)	Cape Hallett.
12	Reid (1962)	Cape Adare.
13	Spellerberg (1966)	Southern McMurdo Sound.
14	Winterbottom (pers. comm.)	circa. 69°25'S. 1°11'W.
15	Wood (pers. comm.)	Cape Crozier.
16	Young (1963a, b)	Cape Royds to Cape Bird.

In March of 1963 McCormick Skuas were found on the Balleny Islands (150 miles north west of Cape Adare) and were possibly breeding there (Kinsky, 1965; Spellerberg, 1965).

The southern limits for breeding of the McCormick Skua are equally vague. On the Antarctic Peninsula, the most southern nest recorded was at Refuge Island Lat. 68° 27' S., Long. 67° 19' W., (Eklund, 1945, p. 302). During the summer season of 1965/66 the author made a reconnaissance of the McCormick Skua colonies in the southern regions of McMurdo Sound. On the western coast of the sound, breeding colonies were found as far south as 78°5' and as far as is known this is the southern-most breeding limit for a bird.

(b) *Flying Range*

Breeding ranges and flying ranges involve very different ecologies and there have been some very interesting reports of the flying range of the McCormick Skua. These reports give sufficient information to show that the winter range of the McCormick Skua may not be restricted to the pack ice of the Antarctic and that they may migrate much further north. (Fig. 2.)

MCCORMICK SKUA FLYING RANGE REPORTS

Map Reference	Authority	Locality
1	Falla, 1940	New Zealand Coast.
2	Murphy, 1936	Japanese waters.
3	Slepstov, 1963	Russian waters.

There are few records of the McCormick Skua from New Zealand proper. The first was at Stewart Island (Falla, 1940); another from the west coast of the North Island in January 1940, and a third on the Northland coast in 1946. Fleming (1953) described a fourth bird that came ashore on the North Island in March 29. The latest record is of one ashore near Himatangi in June, 1965.

In November 1904, Argentine naturalists procured a specimen of *C. maccormicki* at Laurie Island in the easternmost South Orkneys at Lat. 60° 45' S., 44° 35' W., and up to that time it was the northern-most record of the species (Clarke, 1906).

A specimen collected in the Sagami Sea off the coast of Japan was identified as *C. maccormicki* by Murphy (1936, p. 1007). Although several McCormicks have been reported as far north as Japan (Austin,

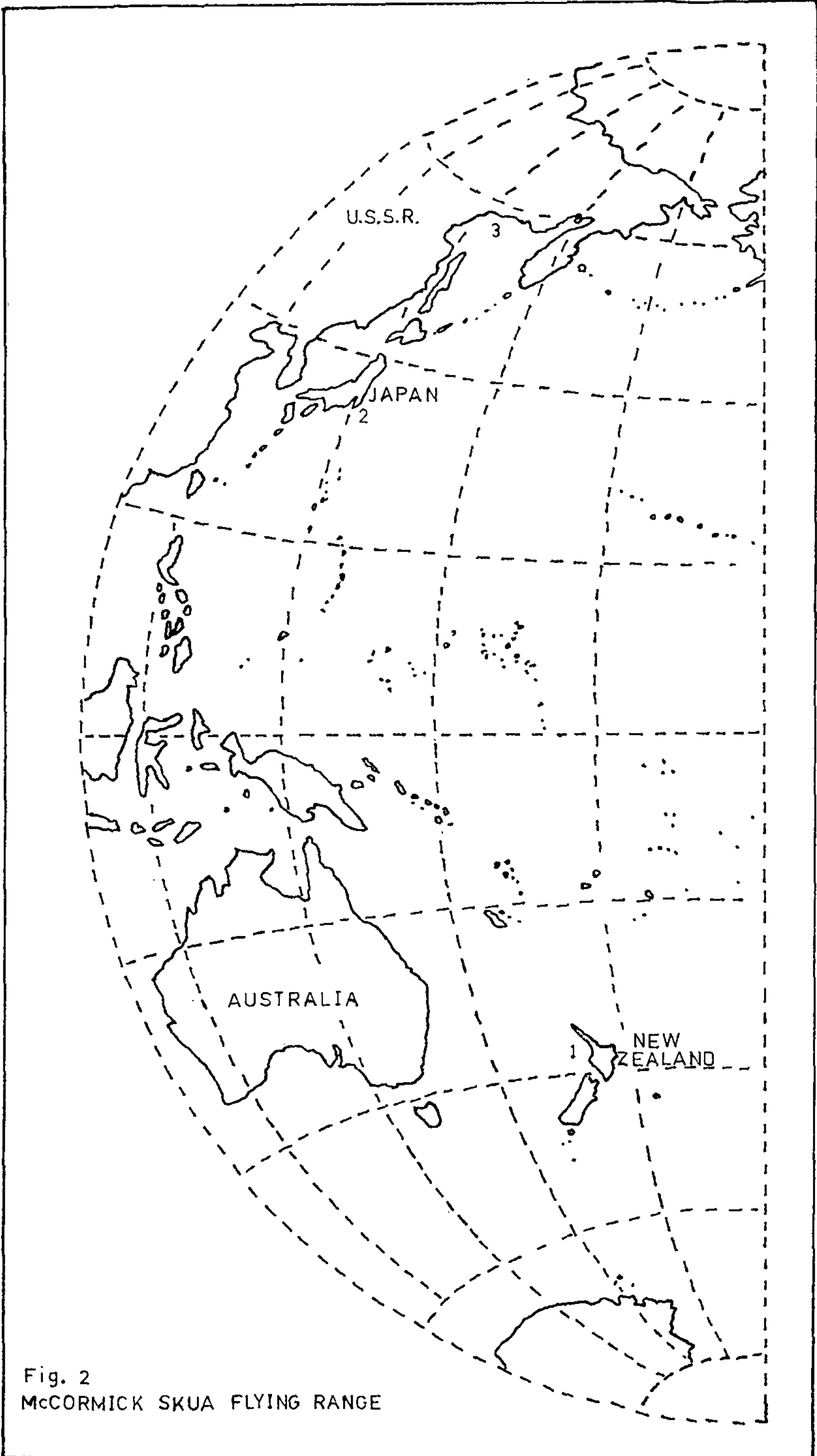


Fig. 2
McCORMICK SKUA FLYING RANGE

1957) this species has been recorded further north by the Russian author Slepstov (1963). He reports the McCormick Skua in the Kuril Straits of the Nemur Sea at Lat. 46° 20' N., Long. 149° 30' E. In the spring, summer and autumn, groups of two to eight birds have been seen in the vicinity of fish shoals. In 1954 the McCormick was found in the South Kuril Straits and in the vicinity of nearby islands.

Interesting reports have come from observers in the Antarctic continent and these reports illustrate the extensive flying range of the species. Amundsen encountered two birds at the inner edge of the Ross ice shelf in Latitude 84° 26' S., on January 9, 1912. Gain believed that the two or three seen by Scott and Wilson in Latitude 80° 20' S., more than 199 kilometers from open water, had been attracted this distance by the wind-borne odour of the blood of a sledge dog slain some time before. On the second Byrd Expedition one of this species was sighted at 86° 05' S., and Hillary recorded a single bird at about 90 miles from the pole in January 1958 (Eklund, 1959).

It is clear that Murphy's (1936) earlier suggestion that the skuas which occur in the temperate north Atlantic during the breeding season of the northern hemisphere forms, may be migrants from some of the Antarctic breeding grounds, must be considered seriously. Skuas have been seen between the equator and the West Indies in April and May, off the West African Coast south of the Cape Verde Islands in November, January and February, and in the central part of the Sargasso Sea between October and December (Fisher and Lockley, 1954). It would seem likely, from these dates, that these were non-breeding birds, but the possibility that they are non-breeding birds from the southern ocean cannot be overlooked. Unfortunately it has not been determined whether these are southern or northern forms.

The Arctic Skua (*Stercorarius parasiticus*), which breeds from the British Isles and northern Labrador northward to the northernmost land area in the Arctic circle, has been recorded at the South Orkneys (Sladen, 1952). Jaegers are recorded annually in considerable numbers off the coast of New Zealand, and it is well known that these species winter in the southern hemisphere. It is also possible that both the northern and southern species spend their non-breeding months in the north Atlantic. This kind of movement away from the breeding range, well documented in the Jaegers may well be possible for the large McCormick Skua.

Obviously more records are needed and the extensive banding programmes now in operation may eventually result in some evidence. Meanwhile, it is suggested that the records of the McCormick Skua in Japanese waters and Russian waters indicate migratory behaviour of the McCormick Skua.

Part 2 — COLONIES IN SOUTHERN McMURDO SOUND

During the austral summer of 1965/66 a reconnaissance was made of the McCormick Skua colonies in the southern McMurdo Sound area. Two day trips by helicopter were made on 29 December and 14 January.

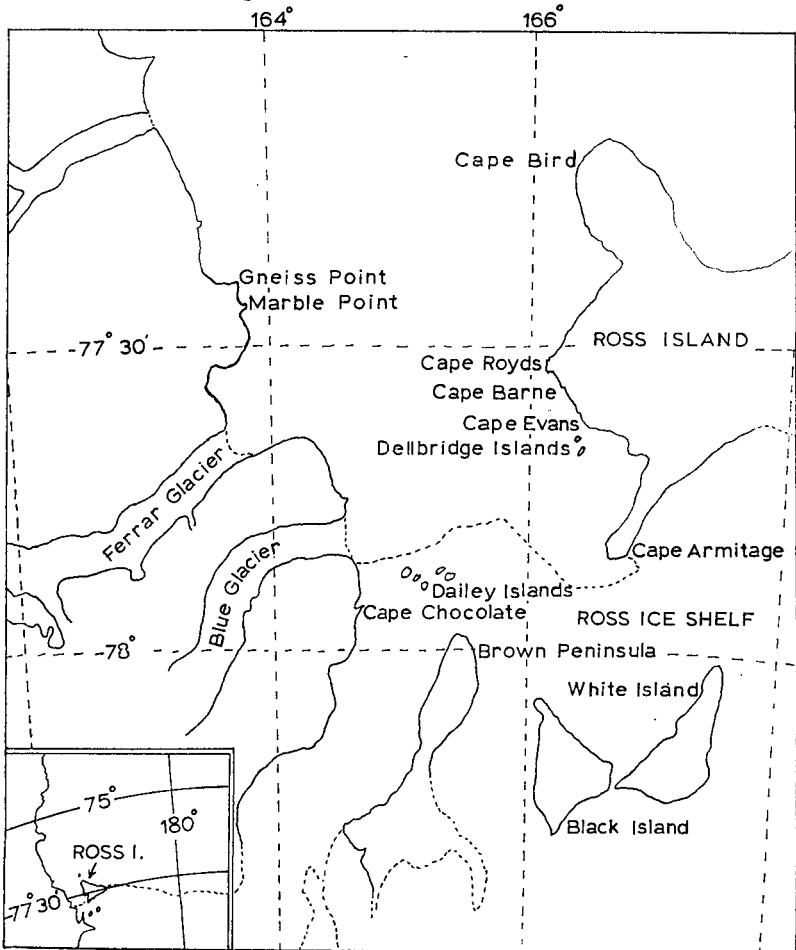
On Gneiss Point (Fig. 3), immediately north of Marble Point, Skuas were found on and about ponds, and two empty scoops (nests) were also discovered. Skuas were seen flying to and from the Marble

Point colony to Gneiss Point. As there are no ponds at Marble Point it appears that the Skuas come to Gneiss Point to bathe at the ponds.

On the southern side of Marble Point the Skua colony covers an area above a beach where shallow depressions and rocks offer protection from southerly winds.

The most southerly colony, found south of Cape Chocolate, extends up to 100 metres inland by the many melt streams and ponds which are found in the area. The nests are 80-100 metres apart, so that the birds are sparsely distributed compared with those in colonies further north.

Fig. 3 McMURDO SOUND



McCORMICK SKUA COLONIES IN
SOUTHERN McMURDO SOUND

Locality	Situation	Breeding Pairs	Remarks
Gneiss Point.	Non-breeding colony around pond.	—	Some scoops, no breeding pairs resident.
Marble Point.	Breeding birds above beach on southern side.	20	20 clutches, 6 with 1 egg; 14 with 2 eggs.
Southern tip of Blue Glacier.	Breeding birds amongst stranded ice-cored moraines.	15-20	All nesting on the edge of ponds.
South of Cape Chocolate.	Breeding birds amongst ice-cored moraines.	25	Nests found as far as 78° 5' S.
Dailey Islands.	Nests on raised beaches on the south-east sides.	14-16	—
Brown Peninsula.	Northern tip.	—	Several birds roosting near ponds.
Cape Armitage.	Southern tip.	1	Nesting beside a pond.
Cape Evans.	Widely distributed around ponds.	55	—
Cape Barne.	Breeding pairs around small ponds.	30	Colony extends well inland.
Cape Royds.	Around lakes on volcanic detritus.	57	—
Horseshoe Bay, immediately north of Cape Royds.	South side.	23	—
Rocky Point, immediately north of Cape Royds.	North and south sides.	68	Colonies are concentrated.

A pair of birds has been recorded over three consecutive summers, 1963/64-1965/66, on the southern side of Observation Hill (Cape Armitage). This pair defends a territory of approximately 400 sq. metres during the summer season when a large colony of non-breeding birds roost in the area and bathe in the pond on Observation Hill. The refuse from two Bases at Cape Armitage, McMurdo Station (U.S.A.) constructed in 1955/56 on the western side, and Scott Base (N.Z.) constructed in 1956/57 on the eastern side, attracts many Skuas through the summer. In February 1964 the population of Skuas centred around McMurdo Station-Scott Base reached 525 birds.

The largest breeding colony is at Cape Evans, 21 kilometres north of Cape Armitage. F. A. de Hamel (unpub. report) reported 52 pairs nesting at Cape Evans in January of 1958. Fifty-four pairs were recorded in January 1964 and fifty-five in January 1965.

A flight by helicopter was made around the Dellbridge Islands, off Cape Evans and no signs of Skuas nesting were seen.

Cape Barne, immediately north of the Barne Glacier is dotted with many small ponds, some of which thaw during the summer months, and there are also some melt streams in late December and early January. Young (1963a) discovered 21 nesting pairs in this area. This number has been increased to 30 nesting pairs, some of which are nesting well inland, by searchers during the summer of 1965/66.

Cape Royds, three miles north of Cape Barne, with its characteristic irregular lava flows of Kenyite and low lava cliffs, is a strip of ice-free land dotted with small lakes and ponds in the valleys. Breeding colonies of Skuas were found in the valleys on the black volcanic detritus and on the slopes of Mount Erebus in the snow free areas. Six colonies of Skuas totalling fifty-seven nesting pairs were found by the end of the 1965/66 summer.

Immediately north of Cape Royds there is a colony on the southern side of Horseshoe Bay (about 23 nesting pairs), and two

colonies (one on each side) on Rocky Point. Further north on Ross Island there are no further suitable nesting areas until Cape Bird is reached.

The number of breeding birds in this area of McMurdo Sound is not large and together with the low breeding success there is a real need for their protection. In 1963/64 only 39.8% of the eggs laid at Cape Royds gave rise to chicks that left the colonies. In 1964/65 this rose to 42.4%, but in 1965/66 it fell to 16.5%. Although the McCormick Skua suffers heavily from the harsh weather conditions, interference by man and his machines is also an important factor affecting the breeding success (Spellerberg, 1966).

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ROOSTING SPARROWS (*PASSER DOMESTICUS*) KILLED BY RAINSTORM, HAWKE'S BAY, NEW ZEALAND

By DAVID G. DAWSON

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On 3 February 1967, following a night of high wind and heavy rain, many dead birds were found below the oak trees where they roost, in Civic Square, Hastings. Of 1357 dead sparrows (Table 1), 1285 were collected on 3 February and 72 on the seven succeeding days, although none seemed fresh enough to have died since 4 February. Most of the birds were moulting.

TABLE 1
DEAD BIRDS FROM CIVIC SQUARE, HASTINGS

	<i>Adult</i>	<i>Juvenile</i>	<i>Total</i>
	<i>Male</i>	<i>Female</i>	
House Sparrow (<i>Passer domesticus</i>)	668	482	207
Starling (<i>Sturnus vulgaris</i>)	2		7
Goldfinch (<i>Carduelis carduelis</i>)	2		1
Indian Myna (<i>Acridotheres tristis</i>)			0
			4

Photographs of the roost showed 14,389 sparrows on 2 July, 1967. Since some birds were obscured a minimum total of 14,500 is estimated. Numbers using the roost would have changed since February but the mortality would still be of the order of 10%, a sizeable proportion of the annual mortality.

The age and sex composition of the dead birds is of interest. Adult female and juvenile sparrows are difficult to distinguish. As the plumage was wet, juveniles were separated by their soft elastic skulls, soft expanded bill corners, reduced or absent underarm down, and small bills. When two observers sorted separate samples of the birds found on the first day the following results were obtained.

	<i>Adult Male</i>	<i>Adult female</i>	<i>Juvenile</i>	<i>Number</i>
Observer 1	49.3%	39.4%	11.4%	686
Observer 2	47.7%	33.8%	18.4%	488

The adult female:juvenile ratios recorded by the two observers differed significantly ($p = 0.001$ in a chi-square test), but there was no difference between the adult male:juvenile + female ratios ($p = 0.5 - 0.7$). This suggests that some juveniles and/or females were wrongly classified.

In spite of this, the sex and age ratios of sparrows found dead agreed well with those of birds caught by mist nets over the same period at the D.S.I.R. Orchard, Havelock North, $2\frac{1}{2}$ miles from Civic Square (Table 1, $p = 0.6 - 0.7$ in a chi-square test). Consequently the low proportion of juvenile to adult dead sparrows appears to be

a true reflection of the proportion living at that time. Table 2 also shows that the percentage of juveniles was higher in 1966 than in 1967 ($p < 0.005$ in a chi-square test on both net and trap captures).

TABLE 2

SEX & AGE RATIOS OF SPARROWS, 15 JANUARY - 15 FEBRUARY

	D.S.I.R. Orchard		Trap		Dead below
	Mist Net				roost
	1966	1967	1966	1967	1967
Adult male %	35	48	4	21	49
Adult female %	18	32	14	22	36
Juvenile %	47	20	82	57	15
Total Number	17	25	51	135	1,357

The 1966 percentage (47% juveniles in mist nets) is nearer what might be expected from the usual annual replacement rate in small passerines overseas (Lack, 1954, Table 21).

Weather records are available from a station only 100 yards from Civic Square. These are taken at 9 a.m. and give the wind velocity then, and the maximum and minimum temperatures, and rainfall, for the previous 24 hours. On 3 February there were high winds, heavy rain and abnormally low temperatures (Figure 1). Low temperatures also occurred on 21 February, 2 March, 13 March, and 22 March, but were not so extreme, nor were they associated with strong wind or heavy rain. Continuous records show that the wind changed to SSW at 3 p.m. on 2 February. The rain began at 5 p.m. but heavy rain (40-50 points/hr) and strong wind (frequent gusts of 30-35 knots) did not come until 3-7 a.m. It was in this period, too, that temperatures reached their minimum.

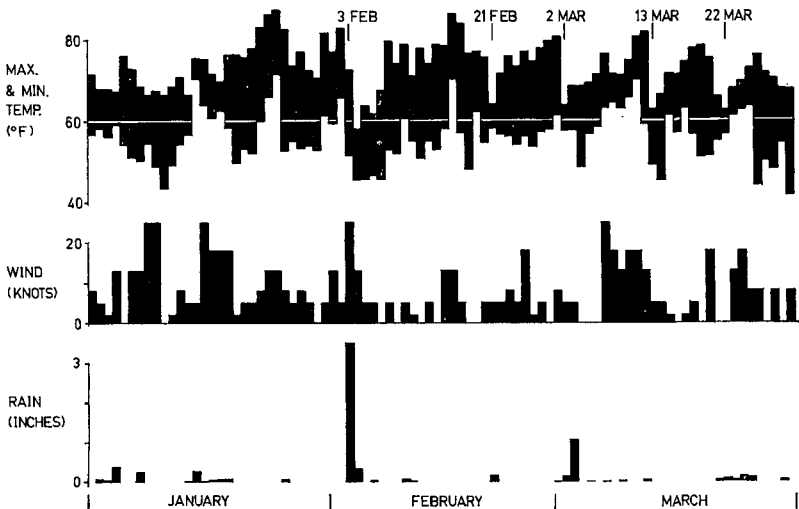


Figure 1 — Weather recorded at the Hastings Fire Station, 9 a.m., January to March, 1967 (see text)

Thus the birds went to roost in moderate winds and steady rain — the more extreme conditions coming after dark. Though Civic Square was searched throughout the period 10 February - 30 March only one other bird was found dead — an adult male sparrow on 16 February. It seems clear that the unseasonable weather brought by cyclone "Diana" was responsible for this unusual bird mortality, which may have been widespread in Hawkes Bay. Three sparrows were found below a small roost in Havelock North on 4 February; and five adult and five juvenile Rooks (*Corvus frugilegus*) were found dead below trees at Bridge Pa on 11 February, and at least 20 others at Otane on 4 February (R. E. R. Porter, and T. P. G. Purchas, *pers. comm.*). Probably the mortality was general and the species that roost communally were merely easier to find. Other contributing factors could include the moult and perhaps the poor season (as evidenced by fewer juvenile sparrows than at the same time in 1966).

ACKNOWLEDGEMENTS

The author wishes to thank Hastings City Council staff for allowing him to examine the dead birds. The N.Z. Meteorological Service and the staff of the Hastings Fire Station provided weather data.

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SHORT NOTE

SEX RATIO OF THE BLACKBIRD (*Turdus merula*) IN CHRISTCHURCH BOTANIC GARDENS

The authors carried out two independent studies in the Christchurch Botanic Gardens during the winter of 1967. Tasker's study involved 180 separate counts of adult Blackbirds on the Archery Lawn, an area of 2.7 acres. Lumping all counts gave 1628 observations comprising 907 males and 728 females, a ratio of 1.22:1.00. East's study involved a series of transects, counting all birds within an area of 14.6 acres on each transect. Lumping the data from all transects gives 768 male Blackbirds and 632 females, a ratio of 1.21:1.00. Thus the two studies independently showed a ratio of approximately 6:5, much closer to unity than the ratio of approximately 2:1 obtained by Gurr (1954) for the Blackbird in New Zealand.

The tameness of birds in the Botanic Gardens makes it a particularly suitable area for determining the sex ratio. Each observer sampled an area in which all the birds present could be seen. Since the ratio of 6:5 is based on over 3000 observations it is likely to be very close to the actual sex ratio in the Gardens, indicating a slight excess of males. In birds the sex ratio is normally about equal in the young but there is often a small excess of males among the adults (Lack, 1954). Gurr's figures were based mainly on birds shot and seen from the road, a method which would tend to give a biased ratio in favour of the more conspicuous males.

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— R. EAST
— R. TASKER

THE FLOCKING OF THE RED-BREASTED DOTTEREL

By R. B. SIBSON

Because of its curiously limited distribution, the Red-breasted Dotterel (*Charadrius obscurus*) is a bird of especial interest in those parts of New Zealand where it is known to breed. On and near the Auckland isthmus, despite the spread of suburbs, the subdivision of hitherto quiet bays and predation during the breeding season by gulls, particularly *Larus dominicanus*, the species persists in sufficient numbers to form flocks as other plovers and dotterels do, at the end of the breeding season.

Four places where post-nuptial flocks have been under observation for some years are (a) Tapora in mid-Kaipara, (b) Jordan's Farm, situated on a peninsula north of Oyster Point and Ngapuke Creek in the south arm of Kaipara Harbour, (c) Kidd's Bay along the south shore of Manukau Harbour and (d) the stretch of shell and saltings north of Miranda in the Firth of Thames.

Red-breasted Dotterels readily adopt new breeding sites, such as shellbanks and shelly beaches, as they are formed or enlarged slowly and naturally by tides and gales e.g. Kidd's Bay and the vicinity of White Bridge, Miranda; or created artificially and swiftly by man, e.g. the rough fringes of Mangere airport.

Colour-ringing has proved that there is some local movement, especially of juveniles; but the flocks in the main are formed from the local breeding pairs and their progeny. So far there is no evidence of immigration from a long distance. H. R. McKenzie's observation of a flock of c.218 at Old Neck, Stewart Island, on 23/5/55, the biggest flock so far recorded, seems to indicate that the Stewart Island-Foveaux Strait population is also fairly sedentary.

In late summer and autumn, some flocks show a liking for the short turf of seaside pastures, which have been reclaimed from saltings and are now closely grazed by sheep and cattle. Here they join other gregarious plovers such as Banded Dotterels (*C. bicinctus*) and Wrybills (*A. frontalis*) not only over the period of the full tide but often for some hours either side. Two such habitats are on the farms of Mr. E. Kidd at Karaka and Mr. G. Jordan in Kaipara.

The following notes have been made at the four localities mentioned above:—

(a) Tapora

Though few pairs are known to nest at Tapora itself, this flocking area is handy to the great sandhills of Muriwai and Pouto; and a few pairs breed around the big dune — Sandy Island — which becomes an island briefly at the times of the biggest tides. Some flock-counts made in recent years are:—

1958	20+	on 9th March
1960	25	on 1st May
1961	40	together and 10 scattered on 16th April
1962	15	on 24th April
1963	20+	on 13th April
1964	6 and 15	in two distinct groups on 4th January

- 1965 40+ on 19th April
 1966 Few on 13th March, squatting among the tidewrack with Banded Dotterels and Welcome Swallows (*H. neoxena*) !
 1967 13 on 12th February. A well-coloured specimen of the Large Sand Dotterel (*C. leschenaulti*) had joined them. All 14 flew and ran together in a tightly knit flock.

(b) *Jordan's Farm*

This is now known to be one of the major high-tide roosting areas for waders in Kaipara Harbour. When its birds were first studied critically in May 1963 (Notornis 10: 250), at least a dozen Red-breasted Dotterels were present. The following spring none could be found nesting on October 5th, although three pairs of Banded Dotterels had nests along narrow strips of beach where they ran the risk of being flooded out by spring tides.

Ngapuke Creek and the adjacent farmlands are a regular wintering area for Wrybills and Banded Dotterels; and they are now joined by Red-breasted Dotterels, for which autumn counts are:—

- 1966 28 on 27th March, accompanied by two Large Sand Dotterels.
 1967 21 on 26th February and 28+ on 29th April.

(c) *Kidd's Bay*

Observations along this unspoilt and rewarding coast began in the middle 1940's. Here the increase of Red-breasted Dotterels has been most heartening, though it is likely that but for the presence of non-breeding Black-backed Gulls it would have been greater. A single bird was present in March and April, 1948; and next October a pair laid eggs which disappeared. Five were seen on 7/8/49; but there was little progress in the 1950's. Hopes were raised when eight were located on 6/7/58 in a wet and lushly grassed paddock at Seagrove. It was no place for nesting, but three had well-reddened breasts. Meanwhile, through the action of the tides and the accretion of dead shells the extent and height of the two main banks were increasing; some thin vegetation was becoming established and the potentially "safe" area for breeding was growing.

Since 1961 two pairs, and more recently three pairs, have nested and a few young have been reared. More have reached the running stage only to fall victims to the ever vigilant Black-backed Gulls. What breeding success the Red-breasted Dotterels have had may be in part attributable to the colonisation of the main shellbank by White-fronted Terns (*S. striata*). In the summer of 1960-1961, about 50 pairs laid eggs, though the colony failed. Since then these terns have usually been present in numbers between November and February; and have provided an "umbrella" under which the Dotterels may find some protection against marauding gulls. At South Kaipara Heads and Waipu I have found Red-breasted Dotterels nesting very close to White-fronted Terns, if not actually among them; and Moon has reported a similar situation on a small islet near Kawau (Focus on N.Z. Birds, 106).

As elsewhere the post-nuptial flocks tend to become bigger between January and April. Likely points of origin for birds which winter in Kidd's Bay are Manukau Heads, the Waikato estuary and the Wairoa

estuary across the isthmus at Clevedon. Across the harbour from Kidd's Bay and in sight of it is Mangere airport. When this was being built and the huge runway was pushed out across the tidal flats, some Red-breasted Dotterels moved in and were quick to seize their opportunities, using the rough earthworks both as a breeding ground and as a winter-roost. Some may have been temporarily lured away from Kidd's Bay.

The following flock-counts have been made:—

- 1962 8 on 28th March.
- 1963 9-12 between mid-January and June.
- 1964 7 on 14th April.
- 1965 (16 on 4th May on the Mangere airport runway).
- 1966 10 on 20th February; 20 on 25th April.
- 1967 12+ on 30th January; 14 on 3rd March; 16 on 26th March; 25 on 15th April, this being the biggest flock so far recorded in Manukau Harbour.

(d) *Miranda*

Observations along the west coast of the Firth of Thames began in 1941. Here during the last quarter of a century there has been a slow increase, so that in 1966 seven pairs may have attempted to breed where none was nesting in 1941. When H. R. McKenzie and I first studied the birds of the Miranda coast, we usually had to work hard to find a single Red-breasted Dotterel and then it was likely to be an immature non-breeder. Between 1941 and 1950 our best count was four. In the following decade there was a slight improvement, 8 or 9 being present during 1953-1955; but attempts at rearing young usually failed. The colonisers may have been refugees from the Coromandel Peninsula, where beaches were becoming much more accessible to the picnicker and bach-builder.

On 31/3/62 for the first time in our experience numbers reached double figures, when eleven were found feeding just south of Kaiāua on a reclaimed mudflat, poorly grassed. It is now a good paddock. In the following spring three pairs occupied territories. More recently 5-7 pairs have nested and a few young have been reared. Predation by gulls has been and still is severe; and probably accounts for the steady decline of the breeding population of Banded Dotterels from about 25 pairs to a mere one or two along what was and still appears to be, as far as terrain goes, a favourable strip of coastland.

Autumn or early winter counts for the last three years have been:

- 1965 17 on 4th July in three groups.
- 1966 18 from at least 6th March to 11th April, by which date two were already reddening. Over a period of some weeks these behaved as a very compact flock, especially if disturbed when resting together at full tide and forced to fly.
- 1967 19 on 28th May.

As further evidence that local movement in late summer and flocking during autumn and winter are characteristic of Red-breasted Dotterels, some other instances from the southern fringe of the northern population are added:—

- Port Waikato — 11 on 7/4/47; 15+ on 24/8/60; 13 on 3/3/63.
- Whatipu, Manukau Heads — 10 on 12/12/51; 12+ on 3/9/52.

Turanga Estuary, Whitford — 6 on 22/6/58, among which was perhaps the reddest specimen I have ever seen; the other five were very pale, not showing a trace of pink.

Oputere, east coast of Coromandel — 12 during June 1967 (per Helen Waters).

Kaituna riverbed, Maketu — 5 on 4/6/66; 8 on 20/5/67 (per R. W. Jackson and H. Lyall).

Red-breasted Dotterels feed mainly along the upper tidal levels of the foreshore where it is sandy or stony, avoiding the soft sticky mud such as commonly occurs near mangroves. After rain and in windy weather they will also feed in short pastures, especially where there are shallow puddles or drainage runnels. Not only moulting adults but also pale juveniles are content to loaf for long hours in dried out seaside paddocks; and may forage for insects there. By mid-winter the flocks are breaking up; and many pairs have taken up territories before the end of July. Later flocks are likely to be composed of immature non-breeders, presumably yearlings; such, for example, as nine, all pale birds, present in Kidd's marsh paddock on 19/8/66; but when fifteen or more were feeding in a bay at Port Waikato on 24/8/60, most were showing some colour. Early breeders are now known to lay their first eggs before the end of August.

The Red-breasted Dotterel is a unique species. Because of its rarity and with a view to its conservation, its numbers should be assessed and its ecology studied without delay. It is probably most plentiful to the north of the area covered in this preliminary survey; but the fine beaches of Northland are fast being "developed." In its favour we know that it is adaptable within limits and persistent; and it appears to be long-lived.



CENSUS RECORDS OF PACIFIC GOLDEN PLOVER FOR FIRTH OF THAMES AND MANUKAU HARBOUR

By *H. R. McKENZIE*

The Pacific Golden Plover (*Pluvialis dominica fulva*) is the fourth most numerous of the Arctic migratory waders coming to New Zealand for our summer. From eastern Asia and Alaska they become widely spread through Melanesia, Polynesia and Hawaii to New Zealand and to Australia.

The census counts of this plover are not so rewarding as those of the Godwit and Knot. Besides being in much smaller numbers they are irregular in their habits. A flock may be found on beach or mudflat one day and inland on short pasture or ploughed ground the next. Even when feeding on the tideflats they will often not use the high-tide roosts of other waders, but will repair to inland resting places up to a mile or more from the sea. Much of their feeding is done inland so they cannot be relied upon to come to the tideflats for every low tide. The seasonal timing of Census counts is important, because when they first arrive from overseas they tend to scatter and are often found in singles or very small flocks, whereas later they gather into larger localised flocks, as noted by Sibson (N.Z.B.N. 2, 6-7).

In the Firth of Thames at high tide a flock can easily be missed on a ploughed paddock some distance inland, the paddock itself not being visible because of the lack of any eminence from which to overlook the extensive plains. In the Manukau it is exasperating to see parties flying inland to some favourite spot which diligent search so far has not revealed. Because of these irregular habits the Golden Plover is not one of the best subjects for census work, so notes taken at other times ("Stab" counts) are used more freely than would be necessary with some other species.

Firth of Thames Summer Counts

Observations by R. B. Sibson, H.R.McK. and others began in the spring of 1941. From 1943 to 1951 small numbers, up to 35, were found but not every year.

The Census records, from 1951 to 1966 inclusive, are given on the chart. The dates and figures in parenthesis are stab counts of occurrences other than censuses, some being gap-filling where no census has been taken and some larger than the census counts of the same season. The flock of 210 counted on 10/1/65 was the biggest recorded for New Zealand. Other counts taken during the period of the censuses have not been used as they are not required for the purpose of this account.

Firth of Thames Winter Counts

Not yet seen in winter.

Firth of Thames Habitat

Although the upper part of the chart is not very satisfactory these observations would indicate that this bird has increased in the Firth of Thames coastal plains belt. Its present habitat there was once a vast swamp where it could not feed or rest. The mudflats alone would not satisfy it. Farm development has provided the ploughed paddocks beloved of the species and allowed the population to build up. Buller, 2nd Ed., 1888, states that flocks of up to 100 were to be seen in favoured places so it would seem that it has perhaps increased and spread more widely since the time of which he wrote. In Clevedon it was not known to occur when G. C. and H. S. Munro were collecting in the eighteen eighties, although the habitat was eminently suitable, with large areas of tidelflat and great stretches of ground ploughed for growing oats. Now it is a regular summer visitor in small numbers. On the other hand a false impression may be gained, because of the former lack of observers in much of the country which is now watched.

Manukau Harbour Summer Counts

Prior to census-taking, the records for Manukau Harbour were based on observations made mainly at Puketutu and Karaka. In 1939-40 flocks of up to 30 were noted, but one of 130 was recorded by P. C. Bull. From 1940 to 1950 flocks were studied more frequently. Counts ranged up to 28 on 23/3/41 near Puketutu; 35 in January 1946 and 49 on 5/3/50 at Karaka. Buller (2nd ed. 1888) mentions that several examples had been obtained in the Manukau Harbour. Skins in the Auckland War Memorial Museum are: Two, "Manukau Harbour" 1881; one, "Auckland District" 1934; two, "Manukau Harbour" 1936. Localities favoured about Manukau have been, or are still, Puketutu, Ihumatao, the Mangere Airport and the Karaka coast. A small flock on a farm at Te Atatu, at the upper end of the Waitemata

Harbour, may have had some relationship with the Manukau flocks. It is most likely that the Manukau area was one of the earliest habitats. The Golden Plover records outside the census period will be better placed if used in a paper covering all records for New Zealand. For the census period 1951 to 1966 the Manukau counts show more comprehensive results than do those for Firth of Thames.

Manukau Harbour Winter Counts

Those shown on the chart may not all be winter birds. The one on 30/7/61 was in winter garb so had most likely wintered here but could have been a stray bird from one of the Pacific islands arriving as a straggler after having failed to go north for the breeding season. One on 5/8/61 was in the full breeding dress of a female or more than half way for a male. It was not the bird of 30/7/61. Although "stay-over" migratory birds will often assume partial breeding colour this one would seem to be a very early migrant in fading plumage. It is perhaps more likely that the state of plumage indicated an aberrant bird. The bird of 26/4/63 was a lame female in breeding plumage. It could still have departed overseas even though it would be a late date for it to do so. The bird of 1/8/65 was quite pale so should have been in the "stay-over" category. Prior to the Census period R. B. Sibson recorded three on 17/4/44 (N.Z.B.N. 2, 6) which were judged to be immature and so might be staying on. Another record by the writer is of two birds on 2/6/47. These would probably be over-wintering. All of these are Manukau observations.

Manukau Harbour Habitat

The principal habitat, at Mr. E. D. Kidd's farm, Karaka, is much easier to approach than the Waitakaruru district of the Firth of Thames. When these plovers are present a car can usually be driven over the grass to an area of semi-salt flat where the growth is always very short. Although they are wary they are so prominent that they can be counted from a distance. At times they have frequented farm land not far away but they do not stay long in any one locality. It is more or less routine when the tide is rising to find them on sand and flat rock on the front of the Urquhart properties. When pushed off there by the water they fly south-west, sometimes to Bell's (formerly Higham's) stop-banked paddocks, but mostly to Kidd's, just inshore from the Karaka shellbank. From there they often go off south overland until lost to sight. The habitat at Puketutu, Mangere, has been destroyed. The other Manukau resorts are used rather spasmodically.

The Pattern of Arrival and Departure for Manukau

The pattern of arrival and departure for this locality is rather well illustrated in observations for the years 1963-64, 1965-66 and 1966-67. These read:—

1963-64		1965-66		1966-67	
Oct.	4 16	Sept.	12 1 male in full	Sept	17 5
	6 19		plumage	Oct.	16 33
	19 40	14	2 Not the	Dec.	11 58
Jan.	31 70		above	Jan.	27 60
Mar.	28 60	27	65	Mar.	27 60
Apr.	11 15	Dec.	12 95 Census	Apr.	7 1 pale, one
	14 1	Apr.	7 16		leg

The Census results do not take any account of high country, so do not help to check the rather vague reports of occurrences over the years in New Zealand. In Hawaii the species occurs regularly from sea level to over 8000 feet, so it is worth while to watch our mountains as well as the littoral. Definite inland reports are: Piopio, 1962, 1, P. McD. McLean; Lake Rerewhakaitu, R. W. Jackson, 4/12/66, at least 25 (Notornis 14, 33).

Pacific Golden Plover Census Totals for Firth of Thames and Manukau Harbour from Feb. 1951 to Dec. 1966

Date	Summer Counts	Date	Summer Counts
29- 4-51	Nil	25- 2-51	13 (55 on 8- 4-51)
2-12-51	65 (35 on 6-10-51)	1951-52	NC (18 on 14- 2-52)
1952-53	NC	1952-53	NC (7 on 29- 1-53) (18 on 14- 2-53)
13-12-53	Nil	22-11-53	17 (8 on 11-10-53) (45 on 21- 3-54) (36 on 3- 4-54)
1954-55	NC (12 on 27-12-54) (39 on 27- 2-55)	1954-55	NC (13 on 11-12-54)
4-12-55	Nil	1955-56	NC (19 on 5-11-55) (48 on 4- 3-56)
25-11-56	Nil (40 On 3- 3-57)	4-11-56	22 (50 on 16- 2-57)
1957-58	NC	1957-58	NC (30 on 22- 3-58)
1958-59	NC (168 on 15- 2-59)	1958-59	NC (110 on 27- 2-59)
6-12-59	105	8-11-59	30 (62 on 3- 1-60)
27-11-60	85	4-12-60	38 (70 on 18- 3-61)
26-11-61	90 (80 on 31- 3-62)	10-12-61	24 (3 on 10- 9-61) (14 on 14- 9-61)
2-12-62	62 (130 on 3- 1-63)	16-12-62	48 (162 on 26- 3-63)
8-12-63	120 (130 on 3- 3-64)	3-11-63	1 (70 on 31- 1-64)
8-11-64	Nil (210 on 10- 1-65)	22-11-64	7 (50 on 25-11-64) (70 on 19- 3-65)
14-11-65	40 (36 on 13- 2-66)	12-12-65	95
4-12-66	10	11-12-66	58

Records of Over-Wintering

None (1 on 30/7/61)
 (1 on 5/8/61)
 (1 on 26/4/63)
 (1 on 1/8/65)

Note.—“Nil” = Census held but none seen.

“NC” = No Census held or records lost.

A SUB-FOSSIL RECORD OF A BARN OWL IN NEW ZEALAND

By R. J. SCARLETT, *Canterbury Museum*

SUMMARY

Bones of *Tyto alba* subsp. are recorded from a sub-fossil deposit at Tom Bowling Beach, Northland.

DISCUSSION

There have been three occurrences in New Zealand of the Australian Barn Owl recently reported. Two specimens, a female, from near Barrytown, Westland, collected on 18/8/1947, by Mr. J. Langridge, and the other, a male, from Runanga, Westland, on 12/8/1960, by Mr. A. Flanagan. AV.2346 and AV.19,597 respectively, are in the Canterbury Museum collection. The third was struck by a car near Haast in November, 1955 (Notornis 7, 208).

In January 1966 Dr. Jack Grant-Mackie and some friends collected a number of sub-fossil bones from sand-dunes at Tom Bowling Beach, Northland, which were sent by Dr. Grant-Mackie to me for identification, and most of which were presented to Canterbury Museum. Among them were a few bones of an owl which were obviously not of Morepork or Laughing Owl. I suspected they might be from a Barn Owl, and while in Australia this year Mr. Alan McEvey kindly allowed me to measure bones of various members of the Tytonidae held in the National Museum, Melbourne. This confirmed that the Northland bones were of a Barn Owl (*Tyto alba*) and probably those of the sub-species *delicatula* from Australia. (I am aware that the species is in need of revision and the name *delicatula* may be superseded but I use it until this happens.)

The New Zealand material consists of a left tibio-tarsus, 1 right and 2 left tarso-metatarsi, all a little sand-worn at the extremities.

Comparable measurements follow:

Tyto castanops (Gould)

	National Museum of Victoria - W.5084 -				C.M.
	L.	P.	M.	D.	
R. tibio-tarsus	12.0	1.5	0.65	1.5	
R. tarso-metatarsus	7.35	1.65	0.7	1.6	

Tyto novaehollandiae (Stephen)

	National Museum of Victoria - W.4851 -			
R. tibio-tarsus	11.3	1.4	0.6	1.4
R. tarso-metatarsus	7.3	1.4	0.65	1.5

Tyto alba delicatula (Gould)

Australian Barn Owl. National Museum of Victoria - B.8652 -

R. tibio-tarsus	9.925	1.0	0.45	1.0
R. tarso-metatarsus	6.75	1.0	0.5	1.2

B.6597 male -

R. tibio-tarsus	9.7	1.0	0.45	1.0
R. tarso-metatarsus	6.7	1.4	0.45	1.0

R.7531 -

L. tibio-tarsus	9.6	1.1	0.415	1.0
R. tarso-metatarsus	6.7	1.0	0.4	1.2

B.6357 -

R. tibio-tarsus	9.4	1.0	0.45	1.0
L. tarso-metatarsus	6.5	1.0	0.5	1.2

W.1498 -

R. tibio-tarsus	9.4	0.95	0.42	1.0
R. tarso-metatarsus	6.4	0.9	0.45	1.0

C.M. AV.20,876 -

L. tibio-tarsus	8.6+(worn)---		0.4	0.9
R. tarso-metatarsus(B)	5.7 [±] (est.)	0.9	0.45	1.0+
R. tarso-metatarsus(A)	5.8 [±] (est.)	0.85	0.4	---
L. tarso-metatarsus	5.85	---	0.4	0.9+

Where no measurements are given the bones are too worn for one to be taken. Although the measurements for the New Zealand bones are somewhat smaller than those I was able to measure in Australia, the tarso-metatarsi fall well within the range of those given by Witherby et. al. (Vol. 2, p. 345) for the British sub-species (*Tyto alba alba* Scopoli) measured on the skin ("tarsus 55-62"). The same tarso-metatarsal measurements are also given (Vol. 2, p. 347) for the Dark-breasted Barn Owl (*Tyto alba guttata*) (Brehm). As the bones from Tom Bowling Beach conform in every way except smaller size with those of *Tyto alba delicatula* in the National Museum, Victoria, the species is not in doubt, and they probably belong to the Australian sub-species.

REFERENCE

H. F. WITHERBY, et. al., 1943: The Handbook of British Birds, Vol. 2.

[The Polynesian Barn Owl (*T. alba lulu*), which is common in Fiji, might be carried to New Zealand in a steady northerly blow.—Ed.]

SHORT NOTES

INLAND NESTING OF RED-BILLED GULLS IN NORTHLAND

The township of Kohukohu lies at the inland extremity of the Hokianga Harbour, where it branches into the Waihou and Mangamuka Rivers. On 12/12/65 a small colony of Red-billed Gulls (*L. scopulinus*) was discovered at Kohukohu; three nests on the abandoned Kohukohu jetty and fourteen nests on the abandoned jetty at Mill Wharf, about 1½ miles from Kohukohu township. The nesting season was well advanced; one nest at Kohukohu jetty held two eggs, and at Mill Wharf each of three nests contained one downy chick, and each of two a feathered chick being fed by parents. Another feathered, non-flying chick, was swimming with parents in attendance.

In 1966 I visited the Mill Wharf colony on five occasions during the period October/December. On October 8th 23 birds were present and two were seen carrying straw. By 30th October 21 nests were finished or partly built, and from the shore five of these were seen to contain eggs. On 5th November we swam out, climbed the piles, and inspected 21 nests, of which 8 contained one egg, 10 two eggs and three three eggs. Hatching had started by 12th November and the parents were very aggressive. By 10th December there were still chicks in twelve of the original nests, and four additional late nests contained respectively one egg, two eggs, two eggs, and one egg one chick. The total Mill Wharf nesting population of gulls was therefore 25 pairs in the 1966 season.

Three pairs laid their eggs in hollows on top of a rotted girder, without any nest lining. Other nests on piles and girders were constructed of straw, small twigs and straw, or small twigs without any straw. One of the late nests was made of straw and dry seaweed, another of small twigs and seaweed. Two nests were right on top of the piles; many of the girders have fallen off or been removed, and the small shelf left is a favoured nest site. All the nests were at least three feet above the water at high tide.

A White-fronted Tern (*S. striata*) which was building a straw nest on top of a pile on 30th October, had laid one egg by 5th November. On 12th November the tern's egg had gone and there was a Red-billed Gull's egg in the nest. On 10th December, when the main gull nesting was nearly over, five pairs of terns were on nests, three of which were on piles and unlined. Two birds were sitting on disused gull nests, to which some additional material appeared to have been added when they were taken over by the terns.

— R. S. COWAN

★

UNUSUAL NESTINGS OF NEW ZEALAND DOTTEREL

In the 1965/66 season two pairs of New Zealand Dotterel (*C. obscurus*) nested about 300 yards apart on sandbanks on the sea-front of Mr. C. F. Duder's farm at North Road, Clevedon. On 23/11/65, No. 1 pair had three small young. Of these one was banded on 6/12/65 and another on 30/12/65. The third one was not banded.

On 6/12/65 No. 2 pair had four eggs in nest. On visiting the nest on 4/1/66 I found that an unknown person had placed three small stakes round the nest and two eggs had gone. These were later deserted and found to be bad.

In the 1966/67 season two pairs again nested, about 250 yards apart.

On 28/9/66 No. 1 pair had nest, two eggs; 30th, two eggs; 10/10/66, one small chick about 100 yards away across a very small tidal creek containing water only at high tide; 11/10/66, chick found dead. On 21/11/66, this pair had another nest with one egg, birds showing very little interest; 23/11/66, still one egg, deserted.

On 28/9/66 No. 2 pair, also with two eggs, about 270 yards from No. 1 pair's nest; 10/10/66, four eggs; 14th, five eggs; 24th, five eggs, bird sitting; 7/11/66 and 9th, and 12th, five eggs, bird sitting each time. On 15/11/66 the nest had been washed out by a high tide. The eggs had been scattered and two were not found. One was in tide wrack. The other two were at high water mark about four feet apart and five feet from the nest site. New nests had been made for each of these eggs where the tide had left them and the bird was sitting on one which was warm.

It being long past a possible hatching date, I took home the cold egg and the washed out one. Both were addled. The third egg was later found to be addled also, and the birds had left the vicinity.

In each case No. 1 pair's record has been shown, as it indicates that the four and five-egg nests were not the result of two birds laying in one nest. There were no other than the two pairs present in either year. It could be that the No. 2 pair was responsible for both the four egg and the five egg clutches. The only other four-egg nest of which I have knowledge was found by J. L. Kendrick and party at or near Ruapuke, south of Raglan. I have not heard of a previous five egg clutch.

— (Mrs.) M. E. MCKENZIE

[Five egg clutches are certainly rare; but at Mangawhai on 20/12/39 C. A. Fleming and I saw a nest containing five eggs which we noted were "all of the same type and did not look like the product of two hens." — Ed.]



STRONG HOMING INSTINCT IN A PUKEKO

Mr. J. Mackintosh has recently been capturing Pukekos (*Porphyrion melanotus*) which cause some trouble around his Grey Partridge pens at the Southland Acclimatisation Society's Game Farm; and after banding they are transported to far-away places. Two captured Pukekos were taken to Tautuku, which is towards the coast from Balclutha and some 60 miles in a direct line from the point of capture. Eight days later one of these birds was retrapped back at the Game Farm. Mr. Mackintosh checked and rechecked his banding records before he was satisfied it was one of the same birds. There have been some similar instances of Pukekos homing in the past, but over much shorter distances; and this is by far the most surprising yet recorded.

Recently (1966), two other instances of the strength of the homing instinct in New Zealand rails have been described. One concerned a Spotless Crake (*Porzana tabuensis*) as reported by Kendrick (Notornis 13, 11) and the other a young Weka (*Gallirallus greyi*) which tramped 80 miles home (Notornis 13, 64).

— R. R. SUTTON

FURTHER BREEDING COLONIES OF GREY-FACED PETRELS
IN TARANAKI

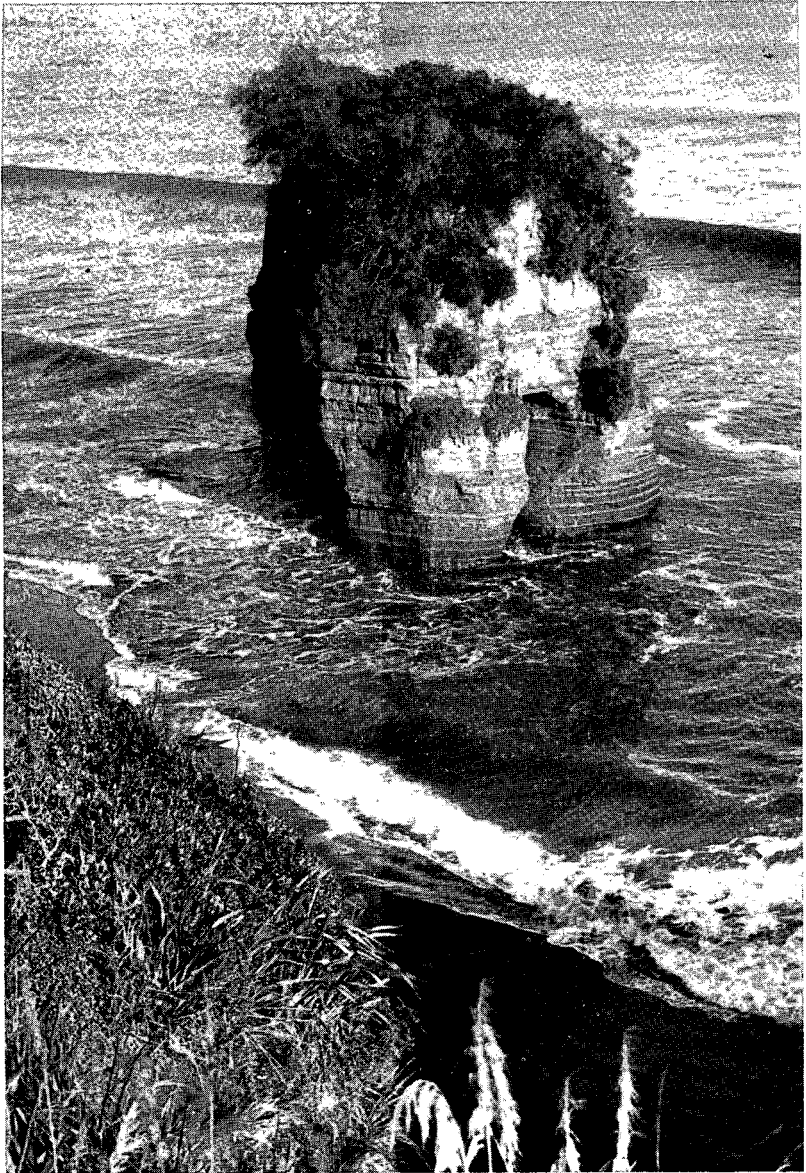


Plate XL — Small islet supporting one of recently-discovered breeding colonies of Grey-faced Petrels.

In Notornis 13, 1: 17 (1966) notice was given of a small breeding colony of Grey-faced Petrels (*Pterodroma macroptera*) on the coastal cliffs about thirty miles north of New Plymouth. Following a visit to that colony on 14/8/1966 members were informed of another group of burrows some 300 yards north of the known colony. However it was not possible to visit the new area until 18/6/1967 when a search revealed at least twenty burrows under vegetative cover similar to that of the original colony. The general appearance of the burrows, and occasional feathers in burrow entrances, indicated that this also was a Grey-faced Petrel breeding ground and on 6/8/1967 this was confirmed when an adult Grey-faced Petrel was temporarily removed from one of the burrows.

Meanwhile, on 8/7/1967 Mr. N. V. A. Banks found between 20 and 30 Grey-faced Petrel burrows under taupata vegetation on the summit of a small steep-sided islet near the mouth of the Tongaporutu River in North Taranaki. This islet, which lies only some twenty yards or less from the mainland cliffs, is completely surrounded by sea at high tide (see Plate XL).

There seems now to be little doubt that the coastal cliffs which extend for thirty odd miles from approximately Urenui to the mouth of the Mokau River will in time be found to support a substantial breeding population of Grey-faced Petrels. Much habitat suitable as breeding grounds for birds of this species occurs throughout their length (see Plate XLI). In the meantime the colonies so far found are of considerable interest, not only because their existence was unknown until quite recently, but also because they include the most southern known mainland breeding colonies of this species in New Zealand.

— D. G. MEDWAY

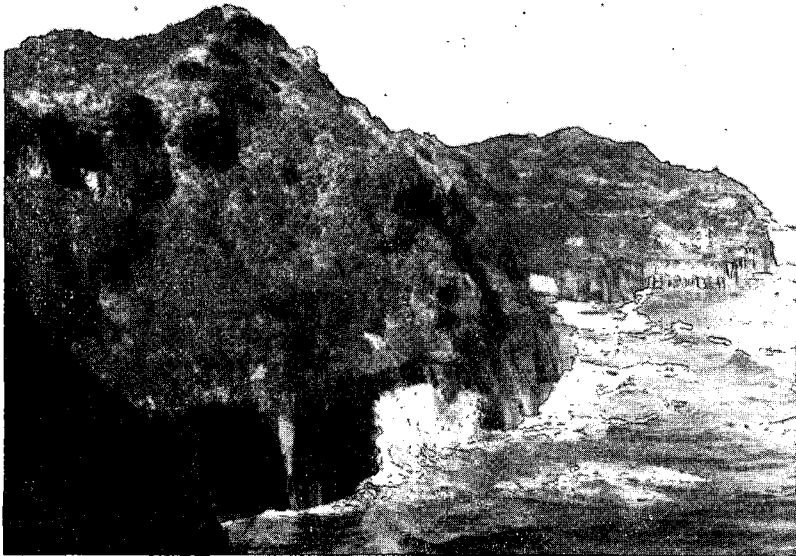


Plate XLI — Coastal cliffs in North Taranaki, showing suitable breeding habitat for Grey-faced Petrels on sandy taupata and flax covered slopes above vertical cliffs.

LESSER FRIGATE BIRD OVER WAIHEKE

My wife and I were staying on Waiheke Island and we were near Little Oneroa on 30/8/67 when we saw flying over us what I am sure was a Lesser Frigate Bird (*Fregata ariel*). The red gular pouch was quite clear, as were the white patches near the wing-bases. The flight was leisurely and easy, as the bird passed over us heading north-east towards the sea. I have seen Lesser Frigate Birds in Fiji, where they are not uncommon; but I understand they are rare in New Zealand. In the latter part of August there had been a period of strong northerly winds; and August temperatures in northern New Zealand had been generally well above average.

— R. H. LOCKSTONE



HUDSONIAN GODWIT IN KAIPARA

The findings of the Field Study Course held in January 1965 (Notornis 12, 70-79) made it possible to produce a working list of the shore birds of Kaipara Harbour. Among the several assembly points commonly used by waders at full tide is the farm of Mr. Graham Jordan, situated on a peninsula just north of Oyster Point in the southern arm and between Ngapuke and Kakanui Creeks. In olden days this area was much favoured by godwit-shooters. Now it is being considered as a likely site for the construction of an atomic power station. Its value as a habitat for waders was rediscovered in May 1963 (Notornis 10, 250-251) and since then, through the courtesy of the owner, has been proved by many visiting bird-watchers.

In January 1965, a godwit showing black in the tail was seen here, but its identity, *melanuroides* or *haemastica*, could not be ascertained. On 29/4/67 when we visited this farm just before full tide, there were thousands of waders in the short grassy paddocks near the tip of the peninsula, South Island Pied Oystercatchers (*H. o. finschi*) being by far the most numerous of the eight species present. It was on the outskirts of a very large flock of these that the Hudsonian Godwit was first noticed. It took wing and headed for Ngapuke Creek, showing its black and white tail quite clearly before it dropped out of sight behind the stopbank. Because it was flying away from us and rather low, the pattern of the diagnostic underwing was not discernible. On the creek it was easily found, resting near some Bartailed Godwits (*L. lapponica*). It was a trim looking bird, primarily darkish gray and white, without nuptial colouring. In preening it raised its wings, just as we wanted, to show the dusky underwing and axillaries; then as it flew leisurely along the tideline, a thin white alar bar was revealed.

Also along the creek not far away was a Long-billed Curlew (*N. madgascariensis*); and rather too far off for subspecific identification we heard and saw a Whimbrel (*N. phaeopus*). Thus the day's tally of waders was ten, five indigenous and five arctic. Most arctic waders which are still in New Zealand as late as the end of April, are likely to be immature non-breeders intending to remain over the winter.

— N. M. GLEESON
J. A. F. JENKINS
R. B. SIBSON

FURTHER NORTH ISLAND RECORDS OF *APTERYX OWENI*

Since I published (*Notornis* 1962, 10, 84-85) sub-fossil records of the Little Grey Kiwi from the North Island, further material of this bird has come to hand and it seems desirable to list the new localities.

WELLINGTON —

Te-Ika-a-Maru midden;

Site N160/50 Paremata Moa-hunter midden;

TARANAKI —

Okohu River mouth Moa-hunter midden;

Site N128/3, Kaupokonui Moa-hunter midden;

Robbers' Hole limestone Cave, Mahoenui;

HAWKES BAY —

Poukawa swamp;

KING COUNTRY —

Taumatamaire, Limestone Cave;

Davis System, Limestone Cave, 22m. south of Te Kuiti;

COROMANDEL PENINSULA —

Whiritoa Moa-hunter midden;

NORTHLAND —

Tom Bowling Beach (dunes, probable association with man).

— R. J. SCARLETT, Canterbury Museum



WRYBILL NEAR GREYMOUTH

While checking some Eastern Bar-tailed Godwits (*L. lapponica baueri*) near Greymouth, on 31/10/67, I picked up a small wader which looked too light in colour for a Banded Dotterel (*C. binctus*). When it turned I could see a single band on the breast but at the range with 10X binoculars I was not sure that the bird was a Wrybill (*A. frontalis*) as I suspected. I then set up the telescope and with cool conditions in good light under 75X magnification was able to pick up the turn in the bill. There could be no doubt about the identification. The bird was getting large worms of some sort on the mudflat and seemed to be in some trouble with them because of their size. This is the first time that I have seen a Wrybill on the West Coast.

— P. GRANT

[The Wrybill is rarely reported on the west coast of the South Island. One was found among Banded Dotterels at Paturau on 20/1/59 (*Notornis* 8, 164). — Ed.]



YELLOWHAMMER ATTACKING ITS OWN REFLECTION

At Greymouth on 8/10/67, I saw a cock Yellowhammer (*Emberiza citrinella*) fighting its reflection in the wing mirror of a parked car. The owner of the car said that the bird did this quite often and became so exhausted that he could walk right up to it. The car was parked in gorse and scrub country fairly regularly while the driver was whitebaiting, so that the Yellowhammer found it necessary to defend its territory not infrequently. It would have been very interesting to have observed the first "encounter."

— P. GRANT

REVIEWS

BULLER'S BIRDS OF NEW ZEALAND

A new edition of Sir Walter Buller's "A History of the Birds of New Zealand" — reproducing in six-colour offset the 48 stone-plate lithographs by J. G. Keulemans — from the Second Edition, 1888, now edited and brought up to date by E. G. Turbott. Published by Messrs. Whitcombe & Tombs Ltd.

The world today looks always for something new and is inclined to forget the value of things old. Ornithologists have as much need as any to guard against this failing, so all will feel grateful that in this instance we have a fine old work made new, by the able hand of Mr. E. G. Turbott. This affords us the opportunity of studying the ornithological situation at the time of Walter Lawry Buller and his artist J. G. Keulemans. The scarcity of the original books has been a difficulty for those seeking to refer to them and this is now obviated. It would be a grand thing if the writings of other workers of New Zealand's early days could be reproduced in similar style. Today we get into a car, a fast boat, or even an aeroplane and sally forth to study birds. What an advantage we have over the pioneer devotees who set off leading a pack-horse, or tramping and carrying a swag, or at best using a horse-drawn vehicle or the then limited railways. We have good reason to be amazed and to appreciate the work that these men, and some women, too, achieved in the field. Their standard of accuracy is something to cause unstinted admiration. Since their time, new facts about birds have been discovered and some of their findings corrected; but this will happen, too, to the work and findings of the present generation. In his Preface to the *History of the Birds of New Zealand, 1873*, Buller wrote ". . . . and the result is now presented to the public in a form which will, I trust, be acceptable to both the scientific and the general reader." The wide acclaim of the reviewers and commentators of the time is sufficient evidence of his having achieved his aim, as is also the present-day regard for what he achieved.

It is good to see that Mr. Turbott has given a well balanced view of the fact that Buller, like others, collected birds by shooting. This was quite a different matter from killing out a rare species in order to put up the price of the skins. Birds were so numerous that few thought of their becoming scarce. In any case we would have been badly off for study material if they had not collected. We can still feel that this was an unfortunate way of making a living. Ideas have changed for the better; and some of our older citizens who once shot native birds for sport or for food, do not now like to think of those days. Many of them make amends for their short-sightedness by being enthusiastic protectionists. Buller, too, would no doubt have become a protectionist, as he was already concerned about the future of some species, even in the latter part of the nineteenth century.

The Editor's Introduction is an essay in itself and a pleasure to read. Perspective in the treatment of a reappraisal such as this is vital and has been admirably achieved. In making an editorial

introduction to each species and following it with the lightly edited text of Buller Mr. Turbott has welded the old with the new, preserving the justly famed style of the early author and aptly bringing up to date the present status of each bird. An example of this, selected at random, is the treatment of the Pied Stilt. Mr. Turbott compares the present distribution of the species with the past, showing its increase and spread and he confirms Buller's suspicions of an internal seasonal movement of population. And another, the White-fronted Tern, shows Buller's account to stand to this day, except for the partial migration to and from Australia, something of which the early author had no opportunity of knowing. These instances show the value of this edition. It has not been necessary to reproduce the textbook material since it is readily available in so much of the modern literature. The measurements and other descriptions of birds remain the same but the numbers, habits and habitat are matters which need this kind of revision. It is good, too, to perpetuate the great artistry of Keulemans.

It is often indicated by reviewers that they have a duty to find something to criticise. If this is correct the present reviewer has failed dismally, being unable to find any fault in this splendid re-presentation.

— H.R.McK.

★

Animal Navigation. By R. M. Lockley. Pan Books Ltd. (Pan Piper Series) 75c.

This paperback, by the well-known ornithologist who pioneered banding work on the Manx Shearwater at Skokholm almost 40 years ago, has much of interest to readers of *Notornis*. The title is a bit misleading, since in the process of working up to discussion of navigation and migration, eight chapters, nearly half the book, are devoted to reviewing our knowledge of the senses of animals.

Anecdotes drawn from the author's own experience and wide reading (back to Leonado) are interspersed through the intriguing summaries of modern knowledge of animal psychology and behaviour. The reader who has not kept up with more specialised publications can thus get acquainted with such fascinating discoveries as echo-reception (sonar) in bats (Griffin) and dolphins, the sense of direction in starlings (Gustav Kramer), use of polarized light by bees (Von Frisch), and the internal chronometers of fiddler crabs. The experiments described show that almost all vertebrate and most invertebrate animals that migrate over long distances have an acute sense of direction or geographical position, as well as an internal biological clock, so that some can navigate by solar time by day and some by sidereal time at night. Lockley is now convinced that nocturnal sea-birds carry a sound-memory of the distinctive echo-pattern of the terrain near their burrows, and that the calling of incoming petrels is to obtain the familiar echo-pattern by which they can locate their burrows accurately (and avoid obstructions).

Lockley has made the most of his brief visits to New Zealand, and brings in many local observations — of a sea elephant's sensitivity, of the binocular eyes of opossums seen on our highways, of the kiwi's sense organs, of grunting leatherjackets, of glowworm caves, of the colonising Monarch butterfly, of the ubiquitous hedgehog, of the lack of rabbit fleas in our rabbits, of sea-bird islands. But even without these local references, *Animal Navigation* would be entertaining and instructive reading.

— C.A.F.

★

Refocus on N.Z. Birds. By G. J. H. Moon. A. H. & A. W. Reed, \$6.

So well-known are Geoff Moon's expertise as a photographer and his perceptiveness as a field naturalist that this rich volume needs no recommendation. Let it suffice to say that one bird photographer of many year's experience said that after perusing it he felt like throwing his cameras away.

The author's mastery of technique is in evidence throughout; but particularly in his flight shots of Morepork and Kingfisher arriving home and in the picture of a Pigeon feeding its chick before dawn. It is good to see at last our elusive Dabchick, obviously at ease, adequately presented in colour. On the whole the reproduction of the colour plates is of a high standard; though there are a few of the seemingly inevitable lapses. The Reef Herons in the cave are too brilliantly blue to be true and the trio of Spoonbills are positively roseate. But what a scoop!

On Hen Island the author was not content simply to photograph birds at their nests. Sitting patiently for long hours in a stuffy hide by a water-hole, he secured pictures of Saddlebacks, Bellbirds and Parakeets drinking, bathing and casually going about their lawful occasions. Further afield, as he turned his attention to some of our Australian invaders, Silvereyes, Coots, Whitefaced Herons and Black-fronted Dotterels posed before his discerning lens.

The book is timely. As northern New Zealand becomes more densely populated and the threat grows not only to the long, once lovely beaches but also to the offshore islands, we are grimly reminded of the need to conserve some wilderness areas and make them absolutely sacrosanct. The Fairy Tern, here immortalised in exquisite colour, is almost a lost New Zealand bird. Every year there are fewer beaches where Red-breasted Dotterels and Variable Oystercatchers may breed in peace, undisturbed by surfer or surf-caster. The public needs vivid books such as this in order that it may learn more of the beauty and variety of the avian heritage which it is in danger of losing. Hence may come a fuller understanding of the crisis which several endemic species are facing; and of the need for resolute and informed measures of conservation.

— R.B.S.

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Contributions should be type-written, double- or treble-spaced, with a wide margin, on one side of the paper only. They should be addressed to the Editor, and are accepted on condition that sole publication is being offered in the first instance to "Notornis." They should be concise, avoid repetition of facts already published, and should take full account of previous literature on the subject matter. The use of an appendix is recommended in certain cases where details and tables are preferably transferred out of the text. Long contributions should be provided with a brief summary at the start.

Reprints: Twenty-five off-prints will be supplied free to authors, other than of Short Notes. When additional copies are required, these will be produced as reprints, and the whole number will be charged to the author by the printers. Arrangements for such reprints must be made directly between the author and the printers, Te Rau Press Ltd., P.O. Box 195, Gisborne, prior to publication.

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Illustrations: Diagrams, etc., should be in Indian ink, preferably on tracing cloth, and the lines and lettering must be sufficiently bold to allow of reduction. Photographs must be suitable in shape to allow of reduction to 7" x 4", or 4" x 3½".

Proofs: First proofs of papers will be sent to authors at the discretion of the Editor, or upon request. They should be returned without delay.

Nomenclature: Contributors should follow the Checklist of N.Z. Birds for both the scientific and vernacular names. Scientific names of species and genera are printed in italics, and in the script should be underlined; and the specific or subspecific name should be enclosed in brackets if following the vernacular name, thus: Stewart Island Kiwi (*Apteryx australis lawryi*). It is necessary to give the scientific name as well as the vernacular the first time the latter is mentioned, but thereafter only one of the names. Capital letters should be used for vernacular names.

References: If listed, these should be in the form of the following examples:

1. Atkinson, I. A. E., 1964: Feeding stations and food of the North Island Saddleback in August. *Notornis* 11, 2, 93-97.
2. Buller, W. L., 1888: A History of the Birds of New Zealand (2nd ed.) 2 vols., the author, London.

The references should be serially numbered, and in the text, should be shown thus: Atkinson 1964 (1), and Buller 1888 (2). If references are cited in the text, the following shortened form may be used: Atkinson 1964, *Notornis* 11, 2: 93-97.

Publication: Contributions will normally be published approximately in the order in which they are received by the Editor, but at his discretion. He may seek the opinion of the Editorial Committee, appointed by the Council of the Society, on any matter including the general suitability of the contribution for publication.

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