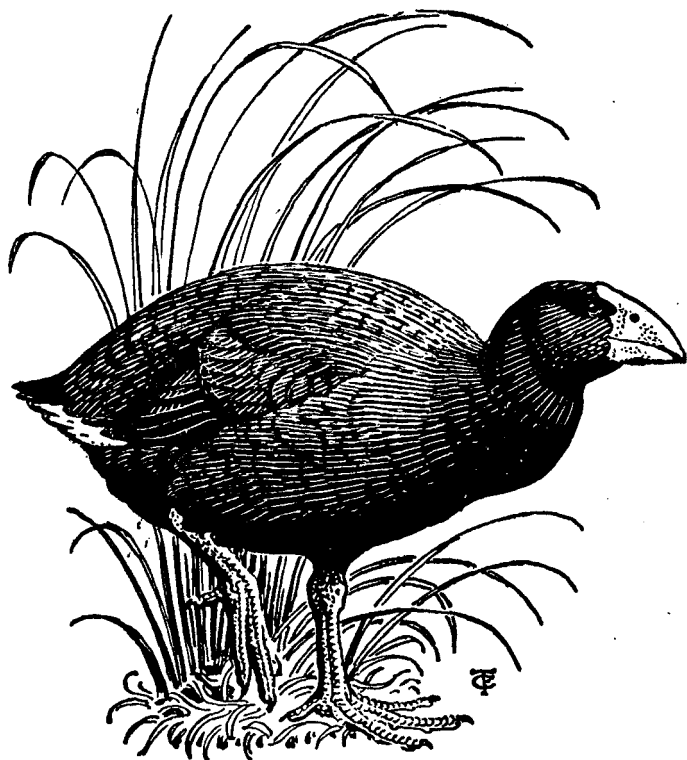


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1. Atkinson, I. A. E., 1964: Feeding stations and food of the North Island Saddleback in August. *Notornis* 11, 2, 93-97.

2. Buller, W. L., 1888: A History of the Birds of New Zealand (2nd ed.) 2 vols., the author, London.

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In continuation of New Zealand Bird Notes

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GREY TERNLETS IN THE BAY OF PLENTY

By R. A. FALLA

The occasional vagrant status of the Grey Ternlet *Procelsterna albibitta* in New Zealand has hitherto been based on three or four sight records, usually single birds, off the coast of Northland between Cape Maria van Diemen and Waipu. The largest number recorded was four off Cape Karikari in January 1951 (Fleming et al. 1953, 52). Much more significant evidence of status can now be recorded from the Bay of Plenty.

When taking part in skin diving exercises off White Island on 25 January 1970 Mr. Dale Pomeroy of Wellington noticed conspicuous flocks of a tern unknown to him congregated on and flying about the precipitous Volkner Rocks north-east of White Island. As a staff cameraman of the National Film Unit he was equipped, as a secondary assignment, to film oceanic birds for a planned nature series, and secured a good cinematographic record which shows impressive flocks of ternlets rising from the steep upper crags of the rock. His estimate of numbers was a thousand or more. A few days later, on 29th January, Mr. Pomeroy went by launch, from Whitianga to the vicinity of the Alderman Islands for further bird photography. Here he was interested to find more of his strange tern using as a roost the Sugarloaf Rock which lies about 2 miles north of the main group. They were in lesser numbers; but closer approach by launch to this small pyramid enabled him to film the birds perching, flying, and feeding at closer quarters than had been possible at the Volkners. The film confirms that the birds are undoubtedly Grey Ternlets.

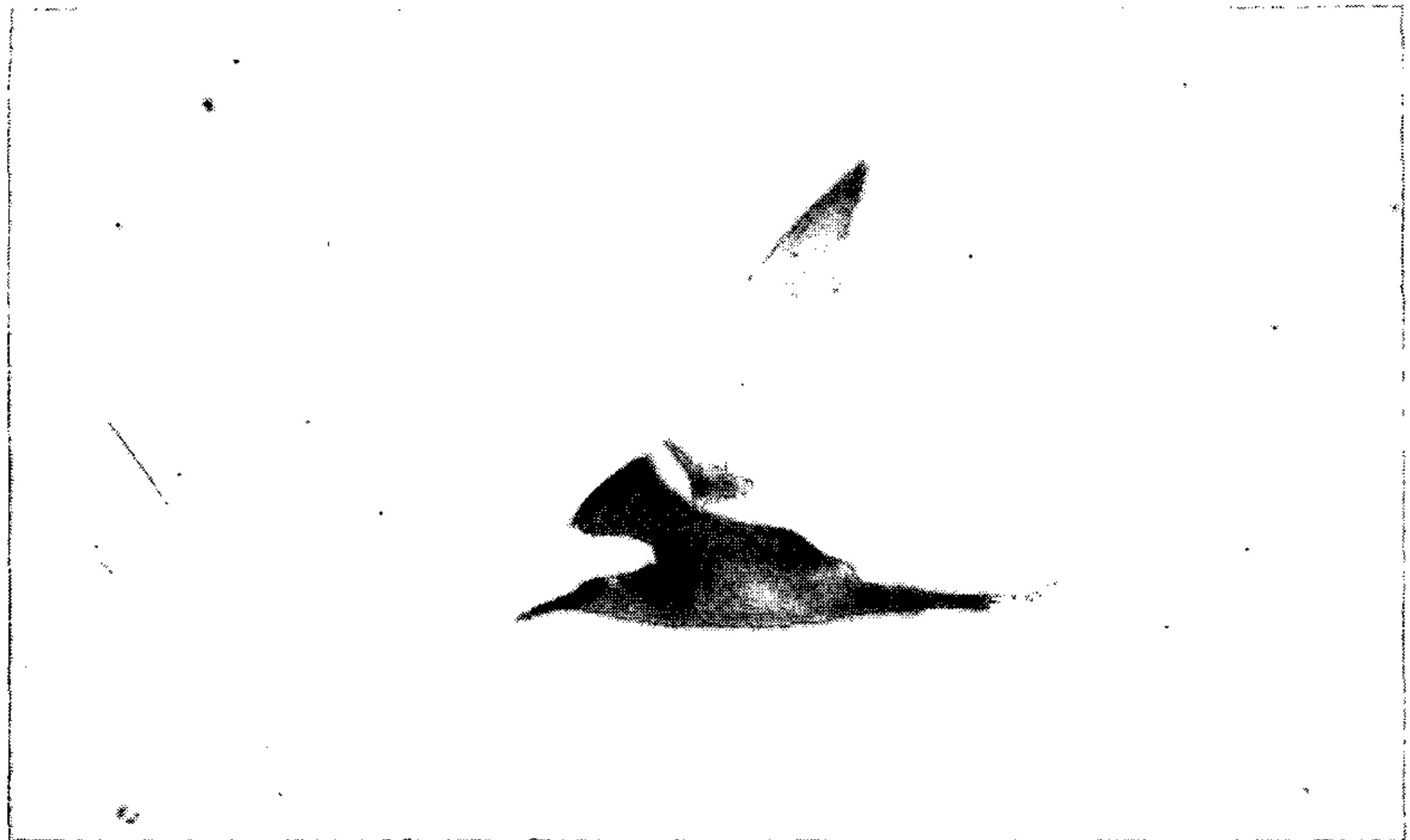
In a somewhat superfluous additional exercise I accompanied Messrs. Halliday and Pomeroy on a further trip from Whitianga, arranged by the National Film Unit, on 4/3/70, armed with a permit from the Department of Internal Affairs in case landing could be made. The ternlets were still there, about 200 of them. On the previous day they had all been seen perched in cavities on the face of the rock, but on 4th, food must have been abundant, as flocks of up to fifty detached themselves at intervals and flew purposefully to areas where they hovered and dipped in the dainty fashion so often described in their known sub-tropical haunts. This quick food-finding reaction of the ternlets seemed to trigger off most of the movement of Red-billed Gulls, flocks of which were resting on the adjacent lower reef. Soon after the gulls had moved into the feed patch the ternlets invariably detached themselves from the melee and sought less disturbed waters elsewhere.

Landing, at least with gear and equipment, was not practicable in the easterly conditions prevailing, but it was not difficult to see the birds in the shallow cavities in the pudding-stone formation of the rock face. There was no sign of nesting, though some of the birds, with shorter tails and a dull brownish tinge in the grey of the back, appeared to be immature. Except in the immediate vicinity of the Sugarloaf no further ternlets were seen near the Alderman Islands. On the way back, about 5 miles northwest of Sugarloaf, two flew past us.



[Pomeroy & Woodward

Plate IV — Alderman Islands (Sugarloaf left foreground). Enlarged from 16mm. ektachrome.



[Pomeroy & Woodward

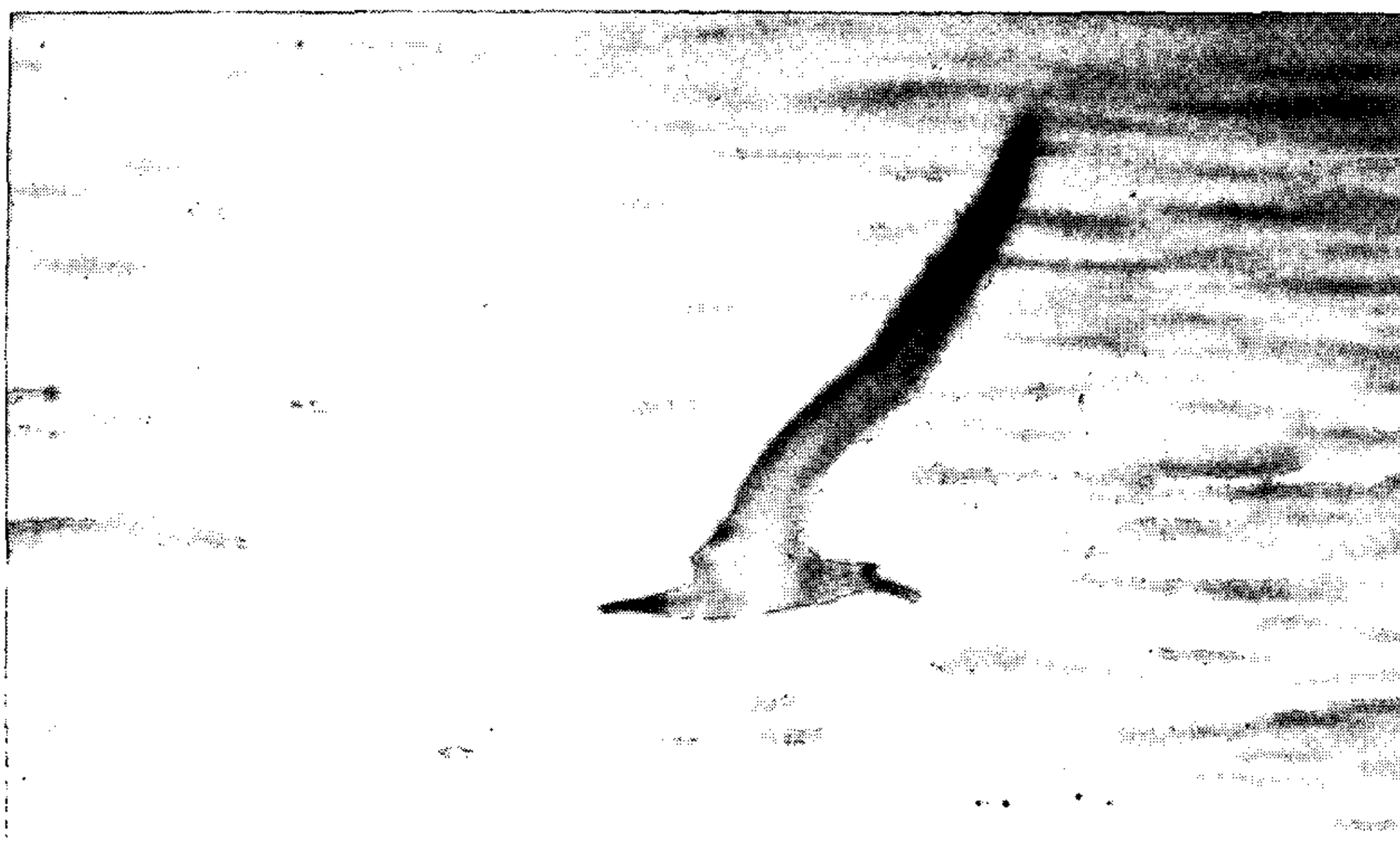
Plate V — Grey Ternlet off Volkner Rocks, Bay of Plenty.

These records raise several questions, the first of which is whether this ternlet has become established in New Zealand waters as a breeding species. The considerable number at the Volkner Rocks suggests that it has. The more difficult question of whether the numbers have built up gradually by breeding, or arrived as a mass invasion is not so easy to answer. Neither Volkner Rocks



[Halliday & Woodward

Plate VI — Grey Ternlets off Sugarloaf, Alderman Islands, 4/3/70.



[Halliday & Woodward

Plate VII — Grey Ternlet off Sugarloaf, Alderman Islands, 4/3/70.

nor the Sugarloaf at the Alderman Islands have received much critical attention in recent years. The Volkners are noted by Wodzicki and Robertson (in Hamilton and Baumgart 1959, 71-72) as a breeding station for Red-billed Gulls and White-fronted Terns. The rocks have intermittently been used as a bombing target by the Royal New Zealand Air Force and the Royal New Zealand Navy. Interest in the Sugarloaf Rock has been more sustained, but none of it recent. There were certainly a few Gannets and greater numbers of White-fronted Terns and Red-billed Gulls nesting there in 1921-26 (Sladden and Falla, 1928, 285-6). Fleming and Wodzicki (1952, p. 61, fig. 24) concluded that the Gannets had abandoned the site, basing their conclusion on an aerial photograph and reports of several observers in 1947-48. It may be assumed that there was no detectable establishment of ternlets at Sugarloaf and probably not at Volkners between 1921 and 1951 when the late Bernard Sladden cruised and recorded meticulously more than twice yearly in both areas. The year 1951, in which four ternlets were observed in Doubtless Bay could possibly have marked the beginning of a population extension. It is not inconceivable that a slow build-up has gone unrecorded over twenty years. Both rocks are well off the beat of bird-watchers bound for the Mercury, Alderman or White Islands, and both are inaccessible in all but the calmest of weather. At any distance ternlets are invisible when standing in crevices. The more conspicuous gulls and terns which are always there in numbers obscure any small groups of Grey Ternlets that happen to fly with them. Both areas are frequented by fishing launches but their occupants would be unlikely to distinguish species in the mixed bird assemblages, or to consider it worthy of report if they did. On the several days of recent observation the ternlets seldom fed more than 100 yards from the home rocks, and were never on the wing for long. Solitary terns with much grey in the plumage are notoriously difficult to identify or even see over the open sea, and the Grey Ternlet is the most cryptic of them all. In spite of these reasonable excuses, it seems instructive in the circumstances to recall that, following the presentation of several papers on seabird distribution at the August 1969 Conference of the Marine Sciences Society, Mr. A. G. York asked, in the course of discussion, why authors so often devoted much space to the plotting of petrel occurrences and distribution, and seldom mentioned terns!

The next exercise, except for survey to ascertain if the birds nest next spring, might be one to detect whether any trends in hydrological conditions help to explain why birds characteristic of sub-tropical convergence habitat are finding the Bay of Plenty so congenial.

REFERENCES

- FLEMING, C. A., and WODZICKI, K. A., 1952. A Census of the Gannet in New Zealand. *Notornis* 5, 2, 39-78.
- FLEMING, C. A. et al, 1953: Checklist of New Zealand Birds.
- HAMILTON, W. M., and BAUMGART, I. L., 1959: White Island, *Bull.* 127, N.Z.D.S.I.R.
- HOGG, M. J.: Brown Booby and Grey Noddy in Northland Waters. *Notornis* X, 239.
- SLADDEN, B., and FALLA, R. A., 1928: Alderman Islands, N.Z. *Journ. Sci. Tech.* 9, 4 & 5, 193-205 and 282-290.

NOTES ON A CRESTED GREBE'S NEST AT LAKE MAPOURIKA

By *GEORGE CHANCE*

The Crested Grebe's nest was inspected by the Gibb boys of Waiho from their canoe on 24/12/68. It contained three eggs. Two days later they observed that a fourth and what proved to be the final egg had been laid.

The nest was situated in a small bay immediately south of the jetty near the main road. This area is the natural stopping and picnic place and it is used for launching boats and by water skiers.

The bay is rimmed with flax and has some raupo by the creek mouth. This provided material for the base of the nest, which was constructed on a drifted tree stump firmly embedded in mud about fifty feet from the lake edge and adjacent to the creek outlet. Protection from wave action came from the curve of the bay and to the north from a sand bar formed by the creek. The nest was not the usual floating raft-type construction that I have observed in Canterbury. The upper part of the cone was formed of raupo, dressed with lake weed which was constantly replenished giving a fresh green appearance to the nest.

When I arrived at Lake Mapourika on 19/1/69, I found that the nest was occupied, and I set about working my floating hide into a suitable position. For two days there was no sign of the second adult and it was not until the first chicken was hatched on the morning of the 21st that the pair was reunited. Almost immediately after the hatching the female left the nest calling hoarsely and stridently for her mate, who was a considerable distance away in the next bay. From that time both birds were in constant attendance.

The chicks were hatched at daily intervals and the nest was abandoned after the arrival of the fourth chick on 24th January. The young soon climb up between the brooding parent's back and wings which are arched in a 'tent' position as if to assist a satisfactory lodgment. The feeding of feathers, whitebait and smelt began almost immediately. But, after the first hatching, it was impossible to determine the order. From my observations it appeared the feather came first. The brooding bird plucked a breast feather and presented it to the nestling which frequently had difficulty in making the initial swallow. On occasions, when the feather was lost or blown away it was retrieved with amazing dexterity and returned. The same ability was demonstrated by the sitting grebe taking a dragon fly on the wing.

The attending bird was responsible for feeding the young which responded to the low call note as the adult approached the nest and partially emerged from under the wing to receive the fish offering. The sight of the young 'stripe heads,' high, dry, and safe on the back of the brooding bird is yet another fascinating aspect of the grebe family. The over-riding instinct of the young is to climb upwards; and although capable of swimming if deposited in the water during the change-over, they set about climbing back up the side of the nest to the security of the under-wing position.

No definite conclusion has been reached as to the object of feather feeding. In 1924, Westmore noted that the pyloric lobe of the stomach is almost invariably plugged with feathers and went on to suggest that the feathers act as a strainer to prevent fish bones or large pieces of chitin from entering the intestine.



[G. R. Chance

Plate VIII — Crested Grebe on nest at Lake Mapourika, offering downy
feather to chick.



[G. R. Chance

Plate IX — The offering of a downy feather is accepted.



[G. R. Chance

Plate X — The other parent arrives while the downy feather is being swallowed.



I. G. R. Chance

Plate XI — Adult climbs on to the nest and offers a small fish.

FOODS OF HARRIERS IN A HIGH COUNTRY HABITAT

By M. J. W. DOUGLAS
Forest Research Institute, Rangiora

SUMMARY

Harrier pellet castings and prey remains were collected over an 18-month period from a regularly used preening site adjacent to a nest. Other prey remains were gathered from that nest and two others. It was concluded that a large part of the food eaten consisted of carrion.

INTRODUCTION

The location of a nest of a pair of Harriers *Circus approximans* within the Harper-Avoca catchment of North Canterbury, afforded an opportunity to obtain information on the feeding habits of these birds. This paper reports on the foods identified in pellet castings and prey remains collected during the period January 1965 to June 1966.

The nest was sited in a red tussock (*Chionochloa rubra*) marsh area at the confluence of the Harper and Avoca rivers, altitude 2,200 ft. The vegetation in the surrounding area is predominantly hard tussock (*Festuca novae-zelandiae*) and introduced grasses, with patches of matagouri (*Discaria toumatou*), sweet briar (*Rosa rubiginosa*) and *Dracophyllum* scrub, and remnant pockets of mountain beech (*Nothofagus solandri* var. *cliffortioides*).

A terrace, 300 yards long, running due north-south, lies on the eastern edge of the marsh. This was regularly used as a feeding, preening and resting site and was presumed to be used only by the pair of Harriers using the nest under regular observation. One of these birds, taken to be the male and easily recognisable by its light coloured plumage, was the most frequent occupant of the terrace. Its mate, a darker bird, was observed on several occasions to fly between the nest and the terrace. Their offspring of the year frequently used the terrace following initial flight during the months of February and March of both seasons.

Castings were collected from the terrace each month, except August when the site was not inspected. The nest, and two other occupied nests, were each visited twice, when the food remains were gathered. All three nests were situated within an approximate two miles radius.

RESULTS AND DISCUSSION

A list of food items, identified from the 99 castings obtained, is presented in Table 1. The relative frequency of occurrence of food items determined from monthly inspection of castings is shown in Table 1.

Table 1 shows that mammalian material was found more commonly than any other food. Similarly, food remains collected at the nests and from the terrace were predominantly of mammalian origin. Most of the adult hare material in the castings was probably scavenged by the Harriers from carcasses killed during a study on these animals that was being conducted in the same general locality.

The extent of predation on adult hares is not well documented: the author and a companion observed only one (unsuccessful) attack during the present study. It was not possible to determine whether

TABLE 1 — Per cent occurrences of food items in castings collected per month.

Months	J	F	M	A	M	J	J	A	S	O	N	D	All months
Castings collected :	19	10	9	25	6	1	3	0	11	6	3	6	99
<u>Food items present (%)</u>													
Hare (1)	63	90	67	88	83	100	33		91	100	100	33	78
Hare (2)	10		33						9			50	9
Hedgehog	32	10	22	12	17				9			17	15
Rabbit							33						1
Deer	5												1
Chamois			11						18				3
Sheep					17		33						2
Small birds	21		11	4					9				7
Duck				4									1
Gosling											33		1
Young magpie													1
Carabid beetle	5	40	11	4									7
Weta	5												1
Cicada			11										1
Grasshopper					17								1
Dragonfly	5												1
Caterpillar	5												1
Other insect			11										1

Hare (1) - adult; (2) - leveret.

the hare was defending itself or nestling leverets. Fleming (1941) has also reported an unsuccessful attack on a full-grown running hare.

There is no doubt that Harriers prey on leverets; their remains occurred in nine of the castings, and fresh skulls, bones and skins were collected from the terrace during each month, from September to March. Leveret remains were also found (Table 2) at each of the nests visited.

TABLE 2 — Food items found at nests during breeding season.

Nest 1 — Hedgehog and leveret remains.

Nest 2 — Young magpie; hedgehog and leveret remains.

Nest 3 — Yellowhammer; hedgehog and leveret remains.

[A. Apse

Plate XII — New Zealand Harrier (*Circus approximans gouldi*).



Spines and hair of hedgehogs (*Erinaceus europaeus*) were found in 15 castings, and skins complete with spines were found at the nests (Table 2) and once on the terrace. Although Harriers have been observed feeding from hedgehogs killed on roads it was surprising to find these animals included in the diet of the study birds as the nearest back country road is some six miles away.

Rabbits are scarce in the area, and only one casting contained fur of this animal. The remainder of the mammalian foods were carrion of red deer (*Cervus elaphus*), chamois (*Rupicapra rupicapra*) and sheep, which were identified by hair and wool.

Remains of birds were found in ten castings. Seven contained small unidentified birds, probably Pipits *Anthus novaeseelandiae*, and one each contained remains of: a Paradise Duck *Tadorna variegata*; a juvenile Canada Goose *Branta canadensis*; a young Magpie *Gymnorhina* sp. A partly devoured Yellow-hammer *Emberiza citrinella* was found at one of the nests, and the carcass of a young Magpie on the terrace.

The most common insect material in 13 castings was of Carabid beetles; the remains of wetas (*Hemideina thoracica*), cicadas (*Melampsalta* sp.), grasshoppers and large dragonflies (*Uroptala carovei*) were also recorded.

It is evident that a large part of the food of these Harriers was carrion.

REFERENCE

FLEMING, C. A., 1941: Summarized classified notes. Annu. Rep. N.Z. Orn. Soc. 1940-41, p. 48.



SHORT NOTE

HARRIER CHASES AND CAPTURES BLACKBIRD

Oliver (1955, New Zealand Birds, p. 430) states that the Harrier *Circus approximans* has been recorded taking birds on the wing, and Witherby *et al.* (1939, The Handbook of British Birds, vol. 3, p. 66) report similarly of the Hen Harrier *C. cyaneus*. In my experience of several species of harriers, they almost always rely on surprise to catch birds and until recently I had never seen one chase and catch an apparently healthy bird.

At about 14.00 hours on 31/12/69, near Cape Palliser, southern Wairarapa, I noticed a Harrier flying fast down wind towards the sea at a height of about 20 feet above the coastal dune; and through binoculars I saw that it was chasing a Blackbird *Turdus merula* flying low over the ground some 30 yards ahead of it. The shore was here quite exposed and entirely without cover for the Blackbird, which found itself "cornered" between the Harrier and the deep blue sea. With a stiff off-shore breeze the Blackbird funkled the sea and landed on the sand at the top of the beach, about 20 yards from the water. The Harrier came in low and slightly overshot the Blackbird, wheeled smartly and dropped onto it. After standing still with the Blackbird in its talons for two or three minutes, the Harrier took off and flew inland with its kill, without leaving any feathers from which to age or sex the Blackbird.

This incident shows how efficiently a Harrier can "corner" a bird that has strayed from cover, and how vulnerable such a bird may be. As this was the only Blackbird I saw in three days on this exposed shore, perhaps it paid the price for trespassing into unsuitable habitat.

— J. A. GIBB

HONEYEATER MOVEMENTS AND THE FLOWERING CYCLE OF VEGETATION ON LITTLE BARRIER ISLAND

By DAVID J. GRAVATT*

INTRODUCTION

The data used in this paper to discuss the relationship between the local movements of honeyeaters (*Meliphagidae*) and the flowering cycle of the plants on Little Barrier, was gathered during a study of honeyeater ecology (to be published separately). From the regular observations made on the numbers of each species feeding in certain areas on different species of plants, it is possible to make some comments on the dependence each species of honeyeater shows on different nectar producing species, and how the nature of the flowering periods and nectar production of these plants affects the local distribution of honeyeater species from season to season.

METHOD

During the course of studies on feeding behaviour of birds on Little Barrier, regular observation patrols were made along a route which went from the homestead (20 feet above sea level) to an altitude of 900 feet on the Thumb Track. To complement this ridge section, the return half of the patrol passed down Waipawa Valley, and thus bird activity could be observed in both ridge and valley vegetation communities.

Three such patrols were made each month for twelve consecutive months (November 1967 to October 1968) as close as possible to the same period in each month. For comparative purposes, each patrol began about 0930 hours and relatively fine or calm days were selected. Notes were made on the feeding behaviour of each bird as it was first encountered and no attempt was made to follow any particular bird. By moving through the bird population it was possible to assess what proportion of each species were behaving in certain ways. Among the data recorded were the names of plant species from which the honeyeaters were taking nectar. Thus it is possible to say what plants in this particular area are used as nectar sources by the honeyeaters and, because the observations were made each month along a fixed patrol route, some comments can be made on the way in which the flowering cycle of the vegetation affects the local movements of the honey-eaters.

BIRD ACTIVITY ON THE RIDGE

Table 1 shows the number of honeyeaters present on the ridge section of the patrol during monthly samples and the number of these observations which were of birds taking nectar. It can be seen that the number of each species present on the ridge varies with the time of year. Although no measure of total nectar availability is possible, this change in population density is correlated to some extent with the type and amount of blossom on the ridge during each monthly

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TABLE 1 — The total number of honeyeaters recorded in the ridge section of the patrols compared with the number observed feeding on nectar.

	Tui		Bellbird		Stitchbird	
	Total	Feeding	Total	Feeding	Total	Feeding
January	16	9	12	4	5	5
February	3	2	20	3	1	—
March	—	—	14	—	1	—
April	4	1	12	1	—	—
May	—	—	12	1	3	—
June	3	—	11	—	1	—
July	3	3	17	4	3	—
August	23	16	11	9	9	8
September	12	11	18	13	10	10
October	16	4	10	5	—	3
November	15	3	9	5	—	—
December	11	9	22	19	3	3
Total	106	58	168	64	36	29

TABLE 2 — *Nectar sources of Tuis* — Number of birds observed each month on flowers of various plant species.

Plant Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<i>Metrosideros excelsa</i>	2										12	11
<i>Metrosideros robusta</i>	8											11
<i>Vitex lucens</i>		5	4	2	2	6	5	5	6	1	1	
<i>Metrosideros fulgens</i>			1	4	3	1	2					
<i>Dysoxylum spectabile</i>						1						
<i>Pittosporum umbellatum</i>								23	12			
<i>Knightia excelsa</i>									2	15	1	
<i>Neopanax arboreum</i>									1			
<i>Phormium tenax</i>											2	
<i>Persoonia toru</i>											1	
Total	10	5	5	6	5	8	7	28	21	16	17	22

TABLE 3 — *Nectar sources of Bellbirds* — Number of birds observed each month on flowers of various plant species.

Plant Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<i>Metrosideros excelsa</i>	5										7	17
<i>Metrosideros robusta</i>	1											11
<i>Metrosideros perforata</i>	1											
<i>Vitex lucens</i>	3	9	5	3	4	8	11	1	5	3	3	1
<i>Schefflera digitata</i>		1										
<i>Phytolacca octandra</i>				1								
<i>Meliccytus ramiflorus</i>					1							
<i>Dysoxylum spectabile</i>						3		1				
<i>Metrosideros fulgens</i>						1	1					
<i>Pittosporum umbellatum</i>								11	11			
<i>Nestegis</i> spp. (<i>Gymnalea</i>)								1	1			
<i>Cyathodes juniperina</i>								1				
<i>Corynocarpus laevigatus</i>								2				
<i>Alseuosmia macrophylla</i>									1	1		
<i>Neopanax arboreum</i>									1			
<i>Hebe</i> sp.									1			
<i>Knightia excelsa</i>									3		1	
<i>Cyathodes fasciculata</i>										1		
<i>Pittosporum tenuifolium</i>										2		
Total	10	10	5	4	5	12	12	17	19	11	11	29

sample. Tuis, being wide ranging in their feeding habits, show marked changes in number. Bellbirds will also travel long distances to feed, but their insectivorous behaviour tends to make the monthly population counts more uniform, as many individuals are present on the ridge when no nectar is available. Stitchbirds however, seem to be more bound to a territory which provides all of their requirements. Typically such a territory seems to be centred in a valley, and the birds range up the sides of the narrow valleys on to the ridges when nectar is abundant there. Thus they are more frequently seen there in January (*Metrosideros robusta*), August (*Pittosporum umbellatum*), September (*Pittosporum umbellatum*, *Alseuosmia macrophylla* and others), and to some extent in December (*Metrosideros excelsa*). They do not seem to range as far from their breeding areas in search of food as do the Tuis or the Bellbirds.

TABLE 4 — *Nectar sources of Stitchbirds* — Number of birds observed each month on flowers of various plant species.

Plant Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<i>Metrosideros excelsa</i>												2
<i>Metrosideros robusta</i>	4											13
<i>Metrosideros perforata</i>	2											
<i>Vitex lucens</i>					1		6		1		2	
<i>Schefflera digitata</i>		2										
<i>Metrosideros fulgens</i>				1		1						
<i>Pittosporum umbellatum</i>								7	5			
<i>Dysoxylum spectabile</i>								2				
<i>Alseuosmia macrophylla</i>								1	5	3		
<i>Hebe</i> sp.									3			
<i>Knightia excelsa</i>									4	1		
<i>Nestegis</i> spp. (<i>Gymnalea</i>)									1			
<i>Neopanax arboreum</i>									1			
Total	6	2	-	1	1	1	6	10	20	4	2	15

PLANT SPECIES USED BY HONEYEATERS

The monthly total of observations made during each patrol of each species of honeyeater feeding on the nectar of different plant species are shown in tables 2, 3 and 4. These tables indicate the following points:

- (1) There is a continuous flowering cycle of flowering plants, and even in winter there is always at least one flowering species available for the honeyeaters.
- (2) Although there is continuity, the widest range of flowering species is during the spring and summer. The sudden flowering of *Pittosporum umbellatum* in August could be classified as the turning point from winter to spring. From this time on there does not appear to be any shortage of nectar until the following autumn. This sudden, large supply of nectar from *P. umbellatum* seems to coincide with the first signs of breeding behaviour of the spring.
- (3) Some plants have a short flowering season and are in flower during only one monthly sample. Others flower for longer periods, and in the case of the puriri (*Vitex lucens*), flowers are present almost all year round. *Vitex lucens*, which is plentiful in the valley communities, is a very important source of nectar and provides food at times when few other plants are flowering.

- (4) Almost all nectar sources can be used by each species of honey-eater, but all species do not rely to the same extent upon the species of plant. The extent to which each species of honeyeater utilizes the different plants depends on their structural adaptations and their behavioural patterns. This aspect is dealt with in a separate paper.
- (5) In conjunction with Table 1, it can be seen that when nectar becomes locally abundant so do the honeyeaters, which move in from neighbouring areas.

Many species of flowering plants grow in areas outside that which was regularly sampled, and when these come into bloom the birds are seen feeding on their nectar. The upper ridges have several species of rata which are productive nectar sources. *Metrosideros umbellata*, the southern rata, is abundant in the summit scrub and features as a dominant species in the vegetation over 1500 feet above sea level. This flowers profusely from late December through February. *M. albiflora* also flowers on the summit ridges in December and January, although this does not provide such a rich nectar source as *M. umbellata*.

Phormium colensoi, the smaller species of flax, flowers on the summit ridges during December. All three honeyeaters visit its flowers and in so doing become crowned with orange pollen. *Ixerba brexiodes*, abundant and often dominant over 1200 feet, is another favoured nectar source. It flowers from November to January and sporadically at other times. In the upper regions of the valleys and in the shady areas up to 1800 feet, *Fuchsia exorticata* is abundant and provides nectar from August to January, while its fruits (November to March) are favourite food items, especially of the Tuis. Also found in the rata/tawa forest is the wineberry (*Aristotelia serrata*) which provides berries that are much sought after in late summer and autumn.

Pohutukawa (*Metrosideros excelsa*) dominates the coastal regions, and its profusion of flower in November and December attracts many honeyeaters. However, the Stitchbirds rarely venture from the forest areas across the farm to pohutukawa along the shore. Elsewhere, where pohutukawa is continuous with the forest, Stitchbirds may be seen feeding from its flowers. Flax (*Phormium tenax*) is common on the cliffs and provides nectar during November, especially for the Tuis. Karo (*Pittosporum crassifolium*) is abundant in the coastal forest and flowers in August and September. Although it usually starts flowering just after *P. umbellatum*, it is just as keenly sought by the honeyeaters.

The garden around the homestead also provides food for the honeyeaters. Just about every type of garden flower is investigated by Tuis and Bellbirds, while fruit trees provide food, often when nectar is scarce. Figs, grapes, guavas and grapefruit are favourites, especially of the Tuis. Stitchbirds are rarely seen in the garden although occasionally females will venture there. There have been sporadic sightings of Stitchbirds feeding from orange blossom, figs, and the berries of *Pseudopanax lessoni* and *Melicytus ramiflorus*.

The amount of movement to and from nectar sources will largely depend on the amount of nectar being produced, which will

in turn depend on the amount of flowers present. Most plant species will have good and bad flowering seasons just as fruit trees will have heavy or light crops depending on the season. Furthermore, the starting and finishing time of flowering seasons is not always at the same time each year. Comparisons from year to year can only be made subjectively but the difference is often obvious and frequently considerable. Thus 1967 was a 'bad' year for *Knightia excelsa*, *Phormium tenax*, *P. colensoi*, and *Ixerba brexiodes*, and a 'good' year for *Metrosideros excelsa*, *M. robusta* and *M. umbellata*. However, almost the reverse was true for 1968. *Knightia excelsa* and *Phormium tenax* flowered particularly well, while *Metrosideros excelsa* was notably poor. On November 8th, 1967, it was noted that, "the majority of the *M. excelsa* is coming into full flower, especially around the coast, while some have been reported flowering for several weeks." Up until the time of leaving the island on November 7th, 1968, no *M. excelsa* had flowered at all.

Poor flowering of important plant species could have a marked effect on the success of honeyeater populations. This would be particularly important during early spring and critical for juveniles during the first periods of bad weather each autumn and winter. Success at such times would depend on the availability of alternative food sources and the adaptability of the species.



SHORT NOTE

BIRDS CAUGHT BY HOOKGRASS

The entanglement of Silvereyes *Zosterops lateralis* and Hedge Sparrows *Prunella modularis* by hookgrass (*Uncinia* spp.) reported by Merilees (1969) and Hilton (1969) may not be quite as rare as these authors suggest. Although Hilton (1969) reported finding no hookgrass seeds on 21 Moreporks *Ninox novaeseelandiae* banded by A. H. Whitaker at the D.S.I.R. Orongorongo Valley Field Station, Turner (1937) reported a Morepork firmly caught by hookgrass on Kapiti Island. The bird was only released with difficulty after a cap was placed over its head to quieten it.

Other records from Kapiti Island include Tomtits *Petroica macrocephala*, Fantails *Rhipidura fuliginosa*, Whiteheads *Mohoua albigilla*, parakeets *Cyanoramphus* spp. and even a Long-tailed Cuckoo *Eudynamis taitensis* found entangled; and kiwi (*Apteryx* spp.) feathers were also frequently found in hookgrass after the birds had pulled free (Wilkinson and Wilkinson, 1952).

These earlier observations, with those of Merilees (1969) and Hilton (1969), suggest that this mortality may not be as uncommon as previously thought and clearly demonstrate that it is not just smaller birds which are liable to be caught by the tenacious *Uncinia*.

REFERENCES

- HILTON, J., 1969: Hookgrass captures hedge sparrows. *Notornis* 16 (4): 236.
MERILEES, W., 1969: Hookgrass kills silvereyes. *Notornis* 16 (2): 144-5.
TURNER, E. P., 1937: Morepork incidents: prisoner of a barbed sedge. *Forest and Bird* 43 (1): 16.
WILKINSON, A. S., and WILKINSON, A., 1952: "Kapiti Bird Sanctuary." Masterton Printing Co., p. 42-43.

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" SPOTTED SHAGS " IN WESTLAND

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The distribution of the Spotted Shag *Stictocarbo punctatus punctatus* (Sparrman, 1786), around the New Zealand mainland is generally considered to include the West Coast of the South Island. On the other hand the breeding range of the Blue Shag *Stictocarbo punctatus steadi* Oliver, 1930, is considered to be restricted to Stewart, Codfish and Centre Islands (Oliver, 1955: 230-233). The Checklist of New Zealand Birds (Fleming, 1953: 30), when considering the distribution of *S. p. punctatus* in Westland cautiously implies that the subspecific status of the "Spotted Shags" there is uncertain.

The authors of "A Field Guide to the Birds of New Zealand" (Falla, et al., 1966: 73) while discussing the distribution of *S. p. punctatus* in the South Island, state: "Smaller scattered colonies on the west coast, as far south as Open Bay Islands, which may in fact be inhabited not by Spotted Shags but by the closely allied Blue Shag." Both, Fleming, 1953, and Falla et al., 1966, however, follow Oliver and confine the breeding distribution of the Blue Shag to Stewart Island and one or two islands in Foveaux Strait.

The situation as outlined above showed that the status of the Westland population of "Spotted Shags" urgently needed investigation, and a search was started in New Zealand and overseas museums for specimens originating from the west coast of the South Island. Early in 1968, only two specimens had been located in New Zealand, and both of these were at the Dominion Museum. Later during the same year the writer had the opportunity to study the famous Reischek collection of New Zealand birds at the Natural History Museum in Vienna, where five specimens collected on the West Coast were found. Three of these were fully adult specimens in excellent plumage and therefore very useful for this project. In addition, two adult specimens were collected under permit for the Dominion Museum during 1968, and one fresh specimen received

Reg. No.	Date Collected	Sex	Locality	Collector
DM-9166	23/12/1955	?	Open Bay Islands	R. A. Falla
49512 (Vienna)	Nov. 1887	♀	Haast River Mouth	A. Reischek
49513 (Vienna)	Nov. 1887	♂	Haast River Mouth	A. Reischek
49516 (Vienna)	Nov. 1887	♀	Haast River Mouth	A. Reischek
DM-13353	1/12/1967	♂	Roto Creek (Okarito)	A. Wright, R. A. Falla
? Canterbury	30/10/1968	?	Cobden Beach (Greymouth)	T. Hartley Smith
DM-14836	15/7/1969	♀	Perpendicular Point (3m. north of Punakaiki)	J. Yaldwyn
DM-14837	15/7/1969	♀	Perpendicular Point (3m. north of Punakaiki)	J. Yaldwyn

by the Canterbury Museum was inspected during the same year. Thus a total of eight fully adult specimens was finally available for study, and these are tabulated here in geographical order from south to north.

All eight specimens studied, although slightly lighter in general colouring than some Stewart Island specimens, and therewith showing closer affinities to the nominate race, can confidently be classified as Blue Shags, *Phalacrocorax punctatus stedi* Oliver. The range of this subspecies therefore extends from Stewart Island and Foveaux Strait north, along the west coast to at least Perpendicular Point, and possibly as far north as the Steeples and Westport.

Both Oliver (1955) and Fleming (1953) mention five areas along the west coast of the South Island at which "Spotted Shags" allegedly breed, i.e.:

Steeple, Perpendicular Point, Ten Mile, Point Elizabeth and Open Bay Islands. Only three of these breeding colonies could be located during 1969, i.e. Steeples, Perpendicular Point and Open Bay Islands. Enquiries concerning the remaining two breeding colonies failed to reveal anybody in the district able to recall ever having known Shags to breed at Point Elizabeth or on Ten Mile Islet, although they have been seen roosting there occasionally.

There is still very little known about the breeding biology of any subspecies of Spotted Shag. Oliver (1955: 231), referring to the nominate race, states that "the breeding season extends over most of the year but there are indications that laying occurs mostly during certain months, for example April to July at Noises; July and August at Waiheke; September and October at Te Henga"; etc. This implies that colonies throughout New Zealand vary individually as far as breeding seasons are concerned, but that every colony on its own is breeding fairly regularly at a certain time each year. Then, discussing the Blue Shags, Oliver (1955: 233) states only that "Eggs have been seen from November until the end of January," and that Richdale observed chicks during the last week in January.

Turbott (1956: 357-361), in comparing the comparatively regular annual breeding cycle of the Bethells Spotted Shag colony (Nest building in July, egg-laying from early August and chicks flying from November) with other Spotted Shag colonies in the Auckland area, documents the amazing irregularities in breeding at other colonies, such as: Waiheke Island (eggs laid late August, December and March); Noises (eggs laid July, August, and October), and Girdwood Point, where small naked chicks were reported on 20th April, 1946, and nests with eggs were seen on 19th October of the same year. He suggests that some colonies might have several peak breeding periods during one year, or that the irregularities in breeding might be caused by either recent disturbances (involving re-laying), or that they could be remnant effects of early uncontrolled destruction of colonies in the Hauraki Gulf.

A possibly similar irregularity in breeding seems to occur at the colony of Blue Shags on Perpendicular Point (3 miles north of Punakaiki), Westland. The writer had the opportunity to visit this colony on two occasions, for the first time on 14/7/61, and again on 15/7/69. During the first visit all adult shags present were in full breeding plumage (referred to as "Pre-nuptial plumage" by

Turbott, 1956) and were busy flying from the rock ledges to the sea and back, carrying bunches of seaweed. They were nest building, and no eggs had been laid at that time. During the writer's second visit, admittedly eight years later, but at exactly the same time of year, all adult birds were found to have lost their breeding plumage and had reached the stage referred to as "Post-nuptial plumage" by Turbott (1956). The majority were feeding flying chicks, with only a small number of nests still containing nearly fully fledged chicks. Assuming that the incubation and fledging periods are the same with Blue Shags as with the nominate race, i.e. over 4, but under 5 weeks for incubation, and 9 weeks from hatching to flying (Turbott, 1956), eggs in the Perpendicular Point colony must have been laid during early April, and possibly even in March, 1969, whereas August would have been the laying month in 1961. During the latter visit, therefore, breeding was found to be at least four months (and possibly five) earlier when compared with 1961.

Much more information is needed to find the reasons for the seemingly erratic breeding behaviour of *Stictocarbo* sub-species, and any reasons suggested on present knowledge are only guesses. A straightforward study of this particular aspect of behaviour by keeping several colonies under close observation for a series of consecutive years should prove a most rewarding project.

REFERENCES

- FALLA, R. A., SIBSON, R. B., and TURBOTT, E. G., 1966: **A Field Guide to the Birds of New Zealand.**
FLEMING, C. A., 1953: **Checklist of New Zealand Birds**, A. H. and A. W. Reed, Wellington.
OLIVER, W. R. B., 1955: **New Zealand Birds**, 2nd Edition, A. H. and A. W. Reed, Wellington.
TURBOTT, E. G., 1956: Notes on the Plumages and Breeding Cycle of the Spotted Shag, **Rec. Auck. Inst. Mus.**, 4: 343-363.



SHORT NOTES

GIANT PETREL FROM THE INDIAN OCEAN

On 21/5/69 Mr. Paul McIlraith picked up a battered and maggotty Giant Petrel in dark plumage on the beach at Little Rakaia, South Canterbury. It carried a band which read OIS MUSEUM PARIS, C.F. 7.106.

Advice has now been received that it was banded by M. Prevost on 23/2/69 at Ile de l'est, Baie Naufrage, Crozet Archipelago, which lies about 51°E, 46°S. Thus it had taken less than three months to reach New Zealand. It is now a skeleton Av. 22997 in the Canterbury Museum.

— RON SCARLETT



AN UNUSUAL FEEDING HABIT OF A SOUTH ISLAND ROBIN

Recently, in a small tributary of the Pelorus River, I observed, on three occasions, a South Island Robin *Petroica a. australis* taking small aquatic insects from shallow water. On one of these occasions I identified a stick caddis *Pseudonema* which the Robin worked on for some time before shaking the case free and eating the larva.

— C. R. VEITCH

OBSERVATIONS ON POPULATION, MOVEMENTS AND FOOD OF THE KEA (*NESTOR NOTABILIS*)

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SUMMARY

Movements, numbers and foods of Keas are recorded from observations from June 1964 - July 1966 at Cupola Basin, and August - September 1965 and 1966 at Mt. Robert. Of 35 Keas captured (24 at Cupola Basin, 11 at Mt. Robert), only six birds resident in Cupola Basin were frequently recovered; all others were seen only occasionally, or not at all. Banded birds dispersed up to 12.5 miles from Cupola Basin.

At Cupola Basin Keas were seen between 2,500 and 7,000 ft. altitude, most frequently at 4,000 - 4,500 ft. Seasonal movements were related mainly to snow and availability of food.

Forty-seven different items of food were seen being eaten. The fruits of *Coprosma pseudocuneata* were the commonest food taken. Voided seeds of five fruiting species germinated after being covered with soil, showing that Keas disperse some alpine plants.

INTRODUCTION

A study of the population, movements and food of the Kea was made between 1964 and 1966 at Cupola Basin and Mt. Robert, Nelson Lakes National Park. Apart from one recent paper (Jackson 1960) little has been published on these aspects of the Kea's life history. Cupola Basin, described by Christie (1964), is a mountainous 3,000 acre tributary catchment of the Travers River (Fig. 1). Forested slopes rise from 2,500 feet to approximately 4,500 feet and above this a zone of grassland broken by extensive screes extends to 6,500 feet



FIGURE 1 — Cupola Basin. Hut is indicated by arrow.

and merges with a further zone of steep rock and scree slopes to the ridges at 6,500-7,396 feet. Similar mountainous terrain extends to the south, east, west and 10 miles north where the range terminates at Mt. Robert, overlooking the Buller River valley.

METHODS

Twenty-four Keas were captured at Cupola Basin from June 1964 - July 1966 and 11 at Mt. Robert during 24 days in August-September 1965 and 1966, in box traps, nets, or by hand. Captured birds were aged and sexed by morphological characters (Oliver 1955), and notes were kept of numbers, distribution and activity throughout the year. Most observations were made at Cupola Basin between 3,500 and 6,500 ft., over an average of nine days a month at irregular intervals. Faeces found (especially near the hut) were examined and undigested seeds and fibrous parts of fruits which they contained were identified by comparison with fresh berries.

POPULATION

Twenty-four birds were banded during the period of observation at Cupola Basin. The monthly numbers banded, observed and re-sighted are given in Table 1.

TABLE 1 — Summary of birds banded, observed and "recaptured" at Cupola Basin, June 1964 - July 1966

1964							1965												1966											
J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A				
<u>Cumulative No banded</u>																														
0	1	1	1	4	4	5	5	8	15	15	15	15	15	15	15	20	20	20	20	21	23	23	23	24	24	24				
<u>Total observed</u>																														
2	0	2	6	5	7	8	4	44	1	16	2	3	5	11	40	10	19	9	13	45	9	5	6	-	13	-				
<u>Total "recaptures"</u>																														
0	0	1	2	1	3	4	1	35	1	6	2	3	5	11	26	10	19	7	12	43	9	5	4	-	13	-				
<u>Days effort</u>																														
5	6	9	8	2	13	16	13	24	1	8	2	8	8	4	13	7	9	12	9	13	11	16	5	0	6	-				

N.B. "recaptures" include all observations of identified marked birds.

The Kea population was estimated by Lincoln index for 16 of the monthly periods (Fig. 2) and the 95% confidence limit of each estimate (Bailey 1951) was computed for units of more than 20 observations. The estimates suggest the population increased from 10 to 25 during the 18 month period for which the Lincoln index was applied. This trend is very close to the accumulated number banded (Table 1), and since relatively steady numbers were observed near the hut, it appears that the 3-4 fold difference between the minimum number estimated and Lincoln index estimate is due to a high proportion of banded birds visiting the area rarely, i.e. the tenet of Lincoln index — random mixing of the population — is not met.

The minimum number of individual Keas present was also estimated for each month from June 1964 - July 1966 (Fig. 2) by

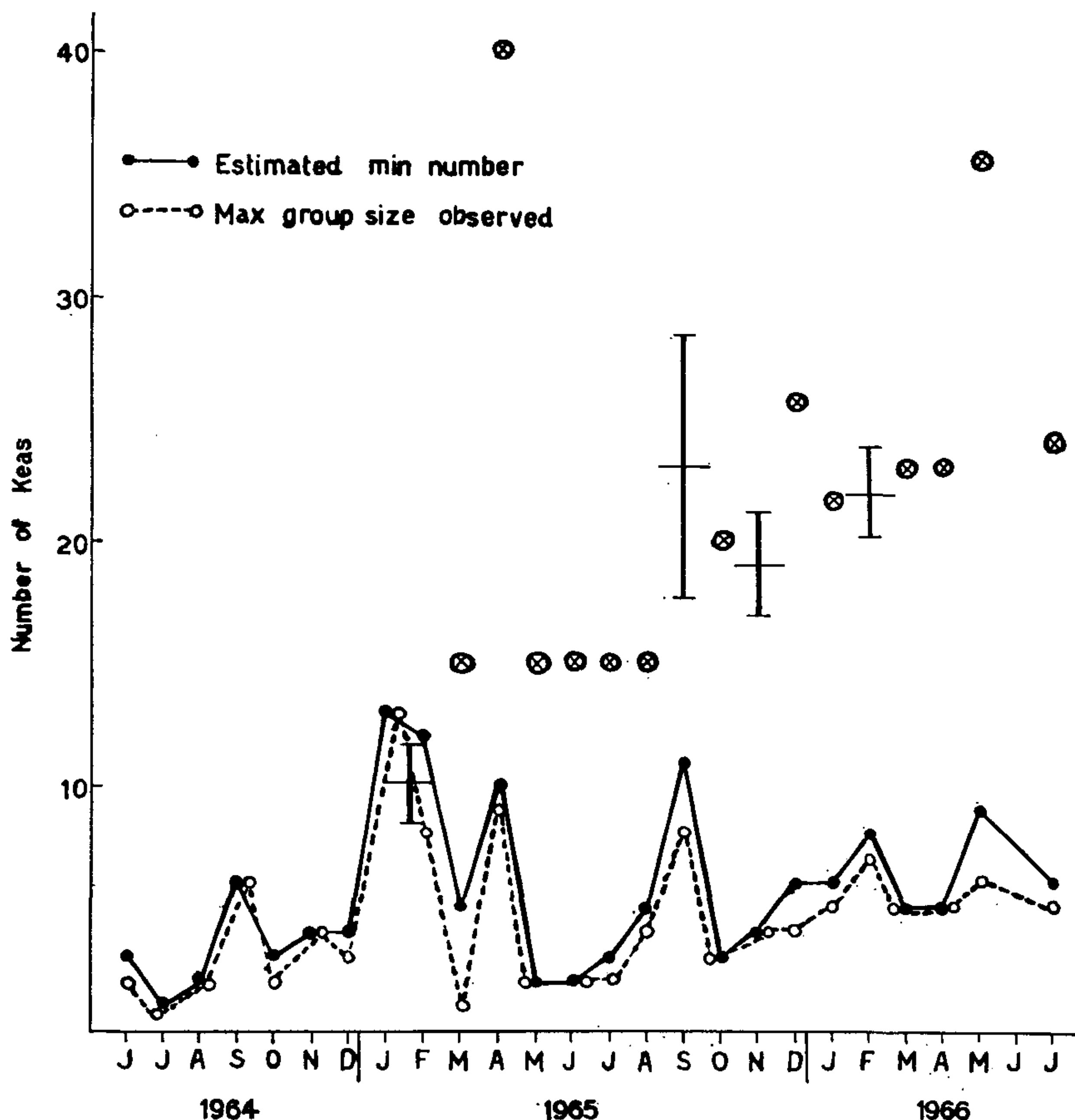


FIGURE 2 — Estimated and observed numbers of Keas at Cupola Basin. Encircled crosses designate Lincoln index estimates from samples of less than 20 units. Standard error is shown only for samples of more than 20 units.

identification of marked birds and numbers of unmarked birds seen. These numbers fluctuated between one bird in July 1964 and 13 in January 1965, and averaged 5.5 over all months.

The number of times each bird was resighted each month from the date of first capture allowed resident and transitory birds to be identified (Fig. 3). Six birds, Nos. 2, 6302, 6304, 6308, 6318 and 6319, were seen more than once a month; all others were resighted fewer than 0.35 times per month. Numbers 6318 and 6319 were juveniles reared by the pair Nos. 2 and 6304 and would probably disperse following separation from their parents. It is clear, however, that the adult pairs Nos. 2 and 6304, 6302 and 6308 were resident birds, whereas all others were visitors whose home range included Cupola Basin. This suggests a resident density of one bird per square mile, plus juveniles, comparable to that recorded by Jackson (1960) at Arthur's Pass, Canterbury.

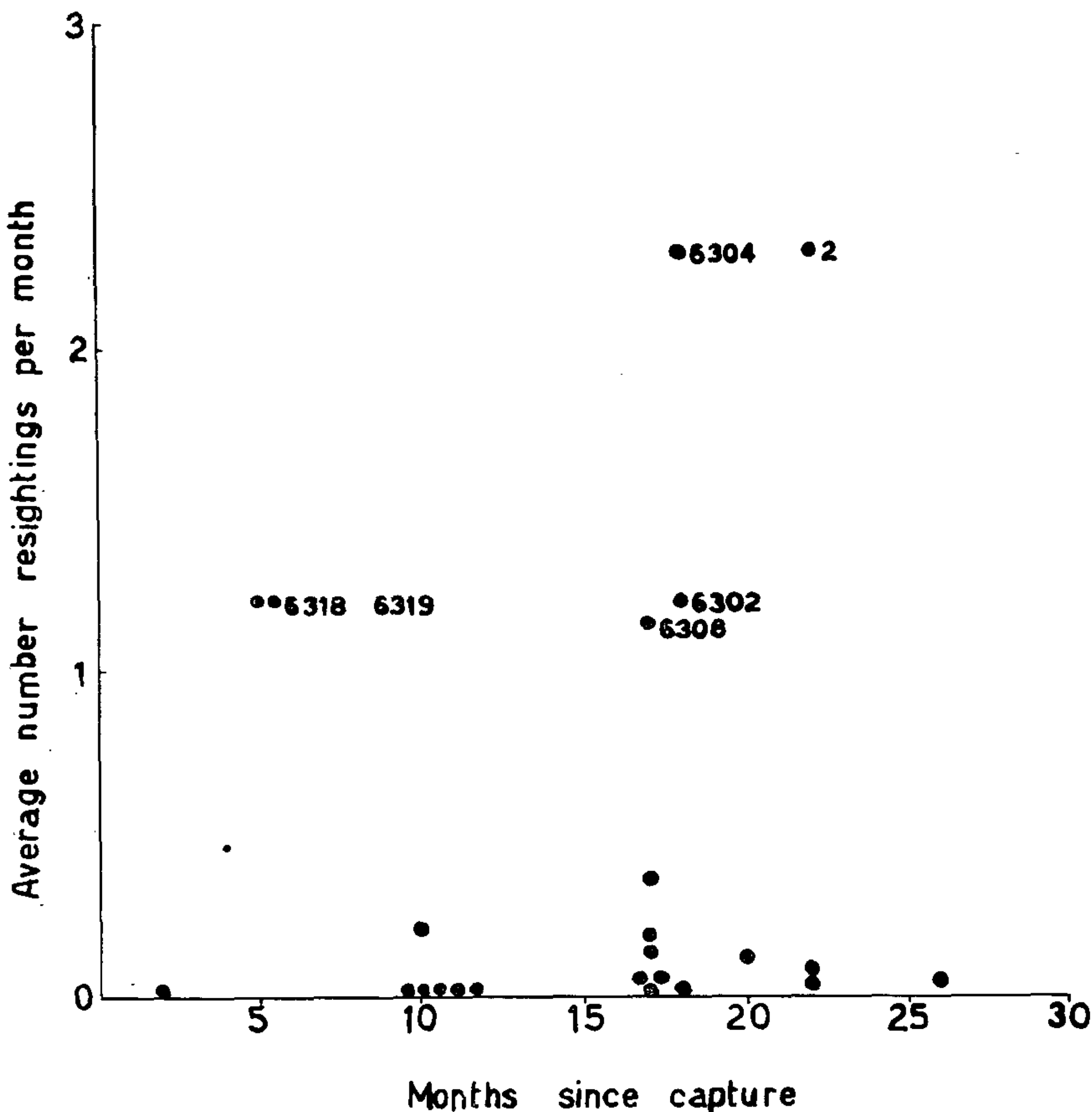


FIGURE 3 — Average number of resightings each month of Keas banded at Cupola Basin.

MOVEMENTS AND GENERAL BEHAVIOUR

The peak numbers of birds seen at Cupola Basin from time to time (Fig. 2) were attributable to visiting groups. Most groups appeared during January, February and September and remained in the area for 2-3 weeks. Transitory groups were seen on isolated occasions during other months, e.g. nine in April 1965.

At Cupola Basin Keas were most frequently observed about the mountain beech (*Nothofagus solandri* var. *cliffortioides*) forest timberline at 4,000 - 4,500 feet and the adjoining scrub zone dominated by *Dracophyllum uniflorum*, *Phyllocladus alpinus*, *Podocarpus nivalis*, *Coprosma pseudocuneata* and *Hebe* species. Besides this, birds were frequently observed over the altitudinal range of 2,500 - 6,500 ft., and occasionally to 7,000 ft.

Seasonal movement was generally similar each year. In the winters of 1964 and 1965 snow cover at Cupola Basin was heavy

and few Keas were seen above timberline. Those that remained scavenged from the waste food dump, but were also present when no waste food was available. Several sightings were made and calls frequently heard in the forest, particularly on warm northerly aspects between 2,500 - 4,000 ft. During September flocks of 6 - 8 birds were frequently seen between 4,000 - 5,000 ft. but from October - December they were seen singly or in groups of two or three. In January and February they congregated in groups of 6 - 13 about the 4,000 - 6,000 ft. level and at this time young birds were attracted by human activity. The groups were active at night, often feeding, and on several occasions they did not return to the forest to roost but remained in rock bluffs 500 - 1,000 ft. above the hut. Flocks disbanded during autumn and groups of two or three were observed about bluffs between 5,000 - 6,500 ft. Keas returned to the forest in autumn or early winter after onset of heavy frosts or snowfalls.

TABLE 2 — Summary of Observations at Mt. Robert

Period	Adult	Juvenile	Total	Cumulative Number Marked	Number marked Observed
22-27/8/65	4	4	8	0	2*) Ski
28/8-4/9/65	11	18	29	0	2*) School
5-12/9/65	9	31	40	8	1*) Period
18-19/9/65	3	0	3	8	2
14-20/8/66	6	6	12	11	1) Ski
29/8-3/9/66	6	14	20	11	4) School period
17-18/9/66	1	0	1	11	0

* banded at Cupola Basin

At Mt. Robert Keas congregated at the ski lodges when Ski School was in progress during August - September 1965 and 1966. The number present in both years (Table 2) increased as the three-week Ski School period progressed, as juvenile birds joined the flock. Birds were attracted by waste food dumps and human activity at Mt. Robert; most dispersed soon after Ski School closed.

DISPERSAL OF BANDED BIRDS

Resightings of banded birds further than two air miles from the two capture points are given in Table 3. Eighteen of the 35 birds were resighted and identified since banding and a further four banded but not identified were also sighted. Sixteen of the 18 were banded at Cupola Basin; nine were seen only in the first month after capture. Only two of the 11 birds marked at Mt. Robert were resighted. One unidentified bird was resighted 12.5 miles from the nearest capture point, Cupola Basin.

TABLE 3 — Resightings of Banded Birds Further Than Two Miles from Capture Point

Band No.	Banded	Resighted	Distance
3	Cupola Basin 23/9/64	Mt Travers /11/64	2.8 miles S
6301	Cupola Basin 20/11/64	Mt Robert car park 22/8/65	11.1 miles NE
6302	Cupola Basin 20/11/64	Mt Robert ski fields 5/9/65	9.5 miles NE
3	Cupola Basin 23/9/64	Upper Travers Saddle 4/1/65	4.0 miles S
6309	Cupola Basin 5/2/65	Hopeless Creek Travers River 8/5/66	3.1 miles NE
unidenti- fied	-	Mt Franklyn, Sabine River /2/67	6.0 miles S
unidenti- fied	-	Head of D'Urville River /3/67	12.5 miles SW
6355	Mt Robert 9/9/65	Rangimarie Tarn, Mt Robert range 24/10/66	3.4 miles S
unidenti- fied	-	Mt Travers Hut 12/66	3.4 miles S
unidenti- fied	-	East Sabine River 25/3/67	6.0 miles S

FOOD

One hundred and ninety-nine items of food seen to be taken by Keas were recorded (Table 4). Fruits of *Coprosma pseudocuneata* were frequently eaten (68 occurrences), although this may be related to availability. Up to 53 seeds of *C. pseudocuneata* were counted in some faeces, with seeds of other species less abundant. During peak fruiting periods of *C. pseudocuneata* most faeces consisted entirely of these seeds and fibrous parts of the fruit.

Voided *C. pseudocuneata* seeds germinated on moist soil. In February 1965 following this observation, faeces containing seeds of *C. pseudocuneata*, *Cyathodes fraseri*, *Muehlenbeckia axillaris*, *Pentachondra pumila*, *Podocarpus nivalis* and *Astelia nervosa* were collected and covered with soil in an enclosure to determine the general effects on viability of passage through the Kea's gut. All except *A. nervosa* germinated within two months but all died soon after a heavy snowfall in April. *A. nervosa* had not germinated after 18 months.

DISCUSSION

Differences between numbers observed at Cupola Basin and the Lincoln index estimates of P (Fig. 2) probably arise from unbanded birds coming in from surrounding areas, their subsequent capture,

TABLE 4 — Food Eaten

Food eaten	Species	Spring Sep-Nov	Summer Dec-Feb	Autumn Mar-May	Winter June-Aug
Fruits	<i>Astelia nervosa</i>		*	3 *	
	<i>Coprosma pseudocuneata</i>	22 *	14 *	31 *	1 *
	C. <i>pumila</i>	1 *	*	*	
	C. <i>serrulata</i>		*	6 *	
	<i>Cyathodes colensoi</i>	1 *	1 *	1 *	
	C <i>fraseri</i>		*	3 *	
	<i>Gaultheria depressa</i>	*	*	2 *	
	<i>Muehlenbeckia axillaris</i>		1 *	2 *	
	<i>Pentachondra pumila</i>	1 *	3 *	2 *	
	<i>Podocarpus nivalis</i>		9 *		
Seeds	<i>Aciphylla colensoi</i>		1 *	3 *	
	A. <i>ferox</i>		*	1 *	
	A. <i>monroi</i>		*	2 *	
	<i>Astelia nervosa</i>		*	1 *	
	<i>Hebe ciliolata</i>		1 *		
	<i>Pimelea oreophila</i>		1 *		
	<i>Pittosporum anomalum</i>		1 *		
	<i>Plantago raoulia</i>		1 *		
Roots (succulent)	<i>Anisotome pilifera</i>			1	
	<i>Celmisia coriacea</i>	1		9	
	<i>Gingidium montanum</i>			2	
	<i>Notothlaspi australe</i>			1	
	<i>Ranunculus insignis</i>			4	
Leaves and leaf buds	<i>Euphrasia zelandica</i>		1		
	<i>Gentiana bellidifolia</i>		3		
	G. <i>spenceri</i>		1		
	<i>Gnaphalium traversii</i>	1			
	<i>Hebe pauciramosa</i>	2			
	H. <i>vernica</i>	1	3		
	<i>Lagenophora petiolata</i>		1		
	<i>Nothofagus solandri</i> var <i>cliffortioides</i>	6			2

TABLE 4 — Food Eaten (Continued)

Food eaten	Species	Spring Sep-Nov	Summer Dec-Feb	Autumn Mar-May	Winter June-Aug
Flowers	<i>Celmisia coriacea</i>		5 *		
	C. <i>discolor</i> var <i>ampla</i>		2 *		
	C. <i>spectabilis</i> var <i>angustifolia</i>		1 *	1 *	
	<i>Cotula pyrethrifolia</i>	*	2 *		*
	<i>Gentiana bellidifolia</i>		*	3 *	
	G. <i>patula</i>		2 *	1 *	
	G. <i>spenceri</i>		*	1 *	
	<i>Haastia pulvinaris</i>		7 *	3 *	
	<i>Luzula campestris</i>	*	1 *		
Entire plant	<i>Anisotome aromatica</i> var <i>aromatica</i>	1			1
	<i>Ourisia sessilifolia</i>	1			
	O. <i>caespitosa</i>	1			
	O. <i>macrophylla</i>	2			
	<i>Ranunculus insignis</i>	2			
Insects	Adult Grasshoppers. (<i>Brachaspis collinus</i>)		2		
Larvae			1		6
* Observed fruiting, seeding or flowering period.					

and infrequent sightings after banding. This results in an estimate which is substantially higher than the numbers observed and also in a rising trend during the study period. This is consistent with the fact that 18 of the 24 banded at Cupola Basin were seen only occasionally (less than 0.35 times per month, Fig. 3) and undoubtedly spend most time in other areas. Nearly all of these were captured and marked soon after being sighted and only one bird remained unmarked by July 1966. By February 1966, 21 birds had been banded and the population estimate was 22. It is therefore evident that the Lincoln index figure is simply the sum of all birds living

within at least 12.5 miles, which appeared in Cupola Basin since June 1964, whereas the estimated minimum number (Fig. 2) comprises the four residents, their offspring and 2-3 visitors from contiguous gullies.

Two points on movement warrant comment:

Throughout spring and summer of all years Keas were observed about the alpine scrub and grassland zones at 4,000-5,000 ft., where food was most plentiful; in autumn, Keas were frequently seen between 5,000-6,500 ft., eating berries and fossicking in moist ground. The movement probably reflects the later flowering and fruiting of plants at high altitude.

During August-September 1964 and 1965 at Cupola Basin and August-September 1965 and 1966 at Mt. Robert, Keas congregated above the timberline. The formation of flocks coincided with pleasant weather during the snow thaw period and numbers fluctuated according to snow conditions. For example, 40 Keas were observed at Mt. Robert (Table 2) during August-September 1965 when heavy snowcover existed above 4,000 ft. In August-September 1966 when there was only light snowcover above 4,500 ft. only 20 birds were present. An unusually heavy snowfall occurred at Cupola Basin in August 1964 and persisted as a heavy snowpack during September. Six birds were seen, compared with 11 in September 1965 when the snowpack was considerably less.

Visiting Keas scattered from the banding stations following the break-up of flocks during late September. Jackson (1960) has recorded a dispersal of juvenile Keas at this time. At Mt. Robert in September 1965, adult and juvenile birds combined into a large flock before they dispersed. Initially, the flock contained equal numbers of juveniles and adults (Table 2), but within three weeks juveniles outnumbered adults by more than 3 to 1. The juveniles became noticeably gregarious and were attracted to food dumps and by human activity on the ski fields. Adults were less gregarious and apart from occasional visits to the food dumps, they remained in adjacent bluffs. This parting appeared to signal separation of young from their parents, and they dispersed independently soon after.

Except for the resident juveniles (6318, 6319), no other juveniles marked at Cupola Basin were seen there again. This reinforces the impression of movement outside family range. Two of the most distant resightings made were the juveniles 6301 and 6305 at 11.1 and 9.5 miles respectively from the banding point, Cupola Basin. The dispersal of most Keas from Cupola Basin was to the south; resightings were made at Mt. Travers 3.2 miles S, Mt. Franklyn 6.0 miles S, Sabine River 6.0 miles S, and in the headwaters of the D'Urville River 12.5 miles SSW. Only three Keas banded at Cupola Basin were seen to the north, despite more opportunities to observe birds in these areas.

The frequency with which some foods are eaten (Table 4) does not necessarily reflect preference. *Coprosma serrulata*, for example, is rare at Cupola Basin, but was observed being eaten six times; it could thus be ranked as a preferred food. Conversely, *C. pseudocuneata* is widespread throughout Cupola Basin, it bears fruit between September and June (subject to snow conditions) and

is the most prolific berrying plant in the area. High use may therefore reflect availability rather than preference. At Arthur's Pass, Canterbury, Jackson (1960) notes that the fruits of *C. pseudocuneatas* are unattractive to Keas.

Often only a small part of the food selected was eaten. On the isolated occasions when Keas were seen catching grasshoppers (Table 4), they ate few in relation to the numbers caught. Similar wasteful behaviour occurred when flowers, branchlets and entire plants were removed.

The Kea has often been criticised as a sheep killer in some districts (Marriner 1908; Myers 1924; Aspinnall 1967).

Keas at Cupola Basin appear to play a beneficial role in dispersing several soil binding plants as shown by germination of voided seeds of succulent fruiting species, *C. pseudocuneata*, *Cyathodes fraseri*, *Muehlenbeckia axillaris*, *Podocarpus nivalis* and *Pentachondra pumila*. When only the seeds were eaten, e.g. *Pimelea oreophila*, *Aciphylla colensoi*, *Hebe ciliolata*, they were crushed and it is probable that most were destroyed during digestion. Bull (1965) records the present paucity of birds in alpine areas of the Nelson Lakes National Park and notes only four berry feeding species. In pre-European times there were probably even fewer species since the Kea was not sighted in the area until 1903 (Marriner 1908) and no introduced species were present. However, some locally extinct species such as the Kakapo *Strigops habroptilus* may have occupied this alpine feeding niche. Today, apart from the infrequent summer visits to alpine areas of Cupola Basin by introduced species such as Redpolls *Carduelis flammea*, Blackbirds *Turdus merula* and Chaffinches *Fringilla coelebs*, the Kea is the only significant berry-eating species present.

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REFERENCES

- ASPINALL, J. C., 1967: Some Observations on Keas. N.Z. Tussock and Grassland Institut. "Revue" 12: 14-17.
- BAILEY, N. T. J., 1951: On Estimating the Size of Mobile Populations from Recapture Data. Biometrika 38: 293-306.
- BULL, P. C., 1965: "Birdlife." Nelson Lakes National Park Handbook. 90-96.
- CHRISTIE, A. H. C., 1964: A Note on the Chamois of New Zealand. Proc. N.Z. Ecol. Soc. No. 11: 32-36.
- JACKSON, J. R., 1960: Keas at Arthur's Pass. Notornis 9: 39-58.
- MARRINER, G. R., 1908: "The Kea. A New Zealand Problem." 151 pp.
- MYERS, J. G., 1924: The Kea or Mountain-Parrot. N.Z.J.Agric. 29: 25.
- OLIVER, W. R. B., 1955: "New Zealand Birds." 541-546.

THE ORANGE-FRONTED PARAKEET

Cyanoramphus malherbi

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ABSTRACT

The habitat and the history of the distribution and status of the Orange-fronted Parakeet *Cyanoramphus malherbi* have been appraised.

Never common, it occurred in most districts of the South Island and Stewart Island and, now rare, it seems confined to mid- and north-west Nelson. It favours forest at about 2,000-2,500 feet above sea level, but has been reported from higher altitudes.

INTRODUCTION

There has never been a comprehensive account of the Orange-fronted Parakeet and the few available notes on the species, mostly by Buller or Reischek, are in many instances nearly 100 years old. Buller's accounts are apparently all second-hand and Reischek has earned a reputation for inaccuracy not only by sexing specimens wrongly but, more important in this case, also for giving unlikely distributions. Reischek should have known this species better than anyone, for he apparently never reported it without a specimen in confirmation but, unfortunately, his reports must lose some authority. Sight records have been regarded with suspicion since the differences which distinguish this species from its nearest congener, the Yellow-crowned Parakeet, can be discerned only at very close range and in good light.

Most information has therefore come from the 59 specimens in 17 museums in New Zealand and overseas but only 25 of these gave the year of collection and only 32 provincial location or better.

THE GENUS *CYANORAMPHUS*

The genus *Cyanoramphus* has six species, two of which are now extinct. *C. zelandicus* was confined to Tahiti in the Society Islands and *C. ulietanius*, known from only two specimens, is believed to have inhabited the Island of Raitea, also in the Society Group (Peters).

The remaining four species are listed in the checklist of New Zealand Birds.

Cyanoramphus novaezelandiae, the red-crowned species, has five subspecies in the New Zealand region and two outside.

The typical subspecies occurs on the three main islands and many offshore islands; *cyanurus* on the Kermadecs, *chathamensis* at the Chathams; *hochstetteri* on Antipodes Island; but *erythrotis* of Macquarie Island is extinct. Outside New Zealand to the north are *verticalis* on Norfolk Island and *saisseti* on New Caledonia.

Cyanoramphus unicolor, the Antipodes Island green parakeet, is common on Antipodes Island.

Cyanoramphus auriceps, the Yellow-crowned Parakeet, has two subspecies.

C. a. auriceps occurs on the three main Islands, some offshore islands and the Auckland Islands.

C. a. forbesi occurred on the Chatham Islands but is now confined to one islet there.

Cyanoramphus malherbi, the Orange-fronted Parakeet, is found in the South Island, did occur on Stewart Island and may have occurred on Auckland Island.

It was first described by De Souance in 1857. Gray recorded it in 1859 as *Platycercus malherbi* and Finsch in 1868 described it as the young of *Platycercus auriceps*. In 1869 Buller described it as *Platycercus alpinus* by which it became best known until 1891 when Salvadori identified Buller's species with that of De Souance.

DESCRIPTION

The Orange-fronted Parakeet is described in Buller (1888), Oliver, and Falla *et al.*

Colour plates are included in the texts of Buller and Falla *et al* but both, especially Buller's, show a paler crown and less contrasting front and eyestripe than any of the specimens in the Dominion Museum.

The slightly smaller size of the Orange-fronted Parakeet is partly obscured by the male's overlap with the yellow-crowned female. Even at its greatest, the size difference can be recognised with certainty only by measurement. Furthermore, the structure and shape of the weaker bill does not help identification because it is more difficult to distinguish than the orange forehead.

Juvenile: De Souance mentioned that a young specimen in the Paris Museum had a barely distinguishable frontal band but was otherwise similar to the adult. If this is characteristic of juveniles the illustration in Buller's text may be not an atypical representation but an illustration of a juvenile specimen.

DISTRIBUTION

The North Island:

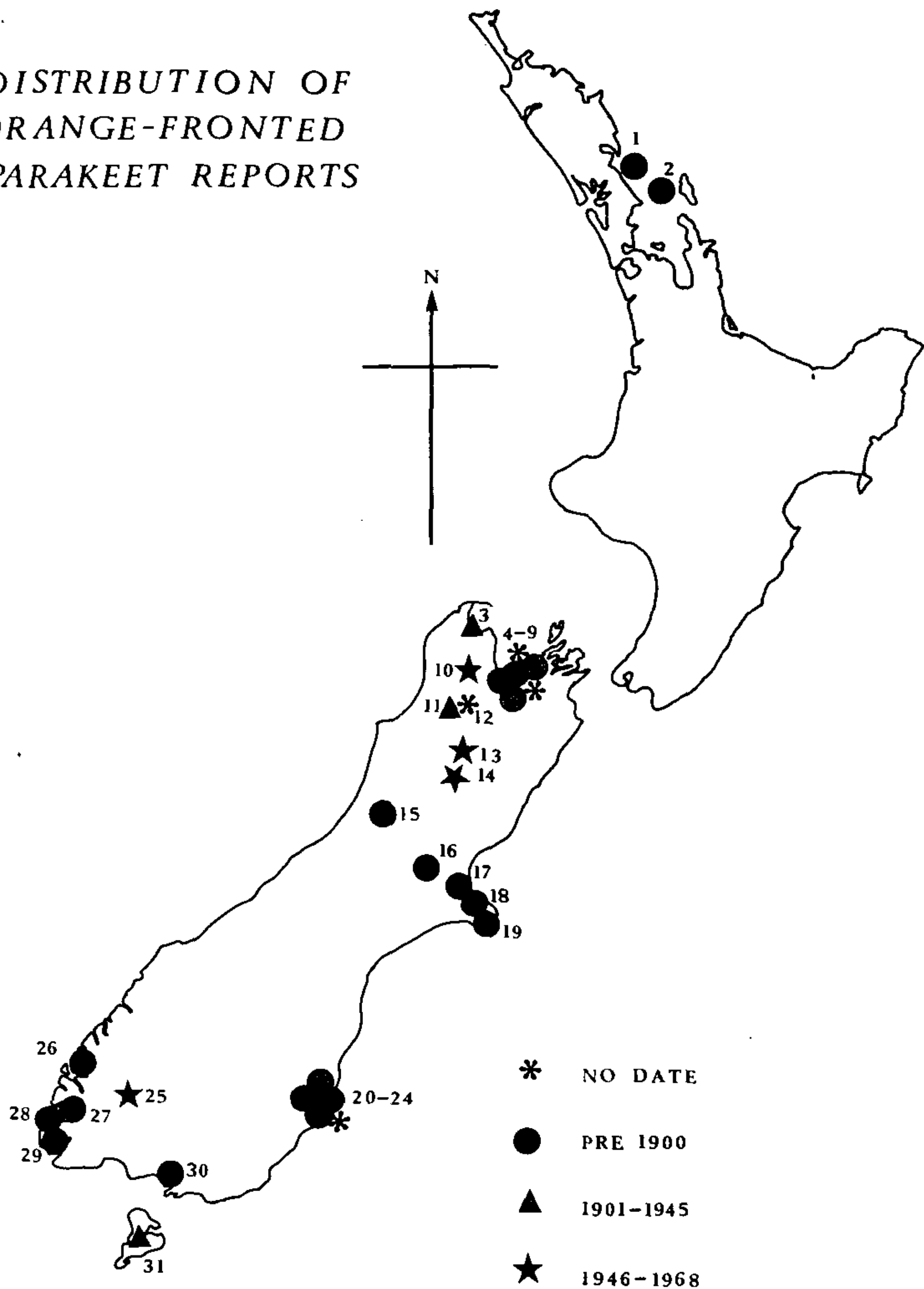
There have been four reports from the North Island. The earliest came from Buller (1869) who mentioned that a caged specimen had been obtained in the Wellington Province but later (1888) he apparently discounted this. A mounted specimen in the Dominion Museum, allegedly from the Wairarapa, may be the cage specimen to which Buller had referred. However, whether these two are connected or not, neither is fully acceptable. These, apart from Buller (1882) and Travers listing the species' distribution as both Islands, are the only references to the species inhabiting the North Island mainland.

The other two reports originated from Reischek but it was Buller (1883) who first reported that Reischek had taken specimens on Hen and Little Barrier Islands. Later Reischek (1886) reported them from Little Barrier Island only, although the Vienna Museum has two specimens labelled "Hen Island" and recorded as collected by Reischek in 1880.

It is very unlikely that the species ever inhabited the North Island, at least in European times. The Hen Island and Little Barrier Island reports must be regarded with suspicion since the species has not been recorded there before or since Reischek's report, although the other two species of parakeet have survived well on both Islands.

Subfossil identification of this species is not positive enough to be acceptable; even so, none of the subfossil material tentatively attributed to this species has come from the North Island. (Scarlett pers. comm.)

*DISTRIBUTION OF
ORANGE-FRONTED
PARAKEET REPORTS*



DISTRIBUTION

The South Island:

Acceptable reports have come from twenty localities in the South Island. All except six are from last century. Although the earlier fourteen provide some data, some of them seem misleading for reasons discussed later. For the sake of completeness they have been included but separated from reports referring to the period after 1900.

REPORTS BEFORE 1900

Fiordland and the West Coast

The southernmost report from this area is of three specimens collected by Reischek in 1887 from Chalky Sound and now held in the Vienna Museum. The British Museum has a specimen taken from Dusky Sound that same year but the collector is not recorded. In 1884 Reischek took a specimen, now in the Vienna Museum, from Mount Foster and wrote (1884) that the species was rare during his six month stay in Dusky Sound. The Cambridge University Museum has a specimen taken in 1899 from Open Cove in Thompson Sound. The only other record from the Fiordland area is a British Museum specimen obtained in 1889 but no other data are given. The most northerly report from the West Coast, a specimen collected by Reischek on Mt. Alexander, was recorded by Buller (1883).

Otago

Morton reported a parakeet near Invercargill "with a band of orange on the forehead" which was undoubtedly this species. No other reports refer specifically to the area south of Dunedin, but there are five reports before 1900 in the Dunedin area and another without date. The earliest of these is a specimen in the Otago Early Settlers' Museum dated 1865 taken from Helensburgh, now a suburb of Dunedin. Potts (1872) mentions specimens procured in Otago in 1871. The Paris Museum and the Frankfurt Museum hold one specimen each taken in 1875 and 1896 respectively from "Dunedin" and Oliver refers to a record from Dunedin dated 1874. The Carnegie Museum has two specimens taken in Otago in 1892 but no detailed information is given.

South and Mid-Canterbury

There are no reports for this period between the Otago Peninsula and the cluster of reports at Banks Peninsula. The earliest of these latter is of two specimens in the Harvard Museum which entered their collection in 1870. No collection date is given and they are labelled simply "Christchurch." The British Museum has a specimen from Akaroa taken in 1872 and the City of Liverpool Museum has three specimens labelled Port Cooper [= Lyttelton] that H. O. Forbes (R. Wagstaffe pers. comm.) listed as being held there at least by 1898. Haast (Buller 1869) reported the species had been shot in the Oxford ranges.

North Canterbury, Nelson and Marlborough

The Auckland Museum has two undated specimens from Nelson. The co-type in the Paris Museum has no date but was collected in Tasman Bay by the Astrolabe and Zelee expedition so it must have been before 1840 and is therefore the earliest known record. The University of Cambridge Museum has a specimen taken in Nelson in

1895 and the Canterbury Museum (N.Z.) has one taken in 1896 labelled "Nelson approximate." Buller (1888) remarked that the species was not uncommon in the wooded hills around Nelson.

With three exceptions, all the reports referring to the period before 1900 have come from Museums, a fact which partly explains the three clusters that occur in Fiordland, Otago Peninsula and Banks Peninsula and perhaps that in Nelson. It is likely that many specimens were labelled with the address of their collector or the town nearest to their point of collection, which may be why the only out of town reports for Dunedin and Christchurch were from literature and not museums.

The Fiordland coast, with all its sheltered sounds providing easy access by sea and its abundant flora and fauna was a popular area for exploration by naturalists. This may explain the concentration of reports in this area — they are probably as much a reflection of the intensity of exploration as of the parakeet population of the time.

Museum specimens labelled "Nelson" may be regarded as coming either from near Nelson town or from within Nelson Province. Remarks like those of Buller (1888) that the species was common in the wooded hills around Nelson and the Canterbury Museum specimen which states "Nelson approximate" certainly gives reason to assume the province was meant; but "Dunedin" and "Christchurch" have no such alternative interpretation yet doubtless most specimens did come from their surrounding areas. Therefore these reports do not give a reliable indication of distribution or details that might indicate their favoured habitat but do indicate that the species was widespread although not common throughout much of the South Island.

REPORTS AFTER 1900

The species has been recorded in six locations this century, the most southerly being Manapouri in 1949 (Tily) but no details were given. The remainder all come from the northern end of the South Island. The earliest of these, from Takaka in 1913, is a specimen held in the Canterbury Museum. The Canterbury and Dominion Museums each have one specimen taken at Owens Junction in 1928 and the Dominion Museum has a second undated specimen from Owens Junction. Breem records a sighting by the Flora River in 1955 of a parakeet seen at a distance of twenty feet and thought to be orange-fronted. G. Caughley (N.Z.F.S.) reported a highly probable but not positive identification of an Orange-fronted Parakeet from the Hope branch of the Waiau River in 1963. In 1965 a Wildlife Service party sighted the species in the D'Urville River Valley (Adams) and since then there has been no acceptable record.

This century five of the six reports including the most recent three and all four specimens have come from the mid-west Nelson-north Canterbury area.

Stewart Island

The Dominion Museum has a specimen labelled Stewart Island 1904, the only record of which I have knowledge from this Island.

The Auckland Islands

Gray and Finisch have made reference to Orange-fronted Parakeets from the Auckland Islands. Gray in 1859 simply stated

"*Platycercus malherbi* habitat Auckland Island." Finsch's (1868) reference was not so straight-forward because at that time he still regarded Orange-fronted Parakeets as juvenile Yellow-crowned Parakeets (Finsch 1868 M). He listed specimens of Yellow-crowned Parakeets from the Auckland Island which he said "form, according to De Souance, a distinct species *Platycercus malherbi*." Because De Souance originally described the species, he, if anyone, should have been able to recognise them so that there is no doubt in my mind that the specimens in question were Orange-fronted Parakeets, but for the following reasons I am not entirely satisfied that they came from the Auckland Islands.

Gray listed it with the same specific name De Souance had first given the species only two years before, so probably he obtained his information from the specimens De Souance had examined. However, De Souance said the habitat was unknown and Gray said it was Auckland Island. The co-type (now in the Paris Museum), which De Souance must have seen for it to be a co-type, is labelled "Astrolabe and Zelee expedition, Tasman Bay," so it is puzzling that neither De Souance nor Gray gave this as its habitat. However, it may help explain, though does not confirm, the Auckland Island habitat Gray gave, because the Astrolabe and Zelee expedition did call at Auckland Island.

When in 1868 Finsch gave the habitat as Auckland Island he said the specimens in question had been examined by De Souance, and had been collected by an antarctic expedition. Because De Souance was French and the Astrolabe and Zelee, also French, was an antarctic expedition which called at the Auckland Islands, it is possible that even after the elapsed nine years Finsch was referring to the specimens De Souance had used to describe the species and from which Gray subsequently obtained his information.

Since there is no record of Orange-fronted Parakeets on Auckland Island other than those in some way associated with the Astrolabe and Zelee expedition, and since there is confusion over the origin of these specimens, it is possible but unlikely that the species ever occurred there.

BREEDING

Apart from three eggs (no date) from Mt. Peel which are now in the Canterbury Museum the only reference to breeding is covered under "Captivity." The Mt. Peel eggs were part of the Stead collection but the criteria for their identification were not given.

FOOD

Only two very brief references specific to Orange-fronted Parakeet's food have been found. Reischek (1885) said its food consists of berries and seeds but the label of a British Museum specimen taken on the West Coast states "Stomach small grubs."

Small grubs as part of its diet could be the major factor which separates it ecologically from the Yellow-crowned Parakeet. Its weaker bill indicates that its food probably is different to some extent from that of the Yellow-crowned Parakeet but there is insufficient information available even to guess what that difference may be.

CAPTIVITY

Although parakeets are popular cage birds there are very few references to captive Orange-fronted Parakeets. Buller (1869) mentioned a caged specimen which to his certain knowledge was five years old and he later wrote (1888) that there were many caged specimens at Nelson. In 1873 he mentioned that more than twenty specimens had been taken to England but it was not until 1883 that he specified these were living examples. In 1874 he mentioned living examples in the Zoological Gardens, Regent Park, in London. According to the Park records (J. J. Yealland pers. comm.) there were two there in 1872 and two more in 1882 but no other information was available.

The only account of this species breeding in captivity comes from Prestwich's "Account of Psittacidae raised in France" in which De Laurier's attempts to raise Orange-fronted Parakeets at Angouleme are described.

In 1883 several pairs of Yellow-crowned and Orange-fronted Parakeets that had reached him sick and without feathers were lost but two pairs of Yellow-crowned and one pair of Orange-fronted had been restored to health. In 1883 the Orange-fronted pair produced a first clutch of four chicks and the female was at that time (20 December 1883) sitting on eggs again. There was no further report until 1887 when it was reported that they had not bred since 1883 and although the male was lively and ardent the female was listless and moulting frequently. There was no further mention of the chicks.

These accounts tell enough to show that the Orange-fronted Parakeet, like our other parakeets, make good captives; and if a pair is ever captured, there is a good chance that they will breed in captivity.

HABITAT

The species has been reported in a range of habitats none of which is strikingly evident as a favoured or typical one. Probably because Buller (1869 I) first named it "alpine parakeet" most writers assumed it to favour an alpine habitat, in spite of Buller himself criticising this choice of name the same year (Buller 1869).

Reischek reported it in the scrub on the summit of Mt. Alexander (Buller 1883) and later (Buller 1888) on the "highest peak of Little Barrier Island." Mt. Alexander, at more than 6,000 ft. above sea level, is truly alpine, but the highest peak of Little Barrier Island, at 2,370 ft. above sea level is hardly alpine yet the wording implies it. Although this Little Barrier Island report is suspect, it may have encouraged the concept of an alpine habitat.

Reischek (1885) said he had come across it only on the mountains near the alps in low thick scrub which implies an alpine habitat. According to literature, however, Mt. Alexander and Mt. Foster were the only localities where he had seen it that could be considered alpine; and, whether he realised it or not at the time of writing, he had, according to museum records, already shot it on Hen Island and Little Barrier Island, neither of which is alpine. This fact could be another reason for discrediting the Little Barrier and

Hen Island reports, in which case none of Reischek's reports should be considered reliable, not even the Mt. Alexander and Mt. Foster reports.

Most references to an alpine habitat can be traced to Reischek who, although not renowned for accuracy, probably did see them in an alpine habitat, but his implication of an exclusively alpine habitat is misleading in the light of all records available.

Buller (1868) gave the habitat as the wooded heights of the South Island and in 1869 reported Haast as shooting this species in forest vegetation at 2,500 ft. In 1888 he said it was by no means uncommon in the wooded hills around Nelson, that specimens had been obtained from the forests of the Southern Alps at 2,000-2,500 ft. and that it may be found frequently in alpine scrub. This second reference to the forests of the Southern Alps at 2,000-2,500 ft. is probably a repetition of Haast's report. (Buller 1869) and that in alpine scrub probably from Reischek (1885) in which case it shows that Buller was still prepared to accept both these habitats at that time.

Potts (1885) said Orange-fronted Parakeets were among the large flocks of parakeets that spread over Canterbury in the summer of 1884-1885, which implies at least that this species did not have an aversion to lower altitudes and was, in that respect, no different from the other New Zealand parakeets. Haast (Buller 1869) went as far as to say Orange-fronted Parakeets always occurred with Yellow-crowned; so in Haast's experience the Orange-fronted Parakeet was never seen outside the Yellow-crowned Parakeet's habitat. There is no doubt that Haast had first hand experience of the species, although perhaps not as much as Reischek; however, his reports have a more reliable ring than Reischek's.

Buller (1868), Potts (1885), Haast (Buller 1869), Breem and Adams all reported the species occurring in the bush and Haast, Breem and Adams specified altitudes, the only ones I have found in the literature searched, from 2,000-2,500 ft.

From this it seems that reports of the species above the bush have been exceptions although not rare ones. Many reports from alpine areas have, on close examination, shown that the only criterion for species identification was the altitude of the sighting. Such reports have only perpetuated and exaggerated the *alpinus* reputation. The absence of reports from low altitudes cannot be regarded as significant when reports of any nature on this species are so scarce.

STATUS

Records show that in European times the Orange-fronted Parakeet has never been as common as either of the other two mainland parakeets.

As mentioned earlier, Buller (1888) said it was not uncommon in the hills around Nelson and he had seen many caged specimens in Nelson. His identification of cage specimens must be acceptable and "many" implies that the species was not scarce there at that time. Potts (1885) said it was fairly represented in the large flocks of parakeets of the 1880's but Reischek (1885) said "it is a rare bird" in the same notes in which he described large flocks of Red-crowned and Yellow-crowned Parakeets that came to Christchurch —

almost certainly the flocks to which Potts was referring. Even if Reischek's distributions are suspect a collector's evidence, as far as this species' abundance is concerned, would be more reliable than that of the most discerning observer because these parakeets are so difficult to identify unless actually held in the hand.

Museum records indicate the species was probably least uncommon in the Nelson area in the 1880's.

The present-day status of *malherbi* is perhaps under-rated. The reputation it has as a subalpine dweller must have influenced many observers to look for it more in these areas and not in the bush, where pertinent records indicate it occurs more commonly. Only an exceptional sighting in the bush could be acceptable and since parakeets have been totally protected the odd specimen that confirmed their presence has not been shot. Most of the acceptable early reports were of specimens either shot or captured.

THE DECLINE OF NEW ZEALAND PARAKEETS

Yellow-crowned and Red-crowned Parakeets were very numerous in the 1880's (Potts 1885) (Handley) (Fulton) at least in the inhabited areas of Canterbury but in the 1890's they declined very drastically and were no longer very common by about 1900 (Fulton). Nowadays Red-crowned Parakeets are rare on the mainland but Yellow-crowned are increasing. On many offshore islands both species are thriving but on all islands which have cats the parakeets are either extinct or declining.

The sudden crash about 1890 may have been typical of any population which builds up to such an extent that it damages its own habitat and then crashes to a very low level, but this does not explain the continued depression lasting some 80 years till now. According to records, the population boom occurred around orchards and gardens. If these were not surplus birds pushed into a fringe habitat by overcrowding then it is strange that parakeets have not recovered and thrived now that there are more orchards and gardens than ever before. It may explain, however, why parakeets have survived on our offshore islands which have apparently not been subjected to a population boom.

About the time of the crash, birds and mammals had already been introduced on a large scale so it is possible that a disease which did not seriously affect, but was carried by, an introduced species was spread to the susceptible parakeets. This could explain the sudden decline but does not explain why close offshore islands have not been affected although many introduced species have spread to them, unless the species responsible was not one of these invaders.

Predation by itself is most unlikely to have been responsible for such a rapid decline but nevertheless cats on our offshore islands are heavy predators on parakeets. Smaller communities such as islands are more severely and quickly affected by introductions than are larger ones which explains why parakeets still occur and why the Yellow-crowned Parakeet is able to increase on the mainland in spite of predation by mustelids as well as cats. The red-crowned species, being more of a ground feeder than the yellow-crowned, possibly falls a victim to predators more easily and is consequently declining.

Whatever the cause of the crash of the 1890s, predators could have kept the declined parakeet population in check. Unfortunately records for populations of offshore islands are insufficient to show a decline, even if one did occur and then, in the absence of introduced predators, a return to normal again.

APPENDIX

The numbers refer to the corresponding ones on the map and the dates given are those of the observation or collection of specimens or, when they were not specified, the earliest reference to the report.

1. Hen Island, 1880. Two specimens collected by Reischek in the Vienna Museum (not acceptable).
2. Little Barrier Island, 1883. Specimen collected by Reischek (Buller 1883) (not acceptable).
3. Takaka, 1913. Specimen in the Canterbury Museum from the Stead collection, the collection locality is vague.
- 4-9. Nelson, no date. Two specimens in the Auckland Museum.
1840 Co-type collected in Tasman Bay by Astrolabe and Zelee expedition, now in the Paris Museum.
1895 Specimen in Cambridge University Museum.
1896 Specimen in Canterbury Museum, location vague.
1888 Buller listed the species as not uncommon in the wooded hills around Nelson.
10. Flora River, 1955. Broom reported a bird seen at 2,300 ft. at about 20 ft., thought to be *C. malherbi*.
- 11-12. Owens Junction, no date. Specimen in Dominion Museum.
1928 Two specimens in Canterbury Museum and one specimen in Dominion Museum.
13. D'Urville River Valley, 1965. Wildlife Service party sighting.
14. Hope branch of Waiatu River, 1963. A highly probable but not positive identification by G. Caughley, N.Z.F.S.
15. Mt. Alexander, 1883. (Buller 1883.)
16. Oxford Ranges, 1869. Haast was reported shooting the species in this area by Buller 1869.
17. Christchurch, pre 1870. Two specimens in Harvard University Museum, no other data.
18. Akaroa, 1872. Specimen in the British Museum.
19. Lyttelton, 1898? Three specimens in the Liverpool Museum.
- 20-24. Helensburgh, 1865. Specimen in Otago Early Settlers' Museum.
Dunedin, 1874. (Oliver 1955).
1875. Specimen in Paris Museum.
1896. Specimen in Frankfurt Museum.
No date. Specimen in Otago Museum.
25. Manapouri, 1949. (Tily 1949.)
26. Open Cove, 1899. Cambridge University Museum.
27. Mt. Foster, 1884. Vienna Museum, collected by Reischek.
28. Dusky Sound, 1887. Specimen in the British Museum.
29. Chalky Sound, 1887. Three specimens in the Vienna Museum collected by Reischek.
30. Near Invercargill, 1872. (Morton 1872.)
31. Stewart Island, 1904. Specimen in the Dominion Museum.
The following have kindly provided details of specimens in their collections:
Smithsonian Institution
Harvard University Museum of Comparative Zoology
Carnegie Museum
American Museum of Natural History
Cambridge University Museum of Zoology
City of Liverpool Museums
British Museum of Natural History
Vienna Museum
Frankfurt Museum
Paris Museum of Natural History
Brussels Royal Institute of Natural Science
Auckland Institute and Museum
Dominion Museum
Canterbury Museum
Otago Museum
Otago Early Settlers' Museum

REFERENCES

- ADAMS, J. S., 1965: Internal Affairs Department files.
BROOM, M. J., 1956: Classified summarised notes, *Notornis* 6: 7, p. 207.
BULLER, W. L. R., 1868: Notes on Herr Finsch's review of Mr. Walter Buller's essay. *Trans. N.Z. Inst.* 1: p. 54.
BULLER, W. L. R., 1869 I: On some new species of New Zealand birds, *Ibis* pp. 39-40.
BULLER, W. L. R., 1869: Notes on ornithology of New Zealand. *Trans. N.Z. Inst.* 2: pp. 385-392.
BULLER, W. L. R., 1873: History of the birds of New Zealand, 1st edition, van Woort, London.

- BULLER, W. L. R., 1874: On the Ornithology of New Zealand. Trans. N.Z. Inst. 7: p. 202.
 BULLER, W. L. R., 1882: Manual of Birds of New Zealand, Govt. Printer, Wellington.
 BULLER, W. L. R., 1883: On some Rare Species of New Zealand Birds. Trans. N.Z. Inst. 16: p. 318.
 BULLER, W. L. R., 1888: History of the Birds of New Zealand 2nd edition, published by the author, London.
 CAUGHLEY, G., 1963: Internal Affairs Department files.
 FALLA, R. A., SIBSON, R. B., TURBOTT, E. G., 1966: A Field Guide to the Birds of New Zealand, Collins, London.
 FINSCH, O., 1868: Monograph of the family Psittacidae 2: p. 286 in Ibis 1869 p. 379.
 FINSCH, O., 1868: Notes on Mr. Walter Buller's essay on the Ornithology of New Zealand. Trans. N.Z. Inst. 1: p. 58-70.
 FORBES, H. O., 1898: Bulletin of the Liverpool Museums Vol. 1.
 FULTON, R., 1907: The disappearance of New Zealand Birds. Trans. N.Z. Inst. 40: p. 494.
 GRAY, G. R., 1859: List of Psittacidae in the British Museum, Ibis 1862, p. 229.
 HANDLEY, J. W., 1895: Notes on Some Species of New Zealand Birds. Trans. N.Z. Inst. 28: p. 362.
 MORTON, J., 1872: Notes on Some of the New Zealand Birds. Trans. N.Z. Inst. 5: p. 225.
 OLIVER, W. R. B., 1955: New Zealand Birds 2nd edition. A. H. & A. W. Reed, Wellington.
 PETERS, J. L., 1937: Checklist of the Birds of the World. Vol. 3, pp. 269-272, Harvard University Press 1937.
 PHILPOTTS, A., 1919: Notes on the Birds of South Western Otago. Trans. N.Z. Inst. 51: p. 222.
 POTTS, T. H., 1872: On the Birds of New Zealand. Trans. N.Z. Inst. 5: p. 185.
 POTTS, T. H., 1885: The Oology of New Zealand. N.Z. Jour. Sci. 2: p. 185.
 PRESTWICH, 1883: Account of Psittacidae raised in France. Bulletin de la Societe d'Acclimatation pp. 692 - 693.
 PRESTWICH, 1884: Account of Psittacidae raised in France. Buletin de la Societe d'Acclimatation pp. 216 - 218.
 PRESTWICH, 1887: Account of Psittacidae raised in France. Buletin de la Societe d'Acclimatation pp. 93 - 94.
 REISCHEK, A., 1884: On New Zealand Ornithology. Trans. N.Z. Inst. 17: p. 190.
 REISCHEK, A., 1885: On the habits of New Zealand Birds. Trans. N.Z. Inst. 18: p. 98.
 REISCHEK, A., 1886: Appended list of Birds which Inhabit Hauturu Island. Trans. N.Z. Inst. 19: p. 138.
 SALVADORI, T., 1891: Catalogue of the Birds of the British Museum 20: p. 590.
 SOUANCE, Ch. De, 1857: Descriptions of three new species of Parakeets. Review et magazin de zoologie, March 1857, p. 98.
 TRAVERS, W. T. L., 1882: On the Distribution of New Zealand Birds. Trans. N.Z. Inst. 15: p. 186.
 TILY, I., 1949: In classified summarised notes. Notornis 3: 4, p. 100.

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SHORT NOTE

DUNKING BY PETROICA

In October 1968 Mr. B. Ward and I made a trip into the Goulund Downs area (N.W. of Nelson). On 12/10/68 we observed a Yellow-breasted Tit feeding its young alongside the Cave creek. It would catch an insect and each time before offering it to the young bird, fly down to a boulder in the creek and dunk the insect in the water.

It was obviously a deliberate series of actions, catching the insect, flying to the creek, dunking it in the water and only then taking it to its young in the branches above.

I have been unable to find a record of such behaviour in any of the Petroica species.

— H. F. HEINEKAMP

HYBRIDIZATION OF EASTERN AND CRIMSON ROSELLAS IN OTAGO

By JILL HAMEL

SUMMARY

An examination of the literature and evidence collected from local aviculturalists indicates that the reported wild interbreeding of the Australian Eastern and Crimson Rosellas in Otago is not proven. Even if established this particular instance of hybridization is unlikely to be of taxonomic significance.

INTRODUCTION

Two species of Australian rosella parakeets have been introduced into New Zealand, the Eastern Rosella *Platycercus eximius* and the Crimson Rosella *P. elegans*. The Eastern Rosella has become established mainly in the north of the North Island and around the Dunedin district of Otago. It has occasionally increased to pest proportions. The Crimson has been reported from the Dunedin district (and more recently, Wellington) and has never been common. In Australia these are two distinct species. Their distribution overlaps broadly throughout New South Wales and Victoria and they occupy similar habitats. Around Dunedin these two species are reported to interbreed since the hybrids have been wild trapped. There are two possible sources of these wild hybrids. They may be derived from aviary bred hybrids which have escaped or they may have been bred in the wild from the rare Crimson which took the only mates that they could find — Eastern Rosella birds.

It would seem to be impossible now to prove conclusively that natural hybridization has occurred since the Crimson has not been conclusively reported in the last twenty years, and the discovery of a mixed breeding pair is improbable. Since Oliver firmly reports hybridization, I considered it worthwhile collating what is known about the local populations.

DISTRIBUTION

Eastern Rosellas are present around Dunedin as small strongly localized flocks. They are said to occur as far north as Palmerston, they are certainly at Puketeraki and are known as far south as Berwick and Waipori Falls township. Localities where they have been sighted within the last year are Waitati (two areas), Leith Saddle, Pigeon Flat, above Sawyers Bay, Ross Creek, Whare Flat, Berwick, Waipori Falls township and Woodside Glen. (Pers. comm. from several local informants.) This range is not significantly different from that given by Oliver in 1955 but there has been a marked decrease in numbers over the past 15 years. Where there used to be flocks of several hundreds, there are now flocks of only 10-30, and they have vanished entirely from some localities where they were formerly common. Rabbit poisoning with grain and strychnine is thought to be the most probable cause of their decline, and steady trapping for local aviaries may also have been effective. Rosellas are reported as having been destructive in field crops of peas at Berwick recently and on small fruit farms around Dunedin in the 1930s, and so have been actively shot by local farmers.

RELEASES

Oliver states that "About 1910 a small shipment of Eastern Rosellas, including a few Crimson Rosellas, that had been refused entry into New Zealand by the Customs Department, was released off Otago Heads by the ship which brought them as she was returning to Sydney." (Oliver 1955: 638.) It seems highly probable that Oliver was given this account by a Dunedin aviarist, Mr. F. W. Barnett, who says that Oliver wrote to him asking about rosellas. Mr. Barnett in turn had been given this account by other older Dunedin aviarists now dead, and he is fairly certain that he passed it on to Oliver. (Barnett: pers. comm.) The Otago introduction is not documented in the letterbooks of the Dunedin Customs Department between May, 1906, and January, 1912.

Local naturalists who might have reported the birds seem to have been unaware of them or else did not publish. In 1922 Thomson reported only the Auckland population of Easterns (Thomson 1922: 137). In 1930 Oliver did the same. There is no mention of rosellas in the Otago Acclimatisation reports between 1904 and 1930. Mr. W. H. Davidson reported in 1948 that the first rosellas were seen in Leith Valley between 1910 and 1913 (Davidson 1948: 214). Mr. F. W. Barnett was trapping rosellas in Leith Valley by 1933 and judging by the numbers seen (a flock of 300-400 seen in the Waitati Valley some time during the 1930s) the species had been established for some years. (Barnett: pers. comm.)

Mr. W. J. Williams, an engineer with the Dunedin Water Department, states in an account probably written about 1950 that the liberation of Eastern Rosellas resulted when an aviary belonging to a farmer on Mt. Cargill was wrecked by a gale. "About a dozen rosellas and a number of Red Lories escaped." (Williams: M.S.) Mr. Barnett had never heard this account, but the odd point is that Red Lory or Lowry is one of the popular names for Crimson Rosella. (Cayley 1963: 162.)

PLUMAGE OF EASTERN AND CRIMSON ROSELLAS

The general pattern of the plumage of the two species is very similar and they interbreed readily as cage birds. Hill states that in Australia "Cross-breeding in the wild . . . is not unknown." (Hill 1957: 108). Back-crossing of F1 hybrids to the Crimson parent produces almost Crimson type plumage in 4 or 5 generations. (F. W. Barnett: pers. comm.) *Vice versa* most of the Crimson characters are lost in a few generations if the hybrids are back-crossed to the Easterns. The salient colour differences between the two species are:

Crimson: Breast, abdomen and undertail coverts dark crimson.
Eastern: Breast and undertail coverts lighter crimson, upper abdomen yellow with a dribble of red, lower abdomen green.

Crimson: Feathers of back and wing coverts edged with crimson.
Eastern: Feathers of back and wing coverts edged with yellow.
Crimson: Cheek patch brilliant blue.
Eastern: Cheek patch white (or pale blue ?).
Crimson: Rump dark crimson.
Eastern: Rump green.

Also the Crimson Rosella is a much larger bird than the Eastern. Gould records the cheek patches of the Eastern Rosella as white (Gould 1865: 55) as does Oliver and Forshaw. Other authors show a light wash of blue.

Definitely hybrid birds caught in the wild are reported to have had a generally Eastern appearance with a red wash extending from the breast well down over the yellow and green of the abdomen. They had pale blue cheek patches and the back feathers tended to have red margins. The rump might be red or green, and the reds throughout tended to be the dark crimson of the Crimson Rosella. A wild-caught hybrid was described to me as having the back feathers margined with red, the crown dark crimson, the cheek patch a washed-out blue, rump and abdomen mottled crimson on green and its other characteristics typically Eastern. This bird was caught at Waitati seven or eight years ago by Mr. Barnett.

All the local aviarists consulted agree that wild Crimson Rosellas have always been uncommon and none has been seen recently. One was seen in the upper Waitati Valley about 30 years ago, in the back garden of a farm house close to the bush (F. W. Barnett: pers. comm.). One was caught in the Waitati Valley in the 1940s that looked to be fully Crimson (D. R. Ker: pers. comm.), and there was a hearsay report of a Crimson seen at Leith Saddle about seven years ago. Also there is general agreement that strongly hybrid birds used to be seen quite regularly though one informant who estimated that he had handled about 3000 rosellas over the last 30 years said it was 10 years since he had caught a pronounced hybrid. Birds are still being caught in the Waitati area which look to be mostly Eastern except that they carry some red on the rump or back and have the blue cheek patches which suggest some Crimson ancestry. Rather less than one in twenty of the wild birds caught carry these markings. (D. R. Ker and W. A. Henderson: pers. comm.)

DISCUSSION

Some minor pieces of evidence suggest that natural hybridization has occurred. Crimson Rosellas are still being kept in local aviaries and hybrids bred. Escapes have been reported recently of Easterns at least; yet the occurrence of strong hybrids in the wild has declined with the decline of the full Crimson. Other species of Rosellas are kept and hybridized in local aviaries. I have seen hybrids of Eastern and Tasmanian Rosellas. Adelaide and Moreton Bay Rosellas have also been kept locally. Moreton Bay Rosellas are reported by Cayley and Forshaw to interbreed with Eastern Rosellas where their ranges overlap. None of the wild-caught Dunedin birds has been reported to show traces of these other species.

Taxonomically it is probably irrelevant whether or not there has been local hybridization. According to Mayr, where one parental species is rare, natural hybridization is 'not different in principle from situations in which a species hybridizes in captivity in the absence of conspecific mates.' (Mayr 1963: 126). Mayr is discussing here individuals which occur beyond the solid geographic or habitat range of their species and states that this phenomenon has been reported for flycatchers, woodpeckers, bulbuls and other birds. I consider that the Dunedin rosellas can best be compared with birds thus isolated.

Disturbance of habitat is also a common cause of hybridization but only in the situation where habitat preferences constitute a barrier to interbreeding. Eastern and Crimson Rosellas have widely overlapping habitat preferences. Hence habitat disturbance or rather disturbance of their relationship to their habitat cannot be invoked as a casual mechanism of hybridization between them.

ACKNOWLEDGEMENTS

I wish to thank Dunedin naturalists and aviarists who have patiently answered my queries and shown me their birds, in particular Miss O. Cartwright, Messrs. F. W. Barnett, W. A. Henderson, D. R. Ker, F. Tardiff, W. Troup and my colleagues in the O.S.N.Z.

BIBLIOGRAPHY

- CAYLEY, N., 1963: *What Bird is That?* Angus and Robertson, Sydney.
DAVIDSON, W. H., 1948: In *Classified Summarized Notes*. *Notornis* 3: 201 - 221.
FORSHAW, J. M., 1969: *Australian Parrots*. Lansdowne, Melbourne.
GOULD, J., 1865: *Handbook of Birds of Australia*. Vol. II, London.
HILL, R., 1967: *Australian Birds*. Nelson, Australia.
MAYR, E., 1963: *Animal Species and Evolution*. Belknap Press, Harvard.
OLIVER, W. R. B., 1930: *New Zealand Birds*. Fine Arts (N.Z.) Wellington.
———, 1955: *New Zealand Birds*. A. H. & A. W. Reed, Wellington.
OTAGO ACCLIMATIZATION SOCIETY: *Annual Reports*, 1904 - 1930.
OTAGO SHIPPING AND CUSTOMS OFFICE *Letterbooks*, Hocken Library, Dunedin.
THOMSON, G. M., 1922: *The Naturalization of Animals and Plants in New Zealand*. Cambridge University Press.
WILLIAMS, W. J.: *Some Native Birds of the Dunedin District*. Undated manuscript by courtesy of Miss O. Cartwright.



SHORT NOTE

WELCOME SWALLOWS AT LAKE OKAREKA

We have had several sightings of the Welcome Swallow *Hirundo neoxena* in the Bay of Plenty particularly at the mouth of the Kaituna River (Kaituna Cut), Matata Lagoon and Tarawera River estuary. Up to date we had not seen the Welcome Swallow on the Volcanic Plateau till 11/3/70 when three birds were observed from our house on the lakeside at Lake Okareka. Following the long dry spell (our driest for many years) the lake level is now the lowest we have known in 11 years and this has turned what was water up to 3 feet deep, with a strong stand of reeds giving excellent nesting sites for many waterfowl, into a barren mud mire (reeds dried and died off) and obviously an excellent breeding ground for insects. The three Welcome Swallows were flying in their usual energetic and spectacular manner over this area eventually landing and perching on the top of three sticks standing upright in the mud.

We noted them resting, one on each stick for nine minutes.

SHORT NOTES

BLACK-CAPPED AND OTHER PETRELS NEAR THE KERMADecs

At 1830 hours on 4/1/70, M.V. Tarawera passed a small group of birds which were feeding, and consequently did not scatter until we were amongst them. The position at this time was 29° 20' South, 174° 14' East. Wind E 14 knots. Air temp. 73°. Sea temp. 74°. The group consisted of 5 Black-winged Petrels *Pterodroma nigripennis*, 4 Wedge-tailed Shearwaters *Puffinus pacificus* and two birds with which I was not familiar. The following is a description of these birds taken at the time; the light was good, and 8 x 50 binoculars were used.

The wings were long and fairly narrow. The flight in the moderate wind involved plenty of wing flapping and gadfling, and very little gliding. There was a prominent black cap which came down below the eye towards the back of the face, though the eye or black patch around the eye was clear of the cap. The forehead was white and the bill black. There was a very prominent white collar passing right around the back of the neck. The back was grey near the collar and seemed to get progressively darker grey towards the tail. The feathers of the back seemed to have some form of marking on them, as though the edges of the feathers were a different colour grey or even brown. The upper surface of the tail was dark grey or black. On the upper wing the primaries were dark grey/black, and the secondaries were a lighter grey, though not nearly so light a grey as the back. The under surface of the body was white with a prominent narrow dark band which seemed to start at the forward edge of the wing and pass well down each side of the breast, but was not complete. The undertail was white.

From references to literature and after discussions and examination of skins at the Dominion Museum, Wellington, it seems clear that these birds were Sunday Island Petrels *Pterodroma cervicalis*.

On 5/1/70, two more of these birds were seen, one at 1000 hours and the other at 1130 hours, the position at 1130 being 26° 16' South, 175° 37' East; the wind E S 15 knots; air temp. 74°; sea temp 75°. With the bird seen at 1130 hours were one *nigripennis*, 4 *pacificus*, and one Kermadec Petrel *P. neglecta*.

Whilst bound from Nuku'alofa to Wellington on 18/1/70 the vessel passed within sight of the Kermadec Islands. At 0700 hours in position 26° 30' S, 177° 32' W; wind ESE 13 knots; air temp. 74°; sea temp. 75°, there was one *cervicalis* present with the other birds about the ship. At 1330 hours when 30 miles south of Raoul Island and almost the same distance from Macauley Island, ten *cervicalis* were seen together. At 1800 hours when 15 miles S.E. of Curtis Island four *cervicalis* were seen together and at 1830 hours three more. From the above observations it would appear that *cervicalis* is still present in the Kermadec Islands; if not on Raoul itself, then on some of the southern islands:

In Notornis XV, 214, I reported seeing large black-capped petrels in this area which I suggested could have been Greater Shearwaters *Puffinus gravis*. At that time it was pointed out by a number of ornithologists that the description given would fit *cervicalis*. Having now become reasonably familiar with *cervicalis* I can state that the birds seen in 1967 and 1968 were certainly not it.

The earlier birds were much larger, with a vastly different flight pattern and with a much larger black cap coming right down in line with the bill. After comparing the field notes on both types, I feel that my original tentative identification of *gravis* must stand.

The most numerous species seen on this passage through the Kermadecs was *nigripennis*; up to a hundred of these birds could be seen about the ship throughout the day. That large numbers stayed with the ship all night cannot be doubted as their distinctive calls could be heard from the bridge throughout the hours of darkness. At 0700 hours on 19/1/70 in position 33° 37' S, 179° 29' W; wind N 13 knots; air 73°; sea 73°, there were still about 40 *nigripennis* accompanying the vessel. This number gradually declined through the day until at 1830 hours in position 35° 40' S, 179° 37' E; wind S 13 knots, air 71°; sea 71°, there were seven of them still following. On 20/1/70 at first light the vessel was on the New Zealand coast south of East Cape and no more *nigripennis* were seen.

It was most interesting to notice the different behaviour of these Kermadec birds from that of *nigripennis* about the north of New Zealand. The New Zealand birds can be relied upon to give a good display of their high flying chases, as described in the Field Guide. The Kermadec birds not only did this but flew close up to the ship, above the bridge and masts more in the fashion of gulls than petrels. The chasing of one bird by two or three others occurred continuously, the birds calling throughout the chase.

— JOHN JENKINS



LITTLE BLACK SHAGS AT GISBORNE

There have been no recorded occurrences of the Little Black Shag *Phalacrocorax sulcirostris* from the Gisborne-East Coast area; but in 1967 and 1968 I suspected that flocks of shags numbering up to 28, flying high overhead to and from the upper reaches of the Waimata River, might be of this species. Confirmation came in March and April 1969, when a feeding flock travelled daily up the river, the maximum count being 41 birds. Usually they progressed rapidly on the deeper far side, feeding on shoals of sprats (yellow-eyed mullet); but sometimes they used the near side with its gently sloping bank, and fed on small flounder, about two inches long. On these occasions, excitement in the flock was even more intense than when a shoal of sprats was encountered, many birds stranding themselves on the bank during dives; and none appeared to fail in catching a flounder at every dive. It is interesting to note that the feeding habits of *P. sulcirostris* are precisely the same as those of the Guanay *P. capensis bougainvillei* of the Peruvian Guano Islands. Nelson (1968) in "Galapagos: Islands of Birds," describes how this species travels in an irregular mass, diving almost in unison, with the rearmost birds continually leap-frogging and landing ahead of the main flock. He expresses the opinion that communal hunting is unlikely to be a specially important mechanism, and goes on to say "It would be fascinating to know more about the precise schooling behaviour of *anchovetas* and what effect hunting Guanays have on

their behaviour." As the feeding habits of the two species are very similar, it would follow that *anchovetas* react in a manner similar to sprats; that is to say, they scatter wildly giving each bird of the feeding flock the opportunity of taking its prey, which it rarely fails to do. Thus it would seem that communal hunting is in fact of advantage to both species.

R. W. S. Cavanagh (*unpub.*) observed Little Black Shags in Hawkes Bay in 1961 at Lakes Purimu, Runanga, Rotoehu, and Hurumoana. He found a nesting colony on Lake Hurumoana, off the Hastings-Taihape Road, and suspected that birds were also nesting on an island in Lake Purimu in company with shags of other species. Sibson (*in litt*) observed four birds at the Tukituki Estuary on 18/5/53, and he states that the species is now numerous at Westshore and the Ahuriri Lagoon.

— A. BLACKBURN



NOTES ON CALLING AND BEHAVIOUR OF THE STEWART ISLAND KIWI

During the period 20 September to 29 October 1969 I was a member of a Wildlife Service survey party based at Port Pegasus, Stewart Island. Kiwis *Apteryx australis lawryi* are plentiful throughout this area and were occasionally seen or heard during daylight hours.

The following observation was made at 16.45 hours on 22/10/69 in tall mixed rata forest about 50 yards from the coast of Pegasus Passage, Port Pegasus. As no published account of *lawryi* calling in the wild appears to exist the following may prove of interest.

I heard a male begin calling about 50 yards away, so hurried to the place. By the time I had located the male a female had started her answering call. Both birds were within five yards of me and the female was in full view. The male was obscured by low fern at about three yards from the female.

The male ceased calling about half a minute after my arrival, then began to chase the female which also immediately ceased calling. They appeared quite indifferent to my presence and the chase continued in small circles, reaching a climax when the male seized the female by the middle of the back. At this point the female broke away and unfortunately crashed into my legs. This brought an abrupt end to the proceedings.

Visibility at the time in the dark bush was poor. The female was the only one of the pair I actually saw calling. She began her low rasping call with head and neck extended and beak fairly wide open pointing upwards. During the actual call, which was repeated several times, she lowered her head slowly until the lower beak-tip was almost touching the ground. As the head was lowered the beak was wagged from side to side, giving a quavering effect to the sound.

The very "scratchy" lower volume sound seemed to come when the bird was breathing in as it lifted its head for the repeat call.

— K. P. HORGAN

REVIEWS

Handbuch Der Vogel Mitteleuropas. Vol. 2: Anseriformes (Part I); Vol. 3: Anseriformes (Part II). By K. M. Bauer and U. N. Glutz von Blotzheim. Vol. 2 edited by G. Neithammer, and Vol. 3 by U. N. Glutz von Blotzheim. Published by Akademische Verlagsgesellschaft, Frankfurt am Main, West Germany, in 1968 and 1969 respectively. Vol. 2 has 534 pages, 5 colour plates and 76 line drawings, whereas Vol. 3 has 503 pages, 1 colour plate and 78 line drawings.

The first volume of this Handbook of the Birds of Central Europe, which is planned to contain eleven volumes eventually, was published in 1966. The two volumes published recently contain the Order Anseriformes, i.e. Swans, Geese and Dabbling Ducks in Volume two, and Diving Ducks, Mergansers and "Stiff-tailed" Ducks in Volume three. As in the first volume, and possibly even more so in these two volumes, every species, be it a rare straggler, or a common resident, is treated with the same thoroughness. The enormously complex subject matter is beautifully arranged and clearly presented, together with extensive literature references added to each species. The two volumes contain much more than would be expected from a Handbook, and they could be described as a collection of Monographs. The Mallard is possibly as good an example as any to show the treatment applied to every species. The text dealing with the Mallard occupies 75 pages with the following heading and sub-headings: Distribution of the Species; Subspecies; Field Identification; Description (including all plumages from downy young to adult); Feather structure; Measurements; Molt; Voice; Breeding Distribution; Distribution in Central Europe; Population numbers; Migration and Dispersal; Habitats; Population Densities; Breeding; Breeding Results, Mortality and Age; Behaviour; Food; Literature.

Four excellent colour plates in Volume two show heads of geese, to illustrate differences in some species and in particular to show subspecific differentiation. The remaining two colour plates (one in each volume) show various down and belly feathers found in dabbling and diving ducks' nests respectively, providing a very useful guide to nest identification. Throughout both volumes a few black and white illustrations are used to help identification of certain species in eclipse plumage, and illustrate some important points otherwise difficult to describe. Numerous excellent line drawings show significant features of behaviour, colour patterns and feather structure. Maps are used extensively to show distribution, dispersal and migration, including maps illustrating recoveries of banded birds of many species. Tables are used only where absolutely necessary, and some graphs provide an excellent means of showing the diverse food used by many of the species dealt with.

From the three first volumes of this new Handbook of the Birds of Central Europe, it is evident that, when completed, it will replace many specialised ornithological volumes needed at present to dig up the information easily found in this Handbook.

The only "mistake" the reviewer was able to find was the fact that to his knowledge, at the present time at least, there are no plans for an English edition.

— F.C.K.

Small Birds of the New Zealand Bush, by Elaine Power. Collins, Auckland and London. \$2.50.

It is hard to find words to express the delight which this book has given me. Mrs. Power must rank as one of our foremost bird artists. Twenty-two of the smaller birds of our islands, ranging in size from the Rifleman to the Tui and the Saddleback, are illustrated, most of them in beautiful monochrome and colour. The descriptions are brief, but adequate, and front and back of dust-jacket and cover provide further pictures in colour. Mrs. Power's skill is such that the birds seem almost alive.

The colour plates and text are printed in Hongkong by a Japanese firm. The text was set in Monotype "Bembo" by an Auckland firm, and is clear and easy to read.

The lack of scientific names in the text is no flaw. Those of us who need them have either memorised them or can use our reference books.

I can think of no better book than this to give any nature-lover.

— R. J. SCARLETT



LETTER

Sir,

This letter refers to the identification of the bird described as a Macaroni Penguin *Eudyptes chrysolophus* and figured under that caption in the paper on New and Rare Birds at Snares Island by John Warham (*Notornis* 16, 4, 223).

We question this identification, as the bird shown has all the characteristics of the black-throated variant of the Royal Penguin *Eudyptes schlegeli*. Some of the differences between the rare black-throated variant of the Royal and the normal adult Macaroni are listed in another paper by one of us (F.C.K.) in the same issue of *Notornis* (pp. 226-229) and a typical Macaroni is figured (p. 227). In addition to the "top-heavy" bill and the apparently jet black throat of the Snares birds, two further points may be mentioned. These are the much larger area of naked skin at the gape in Royals, and the white patch in the upper tail coverts, common in Royals, and rarely, if ever, found in Macaronis. On all counts the Snares bird adds up to *Eudyptes schlegeli*.

It seems evident that both species are likely to occur as vagrants in coastal or sub-antarctic New Zealand. *Notornis* 16: 4, provides a useful identification aid with photographs of four birds, considered by us to be three Royals (pp. 223 and 228) and one Macaroni (p. 227).

— R. A. FALLA
C. A. FLEMING
F. C. KINSKY

Wellington, 26/2/1970

1970 ANNUAL MEETING, WELLINGTON

The Society's Council met on Friday, 15th May, with a full day of business from which the following items may be of general interest:

(i) A Project Assistance Fund has been established, replacing the Minor Expeditions Fund. Grants may be made from this fund towards expenses incurred in any ornithological research project, study, or expedition. Applicants must have been members of the Society for at least two years, and must undertake to publish in "*Notornis*" or deposit findings in the Recording Scheme. Grants will be limited to \$300 in total in any one financial year.

(ii) Following the successful trial in September-October 1969, the Bird Distribution Mapping Scheme has been adopted for a period of three years.

(iii) Council members who must travel to meetings may now claim fares to the equivalent of first class rail fares.

The Conference of Regional Representatives on Saturday morning was attended by all but 4 of the 19 R.R.'s. and consequently was the most successful yet, with a very fruitful discussion and exchange of ideas.

The following papers were presented on the Saturday afternoon:

(1) Dr. Ian Andrew on Bush Census Techniques, as used at Lake Waikaremoana.

(2) Dr. P. C. Bull reporting on the trial of the Bird Distribution Mapping Scheme.

(3) Mr. John Kendrick on Sound Recording of Birds.

All these speakers were enthusiastically received, and the success of the afternoon was completed with a sumptuous afternoon tea served by Wellington ladies.

Members gathered for cocktails and a buffet dinner before the Annual General Meeting, which commenced at 8 p.m. with the President, Dr. G. R. Williams, in the chair, and 54 members present.

The Editor's Report explained that the quality of "*Notornis*" depends on the material that is sent in, and he hoped that spirited correspondence would follow any imperfections. Discussion centred on the problem of long articles, and Dr. R. A. Falla stated that in some cases nothing would be lost, the Society would be a good deal happier, and "*Notornis*" some pages shorter, if some ruthless pruning was practised. The continued increase in cost is giving concern; but is the result of the rising cost of paper and labour, as well as the growth in size. A change to other than art paper was suggested, and the Treasurer stated that up to \$250 per year could be saved by using a lighter grade of paper. The Council was asked to look into methods of reducing the cost of "*Notornis*."

Scheme reports were presented to the meeting, including the report of the Society's representative on the Banding Advisory Committee of the Department of Internal Affairs, Mr. J. M. Cunningham, in which he criticised the lack of annual reports on banding, and tendered his resignation as representative. Dr. Falla expressed the hope that New Zealand's scheme does not get bogged down, and if it is not to be kept for professionals, some assurance will have to be made

that the Wildlife Branch will produce annual reports. Dr. Williams explained that the scheme was now of no cost to the Society, but the Department wants the amateur to continue to remain in the scheme.

The four retiring members of the Council were declared re-elected unopposed — Dr. P. C. Bull, Dr. R. A. Falla, Mrs. J. B. Hamel, and Mr. N. B. MacKenzie.

The new constitution proposed for approval at this meeting was referred back to the Council after considerable discussion, particularly on the two issues of Conservation and Junior Membership. Strong views were held on these matters and changes in the proposed constitution overlooked recent decisions of general meetings of the Society. The Constitution Sub-Committee of the Council was asked to receive further submissions from members and to submit new proposals to the next A.G.M.

The proposed increases in subscription rates were approved and the meeting closed a little before midnight.

— B. A. ELLIS



BEACH PATROL SCHEME, 1969

Not less than 84 members and friends took part in the Scheme in 1969. They travelled 1570 miles along beaches and reported finding 2324 dead seabirds plus a small number of other species. Particularly commendable efforts were made by teams led by A. T. Edgar in Northland, Mrs. S. Reed in Auckland, C. Paulin in Taranaki, D. E. Crockett in Wanganui and Dr. I. G. Andrew in Manawatu; and individually by Elizabeth Madgwick (Northland), T. R. Harty (South Auckland), G. A. Woodward and E. K. Saul (Wellington), R. J. Pierce (South Canterbury) and R. Boud (Southland). Cards have been received from all zones except Fiordland, Auckland East and North Coast South Island. At present the numbers of specimens reported from zones are as follows: Auckland West 820; Taranaki 121; Wellington West 1,110; Westland 2; Bay of Plenty 71; East Coast North Island 9; Wairarapa 1; Canterbury North 7; Canterbury South 21; Otago 7; Southland 56; Wellington South 99.

No large wrecks were reported during 1969. The most abundant species found was again Fairy Prion (427 specimens); and this was undoubtedly the major species among a large number of unidentified prions. There was a remarkably large number of albatrosses and mollymawks (170) of all the usual species but especially mollymawks. Shearwaters were represented by 262 Sooty, 183 Fluttering and 99 Short-tailed, plus lesser numbers of the other species. There were 5 Blue Petrels. Rare specimens found were 1 Wilson's Storm Petrel, 2 Grey-backed Storm Petrels, 1 Arctic Tern and 1 Oriental Cuckoo.

Regarding final reports, the 1968 report has taken longer than expected to complete but will be with the editor within a month. The 1969 report should be done by the end of this year. Some work has been done on the outstanding reports for 1965-67 but I can do little more before next year. However, E. K. Saul has kindly offered to assist and is now working on the 1967 data.

— M. J. IMBER, Organiser

STATEMENT OF ACCOUNTS

For the Year Ended 31st December, 1969

1968			1969
	OUR INCOME WAS EARNED FROM:		
1818	Subscriptions: Ordinary	1854	
47	Arrears	18	
	Transfer from		
152	Life Members (Note 1)	151	
21	Donations	16	
745	Profit on Christmas Cards	106	
252	Sale of Back Numbers	346	
50	Surplus Field Study Course	19	
-	Biology of Birds	212	
-	Tent Sales	50	
3085	TOTAL ORDINARY INCOME		\$2772
	PLUS INVESTMENT INCOME:		
340	Interest	297	
193	Dividends	208	
612	Royalties	13	
1145	TOTAL INVESTMENT INCOME		518
4230	TOTAL INCOME		\$3290
	LESS EXPENSES:		
2324	"Notornis" Printing & Distribution	2725	
62	Postages	62	
157	Printing & Stationery	153	
81	General Expenses	96	
16	Annual General Meeting	14	
108	Travelling Expenses	130	
5	Nest Record Scheme	56	
5	Recording Scheme	10	
20	Royal Society Affiliation	20	
64	Library Expenses	76	
80	Nett Cost of Kermadec Expedition	-	
225	Audit Fee	100	
-	Kermadec Reprints	48	
-	Beach Patrol Scheme	25	
-	Distribution Mapping Scheme	12	
-	Donations — Royal Society	75	
3147	TOTAL EXPENSES		3602
	NETT DEFICIT TRANSFERRED TO		
\$1083	(Surplus) THE ACCUMULATED FUND		\$312

BALANCE SHEET

As at 31st December, 1969

1968		1969
	CURRENT ASSETS:	
5324	Cash at Bank of N.Z.	3969
79	Sundry Amounts owed to the Society	20
515	Bank of N.Z. Savings Account	519
104	Checklist Expenses	—
100	Stocks of "Notornis"	100
100	Stock of "Biology of Birds"	100
<hr/>		<hr/>
6222	TOTAL CURRENT ASSETS	\$4708
	INVESTMENTS AT COST:	
5134	Shares in Public Companies (Note 2)	5281
4284	Local Body Stocks	5274
<hr/>		<hr/>
9418	TOTAL INVESTMENTS	10555
1000	Library at Valuation	1000
<hr/>		<hr/>
16640	TOTAL ASSETS	16263
	LESS LIABILITIES:	
735	Amounts owed by the Society	873
177	Subscriptions in Advance	176
	RESERVE FUNDS:	
—	Publications	1104
	Less Checklist Expenses written off	104
		<hr/>
		1000
251	Minor Expeditions	251
1512	Life Subscriptions	1414
<hr/>		<hr/>
2675	TOTAL LIABILITIES	3714
<hr/>		<hr/>
	VALUE OF ACCUMULATED FUNDS	
13956	AS BELOW	\$12549
<hr/>		<hr/>
	ACCUMULATED FUNDS:	
14078	Balance 1/1/69	13965
1083	Plus Surplus for Year	—
<hr/>		<hr/>
15161		13965
500	Less Stock of "Notornis" written down	—
696	Loss on "Biology of Birds"	—
<hr/>		<hr/>
	Deficit for Year	312
	Transfer to Publications Reserve	1104
1196		<hr/>
		1416
<hr/>		<hr/>
\$13965	BALANCE 31/12/69 AS ABOVE	\$12549
<hr/>		<hr/>

AUDITORS' REPORT TO THE MEMBERS

For the Year Ended 31st December, 1969

We report, that in our opinion, the foregoing accounts of **The Ornithological Society of N.Z. (Inc.)** for the year ended 31st December, 1969, are in agreement with the books and reports of the Society and give a true and fair view of the Society's position at that date and the results of its transactions for the year. The Society has kept proper books and supplied all the information required.

THOMPSON & LANG, Chartered Accountants,
Auditors

Dunedin, 27th February, 1970

NOTES TO THE ACCOUNTS

Note 1: Life Members transfer 10% of Balance 1/1/69.

Note 2: Shares in Public Companies cost \$5280.60 and had an approximate market value of \$6583.66 as at 31/12/69.

SCHEDULE 1: LONG-TERM INVESTMENTS

SHARES IN PUBLIC COMPANIES AS AT 31st DECEMBER, 1969

Company	Shares Held	Cost of Purchase \$	Approximate Market Value at 31/12/69 \$
Andrews & Beaven	450	892.39	880.00
Farmers Trading Co.	500	1018.50	520.00
Forest Products Ltd. (68 only part paid)	548	1142.45	2246.80
General Foods (Convertible Notes)	168	84.00	168.00
Alex Harvey	168	486.41	735.32
Wilsons Portland Cement	500	1044.62	1375.00
J. Wattie Canneries	571	612.23	993.54
		\$5280.60	\$6918.66

SCHEDULE 2: SHORT-TERM INVESTMENTS

LOCAL BODY STOCKS AS AT 31st DECEMBER, 1969

Auckland Electric Power Board	....	\$400 due	1/4/70
Auckland Electric Power Board	....	600 due	15/2/71
Auckland Electric Power Board	....	400 due	15/10/75
Southland Hospital Board	....	990 due	1/11/74
Southland Harbour Board	....	953 due	30/6/72
Otago Harbour Board	....	966 due	1/9/71
Auckland Hospital Board	....	965 due	17/6/73
		\$5274	

TREASURER'S REPORT

For the Year Ended 31/12/69

PRESENTED AT THE ANNUAL GENERAL MEETING
OF THE O.S.N.Z., WELLINGTON, 16/5/70

For the year 1969 I have to report that our continued policy of a high standard journal and active investigation and recording schemes, operated on the basis of a \$2.00 basic subscription, has resulted in a nett deficit of \$312. Contributing to this deficit has been a disappointing response to the 1969 Christmas card, which resulted in the small profit of \$106 as compared to \$745 in 1968. Royalties also showed a decline. Running costs now amount to approximately \$3.60 (\$3602/1004) per member. Were it not for the invested accumulated fund (built up from past Christmas card profits royalties and a legacy) returning an interest of approximately 50c per member, the deficit for 1969 would have been in the order of \$800.

Subscriptions were last raised in 1962 to \$2.00 which then had a buying power of \$2.54 based on 1970 values (assuming 3% inflation per annum compounded over eight years). Running costs per member have exceeded the subscription rate per member ever since 1964, the deficit being met by the *interest* returned from investments, Christmas card profits and royalties. If subscriptions are not raised in 1971, and if Christmas card profits plus royalties again fail to cover the margin, it is probable that the *capital* of the invested fund will have to be eroded to meet ordinary expenses.

Some 160 copies of the publication "Biology of Birds" were sold during the year yielding \$212. Back numbers of "Notornis" continued to find a steady market especially overseas, and yielded \$346. Surplus tent flies from the Kermadec Expedition yielded \$50; the tents themselves are in the custody of the Treasurer.

Investment income returned just on \$500, but of this \$147 was reinvested in cash issues offered by public companies. The 1969 recovery of the share market is reflected in the market value of our shares being \$1638 above cost price as at 31/12/69.

With regard to the year's expenses I have to report a further 3% increase in printing "Notornis" over that for 1968, after allowing for the increase of 24 pages in Vol 16 (1969). This is additional to the 20% increase in 1968 over that for 1967. Additional illustrations further increased the cost some \$200 over that for 1968. Donations to the Royal Society totalled \$75 being \$25 to the Fleming Portrait Fund, and \$50 to the building appeal.

Membership for the year remained static. One hundred and two new members joined while 59 left the Society and a further 45 were struck off as being unfinancial. Total membership stands at 1004 (if husband/wife membership is counted as two members, and 'exchanges' and 'complimentaries' are excluded).

Again I have to thank the willing group of Dunedin folk (Jill Hamel, Bob Smith, Robin Gledhill, Peter Schweigman, and my wife Colleen) for their assistance at busy times. To our Auditor, Mr. J. Lang, goes my sincere appreciation for his continued goodwill and courtesy in handling the affairs of the Society.

— JAMES P. C. WATT,
Hon. Treasurer

REPORT OF THE NEST RECORD SCHEME

For the Year Ended April 30th, 1970

Throughout the year ending April 30th, 1970, 507 nest record cards have been received from 23 contributors. Observations were made for 44 species. The largest contribution by a junior member is that of Stephen Lawrence of Wanganui, who recorded 55 observations of nesting of 8 species. The most detailed observation of an individual nest was made by Michael O'Shea of Wanganui, who observed the nest of a Hedge Sparrow.

O.S.N.Z. members are reminded that nest record cards can be borrowed for information on breeding behaviour. We would be grateful if those availing themselves of this service could, where practicable, make available to the Society the results of their analyses, as the information would then be available to others on request. This does not apply, of course, to those whose results are published in *Notornis*, or elsewhere.

Five colonial cards covering mainly gulls, terns and shags have been included in this year's report.

The Blue Duck is recorded in the scheme for the first time this year.

Sincere thanks to those who contributed cards during the year and best wishes to those who are planning to participate in the Nest Record Scheme in the future.

LIST OF CONTRIBUTORS

Dr. I. G. Andrew, Mrs. B. Brown, T. R. Calvert, C. N. Challies, P. Child, B. Cowan (43), J. A. Cowie, A. T. Edgar (12), B. A. Ellis, I. G. Granville (23), H. F. Heinekamp, M. Hawes and R. Gray (37), D. Haddon (38), J. R. Jackson, E. B. Jones, S. B. Lawrence (55), M. O'Shea (13), R. Pierce, O. Toor, G. Welsh (22), B. Wilson, A. H. Whitaker.

A group study consisting of Stephen Lawrence, Ormond Toor, Ian Granville, Greg Welsh and Lawrence Edlin contributed 196 cards on the Black-backed Gull *Larus dominicanus* from the Kaitoke Colony, Wanganui.

— DAVID E. CROCKETT,
Nest Record Organiser

SPECIES LIST OF NEST RECORD CARDS

SPECIES	Previous Total	1969-70 New Total	SPECIES	Previous Total	1969-70 New Total	
North Island Kiwi	2	-	N.Z. Dotterel	53	5	58
Stewart Island Kiwi	3	-	Wrybill Plover	9	-	9
Great Spotted Kiwi	1	-	Pied Stilt	239	8	247
Yellow-eyed Penguin	11	-	Black Stilt	6	-	6
Little Blue Penguin	58	-	Southern Skua	2	-	2
White-flipped Penguin	12	-	Black-backed Gull	222	201	423
N.Z. Crested Penguin	2	-	Red-billed Gull	107	-	107
Southern Crested Grebe	2	-	Black-billed Gull	102	1	103
N.Z. Dabchick	1	-	Black-fronted Tern	208	-	208
Wandering Albatross	11	-	Caspian Tern	38	-	40
Light-mantled Sooty Albatross	4	-	Antarctic Tern	3	-	3
Fairy Prion	16	-	Fairy Tern	9	-	9
Flesh-footed Shearwater	1	-	White-fronted Tern	53	1	54
Sooty Shearwater	4	-	White Tern	1	-	1
Fluttering Shearwater	7	-	Grey Ternlet	5	-	5
Allied Shearwater	3	-	N.Z. Pigeon	28	1	29
Black Petrel	1	-	Rock Pigeon	64	-	64
Grev-faced Petrel	14	-	Kaka	9	-	9
Kermadec Petrel	1	-	Kea	52	2	54
Pycroft's Petrel	5	-	N.Z. Parakeet (Red-crowned)	7	-	7
White-faced Storm Petrel	5	-	Yellow-crowned Parakeet	3	1	4
Diving Petrel	51	-	Shining Cuckoo	4	-	4
Gannet	4	-	Morepork	10	-	10
Black Shag	63	1	Little Owl	14	-	14
Pied Shag	20	1	Kingfisher	65	-	65
Little Black Shag	1	-	South Island Rifleman	72	39	111
White-throated Shag	13	1	North Island Rifleman	5	-	5
King Shag	18	-	Rock Wren	11	-	11
Spotted Shag	5	-	Skylark	99	2	101
Blue Heron	31	-	Welcome Swallow	162	14	176
White-faced Heron	13	1	Fantail	142	-	142
Bittern	2	-	N.I. Fantail	21	15	36
Canada Goose	22	-	N.I. Tomtit	22	-	22
Domestic Goose (presumed escaped)	2	-	S.I. Tomtit	23	-	23
Mute Swan	9	-	N.I. Robin	8	-	8
Black Swan	47	2	S.I. Robin	15	-	15
Paradise Duck	7	-	N.I. Fernbird	7	4	11
Grey Teal	9	-	S.I. Fernbird	9	-	9
Brown Teal	2	-	Brown Creeper	4	-	4
Blue Duck	-	1	Whitehead	6	-	6
Grey Duck	84	2	Yellowhead	13	-	13
Grey Duck/Mallard Cross	2	-	Grey Warbler	85	6	91
Mallard	58	9	Song Thrush	1222	32	1254
Shoveller	12	-	Blackbird	1053	45	1098
Black Teal	6	-	Hedge Sparrow	146	1	147
Harrier	50	2	N.Z. Pipit	32	2	34
N.Z. Falcon	5	-	Bellbird	18	-	18
Pheasant	18	-	Tui	28	-	28
Brown Quail	4	-	White-eye	126	18	144
Californian Quail	18	-	Greenfinch	79	11	90
Chukor	1	-	Goldfinch	334	19	353
Banded Rail	4	-	Lesser Redpoll	61	1	62
Spotless Crane	2	3	Chaffinch	175	8	183
North Island Weka	8	-	Yellowhammer	33	2	35
South Island Weka	8	-	Cirl Bunting	1	-	1
Pukeko	106	7	House Sparrow	497	7	504
Australian Coot	4	7	Starling	211	10	221
South Island Pied Oystercatcher	103	4	Myna	21	1	22
North Island Pied Oystercatcher	30	-	White-backed Magpie	25	1	22
Black Oystercatcher	35	3	Maopie (Species not indicated)	6	-	6
Spur Winged Plover	32	-	North Island Saddleback	7	-	7
Banded Dotterel	165	-				
				7408	507	7915

RECORDING SCHEME**Report for 1969/70**

Files or extracts from files for 29 species have been sent out on request during the year (compare previous annual figures of 4, 3, 10 and 23). Much good information has come in but the number of contributors is slightly down on last year. My thanks to all who have sent notes. Many of those who have borrowed species files have stated that they found them very useful — the more contributions, the more useful the files will become. I ask for the co-operation of all R.R.'s in collecting and forwarding items of unpublished information and copies of all newsletters.

The following is a list of contributors:—

Southland — Mrs. Barlow.

Otago — P. Child, W. T. Poppelwell, R. Smith.

Canterbury — R. J. Pierce.

West Coast — P. Grant, C. R. Veitch.

Marlborough — R. M. Holdaway.

Nelson — F. Boyce.

Wellington — B. D. Bell, M. J. Imber, F. C. Kinsky, D. V. Merton, Wildlife.

Wairarapa —

Manawatu — I. G. Andrew, E. B. Jones, A. A. Savell.

Wanganui —

Taranaki — A. Fielding, D. Medway.

Hawkes Bay —

Gisborne — A. Blackburn.

Volcanic Plateau — R. Cowan, A. Cragg, R. W. Jackson, M. G. MacDonald, N. Hellyer.

Bay of Plenty —

Waikato — D. W. Hadden, J. Seddon.

South Auckland — H. R. McKenzie.

Auckland — G. Adams, T. R. Calvert, J. Jenkins, Mrs. Reed, R. B. Sibson, E. G. Turbott.

Northland — Mrs. Barron, D. E. Calvert, C. Clunie, B. Cooksey, C. W. Devonshire, Miss Madgwick, R. H. Michie, M. Munro, Mrs. Reynolds, G. Wightman.

Canada — Dr. J. B. Hardie.

E. & O. E.

— A. T. EDGAR, Recorder

**NOTICE****DONATIONS**

The Society gratefully acknowledges the following donations of one dollar or more received during the year ended 31/12/69. Some thirty members also contributed an extra dollar through their endowment subscription. E. St. Paul, \$2.05; Miss D. A. White, \$2.00; Miss B. McDougall, \$6.00; Roy Cooper, \$1.00; G. Wightman, \$1.00; J. A. Fagan, \$1.00; A. Todd, \$1.00.

LIBRARY REPORT

1st January to 31st December, 1969

The past year has been satisfactory and encouraging. The usual journals and some separates have come in and been catalogued, and borrowings are fairly constant, particularly by university students, many of whom are working on theses. The inter-loan system has still further increased, and it is noticeable that many of these go out to universities all over New Zealand.

Our thanks and appreciation should again be expressed to the Director of the Auckland War Memorial Museum and the Council for the continued housing of the library; also to Miss Evans, Museum Librarian, and her staff, for their friendly helpfulness.

— HETTY McKENZIE, Hon. Librarian

— ★ —

CARD COMMITTEE REPORT

The 1969 Christmas Card depicted the Spotted Shag by John Gould, published in "Birds of Australia." This was the fourth in the Society's historical series. Sales this year fell well below those of previous years and it is difficult to understand why this happened. Probably it was the result of several reasons. The Shag obviously was not a popular subject and some people even got confused because the illustration was taken from an Australian publication.

This year 19,500 cards were printed and 904 dozen were sold. This number included 45 dozen 1968, 15 dozen 1967, 25 dozen 1966 and 6 dozen mixed packages. The net profit for the year was \$100. The printing was rather patchy and the cards required sorting before dispatch, but the printer has agreed to credit the Society with those which were unacceptable. This is expected to be about 1,500 cards.

The painting for 1970 has not been selected as yet but it is hoped to illustrate a bush bird. It is also planned to sell previous years' cards which are still available and mixed packages. In this way it is hoped to reduce the backlog of cards on hand.

Once again, on behalf of the Society, I would like to thank the Turnbull Library, the Royal Forest and Bird Protection Society, and also my wife, who handled the packaging of the cards.

— B. D. BELL, Convenor

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SUMMER STUDY COURSE, FAR NORTH

In mid-January, 1971, a one-week Study Course will be held in the Far North, probably using Houhora as base camp for work around the Parengarenga inlet. Full details will be circulated with the September issue of *Notornis*.

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LIFE MEMBERSHIP

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Due to the adoption of new subscription rates, the Society's Council advises that acceptance of future applications for life membership may be deferred until after 1st January, 1971.

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Kermadecs Expedition, 1964, by A. T. Edgar. Reprints at 45c.

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and E. G. Turbott. \$4.50.

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