New Zealand Bird Notes

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MEASUREMENTS OF BIRDS.

(By L. Gurr, Department of Zoology, University of Otago.)

This paper on the measurements of birds has been written with the hope that it may stimulate the interest of the members of the society in this aspect of ornithology, the taxonomic import of which is obvious. Further, it is hoped that by the publication of this standard set of measurements, which must form the basis of any work of this type, whatever bird is studied, some degree of uniformity will be obtained in the measurements taken by the various workers in this field in New Zealand. Unless all workers use the same methods comparisons of measurements are useless and can only lead to erroneous conclusions being formed.

All methods given are those recommended by Baldwin, Oberholser and Worley, whose excellent book on this subject should be referred to by anyone requiring to take measurements of special structures or types

not dealt with in this paper. Space does not permit the inclusion of any more measurements than those which are the most frequently used.

The most essential instruments required are a pair of dividers and a ruler graduated to millimeters and fractions of millimeters. For beak and leg measurements, dividers should always be used; for those of wing and tail, dividers or ruler may be used according to individual preferences; total length and extent of wings are best measured with a ruler. If obtainable, a pair of sharp pointed calipers graduated to tenths of a millimeter, will be found to be a refinement and useful for measurements of the bill and smaller parts.

Structures that are too long to be measured with dividers or ruler, i.e., extent of wings, can easily be dealt with by marking off the points reached by the extremities of the structure on the floor or bench and measuring the distance between these points. Whenever dividers are used, care must be exercised to see that the point does not slip past the actual mark required.

In all measurements of feathers, except those of primaries and secondaries, the shaft if bent should be straightened and that measurement given.

To avoid missing out a measurement it is as well to measure the structures always in the same sequence, i.e., start at the head of the bird and work backwards—beak, wing, leg and tail, or follow the sequence in which you intend setting out your results. The most general sequence of stating measurements and that which is recommended for uniformity is:—(1) Total length (''length''); (2) extent of wings (''extent''); (3) length of closed wings (''wing''); (4) length of tail (''tail''); (5) length of exposed culmen (''exposed culmen''); (6) length of tarsus (''tarsus''); (7) length of middle toe (''middle toe''). Here feathered structures are given first, and ''soft parts'' next. For the sake of completeness the writer suggests that total culmen, width of bill at base, height of bill at base and length of middle claw be included where possible.

Should it be found necessary to deviate from the standard way of making any measurement the author should adequately state his methods, indeed it is advisable always to mention the methods used, even if they are those generally accepted. Too frequently, papers have been published on this subject without mention of the methods used to arrive at the results obtained, with consequent total loss of value for purposes of comparison with the results of other workers.

Finally, it cannot be stressed too much that the greater the number of individuals of a species measured, the greater the value of the work. The range and variation can be shown, and if the results are submitted to statistical analysis the significance of the results will be revealed. The results may then be used (1) for purposes of generic and even family characterisations to indicate the differences and similarities between such groups; (2) to show differences between species and between sub-species; and (3) to bring out the many kinds of variation within the limits of species and sub-species. Some measurements are suitable for all three of these purposes; others, by their nature, for only one.

The writer wishes to thank Professor B. J. Marples, of the University of Otago, for reading this paper in manuscript, and for helpful advice and criticism.

Reference.

Baldwin, S. Prentiss; Oberholser, Harry C., and Worley, Leonard G.: "Measurements of Birds." Scientific Publications of the Cleveland Museum of Natural History, vol. II., pp. i-ix; 1-165; figs 1-151, Oct., 1931. Cleveland, Ohio.

TOTAL LENGTH WITH FEATHERS.

Measured from the tip of the bill to the tip of the tail, the bird, thoroughly relaxed, lying flat on its back along a ruler, with the head bent dorsally so that the bill is approximately parallel with the ruler, and without stretching the neck beyond a natural position.

WING MEASUREMENTS.

Extent of Wings with Feathers.—The distance between the tips of the outstretched wings, measured from the farthest primary tip on one side to the farthest primary tip on the other, by laying the bird, thoroughly relaxed, flat on its back, and, by grasping each wing at the carpel joint, spreading the wings out along a ruler as far as possible without injuring the bird or flattening the wing quills.

Length of Closed Wings. (Fig. 6).—This is the wing measurement most commonly used, and is generally called "wing" or "length of wing" in descriptions of birds. It is preferably taken with dividers in a straight line from the farthest anterior point on the anterior edge of the wrist joint to the tip of the longest primary, without attempting to flatten out the curve of this feather; and it is therefore the chord of the closed (folded) wing. In taking this measurement, if the bird is held in the left hand dorsal surface up with the neck passing between the first and second fingers it is easy to place the nail of the index finger in the joint of the carpel flexure, and thus have a solid object to hold that point of the dividers against at the correct spot.

TAIL MEASUREMENTS.

Length of Tail.—Measured with dividers, one point being inserted between the two middle rectrices at the place where their bases emerge from the skin, and the other point of the dividers brought into contact with the tip of the longest tail feather where the tail is closed. If the longest feathers are bent, curved, or curled, they should be straightened for measuring. Note should be made if the tail-feathers show abrasion, since in such case the tips may be worn off and the length thereby considerably changed.

BEAK MEASUREMENTS.

Length of Exposed Culmen. (Fig. 1).—Measured from the point at which the feathers of the forehead in their natural position cease to hide the culmen (point B, fig. 1) in a straight line to the tip of the culmen (point A, fig. 1). This is, therefore, really the chord of the exposed culmen (the length of the straight line between point A and point B, fig. 1). This measurement is easy to take and has, besides, the advantage that its posterior point of departure is the same as that at which it is convenient to measure the height and width of the bill.

Length of Total Culmen. (Fig. 1).—Measured from that point where the integument of the forehead of the bird meets the horny covering of the bill (point C, fig. 1) in a straight line to the tip of the bill (point A, fig. 1), this is the chord of the total culmen. In birds with a cere the posterior limit for this measurement should be the point where the feathers begin, or the anterior end of the frontal bones of the skull on the forehead.

Height of Bill at Base. (Fig. 1).—Measured from the base of the exposed culmen (which is usually the highest point of the culmen) (point B, fig. 1) to the lower edge of the ramus of the mandible below, at the point that is antero-posteriorly opposite (point D, fig. 1) which would almost always be the nearest point.

Width of Bill at Base. (Fig. 2).—This measurement should be taken directly below the base of the exposed culmen, and is the shortest distance from the cutting edge (commissure) on the one side to the cutting edge on the opposite side.

LEG MEASUREMENTS.

Length of Tarsus (tarso-metatarsus). (Fig. 3).—The length of the "tarsus" is measured from the exact middle point of the joint between the tibia and the metatarsus **behind**, to the lower edge of the lowest undivided scute on the **front** of the junction of the metatarsus with the base of the middle toe, or to the middle of this articulation when such is discernible. This measurement is therefore the diagonal of the tarsus. Some workers prefer to measure the tarsus wholly on the **anterior** side, but care should be taken in determining the proper point for insertion of the dividers at the upper (anterior) end of the tarsus. However, whichever method is used it should be clearly stated in the text.

FOOT MEASUREMENTS.

Measurement of all toes and all claws are sometimes taken, but that of the middle toe is that most generally referred to. Care should be taken in **all** measurements of the toes to make sure that the toe is straight, as otherwise the results will be in error. It is often advisable to place the foot in a standing position on a flat surface to ensure the straightness of the toe whilst measuring. In all cases the measurement of the length of the claw is the chord of the claw.

Length of the Middle Toe. (Fig. 4.)—The length of the middle (third) toe is measured on its dorsal surface, with dividers, from its very base at the middle of the metatarsal joint, where it is discernible, otherwise from the lower edge of the lowest entire tarsal scute, to its distal and where its integument ends on the base of the claw, and exclusive of the claw.

Length of Middle Claw. (Fig. 5).—The length of the claw of the middle toe is measured from the point on its upper surface where the skin of the toe impinges on the base of the claw, in a straight line to the tip. This is, therefore, the chord of the claw.

Length of Middle Toe and Claw.—The middle toe together with the claw may be measured with dividers, from the base of the toe on its upper surface in a straight line to the tip of the claw. (Points of insertion for dividers same as those illustrated in figs. 4 and 5.)

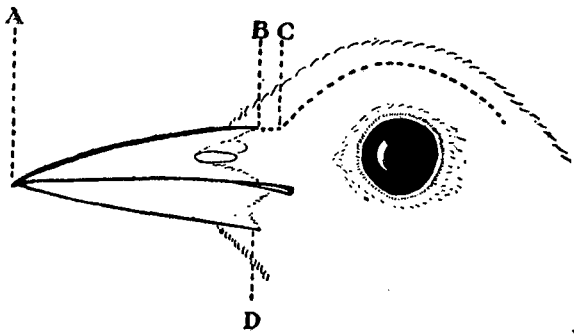


Fig 1

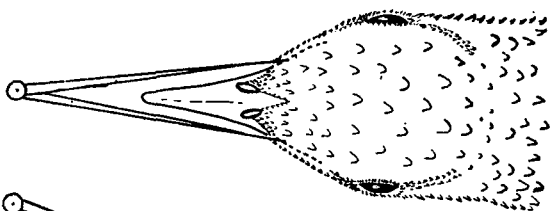


Fig 2

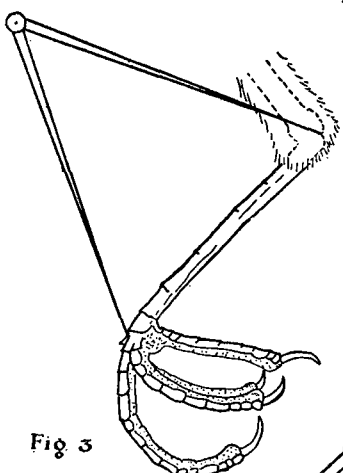


Fig 3

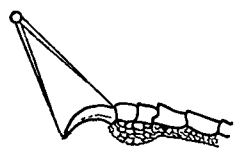


Fig. 5

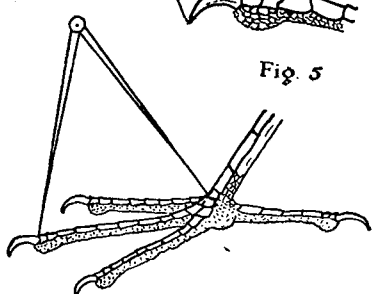


Fig 4

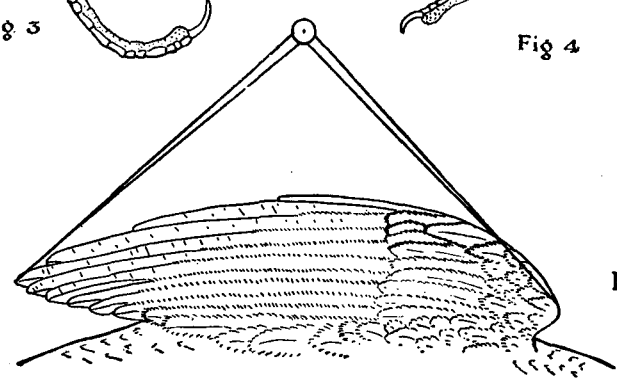


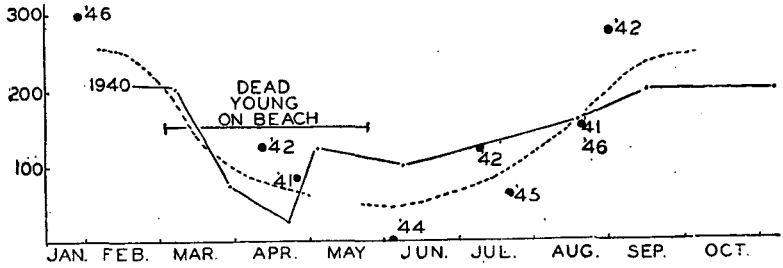
Fig 6

CONTRIBUTIONS TO THE GANNET CENSUS.

I.—OAIA GANNETRY, MURIWAI, FROM 1940 TO 1946.

By C. A. Fleming and R. B. Sibson.

The gannets (Moris serrator) nesting on Oaia, an islet within a mile of Muriwai Beach, can be observed with binoculars and telescope from the mainland. On about a dozen visits in 1940 we made rough counts of the gannets visible, and one of us (R.B.S.) has supplemented these with other counts made at various times since. Part of the surface of the islet is invisible from the beach, so the figures give a minimum population only, but yield interesting information on the occupation of the nesting site in winter. As all counts are approximate, they are not presented in detail, but are shown on the accompanying graph, in which the 1940 observations are linked with a continuous line. Other counts or estimates are shown as black circles and the monthly means are linked by a dotted line, broken in May where the single observation is probably above the mean.



The highest count in 1940 was about 200 birds (February and November) but later observations put the total at 250 to 300 on 1/9/42 and "about 150 pairs" on 27/1/46. We do not confidently assert an increase in the population, although more have been counted in later years. The number of visible nests is taken as 150 to 225, since sample counts in the height of the breeding season elsewhere show that about 25% of the birds present at a colony are mates of sitting birds.

The number of adults ashore on Oaia falls in March and rises again before September, but in the intervening months the numbers vary greatly. There are records of birds on the island in every winter month. On 4/6/44 none was present, but 100 were present on 9/6/40 in rough weather, this number decreasing later in the day when the weather improved. Dark young birds were abundant on 23/3/40, but none on 21/4/40. Dead fledglings have been found on the beach as late as May 24, but thereafter no immature birds have been seen either on the beach, on the islet, or at sea. Dead adults totalling 17 in 1940 alone, were noted on the beach in every month except January: one on 21/2/40 showed incipient moult. Up to 5 black shags (Phalacrocorax carbo) were ashore with the gannets in March, 1940, and up to about a dozen spotted shags (Stictocarbo p. punctatus) are sometimes visible.

In short, Oaia is occupied as a roost throughout the winter by some of the gannets that nest there, and there is no clue to the whereabouts of immature birds after May.

II.—GANNETS ASHORE AT THE MERCURY ISLANDS.

By P. C. Bull and C. A. Fleming.

During naval service in 1942, P.C.B. examined a stack off Huruhi Bay, Great Mercury Island on August 10. The stack is marked by a dotted circle near a 17-fathom sounding off the south-west coast of the Great Mercury Island on Admiralty Chart No. 2543. There were some signs of guano and Lieut. J. Holt, then commanding officer of H.M.N.Z.S. Humphrey, said he had seen gannets nesting there in pre-war days. This was confirmed by the son of the occupier of the Great Mercury. On October 2 a single gannet was resting on the stack, but during several periods spent in Huruhi Bay between the above dates none was seen ashore.

On October 20, C.A.F., accompanied a Whitianga fishing launch to the stack. This and another stack closer to the Great Mercury are locally known as "The Sisters," and the presence of gannets ashore at times was again confirmed by the fishermen. At 12.30 p.m. the stack was examined from the launch which cruised slowly round about 20 yards offshore. The rock is conical, about 2 chains in diameter, and supports a little taupata and much mesembryanthemum, some patches of which were dead. There were no gannets ashore, but considerable suggestion of their presence—white staining of the rocks and a noticeable smell. No nests were recognised, and since breeding was in full swing by this date at gannetries in Hauraki Gulf, the islet must be regarded as a roost only, at least in the 1946 season.

RECORDS WANTED.—Mr. D. L. Serventy is collecting records of Puffinus tenuirostris in New Zealand waters, and desires unpublished data concerning this species. Dates and numbers of birds found on beaches are required and also information as to the maturity of the specimens, distribution in N.Z. waters, age of corpses and weather conditions at time birds were washed ashore. Information may be sent direct or to Mr. J. M. Cunningham, 39 Renall Street, Masterton.

DISTRIBUTION OF MYNAS.—In response to the request for distributional data regarding the myna (Acridotheres tristis), 14 members sent in replies, some in considerable detail. The information is at present being collated, and, as evidence in some areas is rather scanty, further notes on the myna's presence or absence in certain districts are required before it will be practicable to publish a distribution map. It is emphasised that what might be common knowledge to some members may not be so to members living in other parts of New Zealand. Dates of first appearances are desired if available. Is the myna present or absent near the following places:—Southern Auckland suburbs, Papatoetoe, Waiuku, Tuakau, Raglan, Kawhia, Paeroa, Waihi, Katikati, Matamata, Tauranga, Opotoki, Awakino, Te Kuiti-Taumaranui Road, Ohakune, Stratford-Ohura Road, Opunake, Taihape, Hunterville, Shannon, Ashhurst, Woodville, Dannevirke, Ormondville, Weber, Herbertville, west of Hastings-Tutira, all localities between Wairoa and Gisborne, Tolaga Bay, Tokomaru Bay or north, Wellington, Marlborough.—J. M. Cunningham.

DESTRUCTION OF PRIONS BY STORM, AUGUST, 1946.

(WITH SPECIAL REFERENCE TO WELLINGTON PROVINCE.)

By K. A. Wodzicki, Department of Scientific and Industrial Research, Wellington, New Zealand.

INTRODUCTORY.

The following is an account of the broad-billed prion (Pachyptila vittata) and other birds cast ashore by August gales, 1946. A large amount of information on this subject has already been published by Turbott and Sibson (1946), dealing in particular with the Auckland Province.

Major R. A. Wilson, Bulls, was the first to see, on August 13, a prion flying inland on the "main road just by Rongotea siding, about half-way between Sanson and Himatangi." Having noticed large numbers of petrels cast ashore on Himatangi Beach, Major Wilson notified the Ornithological Society of New Zealand. The Hon. Secretary (Mr. J. M. Cunningham) acted immediately, approaching the Dominion Museum, Wellington, the Wanganui and New Plymouth Museums, as well as the leading newspapers and the National Broadcasting Service. A Press statement was made by Dr. W. R. B. Oliver, Director of the Dominion Museum, and an appeal for specimens and information was broadcast to the general public on August 22.

AUGUST WEATHER IN WELLINGTON PROVINCE.

Weather conditions are no doubt of paramount importance and to a very great degree responsible for any large scale destruction of petrels, as was the case in August, 1946. For this reason it seems fit to enlarge on the weather description of the Auckland Province given by Turbott and Sibson (1946), and to emphasise some of the features peculiar to the Wellington Province.

According to information supplied by the Meteorological Office, Wellington, there was a persistence of bad rather than a period of extreme weather conditions between August 3 and 14, 1946. According to the Notes of the New Zealand Meteorological Office (1946), "August was a windy month, with frequent rain in most districts.. The westerly type of weather which set in early during July continued with only two brief interruptions. The average atmospheric pressure for the month was unusually low. Hence, except in very protected eastern localities, conditions have been very changeable, with many intensive showers. . . . A feature of the weather of July and August was the unprecedented persistence of rainy days, these continuing without a break for over 30 days at many stations. (e.g., New Plymouth 38 days, Tangarakau, Taranaki, 43 days.) . . . . A weak, cold front affected the South Island early on the 12th, and this was soon followed by a pair of fronts connected with a very deep depression travelling south of New Zealand, and giving a record low barometer reading of 948 mb. at Campbell Island at 9 a.m. on 13th. Squally westerly to north-westerly gales were widespread. The weather being showery except in very sheltered localities. . . ."

It is interesting to note that mean temperatures for the month were in the main above normal (Ohakea 1.8 deg.F., and Kapiti Island 1.2deg.

F. above). For the first half of the month, the lowest midday temperatures were for Wanganui, 46deg. on both 3rd and 5th, and for Kelburn, Wellington, 48deg. on the 10th.

Still more interesting are the records of winds off the west coast, North Island, with regard to both coastal reports and gradient winds (which is approximately that prevailing at 3,000ft.) as indicated by the synoptic weather charts. From the 3rd to 13th August, winds over the whole region were persistently from between W.N.W. and S.W. From the 5th onward they were at least moderate in force and often strong. Continuous autographic records at Ohakea show a mean wind speed for the period 3rd to 14th August of 18.6 m.p.h. and on the calmest day of the period there was one gust reaching 33 m.p.h., and the 13th was the windiest day, with a peak gust of 71 m.p.h.

RECORD OF SPECIMENS.

As in the Auckland Province, the majority of the petrels storm-wrecked during the August gales (1946) were broad-billed prions (P. vittata).

The following is a list of specimens recorded, arranged geographically:—

NORTH ISLAND.

August 30, 1946.—"Three miles from the Heads on south side of Manukau Harbour, about 20 to the mile were found. Some, but not a great number, were also found inland in gullies. Also inland was a diving petrel, a mutton bird and a dove petrel, a giant nelly, . . and an albatross."—(B. S. Irwin, Irvin's Road, Awhitu Central.)

August 26, 1946.—"A broad-billed prion found alive but exhausted a few days previously."—(L. F. Hoppes, Te Puninga, R.D., Morrinsville.)

August 27, 1946.—"A bird apparently vittata, found dead on 15/8/46 after the storm of the previous night."—(A. T. Rowe, Te Ko, Taranaki; 30 miles inland.)

September 9, 1946.—"Seven P. vittata and two 'narrow-billed' birds recorded, all within 500 yards west of the mole at the river mouth; large quantities of driftwood on beach hampering accurate counts. None found on opposite side of river near the airport."—(W. P. Mead, 27 Cornfoot Street, Castlecliff, Wanganui.)

September 14, 1946.—"Two P. vittata: one found in a field behind Marton and another 20 miles inland in Taranaki. Reports received to the effect that 17 prions had been found in a mile stretch at Castlecliff."—(J. Moreland, Curator, Wanganui Museum.)

August 25, 1946.—"Himitangi Beach; in one mile 12 P. vittata and two Pelecanoides urinatrix. They had been dead for a considerable time. For many years I have known that for some reason the sea coast fronting Makerua and Tokomaru has been very destructive to bird life. It blows very hard in this area and on occasions the paddocks are just dotted with dead prions. It was there that mollymawks were found, and this is also where Australian spine-tailed swifts were found; apparently the hills seem to act as a funnel when a heavy westerly is blowing. They were more decomposed than the Morrinsville bird."—(T. Andrew, Wellington Acclimatisation Society Ranger, 52 Pascal Street, Palmerston North.)

August 26, 1946.—"Three vittata and one turtur were sent from Himitangi Beach by Major Wilson. They were all normal specimens of the New Zealand breeding forms of both species, and were in a starved condition."—(Dr. R. A. Falla, Christchurch.)

July 28, 1946 (presumably intended for August 28).—"Sixty-seven broad-billed and fairy prions were counted on a 2¾ miles stretch of beach between Hokio Stream and Waitarere township."—(C. H. Skuse, Hokio Beach School.)

The following inland records were supplied by Dr. W. R. B. Oliver, Wellington:—

TABLE I.

Date.	Located and Reported by	Distance from coast, miles.	Remarks.
7/8/46	Foxton, D. Y. Cole	12	Probably P. vittata
14/8/46	Sanson, T. M. Henson	8	P. vittata
14/8/46	Waitatapia, T. J. Wilson	3	P. vittata
14/8/46	Paraparaumu, K. Hoggard	2	Probably P. turtur
22/8/46	Tiakitahuna, P. Ampney	8	Probably P. vittata
22/8/46	Otaki Gorge, C. K. Arcus	10	P. vittata

As was mentioned above, three sectors of the beach between Plimmerton and Waikanae were inspected by parties of Wellington ornithologists with the following results:—

(i) A mile north of Te Rewa Rewa Point, between Plimmerton and Pukerua Bay, was inspected by Messrs. F. L. Newcombe and A. B. Dixon (on September 1, 1946). This piece of coast is directly exposed to the full force of westerly and north-westerly gales. The following species were recorded:—Pachyptila vittata, 16; Pachyptila turtur, 4; Puffinus griseus, 1; Puffinus gavia, 1; Phalacrocorax varius, 1; Larus novaehollandiae, 2; unidentified prions, 4; total, 29.

(ii) Dr. W. R.B . Oliver, on August 24th, 1946, searched six miles of the beach from the Waikanae River estuary to Paekakariki. The results of his inspection are given in Table II.

TABLE II.

Sector of Beach	Distance in miles	Pachyptila vittata.	Pachyptila belcheri.	Pachyptila turtur	Pelecanoides urinatrix	Eudyptula minor	No. of birds per mile of beach
Waikanae to Paraparaumu	1	29	1	5	—	—	35
South of Paraparaumu . . .	1	7	—	—	—	—	7
Beach for 2 miles south . .	2	—	—	—	—	—	—
North of Paekakariki . . .	2	17	—	1	2	1	21
Total . . .	6	53	1	6	2	1	63

(iii) The writer investigated a sector of the Waikanae Beach on August 21. 1946, and the results of this inspection are given in Table III.:

TABLE III.

Sector of Beach	Distance in miles	Pachyptila vittata.	Pachyptila turtur.	Pachyptila unidentfd.	Eudyptula minor	No. of birds per mile of beach
From River Mouth to base of spit	1	11	1	—	—	12
North of above—						
First mile	1	31	2	—	—	33
Second mile	1	9	—	1	—	10
Third mile	1	16	1	2	1	20
TOTAL . . .	4	67	4	3	1	

SOUTH ISLAND.

From August 23 to 29, 1946.—Mr. Charles Fleming inspected several beaches between Port Elizabeth and St. Kilda, and also a mile of beach south of Greymouth mole, not a single bird being found.

A fresh P. vittata specimen was picked up on August 25, 1946, on Carter's Beach, Westport, and sent to the Canterbury Museum. Dr. R. A. Falla informs me that it was a mature bird, possibly three years old, in a very fat condition; it seems unlikely that this bird was cast ashore by the August gales which destroyed so many petrels in the North.

This seems to confirm the theory that very few, if any, birds are cast ashore on the West Coast of the South Island during occurrences of this nature.

OTHER BIRDS.

Other species were cast ashore in relatively small numbers:—Slender-billed prion (P. belcheri): one on August 24, fresh, Paraparaumu Beach. Fairy prion (P. turtur): the record of specimens cast ashore in different localities of the Wellington Province has been given above. We find also (Tables I.—III.) that for 172 P. vittata specimens there were only 16 P. turtur (i.e., approximately 9% of the number of vittata). This is in full agreement with the figures given by Sibson and Turbott for the Auckland Province. Table IV. places on record some data on P. turtur collected at Waikanae on August 21.

TABLE IV.

No.	Weight (grammes)	Culmen (millimetres) Length	Width	Remarks
1.	96.0	23	11	Fresh
2.	141.5	20.6	10.8	Fresh, female
3.	98.0	21.6	10.6	
4.	87.0	20.6	10.5	

The bill measurements fall within the measurements of P. turtur from New Zealand grounds. (Falla, 1940.)

Other sea birds found dead since the gale began are:—Little Blue penguin (Eudyptula minor), mutton bird (Puffinus griseus), fluttering shearwater (P. gavia), pied shag (Phalacrocorax varius), and red-billed gull (Larus novaehollandiae). All these species, like the fairy prion, were found in small numbers and seem to represent a cross section of the winter coastal population of birds along the southern part of the west coast of the North Island.

DISCUSSION.

As stated before, the aim of the present paper is to give a picture of the effects of the August, 1946, storm on birds (in the southern part of the North Island). This may contribute to a better knowledge of "their winter feeding range, of which so little is accurately known." (Falla, 1940.) It is hoped that a full account of this occurrence compared with those of 1918 and 1932, will be ultimately compiled and a comparison with overseas records, especially Australian, made. Such an account may also show to what extent weather conditions and other factors are possibly responsible for taking, at times, such a heavy toll of the prion population.

Before concluding this report I would like to present and discuss some conclusions arising from an examination of prions collected mainly on Waikanae Beach. These facts may throw some light on both the systematics and the physiological state in which the birds died.

The range of variation of different body measurements of a sample of birds collected mainly on Paraparaumu Beach is presented in Table V. These body measurements fall within the dimensions of P. vittata from New Zealand breeding grounds:—

TABLE V.—Measurements in Millimetres.

Date Aug. 1946	Locality	Length	Wing	Tail	Tarsus	Toe	Culmen Length	Culmen Width	Collected by
24	Beach be-	330	211	98	36	42	37.5	22.2	W. R. B. Oliver
24	tween Wai-	340	216	103	34	36	36.5	20.4	,,
24	kanae and	335	215	108	32	37	31.5	21	,,
24	River mouth	330	206	100	35	39	34.2	19.5	,,
24	and	320	200	97	33	37	34.2	21.4	,,
24	Parapara-	325	217	104	35	38	35.8	21.4	,,
24	umu	330	207	97	33	38	37	21.4	,,
26	Morrinsville		214	111	35	45	35	21	L. F. Hoppes
	Foxton Bch	330	210		40		32	21	F. H. Robertson
	Averages	330	210.66	102.25	34.77	39			

Table VI. supplies us with some information on the more significant dimensional differences in the bills of the broad-billed prion. The majority of these birds were collected on Waikanae Beach. (See also Table III.) It presents an interesting example of a rather extensive range of variation which seems to be much more pronounced in males than in females:—

TABLE VI.

Bill Measurements (in millimetres) of P. Vittata.

	CULMEN.							
	LENGTH				WIDTH			
No. of Birds.	Longest.	Shortest.	Mean.	Standard Deviation	Widest.	Narrowest.	Mean.	Standard Deviation
72 sexed and unidentfd	38	31.5	34.595	*‡1.532	23.8	19	21.256	*‡0.935
16 male	36.6	32	34.544	*‡1.352	23.8	20.2	21.681	*‡0.906
15 female	36.5	32.5	34.393	*‡0.923	22.5	19.5	20.866	*‡0.841

*‡ Indicates plus minus.

Forty-five birds (including all those sexed) were collected at Waikanae Beach on August 21st, 1946, by K.A.W.

The specimens of P. vittata collected on Waikanae Beach afforded an opportunity of considering the weight of a number of emaciated birds and also the stage of their gonads. Forty-five birds were examined, of which thirteen could not be sexed and sixteen each were males and females. The standard deviation of all 45 birds was 154.52gms., plus minus 16.85, while the average weight of unsexed birds was 160.73gms., that of a male 148.03gms., and that of a female 155.96gms..

According to Falla (1940) throughout the whole "known breeding range the annual laying date is early in the month of September." Measurements (the greatest length of testes and the diameter of the largest follicle) have been taken in 15 males and 13 females.

The average greatest length of the testis was as follows:—3mms., 1 bird; 4 and 5 mms., 3 birds each; 6 and 8 mms., 1 bird each; 9 mms., 5 birds; 10 and 11 mms., 1 bird each. Eight females had very small ovaries, in four the diameter of the largest follicle was 3 mms., and in one bird, 4 mms.

Little is known about the seasonal increase in size of the gonads of P. vittata in the pre-laying period. It seems, however, likely that the birds from the Wellington Province compared with those from Auckland

were in a less advanced breeding condition, or alternatively, most of the birds cast ashore were sexually immature.

I wish to record the kind assistance of the Meteorological Office, Wellington, and especially Dr. C. J. Seelye, for providing and discussing the meteorological data, and of Miss Nancy Cooper, B.Sc., for compiling the statistical part, and last, but not least, my thanks are due to all who have contributed to this paper by providing valuable information and material.

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NOTES ON THE BIRDS OF MOKOHINAU.

By Major G. A. Buddle, Auckland.

The following birds were observed during a visit to the Mokohinau group, extending from November 23 to 28, 1945. Burgess Island, on which the lighthouse stands, is the largest; to the west of Burgess Island lie two other smaller ones and a number of rocky islets. Fanal Island, which lies about three miles to the south, was not visited. All these islands are covered with a very stunted vegetation consisting chiefly of pohutukawa, ngaio, veronica, flax, tussock, etc.

Red-fronted parakeet (Cyanorhamphus novaeseelandiae)—Not plentiful; seen mostly along the cliff faces.

Tui (Prosthemadera novaeseelandiae).—Three were seen on West Island, probably temporary visitors from Little Barrier or Hen Island; they were seen only on one occasion, and the resident caretaker said he had not seen tuis there before.

Pipit (Anthus novaezealandiae).—Fairly well distributed on all the islands.

Harrier (Circus approximans).—Two pairs frequented a red-billed gull colony and kept a perpetual state of alarm among the gulls as they passed to and fro.

Starling (Sturnus vulgaris).—In fair numbers.

Blue penguin (Eudyptula minor).—A nest with two chicks in dark brown down was placed behind an oil drum in a shed on the beach; several burrows were seen on the western islands.

White-fronted tern (Sterna striata).—About six pairs were nesting on the cliffs below one of the red-billed gull groups.

Red-billed gull (Larus novae-hollandiae).—A large colony estimated at 18-20,000 (including unemployed birds). This figure is considerably larger than Fleming's preliminary census of 1944. (See separate article

in this issue.) No young were seen on November 23, but two were seen on November 24, and many hatched out on succeeding days.

Black-backed gull (Larus dominicanus).—Several were seen, but did not appear to be nesting on the islands.

Pied shag (Phalacrocorax varius).—No nesting colony was seen, but odd birds were occasionally seen.

Gannet (Moris serrator).—Frequently seen fishing round the coast and off shore, probably members of the Great Barrier colony (or from an unconfirmed gannetry reported to have been formed recently on Groper Rock about three miles to the west).

White-faced storm petrel (Pelagodroma marina).—A fairly large colony estimated at about 500 pairs on Lizard Island, a small islet near the landing on Burgess Island. Most burrows were occupied by birds sitting on well incubated eggs. The islet is covered with a vegetation of mesembryanthemum, sedge, rushes and a few stunted ngaio. The burrows were mostly in the mesembryanthemum area.

Fluttering shearwater (Puffinus gavia).—A few larger burrows among the storm petrel burrows were those of either P. gavia or P. assimilis: one belated young of P. gavia was still in one of the burrows; these larger burrows were chiefly among the roots of the ngaio or under the sedge. A few similar burrows were found on the cliff edge of the Western Island, unoccupied, but, by the appearance of old feathers, probably P. assimilis. On August 6, 1946, P. assimilis were occupying most of these burrows, sitting on well incubated eggs.

Grey-faced petrel (Pterodroma macroptera).—This is the chief petrel inhabitant of the group, being well distributed over all the islands, particularly West Island and the two small islets between Burgess and West Islands. The young were still in down, but with feathers showing. This species is the local "mutton bird," and the caretaker of the island wrote to me to say that a party of about a dozen Maoris from Callione Bay on the Great Barrier, arrived at the beginning of December and in ten days had taken 3500 mutton birds (including those taken from Fanal Island, the largest of the group).

Stray Visitors.—The caretaker in the course of conversation mentioned a number of passing visitors, passerines and waders, but details were too vague for record purposes, except that one was most probably a curlew or whimbrel. However, one bird he described as a large black crow, something like a rook, which he saw on two consecutive days (Oct. 3 and 4). I happened to be on the Little Barrier (about 13 miles to the south) at this time. What was almost certainly the same bird appeared there on October 5 and stayed two days, being last seen heading for the mainland in the direction of Leigh. It was definitely not a rook; its call being very like that of a raven; so presume it likely to have been one of the Australian crows.

DESTRUCTION OF ROOKS (Corvus frugilegus).—During an organised campaign of destruction of Canterbury rooks, about 5000 birds, representing half the breeding population, were killed by shooting and poisoning in the 12-month period up to 31/8/46.—Dr. R. A. Falla, Chch.

BREEDING OF THE RED-BILLED GULL.

By Major G. A. Buddle, Auckland.

Referring to C. A. Fleming's preliminary census of the Mokohinau colony of red-billed gulls (Larus novaehollandiae) in 1944 (vide N.Z. Bird Notes, vol. 2, p. 27) in company with Major R. A. Wilson I spent six days at Mokohinau during the 1945 breeding season (Nov. 21st to 27th) and have the following observations to make:

RED-BILLED GULL IN FLIGHT.
Photo G. A. Buddle.
By courtesy of "Weekly Press."

Group I.—Still the largest individual group and also the earliest to lay. About 15% of the nests had young, and I should judge that the earliest had hatched out about November 16 or 17. About 90% of the nests contained two eggs (or young); 1/2% had three eggs and the remainder 1 egg. Wastage had already started at this early stage, as a number of dead chicks were seen. There was a greater concentration of nests per square yard in this group than in any of the others, and my estimate was about 1500 nests.

Group II.—No comment.

Group III.—No comment.

Group IV. — Approximately 150 nests; no young hatched. Several white-fronted terns (Sterna striata) nesting on the edge of this colony.

Group V.—Had moved nearer to Group X and almost joined up with it. The first young of this group hatched 23/11/45; about 600 nests.

Group VI.—About 100 nests.

Groups VII. and IX.—Were continuous and almost joined up with VIII. which had increased considerably in size. No count was made of nests in these areas, but on the basis of concentration of nests per square yard in other areas, the nests would number in the vicinity of 4000.

Group XI.—A small colony not mentioned by Fleming, on outlying rocks east of the landing and opposite Group IV; about 75 nests (one of which contained four eggs, probably two eggs of two females, as one pair of eggs was of different shape from the other).

The above figures give a breeding population of about 13,000 birds; somewhat higher than Fleming's count.

No immature birds were seen in the area. I visited Mokohinau in November, 1936, and although, owing to bad weather, the visit was brief, I noticed that Colony IV. at that time was very much larger and a

continuous colony occupied the cliff top from the landing place westward and northward to and possibly beyond the two indentations shown on Fleming's map half way up the west coast of the island. No count was possible, but the area occupied was about the equivalent of that now occupied on the north coast, of the island.

I visited the island again on August 6, 1946; no red-billed gulls were seen in the vicinity.

Oliver ("N.Z. Birds," p. 268) states that the habit of nesting at the same place every second year only has been observed at Mokohinau; on this occasion the statement does not hold good.

STOAT WITH STARLING (Sturnus vulgaris).—At the Okoia deviation, 15/4/46, a large "stoat" (or other mustellid) was surprised carrying in its mouth an adult starling which it dropped. The starling was still moving but died almost immediately. At the time large flocks of starlings were feeding on the rushy flats of the Matarawa nearby, and the "stoat" had presumably caught one on the ground.—C. A. Fleming, Wellington.

YEAR'S RECORD OF SONG OF HEDGE SPARROW (Prunella modularis) from garden, 30 Stonelaw Tce., Dunedin: Last record summer song, Jan. 17, 1945. Though an occasional song was heard at Purakanui on April 1, the next recorded song from the garden was on May 3. Wing-flicking noted May 6. From May 16 occasional songs were heard almost daily. In July there was a slight increase in song, and by the beginning of August the birds seemed to have reached the peak of their singing, a slight decrease being noticed at the end of the month. During August much wing-flicking and chasing was recorded. In October there was a marked decrease in song, and the last song recorded for the season was January 6. On December 9 two phrases of song were heard at 9.40 at night.—Mrs. I. Tily, Dunedin.

NEST SITE COMPETITION BETWEEN STARLING (Sturnus vulgaris) and SPARROW (Passer domesticus).—On April 29, 1945, the entrance to a garden nesting box was made too small for starlings to enter. They continued to visit the box, and as far as my observation went, tried vainly to enter it. On June 7th, house sparrows which had previously been driven out by the starlings, took a returning interest in the boxes, but starlings repeatedly drove them away. On July 12 a female sparrow carried straw to the lower flat, and a male to the top one. Then began a contest between two very determined types of birds, and through August, September and October the sparrows carried material into the box and the starlings thrust in their heads and took out the material. The contest continued, but with less zest, through November and December and no sparrow succeeded in building a nest and lay. Often a sparrow would attack a starling, usually when it had its head in the entrance hole, or a starling would attack a sparrow. A male blackbird (Turdus merula) sometimes perched near and watched events with keen interest. On March 21 the starling had resumed the task of taking out straw, and in April the sparrows and starlings had returned to their old disputes at the nesting box, which was cleaned out and washed on April 16.—Mrs. I. Tily, Dunedin.

UNUSUAL NEST-SITE OF A RED-BILLED GULL COLONY.

By W. J. Phillipps and C. J. Lindsay.

In 1944, during a visit to Rotorua, it was reported to one of us (W.J.P.) that in the spring of 1943, terns were laying their eggs on two small islands in a warm thermal pool behind the bathhouse at Whaka-

rewarewa. This report was supplied by Mr. D. T. Alexander, headmaster of the Whakarewarewa School, whose attention had been drawn to this occurrence by the fact that a schoolboy had shown him several of the eggs which he had secured by swimming to the islands. These eggs had been lost. It seems that many people knew of the eggs, the general belief being that the birds left them there to be hatched by the

thermal heat in the ground. However, in 1944, certain subterranean changes took place, the result being that the pool in question more or less dried up; and Mr. Alexander received a report that the birds had transferred their breeding-place to Waiotapu.

In September of 1946 we were able to visit the district and found time to inquire further into the remarkable story concerning the habits of these birds. We visited Waiotapu, where we were met by Mr. W. H. Walker, who has charge of the thermal area open to visitors in that locality. Mr. Walker produced a photograph of the birds nesting in 1944 in the immediate vicinity of the hot-water pools. From this photograph and his description, it was possible to identify the species as the red-billed gull (*Larus novaehollandiae*). Mr. Walker informed us that he had done everything in his power to prevent visitors from disturbing the nesting birds, and had fed both adults and young in the hope that they would return the following year; but the birds had not appeared since the above-mentioned date.

At Waiotapu we were conducted by Mr. Walker past various types of thermal activity to a slight ridge bordering the lower end of a hot-water pool some acres in extent. This was the breeding-ridge of the red-billed gulls, actually a small area about thirty feet by twelve feet. The ground was slightly warm to the touch; and this must have been of material assistance in the incubation of the eggs. Evidence of thirty-two nests was plainly visible. Doubtless many others had been destroyed in the passage of time. One nest was only three feet away from a steaming sulphur-encrusted fumarole; others were at varying distances from a few feet upwards from similar fumaroles. Mr. Walker estimated that 150 birds were breeding here in 1944; and he watched the parent birds leading their chicks around the edge of the large hot-water pool to a cold-water pool several hundreds yards distant. Here, by pecking and poking, the adults taught their young to enter the water and swim.

We were fortunate in being able to secure a series of photographs of the nesting ridge, and we are indebted to Miss S. S. Baker for the accompanying line drawing. As these birds are said to occupy nesting-sites on alternate years, it is possible that they will return to Waiotapu at a later date. No birds have arrived to breed on this site in the 1945-46 season. Further investigations of more remote thermal areas also are desirable. Normally, the red-billed gull nests on an unfrequented rocky coast or on islands offshore, not infrequently in large numbers. What caused a small colony to take up a nesting-site miles inland, especially in a thermal area, is difficult to explain.

BLACK SHAG WITH EEL.—On 6/11/46 when driving over a bridge crossing a large drain on the Okuku Road, north-west from Shannon, I noticed a wild splashing in the water. I found that a black shag (*Phalacrocorax carbo*) had captured a large eel. The shag had the eel gripped below the head and the eel had coiled itself round the bird's neck. Unfortunately my arrival startled the bird which opened its beak and the eel promptly slid into the water. The shag, which had been beating the water with its wings (possibly trying to lift its heavy capture) flew up and made off.—A. A. Savill, Levin.

PUZZLING DOTTERELS AT RUAKAKA, N. AUCKLAND.

By H. R. McKenzie, Clevedon.

A few miles south of Whangarei Harbour, Ruakaka is a typical east coast estuary of North Auckland. On 13 and 14/2/46, two strange dotterels were seen across the river and on a second visit on the 14th they were feeding on the outer sandbank. On three occasions they were watched with glasses at a few yards.

In general appearance, carriage and stance they were like the red-breasted dotterel (Pluviorhynchus obscurus) but smaller, though a little larger and more solid than the banded dotterel (Charadrius bicinctus). Careful notes were made of their colour; back, brown as in banded dotterel; head darker than in either banded or red-breasted dotterel; light band on the throat and a dark shoulder to shoulder band, very definite; a dark grey wash extended downwards from the band to the lower breast, not broken, but just a little lighter below the upper band; no definite eye stripe. One bird was a little more coloured than the other. The whole appearance gave the impression of new colouring, not fading colour as in two banded dotterels seen above the bridge. No distinctive leg-colour was noted, but the legs were not bowed outwards at the upper joint as in a banded dotterel. There was nothing unusual about the bill, which was short and stout. The body was rounded, not flattened like a banded dotterel's. The manner of feeding was as described for Charadrius mongolus in The Emu, January, 1945; vol xliv, p.209. Generally they were more erect than banded dotterels.

On the first two visits they were in the midst of a loose flock of red-breasted dotterels, resting at high-tide. They kept fairly close together but not closer to each other than they were to the red-breasted dotterels. On the third visit they were feeding some yards apart from each other and about the same distance from the red-breasted dotterels. On visits on February 15, 16, 21 and 22 they were missing.

No banded dotterels were at any time seen with or near the red-breasted dotterels. On the sand-flat above the footbridge two banded dotterels in typical fading plumage were seen at low tide on February 14, 15 and 16.

The two puzzling birds seen on February 13 and 14 were certainly not Charadrius bicinctus. The question is whether they were Charadrius mongolus, a bird not hitherto recorded for New Zealand, although it occurs annually in some numbers in south-east Australia; and another closely-related Asiatic dotterel, the large-billed Charadius leschenaulti, has twice been reported in recent years from Manukau Harbour. (v. The Emu, Jan. 1946, p 223, and July, 1946, p 76).

(Mr. McKenzie's observations draw attention to the possibilities of additional species of the wader family being recorded from New Zealand and members interested in these birds are urged to closely examine any shore birds seen by them and to take down on the spot as complete a description of the birds as possible.—Ed.)

LATE NESTING OF SKYLARK (Alauda arvensis).—Berwick, Otago, 2/1/46, nest with four young hatched that day. Purakanui, Otago, 18/1/46, nest, 3 eggs.—Mrs. I. Tily, Dunedin.

ROOSTING HABITS OF STARLINGS.

By H. Secker, Wellington.

The roosting habits of Sturnus vulgaris studied at Karori, Wellington, in the winter of 1946, show that behaviour is similar to that noticed by English observers. Observations of an hour's duration were discontinued in September.

Birds were watched on July 20 as they assembled in trees scattered about built-up areas where they sang until 1655, when all departed in an easterly direction. On July 28 there were two crescendos of song at 1640 and 1650 and a gradual decline till 1700; after 1650, restlessness was evident. A group of six birds when quitting this area at 1700 headed for open country, scattering widely until some emotion made them bunch again and turn east; smaller flocks left at 1705 and 1710; this tendency to lag is because some individuals are more advanced sexually —but would this explain their behaviour in June when birds a few hundred yards from a main roost are seen singly from 1700 to 1715?

Roosts were possible at Karori Park. On August 3, between 1645 and 1730, a single bird left the plantation at 1700 but wavered over a cypress clump three hundred meters distant and alighted on it. Other groups of three to nine birds left between 1715 and 1722, though at 1724 many remained singing. At 1725 and 1726 two more small groups disappeared; a few birds were left sitting on the leading shoots of the pine trees and no more departed.

There was a tendency to follow the contours of hills on the south side of the Karori Valley, one pair veered down the Karori Stream until they approached the crest of the ridge, when they turned eastward. This was probably an urge towards a breeding area, for sexual chases were seen after 1700 in the plantation.

The effect of declining light was illustrated on August 24; two birds set out at the same time, one with purposeful flight but the second appeared surreptitiously, made a brief sally and glided back to the trees; it took off again in an easterly direction but returned three times without perching and uttering a call "Tchirck, tchirck" until the urge to reach the main roost was predominant. This behaviour was caused by the breeding urge and fading light after the sun had left nearby hills.

Birds forage as far afield as the Makara Valley, but the writer is uncertain of their roosting areas; one gathering exists behind Victoria University College, and Karori birds probably go there.

Perhaps available nesting areas are selected early by the more sexually advanced birds; if nesting sites for this species were limited an explanation is possible for large numbers feeding in open country during December; alternatively these birds have finished breeding or attempting to breed. "N.Z. Bird Notes," Vol. 1, May, 1946, mentions activities of this sort in March and May and June. By early January large parties inhabit pasture.

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A CUCKOO IN THE NEST.

By Mrs. A. S. Wilkinson, Levin.

Only once during our 18 years' stay on Kapiti Island did we have the chance to photograph a young long-tailed cuckoo (Eudynamis taitensis) in the nest of a whitehead (Mohoua albicilla). Other whitehead's nests were found in plenty, but any that might have held a cuckoo's egg were either far too high or in otherwise unsuitable positions for photography.

Once an egg of a long-tailed cuckoo was taken from an awkwardly placed nest and introduced into a more easily accessible one, but the whitehead would have none of it and it was promptly ejected, to be shattered in a thousand pieces on the ground below, to our great annoyance. So there was general excitement when at last a whitehead's nest was located by our daughter (Mrs. R. H. D. Stidolph) in a small-leafed coprosma, about six feet from the ground. In the nest was a young long-tailed cuckoo which we judged to be then about a week old. This was on January 16, 1936.

The next few days after this interesting discovery were very cold, with wind and rain, but on the 20th it cleared up and no time was lost by my husband in building a stage so that the camera would be on a slightly higher level than the nest. A photograph was taken that day of the young cuckoo which by now was a well-feathered fine-looking bird, but the whiteheads resented the presence of the camera, and myself, and it was not until the 24th that the first picture of the male bird feeding its foster chick was taken, and then only after a wait of three hours.

I was very disappointed by the suspicious behaviour of this pair of whiteheads. At other nests I had found them very trustful, taking little or no notice of the camera.. Of course birds do vary in temperament, and it was just bad luck for me that this particular pair should be so cautious. Back and forth, and in and out they would go through the bushes in a most tantalising manner, each carrying a mouthful of insects, sometimes sneaking furtively up behind the nest and trying to feed the eager youngster through a tangled barrier of leafy twigs.

As the chick grew bigger and stronger it would endeavour to scramble out of the nest to receive its meal, and in this way I was repeatedly cheated of what might have been a very good picture. When the whiteheads did pluck up enough courage to venture round to the front of the nest they were in such a hurry to feed and be gone that I had to be very much on the alert and ready to snap on the instant. Plunging its head far into the gaping mouth one would think required a lot of courage on the part of the whitehead and the cuckoo would often make a snap after the departing bird as though it would swallow it. It certainly looked a formidable and bad tempered youngster and would snap at passing flies and at my fingers if I ventured to touch it, giving at the same time a harsh squeak. But it really did have some excuse for its peevishness when it could see and hear its foster parents hovering so near and failing to deliver the goods.

The hours I spent waiting at the nest were full of interest and from where I stood at the foot of the scaffold that held the camera, I was partly

hidden from view and sheltered from the sun, but could watch all the manoeuvres of the whiteheads trying to dodge coming directly in front of the lens, and listen to the various calls the young cuckoo used to encourage them to hurry up and attend to its wants. When it could hear them approaching, though still some distance away, it would sit up alertly listening and call eagerly, "cheep, cheep"—notes which closely resemble the whitehead's own, but when the birds were very near it would give a note resembling the winding up of a watch spring, very similar to that used by the young whitehead—"whir-r-r-r-r." This use of notes so like those of the whitehead, is, I think, one of the many strange and mysterious things about the cuckoo. It may be that having the ability to so mimic the whiteheads (though more probably the notes come naturally) the little cuckoo makes a stronger appeal to its foster parents and urges them to greater efforts to supply the needs of the ever hungry babe that has been so unjustly thrust upon them—and at the cost of their own rightful brood. If they had only behaved more naturally and not been so camera-shy I would have learnt more about their ways of bringing up their huge foster chick.

Photo. Mrs. A. S. Wilkinson.

WHITEHEAD ABOUT TO FEED YOUNG LONG-TAILED CUCKOO, KAPITI ISLAND.

By the 27th, the young cuckoo was getting very restless and impatient, and next day it was scrambling off the nest and seemed quite ready to leave. On the 29th it could only be induced to stay in the nest, which by this time was flattened out of shape—by packing twigs round it and this was the last day on which I attempted to photograph it. On the 31st it was out of the nest but sitting in the same little coprosma

that had sheltered it for probably three weeks, and from there the cuckoo must have flown some distance away, for I never saw it again.

SUPPLEMENTARY NOTES.

By R. H. D. Stidolph, Masterton.

It was my good fortune to be on holiday at Kapiti Island when the above nest was found and before Mrs. Wilkinson took her photographs several days later, I made a few random observations of the feeding and brooding of the young cuckoo.

When the nest was found (January 16) the young cuckoo filled it completely and rested with its head over its shoulder.. Its rat-like eye, enormous orange-coloured gape and hawk-like bill were conspicuous features of its make-up.

The adult whiteheads approached the nest very quietly and without haste and fed the youngster without making a sound, but immediately the bird was fed one adult bird sang and twittered before departing.

On January 17 the weather was very windy after heavy rain. I arrived at the nest late in the afternoon. At 4.13 p.m. the cuckoo was fed by one whitehead, which slipped quietly on the nest and brooded the youngster for 25 minutes when the other adult arrived and fed the chick. Both whiteheads then left and returned 12 minutes later, at 4.50 p.m., when one bird fed the cuckoo, sat on it for a minute and then left when the other adult arrived to feed the youngster. A cicada was seen amongst the food fed to the cuckoo.

The next day, January 18, the cuckoo, during a short period I spent at the nest, was fed by one adult at intervals of five minutes (three periods) and after a lapse of ten minutes it was fed by both adults which arrived at the nest together. A caterpillar was noticed among the food fed to the cuckoo. Unfortunately I had to leave the island that day.

DUCKLINGS FALLING OVER CLIFF.—In October, as Mr. Corkran was working in the Woodhaugh Quarry, beside the Leith, Dunedin, he saw a wild duck walking backwards and forwards quacking at the foot of a 60ft. cliff in the quarry. Hearing a "plop" near him he looked around, and discovered that it had been made by a young duckling landing on the ground at the foot of the cliff. The adult duck guided the young one to the safety of a bush about three yards away, and then returned to resume her quacking at the foot of the cliff. Presently another duckling appeared from the top of the cliff, and, on landing at the bottom, it too was guided to the sheltering bush. In all, five ducklings estimated to be no more than three days old, made this hazardous trip. With wings spread, down they came at short intervals, and when about two and a half feet from the ground, the tiny creatures turned in the air and landed on their backs. Three made the landing safely, one was stunned but soon recovered, and one was killed. The adult waited for a while as if to see if the dead duckling would recover from its fall, but it showed no signs of life, and the adult collected the other four young ones, which on their descent had been led one by one to the safety of the bush. The family made its way to the waters of the Leith.—Mrs. I. Tily, Dunedin.

COURTSHIP OF WHITEHEAD (*Mohoua albicilla*).—On January 12, 1936, on Kapiti Island, two birds were seen in a manuka. One, presumed to be the male, chased the other among the branches in a comparatively small compass, fluttering its wings during the pursuit. The presumed female perched on a branch while the male fluttered his wings, standing just in front of the female, and occasionally bowed his head and touched the female's crown with his bill, a performance which continued for about a minute. The male then gave a little twitter before coition took place. The birds then resumed feeding.—R. H. D. Stidolph, Masterton.

HARRIERS WITH STOATS.—On 13/11/46, about one mile south of Shannon a kahu (Circus approximans) flapped across the road a few feet in front of my car. It was carrying a fully-grown stoat in its claws. The victim was being carried by the head and it had been ripped open right along the belly. This is the second time this year I have seen a kahu with a stoat in its talons. The previous occasion was in the earlier part of this year (either April or June) when south of Paraparaumu but the victim in this case was a small stoat. The one seen today was a very well grown specimen.—A. A. Savill, Levin.

BIRDS AT HERBERT, NORTH OTAGO.—An area of 30-50 acres of rich hill-top farm land 4-5 miles from east coast. There are plantations of macrocarpa, pinus insignis, bluegums and a piece of bush with many matai, totara and broad leaf trees as well as the usual smaller trees. A large pond of stagnant surface water with willows attracts grey ducks and stilts. A farm house and garden with flax, fuchsia, etc., is also in the area.—List 1: Birds seen and heard every day from the house: House sparrow, thrush, blackbird, starling, bellbird, lark, harrier. List 2.—Birds to be seen almost anytime in particular haunts: Grey duck, magpie, goldfinch, rifleman, grey warbler, hedge-sparrow. List 3.—Birds seen and heard at short intervals (days to weeks): Little owl, native pigeon, fantail, white-eye, pied stilt, gulls. List 4: Birds seen and heard at long intervals (months to years): N.Z. falcon, tui, shining cuckoo, paradise duck. Others reported but not personally observed: Pipit, greenfinch, yellow-hammer.—Miss S. Anderson, Herbert.

SPUR-WINGED PLOVER AT WAITOTARA.—About the end of November, 1945, Mr. C. J. Glentworth, of Waitotara, picked up an exhausted bird on the edge of a swamp near Waitotara Station. He took it home and kept it till the next day, but as it would not eat, yet seemed in better condition after a night's rest, he released it, and it flew away. During the day the bird was in his possession it was seen by a number of people, none of whom had ever before seen a similar bird. Recently he asked me if I could identify it, and from his description (spurs on wings, projections each side of beak, and size and colouring) it appeared that the bird was an Australian spur-winged plover (Lobibyx novaehollandiae). The specimen found in 1886, at Kaiiwi is in the Wanganui Museum. I therefore arranged for Mr. Glentworth to meet me at the Museum, where he confirmed that the bird he had found was identical in appearance with the specimen in the museum. —W. P. Mead, Wanganui.

REVIEW.

The Waikanae Estuary. An Ecological Survey of New Zealand Birds. By K. A. Wodzicki, Ph.D. (Cracow), Wellington, New Zealand. (Emu, vol. 46, pp. 3-43, 1946.)

In May, 1941, the Ornithological Society gained as a member Dr. K. A. Wodzicki, who brought to this country wide experience in the biological sciences in Europe. The energy and enthusiasm with which he has made himself familiar with New Zealand bird life have been documented by contributions to this journal. Soon after his arrival Dr. Wodzicki honoured the reviewer by asking for advice on an ornithological project near Wellington. The results of regular bird censuses at Muriwai in 1939-40 prompted the suggestion that a similar study of a Wellington estuary might be fruitful. Waikanae was chosen, and the results of the first year's observations, with A. A. Kirk, were published in "N.Z. Bird Notes," vol. 1, No. 2. The paper under review presents the results of 37 visits to the estuary between July, 1941 and August, 1943. A description of the locality, illustrated with maps and photographs and with meteorological tables, introduces an annotated list of the birds recorded from the Waikanae area during the past 70 years, with a liberal accompaniment of tables and graphs showing the numbers of each species observed during 1941-43. Specimens from the district are noted, although their pertinence to the ecological survey is, in general, not demonstrated. The list of Waikanae birds embraces 61 species, but Buller's shearwater and the short-tailed shearwater recorded by Oliver (1930) may be noted as trivial omissions. The concluding section of the paper includes discussion of the problems of bird associations, of mixed flocking, of the status of the various species (residents, regular and occasional visitors), of migration, and of the yearly cycle of the Waikanae avifauna.

Of the observations recorded, the regular counts and graphs of the numbers of several species appear to the reviewer particularly valuable: it may be many years before bird migration in New Zealand can be adequately studied by ringing, and, in the meantime, accumulation of information of this nature, from different parts of New Zealand, can provide objective data for the deduction of movements of bird populations which ringing results will eventually supplement but never supplant. To quote an instance from Waikanae, the demonstrated virtual absence of white-fronted terns between July and October is highly significant in view of their reported absence from Chatham Islands, and the recent conclusion of Hindwood (Emu, 45, pp. 179-200) that Australian records of this species are migrants from New Zealand. For the banded dotterel, stilts, gulls, Caspian and black-fronted terns, Wodzicki presents similar information on seasonal population changes, and the value of such careful censuses at regular intervals is patent—may we have many more from the length and breadth of the Dominion.

In assessing such a substantial paper, it is inevitable that the critical reader will find points of disagreement, mention of which, in a review, may perhaps be excused provided that such criticism does not distort one's general judgment of the contribution. The Caspian tern is envisaged as arriving at Waikanae "from the nearby nesting grounds at Kapiti," with no authority quoted for this reputed breeding station where Wilkinson (Emu, 26, p. 254) reported the species as occasional, and knew no nesting. The reviewer doubts the wisdom of accepting Buller's identifications of the prions he found on Waikanae Beach in 1878—certainly Buller never identified a bird as P. salvini, for that name postdates his death, and although the name "banksi" was often applied to the bird we now call salvini, it was also used by Buller for the prions breeding at the Brothers (turtur) and at the Auckland Islands (desolata).

The sections dealing with ducks will interest those who believe that the factors controlling game bird populations are amenable to scientific analysis as the basis for a positive conservation policy. We know so little of these factors, many and complex as they are admitted to be, that the author's suggestion that increase in numbers of paradise and grey ducks at Waikanae is related to the "closed season" of 1942 must be accepted with caution. Actually, the count of paradise following the shooting season of 1943 (28 on July 3) is much higher than the maximum in the year that followed the closed season of 1942 (6 on June 14). Analysis of Table 5 (grey duck) shows, too, that although the highest count certainly followed the closed season, yet the average counts before and after the closed season scarcely differ. (It may be noted in passing that failure to indicate whether a "dash" signifies "no ducks" or "no observation" hinders interpretation of the tables.) Even the greater difference between the mean count for the year between the 1941 and 1942 breeding seasons and that for the period between the 1942 breeding season and the following shooting season, when the maximum benefit of protection should have been evident, is not of statistical significance. It is not intended to deny that the closed season may have benefited the duck population, but only to point out the difficulty of accumulating convincing evidence of a change in the population of a wild bird.

The sub-title, "An Ecological Survey," deserves some consideration. Ecology is the study of the relation of organisms to their environment, and "the ecologist is concerned with the study of the casual relations respecting the presence of particular species in particular places." (E. J. Salisbury.) The amateur field naturalist may receive such definitions with something of the jubilation of the "bourgeoise gentilhomme" when he realised that he had been speaking "prose" all his life, and it is to some extent true that a schoolboy egg collector, searching for a bird's nest, may become an ecologist in determining its whereabouts, and most articles in "Bird Notes" are contributions to ecology in its broad sense. But, to quote W. H. Thorpe, "there is a good deal of incomplete and casual observation which . . . . scarcely deserves to be dignified by the term 'ecology.'" The concept of "an association of plants or animals as forming in some sense an organic whole" (again the words are Thorpe's) is fundamental to ecology, and it is here that Dr. Wodzicki's approach to the analysis of the Waikanae estuary and its bird life, despite some diffuseness, prolixity and irrelevancies, justifies the subtitle of a paper which acknowledges, implicity, that the understanding of New Zealand's wild life problems will involve an appreciation of the whole environment, dynamic and complex. Ecology, as a science, is still in its childhood: New Zealand abounds in pabulum for its nourishment, and Dr. Wodzicki has offered a substantial meal to the growing child.—C.A.F.

WASHDYKE LAGOON, TIMARU.—On a casual inspection 17/1/46, there were 500-600 black-billed gulls, 400-600 black-backed gulls, c 12 white-fronted terns, c 10 Caspian terns, c 150 ducks (grey, mallard and hybrids), c 65 black swans, c 300 pied stilts, 1 pied oystercatcher, several hundred banded dotterels, etc. This lagoon is worthy of regular study by some person with opportunity for making repeated visits.—J. M. Cunningham, Masterton.

BIRDS AT WHAREAMA, EAST COAST, WAIRARAPA.—Not a good estuary for waders. Total list seen, 14/7/46 c, 20 black-backed gulls, 1 red-billed gull, 1 white-throated shag, 8 black shags, c 3 grey ducks, harriers, magpies not numerous, yellow hammers numerous, flocks c 15 skylarks common.—R. H. D. Stidolph and J. M. Cunningham.

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Dunedin Training College, Dunedin.
Ettrick School, Otago.
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Hornby School, Canterbury.
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Kakapotahi School, Westland.
*The Bird Club, King's College, Otahuhu, Auckland.
Kowhai Bush School, Canterbury.
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Opawa School, Christchurch.
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National Library Service, P.B., Wellington.

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Otago University Library, Dunedin.
Rod and Gun Club, c/o W. H. Sininger, 5 Mead Street, Rotorua.
Waimarino Acclimatisation Society, Raetihi.
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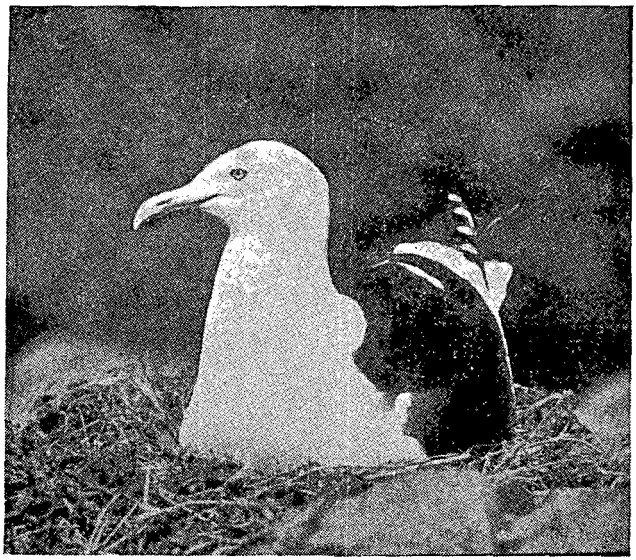

Photo: A. S. Wilkinson.

BLACK-BACKED GULL ON NEST, KAPITI.

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