

NOTORNIS IN MARCH, 1951.

A REPORT OF THE SIXTH EXPEDITION.

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Between the dates of 13th and 19th March, 1951, a sixth party of observers comprising F. L. Newcombe, F. Woodrow and C. E. McIvor and the writer carried out a reconnaissance in that part of the Murchison Range in the Fiordland National Park that is the only known habitat of the takahe (*Notornis hochstetteri*). One of the party, F. Woodrow, had spent a great deal of time in the area snaring deer and trapping possible predators between early November, 1950, and the initial date of this expedition. He had also reconnoitred new country, finding further small colonies of takahe to the south and west. The principal objects of our visit were three-fold:—

- (i) To assess the results of the 1950-51 breeding season;
- (ii) To add further to our knowledge of the general behaviour of the birds by making a visit at a time at which there had been no previous study;
- (iii) To make a census which would include those areas where more takahe were recently found.

This paper is a record of the pooled observations of the members of the party.

The results obtained, together with those from earlier parties (Falla 1949, 1951; Fleming, 1951; Miers, 1950; Turbott, 1951; Williams, 1950) furnish a record that covers the year except for that part between mid-autumn and late winter. Most of these authors have described the habitat in some detail but so far no mention has been made of rainfall which is probably at least 100 inches annually.

RESULTS OF THE 1950-51 BREEDING SEASON.

The last few months of 1950 and the first three months of 1951 were unusually dry and mild in the South Island and the autumn was notable not only for the low levels to which all the lakes fell (that in Takaha Valley was approximately one foot below the February, 1950, level) but also for the heavy crops borne by the berry-producing native shrubs. It is quite possible that this mild season had its effect on the outcome of the breeding season of *Notornis*. Hatching of chicks had occurred as early as the end of October or the beginning of November, for that member of our party on duty in the area in mid-November saw a chick at that time being fed by the parents. By March, a total of five different chicks had been recorded at one time or another and there was evidence in the way of fairly recent chick droppings that two more had been hatched. In February, 1950, only one chick was known to be surviving in an area where three were found in this following season. The five definitely recorded chicks were distributed as follows: Two in Takaha Valley, two in the Point Burn and one in the so-called Mystery Burn which saddles with the south-western side of the Point Burn. The two chicks whose existence was supported by only circumstantial evidence were located, one in a corrie on the Point Burn side of the ridge between that valley and the Mystery Burn, and the other on the southern side of the head of Takaha Valley. It will be convenient when describing the whereabouts of the chicks in the two main valleys to refer to Fleming's map of the area given on page 117 of *Notornis* 4 (5), July, 1951. In Takaha Valley pairs A and C (the latter probably the same as pair J) hatched a chick each; and in the Point Burn, pair G had a well-grown youngster, and yet another was accompanying a pair which might be called "L" found occupying ground at over 3,000 feet a.s.l. at the north-western head of the Point Burn. Evidence will be offered later which suggests strongly that pairs A and C are the same as those known to have hatched and at least partially-raised chicks in the 1949-50 season. Pair A presumably raised a chick in the 1948-49 season also (Falla 1949). Pair D, who were known to have hatched a chick in early

December, 1949, were not seen to have done so this year. However, one of this pair was reported on January 11th, 1951, to still be sitting on an empty nest which it had occupied for at least 36 days. To the quota of addled and infertile eggs listed by Falla (loc. cit.) may be added yet another found by F. Woodrow in the Ettrick Burn. Its dimensions were 7.32cm. x 4.94cm.

THE MOULT.

At the time of this survey the adult post-nuptial moult was virtually over as only a few shed feathers were found and the adult birds were in magnificent plumage. In early February of the previous year the moult was in full progress and numbers of dropped feathers were found in the moulting places which were usually situated beneath shrubs. From observations made by me on previous visits and from reports already published (Falla, 1949) it appears that the post-nuptial moult begins about the latter part of January and continues until about the beginning of March. As for the chicks, they have shed most of their down at about eight weeks of age and have assumed in its place a first teleoptyle plumage similar to that of the adult. (Fleming, loc. cit.) The time at which this change occurs has been calculated from observations made on the live downy chick, then less than six weeks of age belonging to pair A that was seen by the party in February, 1950, and from the appearance of the dead chick found at the same time which had almost certainly been seen alive in mid-December and so was approximately eight to ten weeks old. During our stay only one young bird was seen at close quarters—it belonged to pair G and was about three-quarters of the adult size. This is larger than any chick previously observed and it is assumed therefore that the age in this case was somewhere between three and four months. The untidy plumage of the head, neck and dorsal surface appeared, in the short glimpses that were had of it, to be a very dark brown with paler mottling and the colour of the bill was still the dull slatey grey of the fledgling stage but without any white at the tip. Falla, in a personal communication, has recalled that some first teleoptyle plumages lose their bright colours rather rapidly and Fleming has remarked (loc. cit.) that the down of adolescent rails soon fades. In the pukeko (*Porphyrio porphyrio*) to which the takahe is closely allied (Mayr 1949) the appearance of the downy chick is very similar indeed to that of *Notornis* and incipient quills faintly blue in colour appear six weeks after hatching. Between the eighth and twelfth week tail feathers become well-developed but the frontal shield and legs are at this time still only tinged with red. At about fourteen weeks the assumption of adult plumage is almost complete (Guthrie-Smith, 1927).

BEHAVIOUR OF THE CHICK.

Observations were confined to the young bird belonging to pair G, as the other two seen (that belonging to pair L and the one in the Mystery Burn) were so wary and shy as to make any useful observation impossible. Pair G's chick was shy also but fortunately was more suitably placed for careful stalking. Although the birds of pair A were observed many times at close range during the course of our visit, the well-grown December-hatched chick that, from time to time, was seen to be regularly in their company until the end of February was now no longer with them and so in the absence of any evidence to the contrary is presumed to have left them permanently. It was last seen during the first week of March feeding independently of the parents and was then extremely shy. Pair C (or J) and their youngster were last reported together in late December. The party was unable to find them on their territory although fresh feeding signs and droppings were present. When undisturbed, pair G's chick was always found in company with its parents and on one occasion was observed between them moving at a good walking pace through the beech forest and keeping up a continuous hoarse whistle (a bass version of the juvenile "cheep") which was frequently answered by a soft "klowp" from one or both of the closely-

attendant adults. On catching sight of the observer all broke into a very fast run and made off in different directions, the young bird moving with great speed, its head held so low that no part of the body was visible above the tussocks of the snow grasses. After being separated from the parents for a short time it uttered what was perhaps a distress cry or an attempt to make the adult assembly call. This was a peculiar harsh and jangling medley of sounds difficult to describe and unlike any call yet heard from an adult. Observations made at a slightly earlier date on the chick belonging to pair A have indicated that about this age the young bird is quite able to feed itself without any assistance from the parents.

ADULT BEHAVIOUR.

Feeding.—The following plants are now known to be used as food, the list being compiled from a collection of those species that the birds have actually been seen to be eating or those showing the typical feeding signs of fallen shoots with cleanly-nipped leaf bases. Analysis of the droppings has not proceeded very far because of the difficult and time-consuming nature of the work.

Family.	Species.	Parts Eaten
Gramineae	<i>Agrostis dyeri</i>	Seeds
	<i>Danthonia crassiuscula</i>	Leaf bases
	" <i>flavescens</i>	Seeds and leaf bases
	" <i>rigida</i>	Leaf bases
	" <i>setifolia</i>	Leaf bases
	" <i>teretifolia</i>	Leaf bases
	<i>Festuca matthewsii</i>	Seeds
	<i>Hierochloe alpina</i>	Seeds
	<i>Poa colensoi</i>	Seeds and leaf bases
	Cyperaceae	<i>Carex testacea</i>
Violaceae	<i>Viola filicaulis</i>	Leaves
Umbelliferae	<i>Aciphylla cuthbertiana</i>	Leaf bases
Compositae	<i>Celmisia petriei</i>	Leaf bases
	" <i>verbascifolia</i>	Leaf bases

Most of these items, except, of course, the seeds, seem to be eaten all the year round, but the *Danthonias* make up by far the bulk of the food. When available, the seeds of *Festuca matthewsii* are taken in great quantity. It is not claimed that the list is exhaustive, for in winter at least there is evidence that the diet includes other material—some change being made necessary because of occasional heavy snowfalls covering up the usual foodstuffs. The insectivorous habit of the fledgling has already been the subject of some discussion by Gurr (1951).

OCCUPATION OF TERRITORY.

This was still a well-marked feature of the behaviour of paired birds and it would be as well here to list those grounds upon which evidence for it is based:—

(i) The Occurrence of Droppings: These are generally long-lasting, perhaps remaining for years in dry sheltered positions although likely to be destroyed by heavy rain when fresh; and the distinction between fresh, recent and old droppings is easily and readily made—being indicated in the recent and old by the degree of bleaching and the shrinkage of the components. It is noticeable that fresh and recent droppings are usually found in well-defined areas separated by expanses where only a few old droppings exist.

(ii) Feeding Signs: Once again classification into age classes is possible. The limits of these cannot be defined as clearly as those of the droppings but there is close accordance in the distribution of corresponding age classes of droppings and feeding relics.

(iii) Calling and Sight Records: These are most frequent in the vicinity of those places where they have been reported on previous visits

and are separated by areas where the birds are rarely seen or heard even though the habitat seems suitable.

(iv.) Distribution of Nests: New and old nests have been found concentrated in much the same places for three seasons now.

(v.) The Movements of "labelled" Pairs: By studying pairs accompanied by a chick—pair A in the 1949-50 season and pair G in the 1950-51 season—it has been possible to get a clear picture of the territory each family was occupying.

(vi.) Fighting: Disputes over what were apparently territorial infringements have been seen by a number of observers during the spring and early summer months (e.g. Falla 1949).

All the criteria mentioned above show an excellent degree of correspondence in the areas in which they occur. However, the fact that droppings and feeding signs can be found linking the areas of concentration indicates that more extensive movements do occur and there is evidence that these are commonest in winter and early spring when food is in shorter supply and has to be sought more actively. Unmated birds, too, would be expected to show a greater tendency to wander than mated pairs.

Territorial behaviour so constant in its manifestation (c.f. Cramp's comments (1947) on territory in the coot, *Fulica a. atra*) indicates that the pair bond once formed is of long duration and that the life span of a bird is at least of the order of the total period the species has been under observation to date—that is, about three years. This is not unlikely for a bird the size of a takahe. To what extent a very low replacement rate in the number of chicks successfully hatched and raised yearly is offset by a correspondingly long expectation of life will not be known until more has been discovered about the population trends. This must await the institution of a banding programme which will, at the same time, supply important and reliable information on territory and general behaviour.

Fleming (loc. cit.) has discussed in an interesting fashion the functional morphology of *Notornis* and has compared it with that of *Porphyrio*, drawing attention to Mayr's remarks already cited on the systematic affinities of the two genera. In behaviour, too, there are points of resemblance although there is surprisingly little of real value in the literature concerning the behaviour of *Porphyrio* in detail and, of course, there has been little chance yet to study *Notornis* intensively. But for those who are interested there is much that is suggestive to be gleaned from a reading of the papers of Berney (1907) and Mathews (1911) and the book of Guthrie-Smith (1927) already quoted in reference to the moult. Further, it is well-known that in the *Rallidae* both sexes very frequently share the task of incubation and this is so with the pukeko. So far, it seems to have been generally assumed that only the female attends to this task in the case of the takahe. Since there are no obvious secondary sex characteristics in this species except, perhaps, the rather unreliable one of size to allow for discrimination, the possibility should be entertained that the male and female both take part in this activity.

THE CENSUS.

The party covered as much as possible of the known range of the takahe and in this it was greatly assisted by the more extensive and solo explorations made earlier in the year by F. Woodrow. It was in the course of this work that he found the small colonies further to the south and west just beyond the limits of the previously known range.

Using Falla's (1951) enumeration of pairs as a basis we may summarise the position as we found it in March, 1951, as follows:—
Pair A.—Still on territory. Had a well-grown chick last seen at the end of February.

- Pair B.—Not seen, but as was the case in the previous year, their existence is presumed from fresh feeding signs and remains of recent nests. The territory of this pair is on the open tops bounding the northern side of Takahe Valley and is well-separated from the valley itself by steep slopes and limestone bluffs.
- Pair C.—Presumed by us to be the same as pair J. Seen last with a chick in late December. None of these birds were seen during this expedition, but the presence of at least one bird is suggested by the occurrence within the bounds of their territory of fresh droppings and feeding signs. The *Danthonia* grasses grow particularly luxuriantly hereabouts and afford excellent and ample cover.
- Pair D.—Apparently not breeding this year. Hatched a chick last year which later died.
- Pair E.—No nest found. Two addled eggs laid last year.
- Pair F.—In an unpublished report Miers records this pair as near the head of Takahe Valley. Its existence was stated to be doubtful by Falla (1951). The party found two pairs in the vicinity of the valley head—seeing one pair whilst hearing a second pair call. One I will call F, the other K.
- Pair G.—Seen with a well-grown chick. Had one egg in the previous season, the fate of which is unknown.
- Pair H.—Reported by Miers to be above the forest line on the southern side of the Point Burn. This record is based on the hearing of a call. Falla reports it as doubtful, with which opinion we agree.
- Pair J.—I feel that the evidence for two pairs, one on either side of the stream running into the head of the lake, is not satisfactory. The two suggested territories are very close together and do not show any clear separation, and the supposed two pairs have not yet been seen or heard under conditions that make their separate existence seem reasonably certain.
- Pair K.—A new record. On the northern side of the cirque at the very head of Takahe Valley. This pair was further to the west and higher up than pair F which was also on the northern side of the valley at this time.
- Pair L.—A new record. Occupies the cirque at the north-western end of the Point Burn. One chick was also present. This territory is perhaps two miles from that of pair G which had been seen earlier in the day.
- Pair M.—Suggested by very fresh signs found in a hanging valley high above the northern side of Takahe Valley. This territory is directly above but some distance from (perhaps half a mile) the nearest known part of pair D's territory. It is possible, therefore, that pairs D and M may be one and the same.
- Single Birds.—One seen on the Point Burn Flat in or near pair G's territory. Pair G was seen and heard by two observers almost immediately afterwards about half a mile away, so there is no possibility of confusion here. Long observation of this bird afforded no evidence that it was paired. A further single bird was seen in January in the corrie referred to previously on the ridge between the Point Burn and Mystery Burn and what was possibly another single bird was reported to be heard calling from the southern side of Takahe Valley near its head on the occasion when pair K was under observation.

Thus, in Takahe Valley, we now know fairly definitely of seven pairs (A, B, C, D, E, F, K) and two chicks, with the possibility of one other pair (M) and one solitary adult. In the Point Burn we know of two pairs (G and L), two chicks and two single birds—a total population

for the main area at the approximate time of our visit of between 23 and 27.

From F. Woodrow's previous work in the explored portions of valleys to the south and west of the Mystery Burn and the Ettrick Burn there is evidence of one pair and one chick, with two single birds in the Mystery Burn and one single bird in the Ettrick Burn. The known total for the at-present explored range of this species lay, then, at this time, somewhere between 30 and 35 individuals. It is worth noting at this point that nowhere within the entire known range has the species been seen (or signs of its presence found) below an altitude of 2000 feet. In this, the four specimens taken last century are notable exceptions.

DEER AND TAKAHE.

Apart from the danger that may exist during the birds' breeding season of deer treading on nest or chicks, there is perhaps a greater danger of increased or even uncontrolled deer herds so altering the environment in the sub-alpine meadows where the birds feed for most of the year and make their nests, that food and cover will eventually be greatly diminished. Already in the northern basin that forms part of the great amphitheatre at the head of the Point Burn there is evidence that the presence of deer is accelerating the normal processes of erosion, for on the tops of the ridges (here about 4,500 feet high) that separate this valley from the southern branch of the Ettrick Burn, deer trails are common; the bare earth is exposed, and steep and narrow scree slopes mar the otherwise smooth curves of the snowgrass-covered walls of the cirque that encloses this end of the valley. Lower down on the boggy glacial benches there are places where the thick covering of the various grasses and herbs has been totally destroyed over many square yards and turned into muddy deer wallows. Deer feed on species of *Danthonia* that the takahe have been shown to depend upon in large part for food and nesting cover and on species at least closely related to those other alpine grasses whose seeds form what is probably a most important part of the birds' diet in late summer and autumn. At present, fortunately, the deer population is not high and is denser in those valleys to the south and west of the main colony, possibly because the other valleys are at a lower altitude. For instance, in the Point Burn (which is about 2500 feet above sea level and 500 feet below Takahe Valley) deer trails are common in the beech forest and fresh droppings are frequent throughout; whereas in Takahe Valley such sign is much less abundant.

Although predator control is generally considered to be an inefficient method of protection of a prey species it is felt to be specially justified in this case as the most dangerous potential predator—the stoat—is quite foreign to the original environment, so adaptation to its presence has not been developed through natural selection, and a tribute must be paid to F. Woodrow for his long and conscientious work, which in addition to ensuring the safety of the birds, has added much to our knowledge. The following is a list of the animals destroyed within the range of the takahe since its rediscovery in 1948. (Numbers are approximate only):—

Red deer (<i>Cervus elaphus</i>)	38
Stoats (<i>Mustela erminea</i>)	19
Australian opossums (<i>Trichosurus vulpecula</i>)	54

OTHER BIRDS.

A total of 19 native and four exotic species were seen or heard during the time of our party's stay. A new record for this part of the Murchison Range was that of a pair of rock wrens (*Xenicus gilviventris*) seen among shrubs on a talus slope at the head of the Point Burn at an altitude of about 3500 feet. The redpolls, chaffinches, goldfinches and yellowhammers reported from Takahe Valley on most of the previous visits, including that of late winter in August, 1949, were on this occasion conspicuously absent.

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HUDSONIAN GODWIT AT RUAKAKA.—On 12/12/51, Messrs. R. N. Buttle, S. C. Rutherford, V. M. Rutherford, T. J. Short and I were fortunate in finding a Hudsonian godwit (*Limosa l. haemastica*) at Ruakaka, and in being able to watch it at leisure. A solitary godwit which was intently feeding within a chain of the footbridge which crosses the Ruakaka Stream to the A.A. camp, was noticed to have a black tail and when it raised a wing, a white rump. Fearless to the point of absurdity as I walked it up, it ran about ten yards ahead and, to make it fly in order that its diagnostic pattern (v. N.Z.B.N. 3, 199) might be seen by my companions who were watching from the bridge, I was forced to hustle it. Even then it alighted almost immediately. On the two occasions when I put it up, it uttered a sharp but not far-carrying double-note "kit-keet," quite distinct from the noisier and more tuneful "kew-kew" of the common N.Z. godwit (*L. lapponica baueri*). I was glad to hear this call as I have not been able to record any note from the four Hudsonian godwits which I have seen before, all of which have been in flocks of other waders. Before we left, a fairy tern (*S. nereis*) flew up the estuary and hovered not far from the Hudsonian godwit, so that these two rare N.Z. birds could be seen at once. We revisited the estuary on 20/12/51 and the tide being at the same low level, found presumably the same two rare birds again feeding within a few yards of one another. It is to be hoped that the Hudsonian godwit did not suffer for its fearless or foolish indifference to man, as the estuary becomes a bedlam of campers over Christmas. This is not the first record of the Hudsonian godwit for the east coast of Northland. Messrs. C. A. Fleming and S. D. Potter and I saw one at Mangawai, 16 miles to the south, on 24/11/40. (*Emu* 43, 136).—R. B. Sibson, Auckland.