THE NESTING SEASON OF NOTORNIS.

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Since Dr. G. B. Orbell's rediscovery of the bird in 1948, progress in field study of **Notornis** has been furthered by a series of investigatory visits. Preliminary notes on part of the nesting season 1948-49 have been published (Falla, Emu 48, 316-322, 1949) and an account of a winter survey of the valley, by Mr. E. G. Turbott, is published in this issue. pp. 107-113.

The Wild Life Branch of the Department of Internal Affairs has since arranged for three further visits of observers who were to cover as far as possible a complete nesting season. The first of these, known as Party No. 3, comprised three officers of the Branch, K. H. Miers, G. R. Williams and F. Woodrow, and was in the valley from the 16th October to 13th November, 1949. The next party, comprising H. J. Ollerenshaw and K. H. Miers, of the Wild Life Branch, L. Gurr, of Otago University, and the writer, was in the valley from 1st to 13th December, and was joined for the last few days by photographers of the National Film Unit and National Publicity Studios. From February 2nd to 7th, Party No. 5, led by Mr. Ollerenshaw, with Messrs. G. R. Williams and C. A. Fleming, as ornithological observers, and three others engaged in geological and archaeological work in the area, was in the valley. The following account is based mainly on the work of No. 4 Party, but acknowledgment is made to the reports of the parties preceding and following it.

OCCUPATION OF TERRITORY.

The valley already was clear of snow when No. 3 Party entered in October, and from the report of K. H. Miers it is evident that the **Notornis** were on approximately the same territories and in substantially the same numbers as they were the summer before. In that season, B. Wiseley had marked known territories on a sketch map, and the same procedure followed in 1949-50 defined the range of five pairs in the Tunnel Burn basin, one on the ridge north, and one at least in the Point Burn to the south. Two other pairs were reported as doubtfully distinct and their status uncertain. This record of birds in pairs, on territory, takes no account of unemployed or non-breeding birds unless any of the pairs whose nests were not found were in that category. If there are such immature and non-breeding birds not in pairs, they do not appear to frequent the valley. The pairs that are settling down range widely at first, according to Mr. Miers, and gradually the discarded blades of snowgrass and the droppings that mark their recent presence become more abundant in a narrowed zone. The next phase is the making of one or more nests (cf. Falla, 1949, p 320) round one of which a heavy accumulation of droppings finally indicates that an egg may be expected in that particular nest.

LAYING AND INCUBATION.

The first bird found in occupation of a nest was already sitting when discovered on 25th October, and the quantity of faeces in the vicinity was estimated by Messrs. Miers and Woodrow to be an accumulation of about five days. They appear to be deposited by the sitting bird, which never fouls the actual nest, and not by an attendant partner. Of this pair, designated E, the partner not sitting usually was ranging within a hundred yards or so but seldom seen in close proximity to the nest. No change of guard was ever seen, but frequently the free bird called loudly from a clearing at the bush edge about fifty yards from the nest and was promptly joined by the sitting bird which left the eggs unattended. We did not find out whether both sexes sit, nor, if only one sits, the sex of the one that does. It was thought prudent not to handle the birds for marking, and a method of recording distinctive yellow scars on the red bill proved unreliable because of flaking of the

bill sheath. In some pairs there was a slight difference in demeanour, but no constant plumage differences could be detected.

There were two eggs in the nest of pair E, one more strongly marked than the egg figured in an earlier paper (Falla, 1949, fig 2, pl. 42) and the other almost unspotted. It became apparent when one of the pair was found still sitting closely on December 1st that the eggs might be addled, and when there was no change by December 12th the close-sitting bird and nest were first made the subject of extensive photographic record and the eggs finally removed. They were much decomposed and infertile. A bird sat on the empty nest for one more day before the pair left the vicinity. Although this nest provided no information on incubation period it offered ample opportunity to observe a sitting bird. Unless approached abruptly it did not leave the nest in alarm. Normal arrival and departure were unobtrusive, making use of all available cover. On arrival, this bird, and another elsewhere, was seen to drive the bill several times into the floor of the nest at the side before shuffling forward on to the eggs. If these had been disarranged at departure the bird occasionally rearranged them, on one occasion getting two awkwardly placed eggs to lie side by side simply by passing the bill between them. When sitting, a bird generally improved its cover by pulling strands of snowgrass across any gap, and normally would be quite invisible at a distance of more than a foot. One reaction on being closely approached was to tuck head and bill completely out of sight, a process performed gradually. Although **Notornis** plumage is quickly bedraggled by rain, sitting birds usually managed to keep both themselves and the nests dry in all weathers. The only other incubating pair observed at all closely was pair A. They were on restricted territory when seen on 13th November by No. 3 Party, and on 1st December a bird was found sitting closely on two eggs at the spot which Mr. Miers had marked as likely. For two weeks following the same bird undoubtedly was on the nest most of the time, and a partner actually was seen in the vicinity only once. The eggs had not hatched when No. 4 Party left on 13th December.

CHICKS.

A leggy chick of two weeks or more was described and photographed by No. 1 party in January, 1949. In the following season the first chick seen was much younger, small enough to have been not more than two or three days old. Pair D had been noticed on 6th December near a nest containing a cold and addled egg. Later, this chick was heard in the grass and seen running rapidly after the old birds. Its down was jet black, legs purplish-brown, bill basally black with terminal two-thirds, including egg-tooth, ivory-white. (In older chick the white is reduced to a small sub-terminal patch, and then disappears.) The chick could hide completely by burrowing into thick grass, remaining completely silent, but when on the move it answered "contact" calls by the parents with a typical nestling "cheep." Its small droppings consisted entirely of slimy black animal debris including recognizable remains of larvae of stone-flies, mayflies, and other aquatic insects. These food traces explained why adult birds had been found pulling up sphagnum and other bog mosses and making no attempt to eat them. Mr. L. H. Gurr, who pulled up some moss in this way, discovered that the freshly-exposed damp earth was seething with the larvae of aquatic insects. Another manifestation of the insect-eating phase was noted in January, 1949, when a chick, with parents standing by, was seen pecking at the drift-line on the lake shore. In suitable winds, this line is well stocked with stranded insect larvae and pupae. Change to a diet of plant food seems to follow quickly as the chick develops. Pair J were found on 6th December to have a chick between two and three weeks old, and this youngster was first traced by the unusually small droppings composed of tender young shoots of **Poa**. The older fledgling watched by No. 5 Party early in February, 1950, had proportionately larger droppings also of vegetable matter. (See Fleming, this issue, p. 102.)

In their downy stage at least, all chicks seem to be brooded by an adult at night or during rain and snow, on any available nest. The feeding range of family parties was found by members of No. 5 Party to be at least as extensive as the pre-nesting territory of the parents and probably is more extensive.

BEHAVIOUR.

In the narrower sense of display patterns, behaviour was not recorded by the October and November observers. In December the opportunities for observing were limited to those provided by pair E when the sitting bird was called off by its mate. The bird responding darted with a crouching run to the caller and straightened up facing it with the two bill tips almost touching, and both necks upstretched. After some seconds one bird, I think the original caller, crouched and moved round the other with a gyratory movement which presented the spread white under-tail coverts to the other's view. Drooped wings and fluffed-out flank feathers gave the general impression of a round white target ringed with blue. Much of this performance was obscured from me by bushes, but it bore some resemblance to the display of the European black-cock **(Lyrurus tetrix).** The more typically gallinule spread of the white tuft with a deflection sideways, as described by Elliot Howard (The Nature of a Bird's World) in the waterhen, was not observed, but may well be used by **Notornis** as a variant of the above.

SUMMARY OF THE 1949-50 NESTING SEASON.

Eight, possibly nine, pairs of birds were located on territory. Of these, five (A, C. D. E. J) were on the valley floor in the Tunnel Burn, one (G) in the Point Burn, and two (B, H) on the tops.

Pair A laid two eggs and had a half-grown chick surviving on 7th February, 1950.

Pair B was not followed up.

Pair C were on territory from December to February but their breeding status was not discovered. A dead fledgling found in their territory in February may have been their's but could have strayed from J.

Pair D.—Laid two eggs and hatched only one chick, which did not survive.

Pair E.—Laid two eggs, both addled.

Pair F.—Existence doubtful.

Pair G.—Had one egg on 6th December; subsequent history unknown, but apparently without young in February.

Pair H.—Existence doubtful; report based on one bird.

Pair J.—Had a half-grown chick on 13th December, and, as the adults had left the territory by February, it may have accompanied them, or have been the decomposed body found in territory C in February.

Although observations did not cover the activities of all the birds known to be in the area, the indications are:—

(a) That not more than two eggs are laid.
(b) That families seem limited to one chick.
(c) That the percentage of fertile eggs laid may be low.

The causes of this state of affairs are not apparent, nor is it known for certain what are the natural hazards to which chicks may fall victims (e.g., G and J or C). Stoats and other predators may be suspected but there is no direct evidence of attacks on **Notornis,** and the possibility that **Notornis** themselves may attack chicks not their own, cannot be ignored. The general situation as it concerns such a small population

seems precarious. Increase is hardly to be expected, but even present numbers could scarcely be maintained if 1949-50 was a typical breeding season, unless there is a reserve of immature and non-breeding birds scattered through the surrounding country while nesters occupy the two valleys. It is now certain that the actual occupants of territory in the Tunnel Burn and Point Burn in the summer of 1949-50 did not exceed 20 birds, of which only half (five pairs) are known for certain to have nested, with results which would be disastrously inadequate if they were normal.

Naturally, predator pressure is to be feared, but so far direct evidence of it is lacking, and the traces of stoat feeding activity examined have consisted of remains of small passerine birds and mice. It is possible that weather is an even more serious and capricious factor, and that excessive rain or abnormal snowfall during the critical early days of incubation may determine the success or otherwise of a breeding season.

Some attempts have been made to estimate the total surviving population of **Notornis**, but, being based on an assumption that the Tunnel Burn and Point Burn might be the only nesting areas, they were premature. Late in the 1948-49 season it was thought that about half of the 40 empty nests found might have been used, suggesting that the number of birds scattered over the area might be 100 (with about 40 of them nesting). Longer observation in the next season showed fewer than 20 adult birds present and five pairs making amongst them about 20 nests, so that the estimate of total population was revised to 40-50 birds.* Since then a wider reconnaissance by officers of the Wildlife Branch in contiguous and adjacent valleys and tops (briefly outlined on page 118 of this issue) gives encouragement to hope that a less restricted basis on which to estimate population can now be adopted.

* The assumption is that the observer has a fair chance of seeing most of the birds that are "on territory," but actually will see very few of those non-breeders that are not.

SPARROWS TEARING PAPER.—On January 27, 1951, while sitting on a rocky ledge at Howick observing reef herons, my attention was diverted to two sparrows which I noticed were trying to carry a piece of brown-paper about a foot square up to the top of the cliff. First one bird and then the other (a cock and a hen) tried to lift the paper in its beak and then each had a turn at tearing quite large bits of the paper and flying off with them. Another example of paper-tearing by sparrows was found in a nest which was blown down from a tall palm tree in our garden. This contained a piece of the paper table-cloth which we use when we have meals in the garden. The piece was about 2½in. long and must have been torn off when the cloth was spread on the garden table some time when we were not looking.—Noelle Macdonald, Howick.

RED-BILLED GULLS TAKING CRICKETS (?) IN FLIGHT.—At sunset on February 15, 1951, red-billed gulls were seen circling at heights from 20 to 200 feet over farm lands on the Awanui-Kaitaia Plain. Their actions in the air were reminiscent of those of some fly-catching birds seen in other countries, and careful observation with field-glasses revealed that they were taking large insects in flight. Crickets are present in the locality in vast numbers and were seen in flight nearer ground level at the same time. Until March 9, whenever calm conditions prevailed, gulls were seen behaving in the same manner at the same time of day. The evening performance began shortly before sunset, when birds commenced to fly about quickly overhead, their straight lines of flight criss-crossing the sky in all directions. Suddenly a bird would hesitate and circle, to be joined immediately by others. The circling was performed at just over stalling speed and was marked at intervals by sudden swerves and dartings. At times the whole sky, as far as one could see with binoculars, was filled with gulls similarly engaged.—A. H. Watt, Awanui.

Photo: H. J. Ollerenshaw.

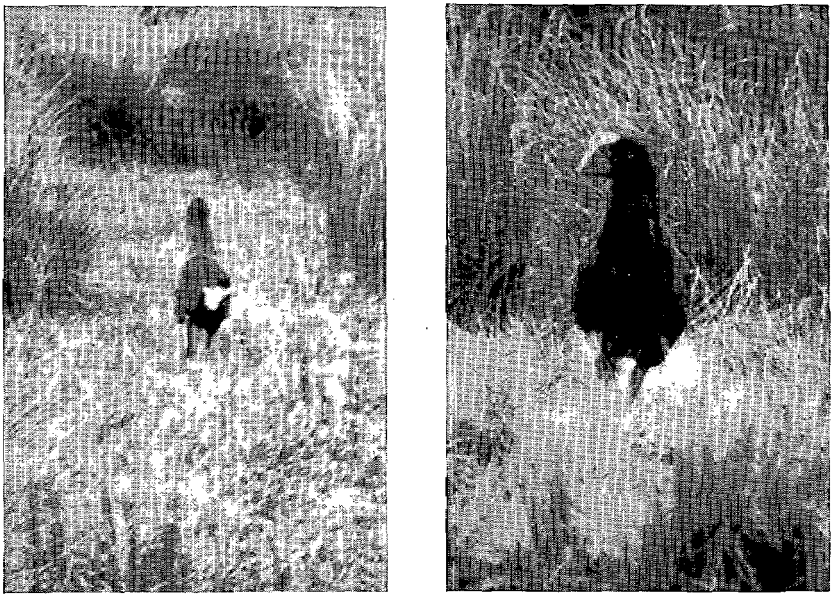
ADULT TAKAHE, December, 1949.

ADULT TAKAHE, December, 1949.

Photo: R. A. Falla.

Photo: National Publicity Studios.

TAKAHE ON NEST, December 12, 1949.



Photos: R. A. Falla.

TAKAHE ATTITUDES, December, 1949.

Photo: R. A. Falla.

NEST AND EGGS OF TAKAHE, December 3, 1949.

Photo: R. A. Falla.

MOSS PULLED UP TO UNCOVER INSECT FOOD FOR YOUNG TAKAHE, December, 1949.

Photo: H. J. Ollerenshaw.

CHARACTERISTIC ACCUMULATION OF DROPPINGS NEAR TAKAHE NEST.

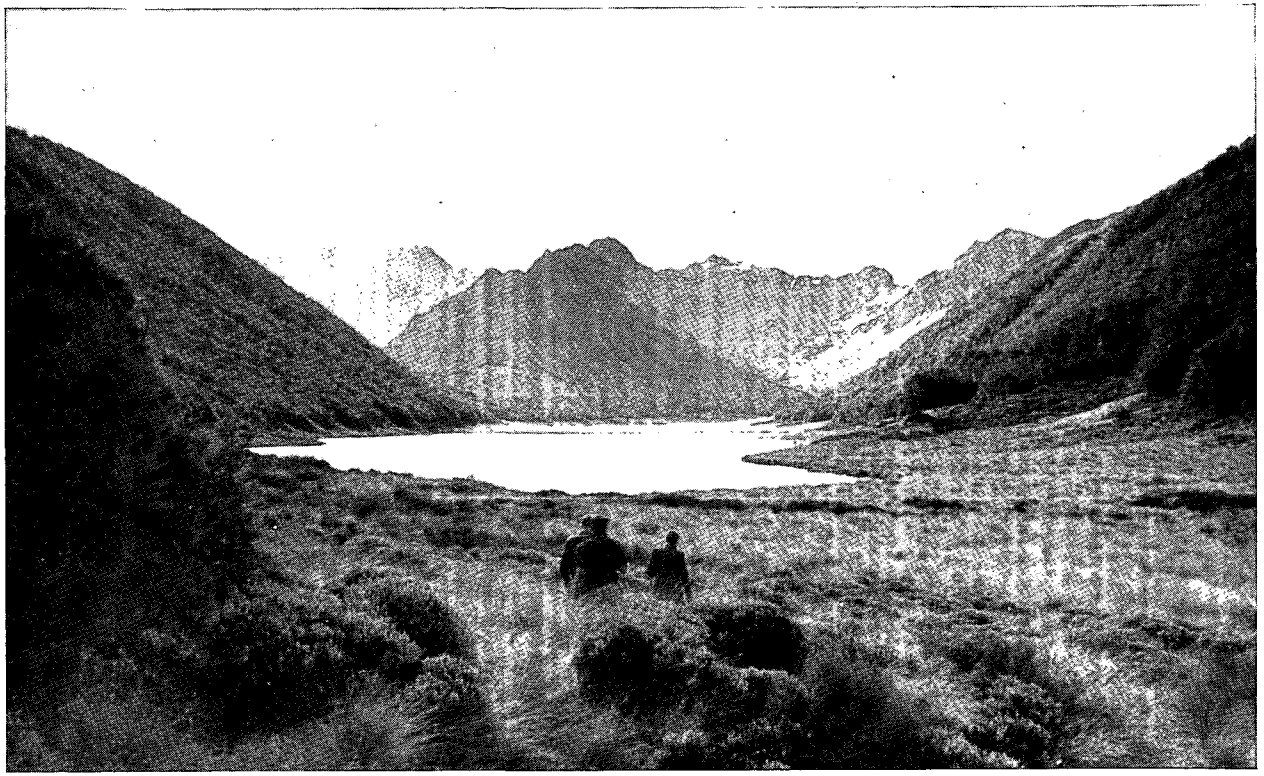


Photo: National Publicity Studios.

TAKAHE VALLEY.