

through till by three weeks they are a sorry mixture of down and feather. At four weeks they are nearly full grown and have little down left. At five weeks they appear fully fledged, though they do not leave the nest till about six weeks.

At all stages they are very active and especially in crops they will be found scattered widely through the corn from about the first week onwards; not necessarily together, in fact often the reverse. They are frequently fed where they stand and not at the nest.

After flight the young continue to use the nest or near vicinity as a roosting place at night for at least two weeks. The hen continues to hunt for her brood during this time.

Finally a hotch-potch of unrelated observations: They will rebuild if their first laying is disturbed or destroyed, and early in incubation they will smash their own eggs. In our experience this second nest is not far removed from their first. Undisturbed, they may use the same nest for a number of seasons, or alternate between two nests. They will desert from the most minor interference and the mere fact of walking up to a nest to examine it and confirm its presence may be sufficient in the early stages. Yet, incredibly, they will allow a crop to be cut about their ears without deserting (chicks), and it is possible to shift a nest, found while harvesting, to the edge of the field, and the hen will continue to feed her chicks in this new situation. (But note here the fact that the chicks wander a lot and are normally frequently fed away from the nest, so that this could be explained as an exaggeration of a normal situation.) They will desert chicks as readily as eggs should they be flushed from the nest. This gives the secret of handling harriers — provided the nest is only visited when the bird is away of her own free will there is virtually no desertion risk; they will usually tolerate being flushed once, while four times seems to be the maximum. Anybody wishing to get information on laying intervals and times of commencing incubation would be wise to watch this. Of our own nests we caused desertion in five; we successfully got a hide up to three; the remainder we left as little disturbed as possible, making no attempt to introduce a hide. Of our desertions, one was caused merely by finding and walking up to the nest, two were caused by hides and two by occupied hides: that is to say, the hides had been successfully brought up to the nest and were accepted by the birds while empty, but the day one of us was left in the hide the birds deserted. We use a heavy grade completely opaque material and so we can confidently rule out the possibility of being seen. We suspect the birds have a 'sense of presence'. Ducks are the same, particularly Shovellers.

MORTALITY AMONG NESTING MUTTONBIRDS NEAR GREYMOUTH

By J. R. JACKSON

During the 1955-56 nesting season several visits were made to colonies of Muttonbirds (*Puffinus griseus*) at Perpendicular Point, Punakaiki and at Twelve Mile Bluff, 12 miles from Greymouth, and in the 1956-57 season the colony at One-One, Hari-Hari, was visited as well.

The colony at Perpendicular Point was formerly very large, and Mr Fischer, who has known the birds for over thirty years, remembers that a stretch of six hundred yards along the cliff used to be riddled with burrows. Even five years ago some burrows remained on the way down to the first cave, but few signs of these now remain. However in 1955-56 at least seven nests and burrows were occupied under or beside the big limestone blocks at the furthest point. The many bleached bones give evidence of the much larger colony in former years. On 4/12/55 at sunset some thirty muttonbirds were flying close inshore and again on 18 and 21/1/55 they were seen in lesser numbers. In February Mr Fischer found two dead birds and a deserted egg. On 12/2/56 no birds were observed overnight nor on the night of 3/3/56. Three more corpses were found. The corpses were found by the more open and accessible nests, perhaps the least favoured nest sites.

On 14/10/56 one burrow was occupied and many had been investigated by the birds. One bird was seen flying at sunset. On 24/11/56 no birds were found and droppings were few and some days old. On the morning of 27/12/56 at least twenty birds left and similarly on the nights of 10/1/57 and 15/1/57 birds returned and departed next morning. On 15/1/57 when a returning bird entered a burrow, welcoming noises from the brooding bird and sometimes a different call, perhaps from the chick, were heard, and so four inaccessible nests were pinpointed. Three birds were caught and examined. They appeared healthy. No corpses were found this season.

Perhaps fifty yards from where burrows were thirty years ago is a cave, containing a Maori midden, and on the cliffs under the burrows nest Spotted Shags (*Stictocarbo punctatus*). In the midden twenty bird bones have been found. These are mainly of the Spotted Shag and none are of the muttonbird.

On top of Twelve Mile Bluff thirty burrows are located in a quarter-acre patch of kiekie (*Freycinetia banksii*) near the cliff top. On 4/12/55 two birds were seen in their burrows, and there were many empty burrows, some obviously having been unoccupied for several years. No trace of old burrows could be found under the nearby second growth, mainly gorse, blackberry and bracken, though before the bluff was cleared, 17 or more years ago, to make what is now called 'Starvation Paddock', muttonbirds were often heard calling by the occupants of nearby houses. A further brief visit was made on 18/12/55, but no birds were seen and the colony appeared deserted. A more careful inspection was undertaken on 22/12/55, when three dead birds were found; two in their burrows and one at the bottom of a runway to the cliff top. No birds had returned to the colony by 10 p.m. On 21/1/56 the colony was visited at midnight and within an hour at least six birds were heard calling. Next morning an occupied burrow was found and three eggs in others, all apparently deserted; another corpse was found. On 12/2/56 the sitting bird and the eggs had gone. Two more birds were found sitting, but they were not disturbed. At least six more corpses were found. A final visit was made on 3/3/56 when the colony was deserted and no birds returned.

In the 1956-57 season during the night of 6/10/56 at least four birds were calling and droppings were found by three burrows. The birds were quiet and very shy, so immediately they heard movement through the kiekie they were silent. The burrows when examined on 24/11/56 were empty, though a corpse was found. Later three more corpses were found in the colony and one on a beach two miles north. Overnight on 21/12/56 no life was heard, but fresh droppings and a broken eggshell with no sign of incubation were found. On 1/1/57 one bird returned and one left next morning, but no occupied burrow could be found, nor on 10/1/57 nor on 15/1/57.

At One-One, at the mouth of the Wanganui River, on the very summit on the inside face, are 16 burrows. Half have not been used for some years and the other half had been investigated by the birds, fresh droppings were around, but none occupied on 9/12/55. One bird was seen flying at sunset on 8/12/56. Here virgin bush remains around the burrows, so human interference can have been only a minor factor in the few birds returning to the colony.

The number of birds found dead during the 1955-56 season seems large in proportion to the small number of breeding pairs thought to be present, and it would be interesting to know the reasons for the mortality. Such information might explain the decline which has occurred during the last forty years in the number of muttonbirds breeding at Perpendicular Point and might even throw some light on the much wider problem of the disappearance of the colonies of muttonbirds and petrels which used to exist in many mainland localities in both North and South Islands.

Unfortunately all the dead birds were in an advanced state of decay, so the cause of death remains uncertain. The bodies showed no signs of having been damaged by animals, such as cats, but it is doubtful if an attack by a stoat could be recognised in such material. Virus diseases have been recorded in shearwaters overseas — e.g. in the Manx Shearwater (*P. puffinus*) (Miles and Stoker, 1948) and in the Bass Strait muttonbirds (*P. tenuirostris*) (pers.

comm.) — and this might provide an explanation for the mortality observed near Greymouth. Certainly the hypothesis is worth testing if fresh materials can be obtained. It is possible that the mortality was increased by a failure of the food supply, and in this connection it is of interest to report that 1955-56 was an unsuccessful breeding season for certain other sea-birds in the district.

In colonies of White-fronted Terns (*Sterna striata*) on a Twelve Mile Island and at the Pancake Rocks, Punakaiki, the eggs were all deserted, and Spotted Shags at Perpendicular Point appeared to raise fewer young than usual.

The disappearance of all birds early in the season and their reappearance later parallels what has been found in Australia where a pair establishes a burrow as its territory, leaves it for a fortnight and returns to lay and to incubate.

I have to thank Mr P. C. Bull for help in the preparation of this paper.

WHITE-FACED HERONS BREEDING IN NORTH AUCKLAND

By F. P. HUDSON

A big dead kauri tree stands on a point of the Kaitoto Creek (Lower Kourawhero) near my house. This tree seems to be a resting place for various strange birds on a flight route from coast to coast — up the Mahurangi River, across the low watershed and down the Hoteo River. In the early autumn of 1956 I saw five herons in this tree and with the aid of binoculars I was able to identify them. They were the first I had seen and were definitely the White-faced Heron (*Notophox novaehollandiae*). They lived up and down the creek and could be seen in open paddocks feeding. Sometimes they roosted in the heads of large totara trees, after a scuffle with the local bunch of magpies. When flying high and purposefully they often gave three loud long croaks, but when flying and playing about the roost tree they gave frequent short croaks.

About the middle of June two would roost here and the other three would continue down the creek. The two broke away from the others in a peculiar manner. Directly over the perch one would turn left, the other right, and each would make a perfect circle about ten chains in diameter and land simultaneously. On June 29 at about 7.45 a.m. I noticed one carrying sticks up into a tall pine tree while the other bird stood in the beginnings of a nest. The height was 47 feet from the ground. The gathering of each load consisted of a glide down of two chains, a minute spent looking for worms, a quick run to pick up a stick, and a slow climb, with neck outstretched, to a limb near the nest, a pause, then a short flight to the base of the long sloping limb, up which the bird flapped with considerable effort to its mate. This went on for one to two hours every morning for about a week. During the day they were away.

On 6 July I noticed one was sitting, and the flimsy nest was never left unattended from then. The other bird would leave about 8 a.m. and return just after sunset with three loud hoarse croaks and then stand on the nest. After two or three minutes one would fly down and hunt worms till dark. I expect that this would be the cock bird relieving the hen to let her get some food. I felt sure she had eggs. The first few days when she stood up to stretch and turn round she was very interested in something between her feet. She was very quiet and did not mind my being under the tree. On 21 July the nest was left for the first time and for all day. The next morning she was back and she sat closely until 4 August, when she flew away and did not return. A. G. Gorbey came from Wellsford and made the difficult climb to the nest. There he found only a few bits of eggshell. On the ground below the nest was more shell and a small dead chick. The eyes of the chick had been open, but it looked pretty helpless. There was some down on it, but the skin was thin. I would think that this nest was a natural failure. There was no sign of interference.