

moved higher until it was 3 m from the ground. When I examined this tree the following morning, I found that it was leaning at an angle of about 35° to the ground. There were two or three small Kakapo chews on the climbing fern *Arthropteris tenella* found growing on the trunk.

This brief night observation was made with the use of a dim red light which enabled me to see c. 4 m. On several occasions I had moved while the light was switched on. The Kakapo appeared to have excellent hearing and would quickly look in my direction at such times. Its subsequent actions indicated that it could not actually "see" me (or the light) unless I moved.

Prior to my arrival in the Esperance Valley, Mr D. V. Merton and Mr J. L. Kendrick (N.Z. Wildlife Service) had tape-recorded a variety of calls made by a Kakapo before it was captured. These calls were used to locate a second bird in the Esperance Valley. On one occasion, a taped call was played to this second bird, with no response. However, about three minutes later, an avalanche fell in the Donne Valley 1.6 km distant. The bird immediately responded with two long, wailing calls.

The variety of calls heard by the party cannot be easily described. They fall into two basic forms — croaks and wails. Croaks were similar to the "kraak" made by kakas, usually short and, frequently, repeated only once although occasionally more often when they were followed by a wail. The wail has been likened to a pig or opossum squeal, usually fairly long and occasionally continuing until the bird sounded as if it was out of breath. No "booming," for which the bird is noted, was heard.

Although the Kakapo each occupied areas some 700 m apart, their calls carried easily over this distance and it is, therefore, probable that the birds were in vocal contact.

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OBSERVATIONS OF TAKAHE NESTING BEHAVIOUR AT MOUNT BRUCE

Hide observations were carried out on a captive pair of Takahe (*Notornis mantelli*) at Mt Bruce, over the period 3 September to 26 September 1975.

These birds were watched on 15 days, and during this time several aspects of behaviour, mainly related to nesting, were noted. Observations commenced while the birds were still engaged in nest-building activities, and by the end of the observation period one egg had been laid and incubation was into its 14th day.

Grazing: Prior to egg-laying the female grazed almost continuously throughout the day. The male's grazing was not as intensive as his mate's and he spent considerable time standing about preening or pacing the barrier between his pen and the enclosure next door which also contained Takahe. At times he would stand at the neutral zone which provided virtually the only visual contact with the pair on the other side of the barrier.

The nesting pair would sometimes drift up to 15 m apart while grazing but generally they fed within 5 m of each other, whereas a younger pair in the next pen often fed independently for long periods during the day.

The male of the nesting pair always appeared to take the initiative whenever both birds travelled any distance — it was always the female who followed.

Although they both made some limited use of their feet to hold food during feeding, the birds were most frequently observed grazing on the short (more palatable) sward grasses. Very little of the taller grasses was touched. In Fiordland the opposite is true; tussock species are taken more frequently than sward species. However, this may be due to availability; tussock grasses are more abundant in Fiordland.

Nest building: When observations commenced, the nesting pair had three trial nests in various early stages of construction. The nest most frequently visited was situated about 5 m from the tower hide and just in from the bush edge. Although both birds visited this nest throughout the day, the male did so more frequently than the female. On every occasion he carried nest material with him. This consisted primarily of clumps of short grass with some turf during the early nest building period. Most was collected not more than 4 m from the nest. The female only carried nest material once or twice on her visits to the nest and these 'tokens' she also collected close to the nest.

As the season developed and laying time approached, the number of visits made by the male to the nest increased considerably. He began to collect beakfuls of longer grass (tall fescue) in preference to the shorter turf growing nearer the nest. He was now travelling much further from the nest to get material. The female also carried 'tokens' more frequently but these were still collected close to the nest and the nature of the material she collected remained the same.

Even into early incubation the male continued to visit the female on the nest with nesting material, but his visits became less frequent as incubation progressed. As the birds adopted a more steady routine, the male commenced visiting the nest without any nest material.

Soliciting and Copulation: Prior to the act of copulation the female solicits the male by adopting a submissive posture, crouching low to the ground with tail down and the carpal flexures of her wings slightly

out from her body. The primaries of the wings are slightly splayed and held against the side of the body. Her head is held low and her body is close to the ground. The shoulders are slightly hunched. Posturing is accompanied by a soft clucking call.

The male approaches the female from behind, standing rather erect, he places a foot on her back while she lies closer to the ground with head and neck outstretched. The male mounts her, maintaining his balance with wings flapping. He straddles her, placing his feet just behind her shoulders, and standing with his head slightly lowered. While the male is balancing, the female stands up quietly and raises her tail, her neck is stretched forward, with her bill resting on the ground. This gives her three points of contact with the ground and provides a more stable 'platform' for the male. It is the same stance that is adopted by female wekas during copulation.

Cloacal contact is brief, accomplished by a few sideways 'wipes' of the male's tail. Should copulation be successful (i.e. if the male does not lose his balance), he then dismounts stepping over the female's head. On the ground immediately in front of her, the male adopts an erect posture. He turns to face the female who has also adopted an erect posture, and they lightly 'grapple' bills. Sometimes the female's head is a little below that of the male's and, as both birds' bills are slightly open, the 'grapple' appears almost to be a ritual of the male feeding the female. This was after successful copulation, and was usually followed by mutual preening.

Often the copulation attempt was unsuccessful, usually because the male lost his balance through the female moving underneath him or because of wind gusts. At such times he toppled off the female sideways instead of stepping off over her head. The 'grappling' that followed unsuccessful copulation often appeared more vigorous (? aggressive) on the female's part — more of a bill clashing. But it was always brief and was usually followed by mutual preening.

The male bird was once observed assuming the soliciting posture before the female. A short time later she assumed the same posture and the male mounted her. This soliciting of the male before the female was commonly observed with a young male in the next pen. This young male once assumed this posture for over three minutes before moving away to graze. His mate displayed no interest and was obviously not ready for copulation — it would seem that the young male was.

With the nesting pair, copulation continued after the first egg was laid. The birds were observed copulating 10 days after incubation commenced.

Incubation and Changeover: On 12 September 1975 one egg was laid and incubation commenced. For the final 14 days until observation ceased, one bird was almost always on the nest, the exception being very brief periods early on in incubation.

Early in incubation the female would be relieved from nest duties several times through the day. She would appear rather furtively and feed close to the nest. Sometimes she would only be out for 20 minutes before returning to the nest. However, as incubation progressed the birds adopted a more steady routine. The male would relieve the female on the nest at about 11 a.m. She would then graze for 1-4 hours, perhaps visiting the male on the nest briefly several times to 'converse' with him. She grazed further from the nest than she did during early incubation. If she was out for only 1-2 hours, the male would again relieve her sometime between 2 and 4 p.m. in the afternoon.

During early incubation nest changeovers appeared prolonged and there was much 'conversing' at the nest as if the relieving bird was ready to take over the other's duties before the sitting bird was prepared to give up the nest. As incubation progressed however, changeovers were accomplished more quickly and quietly.

Greeting: This form of display was most frequently observed when the pair reunited after being apart briefly. Either bird would rush up to its mate with head and neck held erect and wings held high on its back — the wings remained unopened but the primaries were flared (referred to as the 'sail' position). The tail was raised, revealing the white underside.

As with bill 'grappling,' 'greeting' appeared to have slightly aggressive connotations at times. The male once chased the female around the enclosure, both birds holding their wings in the 'sail' position as they ran. When the male finally caught up with the female he pecked at her sharply. The display may indicate excitement, just as tail flicking is an indication of excitement or distress, or it may be a courtship activity or both. Greeting between birds of a pair was often followed by bill grappling and then mutual preening.

Bathing and Preening: Takahe bathe frequently and in all weathers and this is usually followed by a prolonged bout of preening. A bird will wade out into the water until the water at least reaches the top of its legs. The bird may then crouch in the water, especially if it is a bit shallow.

Bathing sometimes appeared to arise out of feeding in the water. The bird would place its bill and sometimes its entire head under-water to grasp at roots and vegetation growing below the surface. These were pulled to the surface and dropped. This developed into a head bobbing exercise, where the whole body dipped each time but only the head was submerged. Water from the head ran down the bird's neck and on to its back as droplets, or else water from the head was shaken on to the back. Usually the wings are shuffled as bathing develops but the action is ponderous, unlike the vibrant fluttering of bathing passerines (although the method of bathing is identical).

When bathing in heavy rain, the birds stood out in the water and wet their heads only, probably because the back was already wet, nevertheless bathing as such was practised, even in the heaviest rain.

Once bathing is over, the bird steps out onto the bank and walks some distance from the water to preen, always it seems with its back to the pond — this is probably not significant. During preening Takahe often stand with both wings outstretched. This is understandable when the bird has just bathed — it probably assists in the drying process. However, Takahe preen regardless of weather conditions and without necessarily bathing first. Not infrequently while preening, a bird would hold both wings out. This is not done for balance, because at any time during preening the bird may fold its wings.

Interspecific displays: The male Takahe was twice observed chasing Blackbirds from his feed tray by running at them flapping his wings. It was windy on the two occasions and the Takahe almost appeared to be trying to fly after the birds! On numerous other occasions he ignored the same birds around his feed tray. Takahe were often observed apparently trying to fly, especially on very windy days.

Once when the female was out feeding a White-faced Heron appeared high overhead. The Takahe upon seeing it, crept furtively towards the bush, her head tilted skyward the whole time, then quite suddenly, she assumed a more normal posture and commenced grazing again. The heron was still overhead but considerably lower and now had its neck outstretched. At a greater altitude and with its neck withdrawn, the bird's silhouette must have resembled that of a raptor. Takahe of both sexes, the females especially, became very furtive when Harriers or Black-backed Gulls flew overhead.

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REDPOLL CAUGHT IN HOOK-SEDGE

Previous references to the phenomenon of birds being trapped in hook-sedges (Merilees 1969, *Notornis* 16 (2): 144; Hilton 1969, *Notornis* 16 (4): 236; Daniel 1970, *Notornis* 17 (2): 101) have reminded me of a similar experience in the valley of the Fish River (Makarora, near Haast Pass, Otago).

On 17 February 1974 I rescued a Redpoll (*Carduelis flammea*) firmly entangled by its wing primaries in a clump of relatively short hook-sedge (*Uncinia* sp.) in a beech forest clearing at c. 760 m (2500'). After removal of the attached seeds the bird flew off quite vigorously.

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