

In August 1986, the pair was moved to an enclosure of about 2000 m<sup>2</sup>, consisting of half tawa, kamahi and tree-fern forest and half grass, and containing two artificial burrows. The birds soon dug two burrows into a bank. They ate little of the supplied food, presumably finding enough naturally. By October, they had built a nest of dry grass in a roost box. On 20 October, I could hear grunting and snorting from the box all morning, and that evening a newly laid egg was present. The next night the egg was being incubated and I did not check it again until it was removed. The pair's nesting behaviour was the same as in the previous season, although the female roosted in a natural burrow by day.

The egg was removed on 30 December. Its shell was thin and had cracked on the bottom. Although extra calcium had been added to the supplied food, a thin-shelled egg was laid, presumably because the female preferred to eat natural food. The chick hatched within 24 hours of pipping on 1 January 1987, 73 days after the egg was laid. It was a healthy, normal chick.

I had not heard before of female kiwis helping to care for eggs during incubation. Unfortunately, I could not tell whether the female Great Spotted Kiwi actually *incubated* the egg or not. I could not catch her in 1985 to see whether she had a brood patch because she roosted in a very long burrow. In 1986, A. Sturmer and A. Grant (pers. comm.) saw a female Stewart Island Brown Kiwi (*A. australis lawryi*) in a nest in southern Stewart Island and M. Potter (pers. comm.) saw female North Island Brown Kiwis (*A. a. mantelli*) in nests at Tangiteroria, near Whangarei. These observations show that female kiwis may have some part in egg care. We still do not know, however, whether the female incubates the egg.

The incubation period of the Great Spotted Kiwi does not seem to differ much from that of the North Island Brown Kiwi. B. Rowe (pers. comm.) found that the incubation period of the North Island Brown Kiwi was on average 71 days but may be as long as 91 days.

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### Female kiwis incubating

On 27 November 1986 at about 1700, we heard a male Stewart Island Brown Kiwi (*Apteryx australis lawryi*) calling in the podocarp-kamahahi forest along the banks of the Robertson River, southern Stewart Island (grid ref. 21136 53275). We watched it from about 10 metres away as it foraged among ferns, after which it disappeared into the base of an old stump. Under the stump we found a small burrow and, by torch light, saw two birds inside, one sitting on an egg. Neither bird seemed disturbed or distressed by the presence of the other or by our activity at the burrow entrance. On the basis of size, bill shape and bill length, we determined that they were male and female. The female, larger and with a longer and more curved bill, was sitting on the egg.

We visited the nest three more times during our 2 week stay in the area. A male bird was incubating the egg on two of these visits and what seemed to be a female on the third. Without having the two birds together to compare their size and without taking measurements we cannot definitely say that this bird was a female, although it seemed much larger and had a longer bill than the bird seen on the other two visits.

On 20 January 1987, Ralph Powlesland, Department of Conservation, found the egg abandoned in the burrow. From its smell and the discharge of fluid, the egg may have been abandoned for 2-3 weeks. The egg contained a fully formed embryo, probably 1 or 2 days from hatching. The preserved embryo was examined by Jim Jolly and Brian Reid, Department of Conservation, who considered it close to hatching.

The incubation period of the Stewart Island Brown Kiwi is not known, but that of the North Island Brown Kiwi (*A. a. mantelli*) is 71-84 days (Robson 1947; Reid & Williams 1975; Reid & Rowe 1978, unpub. report of Otorohanga Zoological Society).

From the probable length of the incubation period and the likely number of days it had been abandoned before being retrieved, the egg was probably laid about mid to late October. Therefore in November the female would have been sitting on the egg about 4-6 weeks after it was laid.

Two kiwis in a burrow containing an egg and the female sitting on the egg are unusual. Information on the North Island Brown Kiwi suggests that the female leaves the egg within 24 hours of laying it and that the male does all the incubation (Buller 1888; Reid & Rowe 1978; M. Potter, pers. comm.). However, Robson (1947) found that the female may sit on the egg for up to three days after laying it but that the male did the rest of the incubation.

On 8 December 1986 we found a second kiwi nest, in a narrow burrow in fairly open manuka scrub, 1-2 m high. At the time, a male kiwi was incubating the egg, but when we visited the nest late in the afternoon the next day, a larger bird with a longer bill, presumably therefore a female, was sitting on the egg. This nest was also inspected in January 1987 by Ralph Powlesland and found to be empty. If the egg had successfully hatched, the female, in December, would have been sitting on the egg at least four weeks after it was laid (assuming an incubation period of 71-84 days and a hatching date of about 15 January).

Our observations suggest that the female Stewart Island Brown Kiwi covers or incubates the egg while the male is foraging. Observations in September 1957 by Soper (1976) suggested that the female Stewart Island Brown Kiwi has a share in parental care. On four consecutive nights he saw a female emerge from a burrow that contained a chick less than a week old. Detailed observations are now needed on the breeding behaviour of the Stewart Island Brown Kiwi to find out the extent of female involvement in incubation and parental care.

#### LITERATURE CITED

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### Spur-winged Plover longevity record

On 2.3.87 I last saw a Spur-winged Plover (*Vanellus miles novaehollandiae*) which I had banded BR/YA at Akers Road, Otatara, near Invercargill, on 8.9.71. I believe that this bird, a male, was at least 20 months old when banded. Its mate in 1971 was a banded female OY/AG. OY/AG's previous mate, also a banded bird, had been killed on the road by a vehicle on 1.11.70. On 15.11.70 I saw OY/AG in coition with a "new" male which had noticeably stiff legs and knobby knees. I saw her again with this bird on 18.5.71, 18.6.71, 16.7.71 and 8.9.71, when the nest was found and the male trapped and banded. A male Spur-winged Plover is known to have attempted coition at 10 months of age (Barlow *et al.* 1972), and so BR/YA was probably at least that age on 15.11.70.

In early July 1985, Southland Acclimatisation Society field officer Mark Sutton reported seeing a banded Spur-winged Plover at Akers Road, and on 13.7.85 I found the bird and had good views of the leg-bands through a 20x telescope. The red and yellow bands were easily picked up, but the blue band had only a small fleck of paint left in one place. These were aluminium bands which had been anodised, enamelled and baked. The monel (M) band was bright and shiny. It had been electroplated as an aid to visibility. On 13.7.85 I saw BR/YA copulating with an unbanded female and later found their nest about 300 m from BR/YA's 1971 nest and banding site.

I next saw BR/YA on 18.6.86, when he had moved 2 km to soccer grounds at Sandy Point, on a strip of land between the road and the Oreti River. Only the yellow band was easily identified. The "blue" band was pale dull metal with no visible paint left, and the red band was mostly pale and dull with small flecks of red paint in places in the engraved numbers on the band. The electroplated monel band was still bright, and could sometimes be seen without telescope or binoculars when caught by the sun.

Between June 1986 and February 1987, I saw the bird on almost every one of my fortnightly visits to the area. He was one of a flock of 9-17 Spur-winged Plovers which regularly fed, loafed and preened on the soccer grounds and a tidal spit across the river. At least five of the birds had deformed feet or legs, a known effect of living in an area with a high sheep population (Barlow 1978a). Throughout the 1986/87 breeding season I saw no territorial behaviour or signs of breeding in this area. Harriers (*Circus approximans*)