

NOTORNIS

is the journal of the Ornithological Society of New Zealand (Inc.)

Editor B. D. Heather,
10 Jocelyn Crescent,
SILVERSTREAM

VOLUME 35

PART 1

MARCH 1988

SOME CHARACTERISTICS OF RED-CROWNED PARAKEETS ON THE POOR KNIGHTS ISLANDS

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ABSTRACT

Measurements, plumage and moult of Red-crowned Parakeets (*Cyanoramphus novaezelandiae novaezelandiae*) were recorded during a banding study on Aorangi Island, Poor Knights Islands, between 1978 and 1986. Males were significantly larger than females in all measurements and in weight. Weight varied throughout the year and was highest in May and lowest in November. The weights of males was significantly less during October and November than at other times of the year, but there were no significant variations in the weight of females. More males than females were caught, and recaptures suggested that females had a lower survival rate than males. Two of the 329 parakeets banded had plumage characteristics of Red-crowned x Yellow-crowned Parakeet (*Cyanoramphus auriceps auriceps*) hybrids. Casual observations indicated that the breeding season extended from late October to January. Most birds were in active moult by late February.

INTRODUCTION

Within New Zealand, *Cyanoramphus* parakeets occur on the North, South and Stewart Islands, and many offshore islands (Taylor 1985a). Although Red-crowned Parakeets (*C. novaezelandiae novaezelandiae*) were once widespread on the North and South Islands (Oliver 1955), few have been seen there in the past 25 years, and then only in large forest remnants (Bull *et al.* 1985). However, the species is still widespread and common on most islands in the Hauraki Gulf and on the Alderman Islands, Kapiti Island, Stewart Island and many of its off-liers, and the Auckland Islands (Taylor 1985a).

Although Red-crowned Parakeets are widespread, there have been few detailed studies of them. Dawe (1979) studied their food and feeding

behaviour on Little Barrier and Tiritiri Matangi Islands and Nixon (1982) examined aspects of their ecology and morphology during his wider study of *Cyanoramphus* parakeets. Taylor (1985a) reviewed their status, habits and conservation in the New Zealand region.

Red-crowned Parakeets are abundant on the mammal-free Poor Knights Islands. On Aorangi Island, the smaller of the two main islands in the group, fresh water is limited to an ephemeral stream and several seeps, which attract large numbers of parakeets to drink and bathe. I took advantage of this situation to trap and band parakeets to examine particularly their measurements, weight, plumage, and moult.

METHODS

Parakeets were caught in mist nets during nine visits to Aorangi Island (35°28'S, 174°44'E) between January 1978 and November 1986. The dates of these visits are given in Table 1. Except in September-October 1981, when the nets were set at Urupa Point, all mist-netting was done at the stream in Puweto Valley. Place names mentioned in the text follow Onley (1982).

TABLE 1 — Numbers of Red-crowned Parakeets mist-netted on Aorangi Island, Poor Knights Islands, 1978-1986

DATE OF VISITS	New Birds Captured			Recaptured	
	Males	Females	Unknown	Males	Females
1-17 January 1978	-	-	10	-	-
19 February-9 March 1980	30	48	8	2	-
23 October-2 November 1980	19	10	-	2	1
5 September-11 October 1981	7	3	-	-	-
9-27 November 1981	16	4	-	1	-
23 November-8 December 1982	11	6	-	1	-
30 April-9 May 1983	56	15	-	4	1
17-27 August 1984	44	19	-	5	1
24 October-1 November 1986	17	6	-	8	-
TOTAL	200	111	18	23	3

During the first visit I recorded only weight, but on the second visit I recorded weight and wing length (length of the flattened and straightened chord). On subsequent visits bill length (from the anterior edge of the

cere to the tip of the upper mandible), bill width (distance across the widest part of the upper mandible), and tarsus were measured to the nearest 0.1 mm with vernier calipers; wing length and tail length to the nearest 1.0 mm using a stopped steel ruler; and weight to the nearest 1.0 g using a 100 or 300 g Pesola spring balance. All birds captured were examined for moult.

Bill size is a reliable indicator of parakeet sex (Nixon 1982). Therefore bill length was plotted against bill width. The measurements cluster into two distinct groups (Figure 1), and birds with larger bills were assumed to be males. The wing length and weight of parakeets captured in February-March 1980 were compared with a plot of these measurements recorded from all birds sexed on the basis of bill size. Most birds captured in February-March 1980 could be assigned to a sex because the plot of their wing length and weight fell well within the cluster of measurements for assumed males and females.

Systematic observations of parakeets were confined to those captured while mist-netting, and all other aspects of parakeet biology reported are anecdotal.

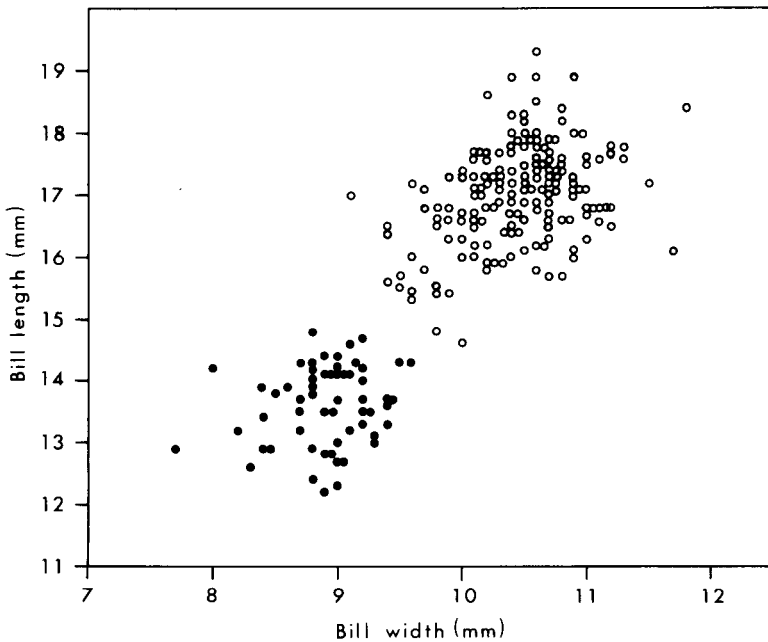


FIGURE 1 — Bill length and bill width of assumed male (○) and female (●) Red-crowned Parakeets captured on Aorangi Island, Poor Knights Island

RESULTS

Measurements and weight

A total of 355 parakeet captures, involving 329 birds, were made (Table 1). About twice as many unbanded males as females were caught, but recaptured males outnumbered recaptured females by about 8:1. The longest interval between banding and recapture was 6 years, 8 months and 3 days, for an adult male banded on 25 February 1980 and recaptured on 28 October 1986.

Males were significantly larger ($P < 0.001$) than females in all measurements and in weight (Table 2).

TABLE 2 — Measurements and weight of Red-crowned Parakeets on Aorangi Island, Poor Knights Islands

		\bar{x}	SD	Range	N
Bill length	M	17.0	0.79	14.6-19.3	180
	F	13.6	0.63	12.2-14.8	62
Bill width	M	10.4	0.46	9.1-11.8	174
	F	8.9	0.36	7.7- 9.6	59
Tarsus	M	21.1	0.84	19.9-23.2	14
	F	20.2	0.85	18.9-22.0	11
Wing length	M	130.4	5.01	114-142	143
	F	122.7	5.27	104-135	54
Tail length	M	133.9	13.68	99-164	55
	F	125.9	12.03	103-147	22
Weight	M	82.1	8.80	63-113	181
	F	67.9	7.48	50- 90	64

Weight varied during the year (Figure 2). The mean weights of males and females were highest in May and declined gradually from August to November. By February-March the weights had increased. The pattern of weight change was similar for both males and females, but the degree of weight change was greater for males. Analysis of the weight data using single factor analysis of variance (ANOVA) and Student-Newman-Keuls procedure (Sokal & Rolf 1969) showed significant differences ($P < 0.05$) in the weights of males between February to September and October to November. There was no significant difference ($P > 0.05$) in the weights

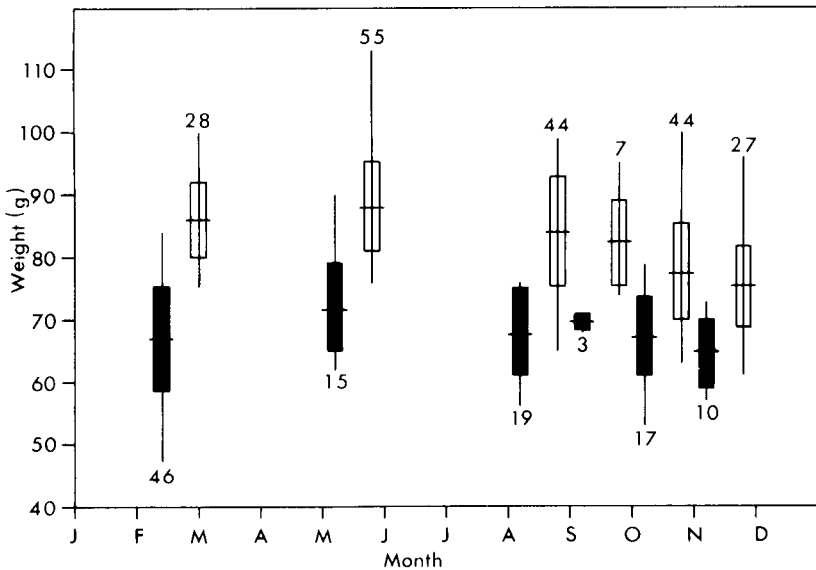


FIGURE 2 Mean (\pm SD) and range of weight of male (open bars) and female (closed bars) Red-crowned Parakeets at different times of the year. The plot of female measurements has been offset for clarity. Numbers indicate sample size.

of females between any months. Males lost proportionally more weight than females (14.8% cf. 9.7%) during spring.

Plumage and moult

Four of the 329 parakeets captured had plumage colouration different from that of a typical Red-crowned Parakeet. One bird had a single yellow feather on its back and two birds had an orange band across the hind edge of the crown. When one of the latter birds was recaptured 15 months later, it still showed the same colour variation. The fourth bird had a patchy red and yellow crown. Most of the crown feathers were red and yellow, yellow being particularly noticeable at the base of the feathers. Measurements of these birds lay within the range for Red-crowned Parakeets caught in this study.

Active moult was recorded during February and March 1980 and May 1983. In February-March, of the 88 parakeets captured 63.6% were in old plumage, 31.8% were in moult and 4.6% had new plumage. Of the 28 birds in moult, nine were in primary moult, 16 were moulting the coverts, 14 the crown and three the tail feathers. Most parakeets were in new plumage by May, and the only moult recorded was in the crown feathers of five of the 76 (6.6%) captured. Some birds had tail feathers missing at other times of the year, but because these feathers are loose I did not consider their loss to be a sign of active moult.

Behaviour

On all visits parakeets were seen to commute between the main islands of the group, a distance of about 150 m. Parakeets usually moved about Aorangi in pairs throughout the year but groups of up to eight birds were seen occasionally. Whenever a parakeet was caught it was usual for another to fly about the net in an agitated manner.

Between January and March, single parakeets were often found roosting in hollow sections of cabbage trees (*Cordyline* sp.) at night.

Feeding

In January parakeets were seen to feed on the seed heads of the jointed rush (*Leptocarpus* sp.) and toetoe (*Cortaderia richardii*). Grasping the base of the seed head with the bill they pulled the seed head through the bill to dislodge the seeds into the gape. They were also seen to eat ripe seeds of *Coprosma macrocarpa* and *Macropiper exulans*.

From February to May parakeets were seen to eat only the seeds of karo (*Pittosporum crassifolium*), opening the top of the soft unripe seed capsule and removing the seeds. Occasionally they fed on capsules which had fallen to the ground.

In August, parakeets fed on karo which were dispersed among the litter, husking the seeds and eating only the kernel. They ate only seeds which were on the surface and did not scrape the litter.

In October and November the only food they were seen to take was the flowers of pohutukawa (*Metrosideros excelsa*). The parakeets seemed to bite off the flower heads and chew the stamens before dropping the flowers.

Breeding

Nesting burrows in the banks of the Puweto Valley stream were cleaned out at about the end of October. On 3 January a nest containing three small young was found in a burrow near the top of the stream bank. The nest chamber was 100 mm from the burrow entrance and droppings lined the lower half of the rim. An adult brooded the young during the nights of 3 and 10 January. No active nests were found during other visits, indicating that breeding had finished by mid-February.

DISCUSSION

The capture of 329 Red-crowned Parakeets during this study demonstrates the abundance of this species on the Poor Knights Islands. Unfortunately too few recaptures were made for me to estimate the size of the population and survival rate of the parakeets. The movement of the parakeets between islands probably had much to do with the low recapture rate.

The predominance of males captured may be a true reflection of the sex ratio of the parakeet population but, in part, it may also be a result of different behaviour, such as males moving about more than females.

However, the even greater predominance of recaptured males suggests that males have a higher survival rate than females. This aspect of the parakeet population on the Poor Knights Islands needs more study.

This study extends the ranges of measurements quoted by Oliver (1955), Forshaw (1973) and Nixon (1982). This is to be expected, however, because previously only small samples (usually fewer than 10 birds) had been measured.

The weight of birds is influenced by environmental and ecological factors. Activities associated with breeding may have resulted in the weight loss from October to November. The male feeds the female during incubation and assists with feeding the young (Taylor 1985b) and this probably accounts for the significant weight loss by males during October and November, compared with no significant weight loss by females during the same period. Presumably food supplies were reduced during winter (May to July) because the weights of both sexes declined from May to August. Presumably recently fledged birds were among the parakeets captured during February-March 1980. However, as these were not identified I cannot tell whether they affected the range of weights.

The presence of a few parakeets with orange in the crown suggests interspecific hybridisation. The head pattern of two of these birds was similar to the lower left illustration of *C. n. chathamensis* × *C. a. forbesi* hybrids recorded by Taylor (1975), thus suggesting Red-crowned × Yellow-crowned hybridisation. The report of two possible Yellow-crowned Parakeets (*C. auriceps auriceps*) by Chambers (1956) and the presence of these hybrids indicates that Yellow-crowned Parakeets may reach the Poor Knights from the adjacent mainland (a distance of 20 km) or from the Hen and Chicken Islands 45 km to the south. The only previous report of parakeet hybridisation in unmodified habitats is from Little Barrier Island, where Veitch (1979) recorded a Red-crowned interbreeding with a Yellow-crowned Parakeet. This situation contrasts with that where the habitat has been drastically modified and hybrids occasionally become locally abundant, as on the Auckland Islands (Taylor 1975, 1985a, 1985b). On the Poor Knights hybridisation probably occurred because of a lack of conspecifics, but on the Auckland Islands the highly modified habitat and rarity of conspecifics both apply (Taylor 1985a).

Movements of *Cyanoramphus* parakeets between islands to feed is not unusual. Fleming (1939) reported that Chatham Island Red-crowned Parakeets (*C. n. chathamensis*) and Forbes' Parakeets (*C. a. forbesi*) flew the 2.5 km from Mangere Island to Pitt Island to feed on seasonally available flowers and fruit. Kinsky & Sibson (1959) also reported Red-crowned Parakeets feeding on toetoe and moving between islands in the Poor Knights group.

The breeding season of Red-crowned Parakeets on the Poor Knights Islands (late October to January) is shorter than that recorded on the mainland and the near-shore Tiritiri Matangi Island (August to April) by Dawe (1979). Gill & McLean (1986) commented that there is evidence

that birds have shorter breeding seasons on islands than on the mainland, but whether this results from low food supply, high population density, or some other factor is not known. The breeding season of Red-crowned Parakeets is timed to match the food supply (Taylor 1985a), but on the Poor Knights the shorter breeding season may be due to high population density.

ACKNOWLEDGEMENTS

I am grateful to the many friends who suffered nipped fingers while extracting struggling parakeets from mist nets. My sincere thanks to Sandy Bartle for suggesting that I work on the Poor Knights Islands, and for field assistance. Joy L. Sagar provided invaluable assistance in the field and commented on an early draft of the report. I thank Rowley Taylor for willingly answering my questions about parakeets and for encouraging the study. Earlier drafts were improved by comments from Rowley Taylor and Ralph Powlesland. Finally, I thank the Hauraki Gulf Maritime Park Board for permission to land on the Poor Knights Islands.

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