HABITAT USE IN AUTUMN BY FOREST BIRDS ON SOUTH EAST ISLAND, CHATHAM ISLANDS

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ABSTRACT

Feeding observations of four species of Chatham Island endemic forest birds, Chatham Island Red-crowned Parakeet, Chatham Island Warbler, Chatham Island Tit and Chatham Island Tui, were collected on South East (Rangatira) Island in March and April 1990. The autumn foraging patterns of the forest species were very different. Parakeets had a broad omnivorous diet, Warbler and Tit were entirely insectivorous, and Tui fed mainly on fruit and some invertebrates. Parakeets used the widest variety of food plant species, including those from both forest and saltmeadow habitats. the Tui was the most plant-specific forager, with over 60% of feeding in one forest tree species. Because food availability changes throughout the year, other plant species will probably be important at different times. All birds fed at relatively low levels in the forest, often on the ground. This behaviour would make them particularly vulnerable to predation and may explain why the birds have now almost gone from other islands of the Chathams group.

INTRODUCTION

Four species of Chatham Island endemic forest birds, Chatham Island Red-crowned Parakeet (*Cyanoramphus novaezelandiae chathamensis*), Chatham Island Warbler (*Gerygone albofrontata*), Chatham Island Tit (*Petroica macrocephala chathamensis*) and Chatham Island Tui (*Prosthemadera novaeseelandiae chathamensis*) were once very abundant on the Chatham Islands but are now rare over most of Chatham Island and Pitt Island (Travers 1872, Fleming 1939, Bell 1955, Oliver 1955, Lindsay *et al.* 1959, West 1988). All are still common on South East (Rangatira) Island, which is predator free. Understanding the habitat use patterns of these species where they are common may help explain why they have declined or disappeared elsewhere on the Chatham Islands and point to ways in which these areas may be enhanced to provide habitat for them in the future.

The aim of our study was to quantify plant species used, foraging level, foraging height, foraging station and food type for Chatham Island Parakeets, Warblers, Tits and Tui on South East Island in autumn 1990.

STUDY AREA

The Chathams group lies c.800 km east of New Zealand. South East Island (176°10′ W, 44°20′ S) is one of a small group of islands lying to the south-east of Chatham Island. It is 218 ha and rises to 207 m a.s.l. In 1915, the lower areas of the island were burnt and sown in pasture for farming. The island was gazetted as a Flora and Fauna Reserve in 1954 and the last of the stock was removed in 1961 (Davis 1987). Today it is covered with forest and regenerating shrublands and with saltmeadow and tussockland on the south-eastern shore.

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TABLE 1 — Plant use (percent) by Chathams Island endemic forest birds on South East Island in autumn

Common name	Scientific name	Parakeet n=351	Tui n=29	Warbler n=233	Tit n=104
Forest plants					
Chatham Island ribbonwood	*Plagianthus regius* var. *chathamicus*	30.2	13.8	7.3	7.7
ngaio	*Myoporum laetum*	15.1	62.1	4.3	4.8
Chatham Island mahoe	*Melycitus chathamicus*	1.1	3.5	22.2	32.7
Chatham Island matipo	*Myrsine chathamica*	1.1	3.5	8.6	13.5
Chatham Island akeake	*Olearia traversii*	5.7	-	5.2	1.9
hoho	*Pseudopanax chathamicus*	1.7	-	-	1.9
kawakawa	*Macropiper excelsa*	0.9	17.2	3.9	-
Chatham Island karamu	*Coprosma chathamica*	0.9	-	-	-
Dieffenbach's koromiko	*Hebe dieffenbachii*	14.5	-	1.7	-
muehlenbeckia	*Muehlenbeckia australis*	1.7	-	10.7	11.5
supplejack	*Ripogonum scandens*	0.6	-	0.4	1.9
standing dead tree		0.3	-	5.5	9.6
windthrown tree		0.3	-	12.5	8.7
litter on ground		9.4	-	18.0	5.8
Saltmeadow					
iceplant	*Disphyma australe*	6.0	-	-	-
NZ spinach	*Tetragonia tetragonioides*	1.1	-	-	-
flax	*Phormium tenax*	1.7	-	-	-
tussock	*Poa* sp.	2.0	-	-	-
sedge	*Carex* sp.	2.9	-	-	-
introduced grass spp.		1.7	-	-	-
bidibidi	*Acaena* sp.	0.3	-	-	-
groundsel	*Senecio* sp.	0.3	-	-	-
sea primrose	*Samolous repens*	0.6	-	-	-

TABLE 2 — Frequency of occurrence (%) of foraging Chatham Island forest birds at different heights on South East Island in autumn

Height (m)	Parakeet	Tui	Warbler	Tit
0	23.9	-	20.2	6.7
0 - 1	2.9	-	33.5	48.1
1 - 2	14.3	20.7	18.7	31.7
2 - 3	7.7	3.5	12.5	9.6
3 - 4	3.1	17.2	6.4	1.9
4 - 5	10.8	13.8	3.0	1.9
5 - 6	18.0	10.3	1.3	-
6 - 7	9.4	24.1	1.7	-
7 - 8	3.4	-	1.7	-
8 - 9	0.3	-	0.4	-
9 - 10	2.6	-	0.4	-
10+	2.3	10.3	-	-

TABLE 3 — Foraging levels of Chatham Island forest birds on South East Island in autumn (percent occurrence)

	Parakeet	Tui	Warbler	Tit
Ground	23.9	-	20.6	6.7
Lower understorey	5.4	17.2	41.2	72.1
Upper understorey	4.8	13.8	28.8	19.2
Shaded canopy	29.9	69.0	6.0	1.0
Unshaded canopy	34.5	-	3.4	1.0
Emergent	1.1	-	-	-

METHODS

Habitat use was described by instantaneous sampling (O'Donnell & Dilks 1988). All tracks were walked daily between 23 March and 6 April 1990. The tracks sampled the full range of habitat types present, except for coastal wave platforms. Whenever a bird was encountered feeding, its food and precise position were described by recording plant species (if applicable), foraging level (ground, lower understorey, upper understorey, shaded canopy, unshaded canopy), foraging height (in metres) and foraging station (e.g. foliage, twigs, branches, see Table 4). A total of 717 observations was collected (Table 1).

TABLE 4 — Foraging stations of Chatham Island forest birds on South East Island in autumn (percent use)

	Parakeet	Tui	Warbler	Tit
Foliage	35.9	-	4.3	1.0
Twigs	38.8	62.1	16.7	18.3
Small branch	10.3	37.9	6.9	4.8
Large branch	0.3	-	1.3	1.0
Trunk	-	-	10.7	27.9
Dead trunk	0.6	-	12.5	10.6
Dead large branch	-	-	4.7	4.8
Dead small branch	1.7	-	6.4	4.8
Dead twig	0.3	-	5.2	7.7
Dead foliage	0.3	-	-	-
Vine	2.0	-	11.6	13.5
Air	-	-	1.7	-
Litter	8.6	-	16.7	5.8
Bare ground	0.9	-	1.3	-
Unknown	0.3	-	-	-

RESULTS

Red-crowned Parakeets

Parakeets were recorded feeding on 20 plant species, on dead trees and on the ground, but three plant species, Chatham Island ribbonwood, ngaio and Dieffenbach's koromiko, were most important (60% of observations, Table 1). Most feeding was in the forest but 16.6% of observations were in saltmeadow. Seeds were the most important food (49.3%), followed by fruit (21.9%), unidentified foods (14.9%), invertebrates (13.3%) and leaves (0.6%). The most important seed sources came from koromiko (14.5%), unidentified seeds on the ground (9.4%) and ribbonwood (8.8%). The most important fruit source was ngaio (15.1%) and invertebrate source was ribbonwood (10.5%). All invertebrates taken from ribbonwood appeared to be a leaf miner, which was attacking the foliage. Parakeets were feeding mostly on the ground or in the forest canopy (4-7 m high, Tables 2 & 3). Foliage and twigs were the most important foraging stations (74.7%, Table 4) and deadwood was hardly used at all in autumn.

Chatham Island Warblers

Warblers fed by gleaning invertebrates. They used almost all of the plant species available in the forest but were not recorded in the saltmeadow. Warblers made particular use of dead trees (18%), ground litter (18%) and Chatham Island mahoe (22%) (Table 1). The majority of observations (84.9%) were 0-3 m high in the lower forest storeys (Tables 2 & 3). A wide

range of foraging substrates was used and dead wood was relatively important (29%, Table 4).

Chatham Island Tits

Tits fed only on invertebrates, typically after scanning from a vantage point to sight prey. Tits used most forest plant species and were not recorded in the saltmeadow habitat (Table 1). Most use was made of the commonest forest trees, mahoe and matipo (46.2%), and dead trees (18.3%). Ground feeding was relatively important (Table 2). Tits fed lower in the forest than the other bird species with 86.5% of observations at <2 m, in the lower understorey (Tables 2 & 3). The most important foraging stations were tree trunks (38.5%, Table 4).

Chatham Island Tui

Tui were recorded feeding in only five forest plant species, mostly (62.1%) in ngaio (Table 1). They fed mainly on fruit (86.2%) with the remaining observations being of invertebrate feeding. Sightings of Tui were spread through most levels of the forest, denoting use of both canopy and understorey plants (Tables 2 & 3). Foraging was carried out only on twigs and small branches (Table 4).

DISCUSSION

The autumn foraging patterns of the four study species were very different. Parakeets had a broad omnivorous diet, Warbler and Tit were entirely insectivorous, and Tui fed mainly on fruit and some invertebrates. Parakeets used the widest variety of food plant species, including those of forest and saltmeadow habitats. The Tui was the most plant-specific forager with over 60% of feeding in ngaio. However, because food availability changes throughout the year, other plant species are probably important in other seasons. For example, hoho was common and was hardly used by any bird species, but it is likely that it would be used later in winter when the fruit ripen. Likewise, kawakawa fruit were beginning to ripen in early April and would probably have become a major source of food for Tui and Parakeets. Nixon (1982) recorded marked seasonal variation in the diet of both the Chatham Island Parakeet and Forbes's Parakeet (*C. auriceps forbesi*) on nearby Mangere Island.

All forest birds fed at relatively low levels in the forest and ground feeding was common for Parakeet and Warbler, compared with similar species in mainland New Zealand forests (cf. Gill 1980, O'Donnell & Dilks 1986). Such behaviour also appears to extend to nesting. For example, Dennison *et al.* (1984) found that Warblers nested low to the ground and in dense foliage on South East and Mangere Islands, whereas on the main Chatham Island where rats (*Rattus* spp.) and cats (*Felis catus*) were common Warblers nested high in open foliage in terminal branches, where they were less accessible to predators. If feeding and nesting low in the forest and on the ground were typical behaviour for the forest birds, this behaviour would make them particularly vulnerable to predation and may explain why the birds have now almost gone from main Chatham Island and are now rare on Pitt Island (cf. West 1988).

The importance of ribbonwood, ngaio and koromiko as food plants in autumn, particularly to Parakeet and Tui, suggests another reason for the decline of forest birds on Chatham Island. These coastal plant species appear to have been among the first to be removed by forest clearance and stock browsing when Europeans began farming (A. Baird, pers. comm.). The importance of these plants gives a guide to species which should be incorporated in any habitat rehabilitation and revegetation programmes on Chatham Island.

We recommend that habitat use by Chatham Island forest birds be investigated at other times of the year to give a guide to the plants which may be important in habitat restoration work in the future.

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