HABITAT USE BY CHATHAM ISLAND PIGEONS

By P.E. PEARSON and G.C. CLIMO

ABSTRACT

In October-November 1990, Chatham Island Pigeons (*Hemiphaga novaeseelandiae chathamensis*) in the Tukṳ a tamatea and Awatotara Valleys, Chatham Island, preferred plants characteristic of mixed broadleaf forest over plants typical of tarahinau forest. Mixed broadleaf forest is confined to gullies and valleys in the region. Browsing by cattle, sheep, pigs and possums is rapidly degenerating these forest remnants. Conservation of Chatham Island Pigeon depends on the protection of these remnants.

INTRODUCTION

The Chatham Island Pigeon (*Hemiphaga novaeseelandiae chathamensis*) is a heavier, larger and more drably coloured subspecies of the New Zealand Pigeon (*H. n. novaeseelandiae*). Endemic to the Chatham Islands and endangered, it is the last surviving offshore island subspecies (Clout 1990). Information on its numbers and ecology is sparse, and no comprehensive study of its habitat use has been done. Future conservation and management plans will need accurate data on its habitat requirements. This paper discusses results of a short-term study on Chatham Island Pigeon habitat use.

In July 1990, two pigeons were radio-tagged, and leg jesses were fitted on another in the Awatotara and Tuku Valleys of Chatham Island. The habitat use by these birds and any other pigeons encountered was studied.

METHODS

Habitat use

The method described by O'Donnell & Dilks (1988) was used. However, because the pigeons are rare and inconspicuous, we introduced two important modifications:

1. Instead of following transects, we searched for and watched the radio-tagged birds (Blue and Green). These birds, their mates (Blunk and Grunk), and the bird with leg jesses only (Red) were identified on the habitat use sheets. Other pigeons encountered were listed as unknown.
2. To ensure a large number of observations, birds were followed for up to 2 hours instead of the 5 minutes suggested by O'Donnell & Dilks (1988).

Most of the observations were made in fine weather between 1100 and 1400 hours, but those made in the early morning and evening and in poor weather were also included.

The material in this paper appeared, in somewhat different form, in Department of Conservation Science and Research Internal Report no. 106 (1991).

Care was taken to avoid disturbing the birds. A careful apporoach allowed us to get within 10 metres of most birds.

Every minute, we recorded the position of the pigeon and its activity using three-letter codes assigned to various criteria. Below is a summary of the main definitions and criteria. A full description of the method terminology is in O'Donnell & Dilks (1988).

Activity: BRO, browsing, eating leaves and shoots; GLE, gleaning, eating fruits and flowers; ROO, roosting, asleep with head pulled in, drooping tail, hunched appearance and sometimes breast lowered onto the perch; LOA, loafing, when bird is inactive but not considered roosting; PRE, preening.

Food type: LEA, leaf; FRU, fruit; FLO, flower.

Plant species: HOH, hoho (*Pseudopanax chathamicus*); MAH, mahoe (*Melicytus chathamicus*); MAT, Chatham Island matipo (*Myrsine chathamica*).

Perch type: LBR, large branch; SBR, small branch; FOL, foliage.

Stratum: ABC, above canopy; EME, emergent; USC, unshaded canopy; SHC, shaded canopy.

Bird height above ground: Expressed in metres estimated by observer. Low canopy height in the study area (< 10 m) made estimates to within a metre possible.

Canopy height: Estimated in metres.

Vegetation description

Vegetation in the study region was sampled so that we could compare the availability of tree species with the frequency of use by pigeons.

Six parallel north-south transects 250 metres apart were followed across the Tuku and Awatotara Valleys. At least one transect traced a line of longitude. Every 100 paces, we sampled vegetation (a plot) until 10 plots were completed. Sixty plots were recorded for the Awatotara and 59 for the Tuku.

Plant species occurrence was described by estimating percent cover. We assumed percent cover was a good indicator of the relative availability of plant species. Each plant species within view was ascribed to a forest stratum, and the percent cover by each species in each stratum was estimated. Preliminary observations were that the pigeons primarily used plants of the canopy strata (unshaded canopy, and shaded canopy). Therefore, only plots with trees in the canopy strata (i.e. forested plots) were used in the habitat use calculations. Eighteen plots in the Awatotara and 45 in the Tuku fitted this criterion. Plant fruiting was noted.

Determining plant preferences

Plant use was determined by combining percentages of all activities except flying. Using Ivlev's preference index formula cited in Strauss (1979), we related plant use by Chatham Island Pigeons to plant availability.

$$E = \frac{r_i - p_i}{r_i + p_i}$$

where E is the measure of electivity, r_i the percent use of canopy plant species and p_i the relative abundance of canopy plant species.

RESULTS

Vegetation

Figure 1 shows the relative cover provided by each canopy species in the forested plots. However, canopy species were not uniformly distributed within the study area. In the Awatotara particularly, forest cover was patchy, interspersed by bracken slopes and tree fern gullies. In the Tuku, the lower region of the study area was dominated by tree ferns whereas the upper regions were dominated by trees.

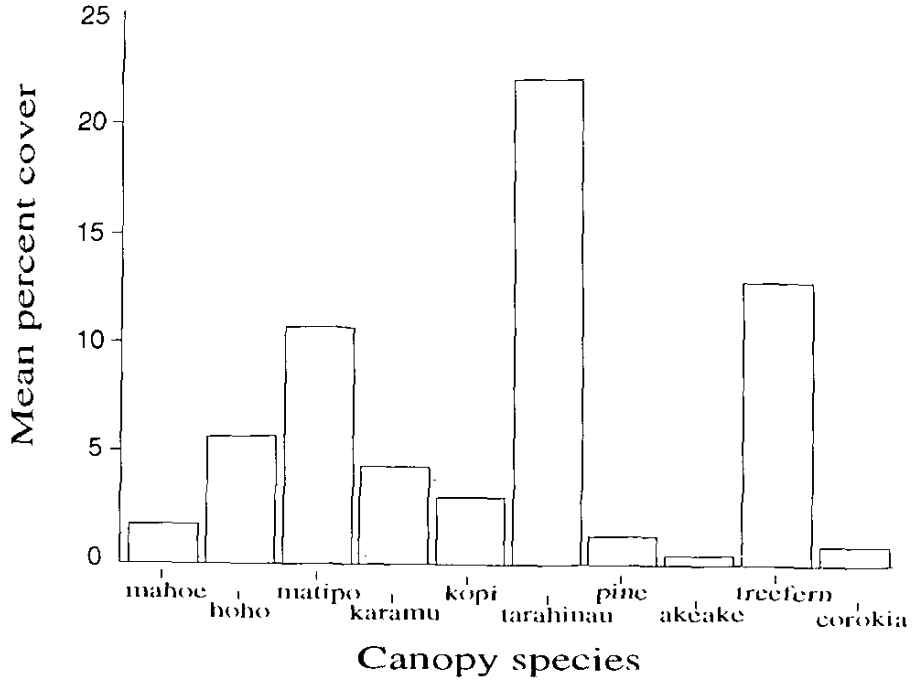

FIGURE 1 — Percentage vegetation cover of forested plots (canopy species) in the Tuku and Awatotara Valleys, n = 63

Tarahinau (*Dracophyllum arboreum*) was more common in upper valley plots, and mahoe (*Melicytus chathamicus*) was in lower valley plots. Hoho (*Pseudopanax chathamicus*), matipo (*Myrsine chathamica*) and karamu (*Coprosma chathamica*) were scattered throughout, but kopi (*Corynocarpus laevigatus*) was in groves. A *Pinus radiata* shelterbelt was in the Awatotara. Pasture grasses surrounded the lower valley regions and were in small clearings within the forest.

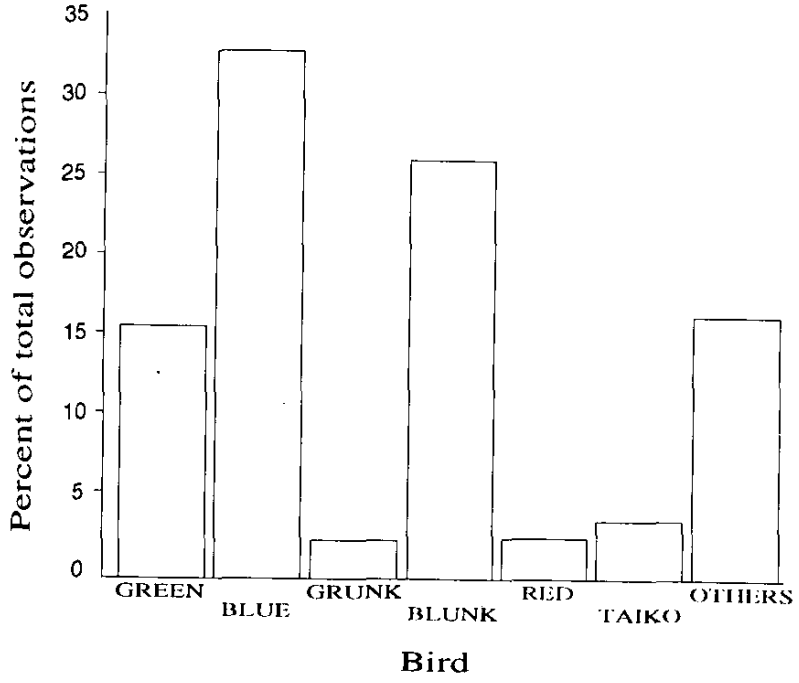

FIGURE 2 — Proportion of observations per bird, n = 5054

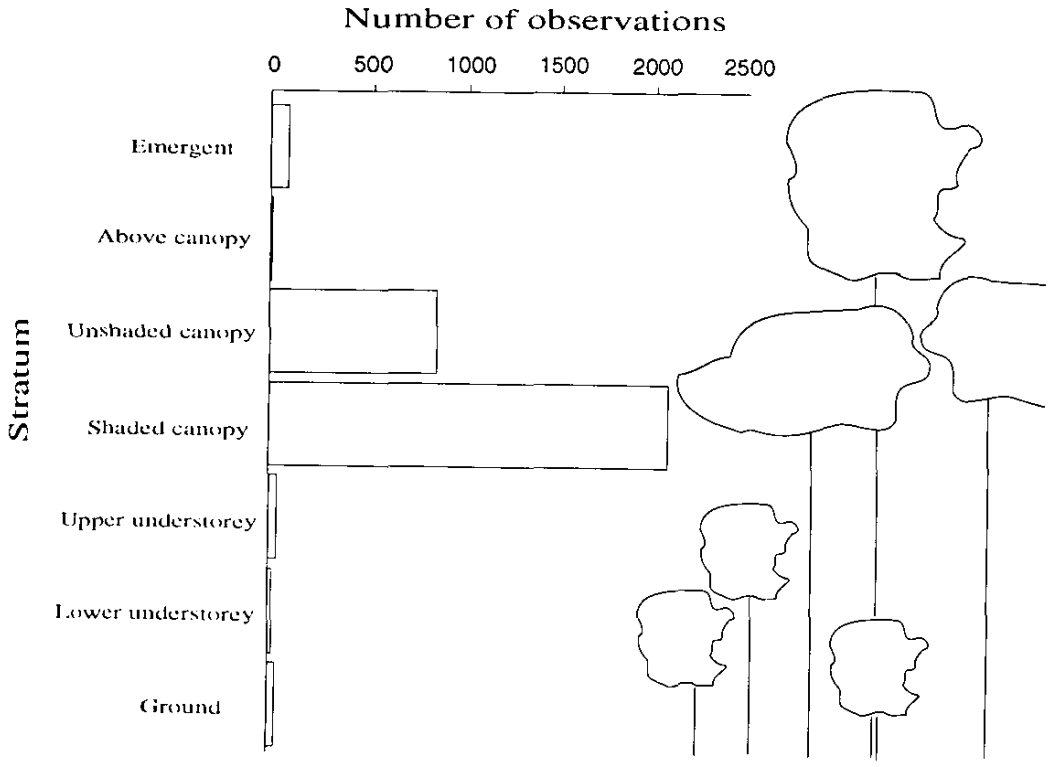

FIGURE 3 — Location of Chatham Island Pigeons within vegetation strata. Birds were mostly observed in canopy strata, n = 3177

Habitat use

We made 5054 observations. Over half (61.5%) were of one pair only (Blue and Blunk, Figure 2). Green, the only other significant contributor, provided 15.7% of all observations. Nearly all observations (94%) were of pigeons in the canopy strata (Figure 3). This supports our assumption that the measure of canopy cover is a good measure of the relative availability of plant species for pigeons.

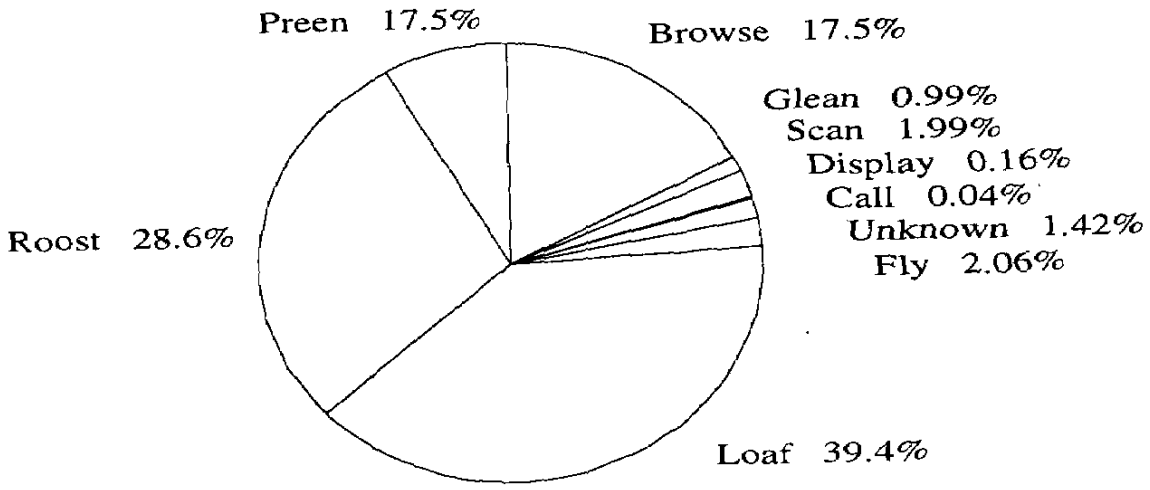

FIGURE 4 — Percentage of observations Chatham Island Pigeons spent in all activities in October-November 1990, n = 5054

Three-quarters (75%) of the observations were of pigeons roosting, loafing and preening (Figure 4) usually in hoho but also in matipo. Pigeons were only occasionally recorded flying.

The greatest proportion of observations were of pigeons in hoho (Figure 5). They often used matipo, occasionally mahoe, karamu, tarahinau, kopi and *Coprosma propinqua* var. *martinii*, but seldom poteretere (*Cyathodes robusta*), pasture, tree ferns and akeake.

The pigeons loafed, roosted and preened mainly in hoho and matipo, but often in mahoe, karamu, kopi, and tarahinau (Figure 6).

Feeding observations

Table 1 gives the total number of feeding observations. Hoho was the most important food plant. Mahoe and *Coprosma propinqua* var. *martinii* were the next most important, and pigeons sometimes fed on matipo and karamu. Pigeons were seldom seen feeding on the ground and rarely on kopi, tarahinau, and poteretere. They did not feed on akeake or tree ferns.

Browsing was the dominant feeding method (Figure 4), particularly in hoho, mahoe and *Coprosma propinqua* var. *martinii* (Figure 7). Some hoho, mahoe and matipo fruits were eaten (Figure 7). Poteretere, common on heathlands in the region, was fruiting copiously but pigeons were not seen eating the fruit.

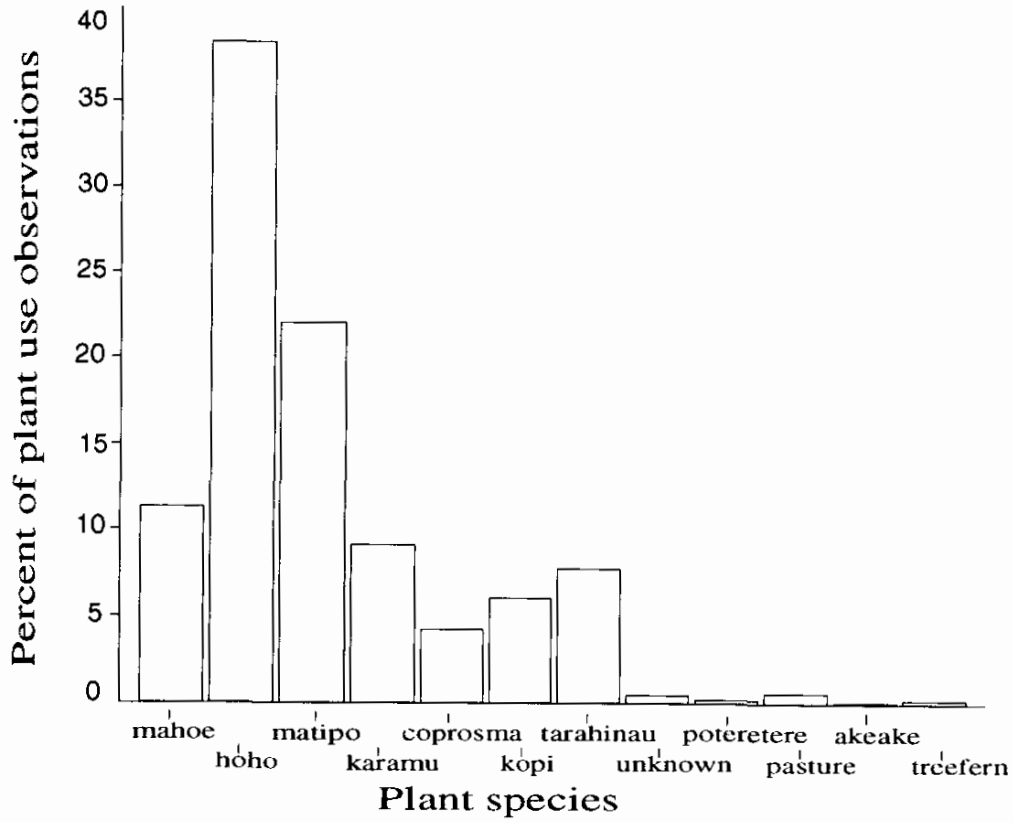

FIGURE 5 — Plants used by Chatham Island Pigeons for all activities, except flying, n = 4950

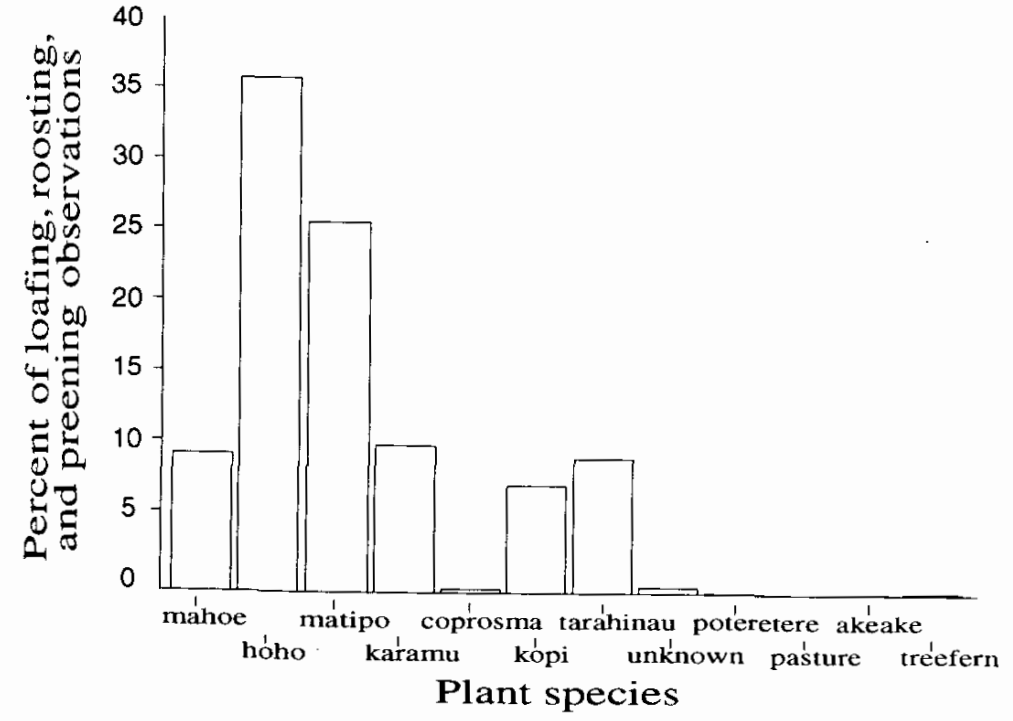

FIGURE 6 — Plants used by Chatham Island Pigeons for loafing, roosting and preening (i.e. non-feeding activities), n = 3836

TABLE 1 — Total number of feeding observations, and number of feeding observations recorded per food plant, October-November, 1990, $n = 932$

Plant species	Foliage	Fruit/Flowers	Total
Mahoe	168	11	179
Hoho	383	30	413
Matipo	47	9	56
Karamu	51	0	51
Kopi	1	0	1
Tarahinau	2	0	2
Poteretere	5	0	5
Coprosma*	198	0	198
Pasture	26	0	26

* = *Coprosma propinqua* var. *martinii*

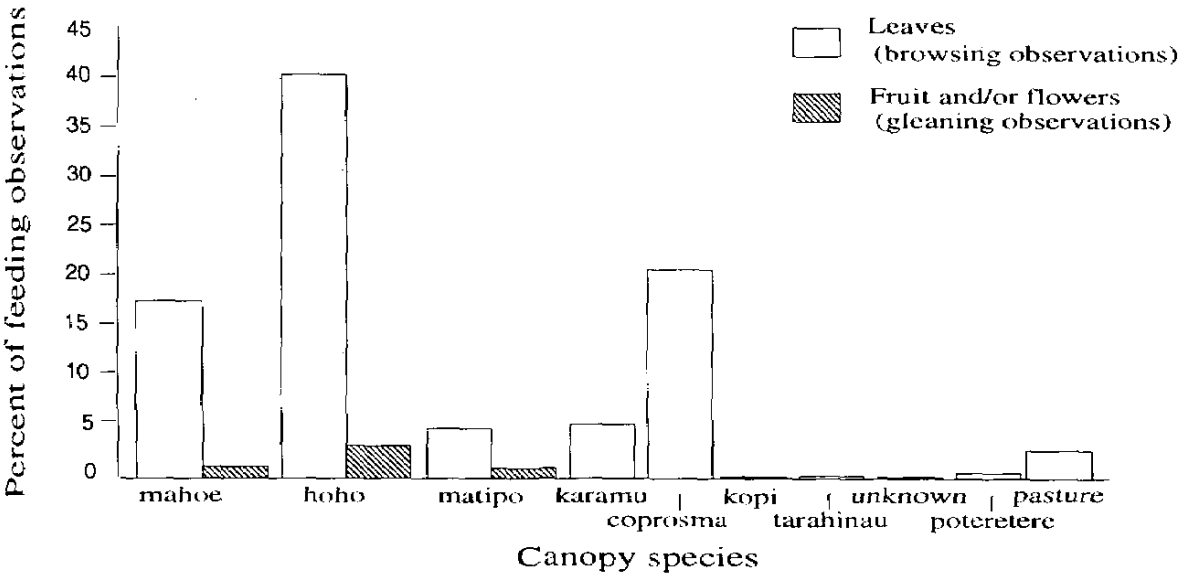

FIGURE 7 — Food plants of Chatham Island Pigeons. Only fruits and/or flowers of mahoe, hoho and matipo were taken, $n = 932$

Habitat preference

Ivlev's preference index (Figure 8) relating the frequency of plant use (Figure 5) to the frequency of availability (Figure 1) shows that the pigeons preferred some canopy plants over others. During our study, hoho, mahoe, matipo, karamu and kopi were preferred over tarahinau, akeake, tree ferns and *Corokia macrocarpa*, which were avoided.

DISCUSSION

Diet

Chatham Island Pigeons are rare, sedentary and difficult to find. Nearly three-quarters of our habitat use observations were on only three individuals,

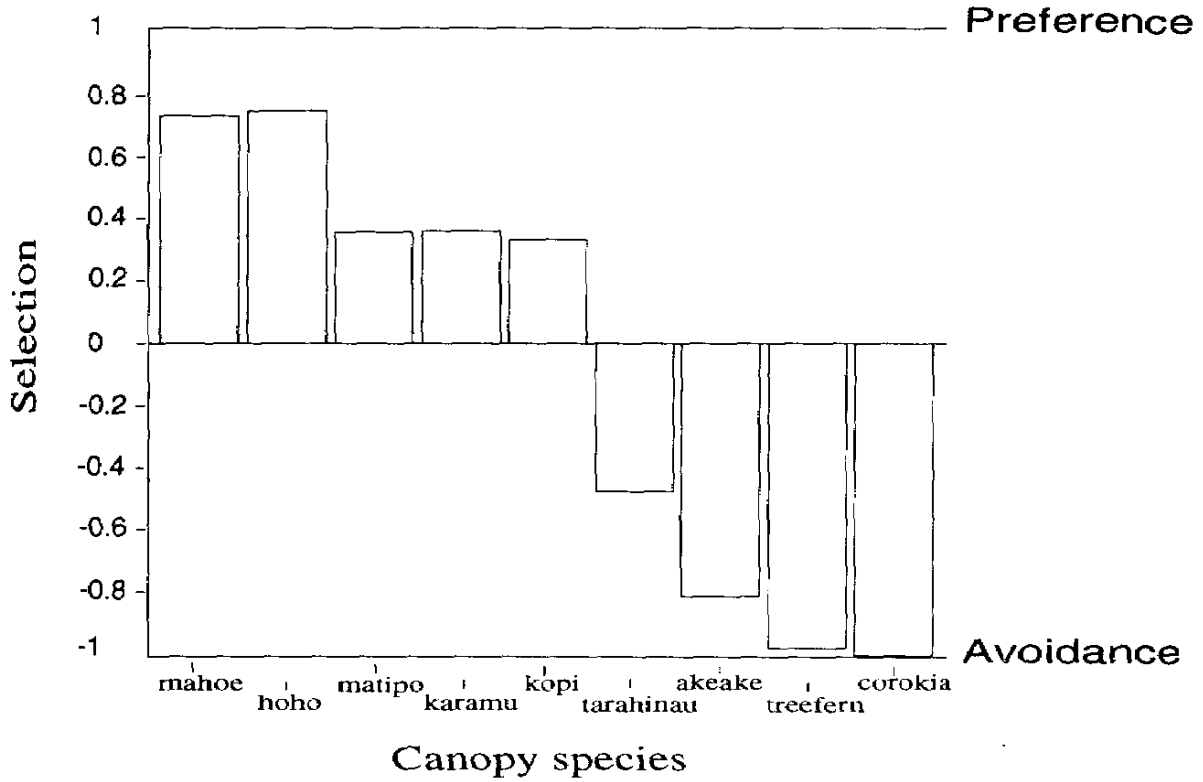

FIGURE 8 — Selection of canopy plant species by Chatham Island Pigeon. Ivlev's preference index U-A/U + A was calculated, where U = percentage of use of plant species and A = percentage of availability (% cover) of each plant species. The index varies between + 1 for preference and -1 for avoidance. Figures close to 0 show non-selective use.

and the data are strongly influenced by the behaviour of these birds. Our effort to obtain a large number of observations by concentrating on the most accessible birds resulted in this bias. Following many more individuals for shorter periods should reduce biases (O'Donnell & Dilks 1988).

Coprosma propinqua var. *martinii* featured strongly in the browsing observations, but all these observations were from Blue and Blunk only. Similarly, only two birds browsed while on the ground and then only during a few prolonged sessions. For example, the Taiko Camp bird was observed only once feeding on pasture but it did so for over half an hour. While these data show that the pigeons have a varied diet, the extent to which the entire population feeds on pasture and *Coprosma propinqua* var. *martinii* is unknown. Other pigeons have been seen feeding on pasture (M. Blake, pers. comm., and Morris 1979) and in December 1990 the Taiko bird was often seen doing so (G. Murman, pers. comm.). Pigeons may feed on pasture more than we observed. If they do, they may then be vulnerable to cat predation.

During our study the pigeons fed mainly on leaves. A small number of hoho, mahoe and matipo were flowering and setting fruit, but the pigeons mostly browsed these trees ignoring the fruit. No ripe fruit was seen during our study. Hoho, for example, does not ripen until winter (Salmon 1980). Some plants not important in our study may become more important when their fruits ripen. These include kopi, mahoe, and *Corokia macrocarpa*. In

March 1991, pigeons were seen taking ripe fruits of *Corokia macrocarpa* (C. Tisdall, pers. comm.). Morris (1979) noted that observers saw pigeons "taking" *C. macrocarpa* but did not state whether fruits or foliage.

Plants from which pigeons have been seen taking fruit are *Coriaria arborea, Macropiper excelsum* and *Rhipogonum scandens* (Morris 1979). All three were in the study area but their fruits were not ripe. The dry, capsular fruits of tarahinau are probably not eaten by the pigeons.

Fruiting species may become so important to the pigeons that they travel some distance to obtain fruits. The only *Fuchsia excorticata* seen in the study area was a seedling directly beneath a favourite roosting site of Blue and Blunk in the Awatotara. The nearest known stand of *F. excorticata* is near Maipito, about 12 km north of the Awatotara and it is possible our study pigeons have visited it.

The pigeons did not attempt to breed during our study. Our feeding observations might reflect diet typical of a non-breeding year only.

Habitat preference

Our data show that Chatham Island Pigeons prefer mahoe, hoho, kopi, karamu and matipo: species typical of mixed broadleaf forests on the Chatham Islands (Cockayne 1901, Kelly 1983). Our data also show that the pigeons avoid tarahinau and tree ferns, which dominate upland tarahinau forests (Kelly 1983). The importance of mixed broadleaf forest may become even more marked during the height of the fruiting season. However, not all preferences were solely based on food selection. Kopi, for instance, was used only for loafing and preening.

Quality of remaining habitat

The Southern Tablelands are dominated by tarahinau forest and *Sporodanthus* wetland. Mixed broadleaf forest is only in gullies and valleys (Kelly 1983) such as the Tuku and Awatotara. Tarahinau forest does contain food species, e.g. hoho, and probably supports some pigeons, and we saw feathers and feeding sign in this forest type. However, because our data show that the pigeons prefer plants typical of mixed broadleaf forest, we suggest these mixed broadleaf remnants are the principal locations for pigeons in the Southern Tablelands.

These remnants are restricted and under threat. The Awatotara and the lower Tuku Valleys are still being modified and deteriorating through browsing by cattle, sheep and possums and rooting and browsing by pigs. The lower Awatotara has suffered noticeable loss of canopy trees in the last 10 years (B. Tuanui, pers. comm.) and there is extensive grazing damage by cattle. Only bush patches remain. The lower Tuku has a healthier, more intact canopy but is also deteriorating and shows much browsing damage in the understorey and ground strata plants. Canopy tree seedlings are constantly browsed and uprooted. The long-term survival of Chatham Island Pigeons relies strongly on the protection and enhancement of these mixed broadleaf refuges.

ACKNOWLEDGEMENTS

We thank the following for help during fieldwork, office work, and for reading draft manuscripts: Peter Dilks, Andy Grant, Judy Grindell, Geordie Murman, Alan Munn, Colin O'Donnell, Ralph Powlesland, Bruce and Liz Tuanui, and Colin Webb.

LITERATURE CITED

ALLAN, H. H. 1961. Flora of New Zealand. Vol. 1. Government Printer

CLOUT, M. C. 1990. The Kereru and its forests. Birds International 2: 10-20.

COCKAYNE, L. C. 1901. A short account of the plant covering of Chatham Island. Trans. Proc. NZ Institute 34: 243-325.

KELLY, G. C. 1983. Distribution and ranking of remaining indigenous vegetation in the Chatham Islands, with site notes and introductory text. Botany Division Vegetation Report no. 474. Botany Division. DSIR.

MORRIS, R. 1979. Observations of the Chatham Island Pigeon in Cascades Gorge. Notornis 26: 390-392.

O'DONNELL, C. F. J.; & DILKS, P. J. 1988. A method for quantifying habitat use of forest birds. Science and Research Series No. 4, Department of Conservation, Wellington.

SALMON, J. T. 1980. The Native Trees of New Zealand. A. H. and A. W. Reed.

STRAUSS, R. E. 1979. Reliability estimates for Ivlev's electivity index, the forage ration, and a proposed linear index of food selection. Trans. Amer. Fisheries Soc. 108: 344-352.

WILSON, H. D. 1982. Field Guide: Stewart Island Plants. Field Guide Publications.

PAUL PEARSON, *4/13 Salisbury St, Christchurch,* and
GIDEON CLIMO, *Maud Island Base, Nelson/Marlborough Conservancy, Department of Conservation, Private Bag, Havelock*