HABITAT RELATIONSHIPS OF FOREST BIRDS IN HANMER FOREST PARK

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ABSTRACT

During a two month survey of birds in Hanmer Forest Park, we compared the relative abundance of eight species over seven different areas. Chaffinches were the most abundant species while bellbirds were the most abundant native species. Bird species richness did not differ substantially between native and exotic forests. Native species and introduced species occurred in both native and exotic forests, and there was no tendency for native species to be found close to native forests. Our data provide a baseline for future studies of forest birds in Hanmer Park.

KEYWORDS: Hanmer Forest Park, bird survey, community structure, habitat use.

INTRODUCTION

Relative density studies of bird communities have provided valuable information on the condition of native and exotic birdlife and habitats throughout New Zealand (Gibb 1961, Clout and Gaze 1984, Taylor 1985). A five year bird study in Mount Aspiring National Park provided information on the state of the stoat and rat populations and on vegetation damage caused by red deer (Child 1981). Clout and Gaze (1984) discussed constraints such as the absence of fruit and nectar, and of holes for hole-nesting species, which prevent indigenous birdlife from living in exotic forests. Other researchers (Crook and Best 1974, Kikkawa 1974) found that birdlife in beech and pine forests was impoverished due to the remarkably uniform composition of the habitats.

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We investigated the present status of birdlife in Hanmer Forest Park by examining relative abundance and species present of birds in native and exotic forests during the late winter and early spring of 1986. This study establishes a baseline for the area for future studies of the status of native bird species, invasion by exotic birdlife, and changes in the avian community in relation to habitat modification.

STUDY AREA

From August 5th to October 7th we conducted field research in Hanmer Forest Park, Amuri County (42°30'S, 172°49'E). Hanmer Forest Park is unique in that commercial pine plantations are adjacent to extensive areas of native beech forests. Using existing trails and roads where possible, we selected seven transects ranging from native forest along the Dillon Stream in the east to Radiata pine on Manuka Road in the west. Each transect consisted of ten stations spaced approximately 200 m apart, except the Mt Isobelle Road transect which involved only six stations due to spatial limitations. Table 1 lists the seven transects and the features of each one. Since vegetation structure is an important variable in avian communities, we have illustrated the horizontal and vertical characteristics of each transect (Fig. 1)

METHODS

Bird communities were surveyed along each transect using the widely accepted method of Dawson and Bull (1975), which provides relative density estimates from five minute counts (5-min counts). We evaluated DF, CN, WF, SC, and MI transects five times and MR and DS transects six times between August 5 and October 7, randomly selecting the order in which transects were sampled within sets of seven work days. Five-minute counts of the number of birds heard and seen were conducted at each of the ten stations along all the transects except MI. Transect MI, having only six stations, was counted twice in one work day yielding 12 recordings (two from each station). At each station we estimated wind intensity and the amount of sunlight hitting the forest canopy, measured temperature, and recorded the time.

The counts were conducted between 9:00 and 13:00 to avoid the dawn chorus and the afternoon slump in avian activity (Dawson 1981). To minimise bias further, the study was restricted, in most cases, to days without rain or heavy winds.

We conducted 380 5-min bird counts. Adequate sample sizes for statistical analysis were obtained for eight species. The means and variances of these data were used to compare the abundance of bird species following the technique of Clout & Gaze (1984). As Dawson and Bull (1975) demonstrated, the number of birds counted per five minutes is not normally distributed. Therefore, a square-root transformation was performed on the counts to make the data more symmetrical around their means. An analysis of variance was used to compare relative densities of each species across habitat types. Because transects were repeatedly sampled, the assumption of independence was not fully met; thus we accepted a significance level of $P<0.01$ when interpreting the analysis of variance.

Scientific names for birds follow Falla et al. (1978); scientific, English and Maori names for the bird species detected are given in Appendix 1.

RESULTS

DISTRIBUTION OF NATIVE BIRDS

Of the fourteen native species of birds recorded, bellbirds were the most common and silvereyes the most ubiquitous. However, despite their abundance, the mean

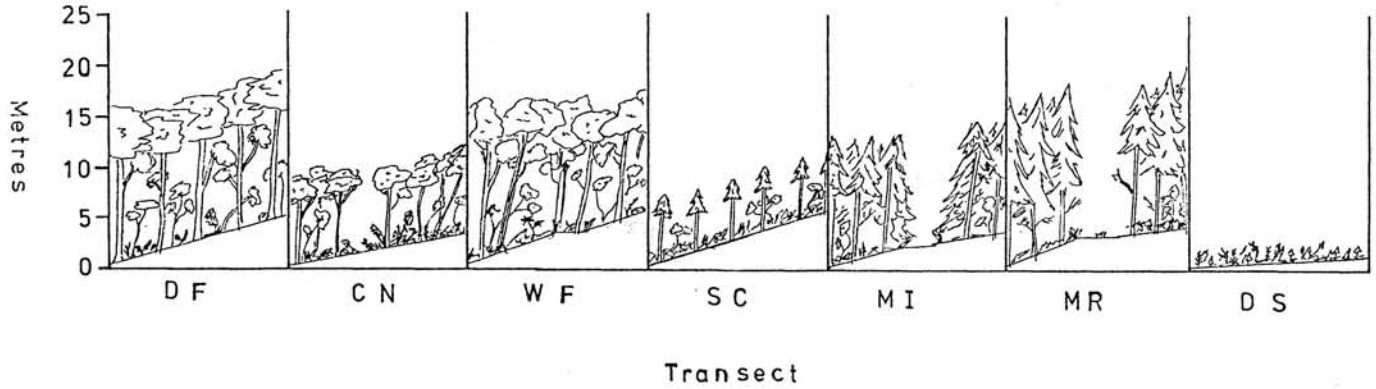


FIGURE 1. TRANSECT PROFILES DEPICTING THE HORIZONTAL AND VERTICAL STRUCTURE OF THE SEVEN STUDY AREAS. DF, CN, AND WF ARE NATIVE AREAS; CN CONSISTS PRIMARILY OF KANUKA SCRUB INSTEAD OF BEECH. SC, MI, MR, AND DS REPRESENT EXOTIC PLANTATIONS OF DIFFERENT AGE CLASSES.

Table 1. Transect features and locations. Canopy height and slope have direct relationships to light penetration and floor cover. Outside Noise is a function of the transect's proximity to a stream. Transect DS, although planted in pines, has no forest characteristics, st = steep, mod = moderate, g = gentle, l = low, a = abundant, sp = sparse.

TRANSECT	FEATURE	LOCATION	CANOPY HEIGHT	ALTITUDE (m above sea)	SLOPE	LIGHT PEN.	OUTSIDE NOISE	FLOOR COVER	HABITAT TYPE
DF	beech far from pine	Dillon forest	16m	530 - 640	st	l	mod	sp	native
CN	scrub near pine	Chatterton track	9m	510 - 780	mod	mod	a	mod	native
WF	beech near pine	Waterfall track	16m	540 - 850	st	l	a	sp	native
SC	pines 5-11 years old	Stoney Creek & Quarry Rd	5.5m	500 - 530	st	a	l	a	mid-age exotic
MI	old pines near beech	Mt Isobelle Road	16m	420 - 480	mod	l	mod	sp	old exotic
MR	pines over 10 years	Manuka Rd	10m	420 - 510	mod	mod	l	mod	old exotic
DS	pine under 5 years	Dillon Stream	1.5m	400 - 500	g	a	mod	a	open field (exotic)

number of bellbirds counted per five minutes varied from 0.60 and 0.63 in two pine plantations younger than 11 years old to 5.53 in the pines bordering native bush. Bellbirds in the exotic forests showed significantly different abundances between areas ($F(2,162)=171.22$, $P<.01$), whereas bellbirds in native forests did not ($F(2,147)=3.37$, $P=.04$). There were few bellbirds in pines under 11 years old (Fig. 2a).

Silvereyes varied significantly in abundance between habitat types ($F(6,373)=12.02$, $P<.01$). The mid-aged plantation (SC) held the most silvereyes (3.82 counted per 5-min), the native areas, the field-like transect (DS), and old pines near beech (MI) supported intermediate numbers (1.20, 2.60, 1.92, 2.25, 2.05 birds per 5-min respectively), and the plantation over 10 years old (MR) harboured the least (0.75) (Fig. 2c).

Despite the relatively small numbers of grey warblers detected during the counts, these birds varied significantly in abundance between transects ($F(6,373)=25.35$, $P<.01$). Within the native areas, the mean number of warblers counted per 5-min did not vary significantly ($F(2,147)=2.85$, $P=.06$). Beech far from pine (DF) yielded the largest number of warblers recorded in native bush. The number of warblers in exotic plantations exceeded those counted in native forests, except on the transect bordering native bush (MI) where virtually no warblers were counted (Fig 2b).

Other native species of birds present in low numbers during the counts included ngirungiru, kahu, pipipi, piwakawaka, karearea, titipounamu, karoro, putangitangi, pihoihoi, and tui. Apart from the counts, we detected kereru feeding in the exotic plantations, ruru calling from native bush, and a kotare searching a riverbed. We found no evidence of the once common toutouwai; it appears to have suffered a local extinction over the last two years (G. Borden pers. comm.). The native falcon, which is the rarest New Zealand native bird in the Hanmer area, was usually observed in patches of native forest.

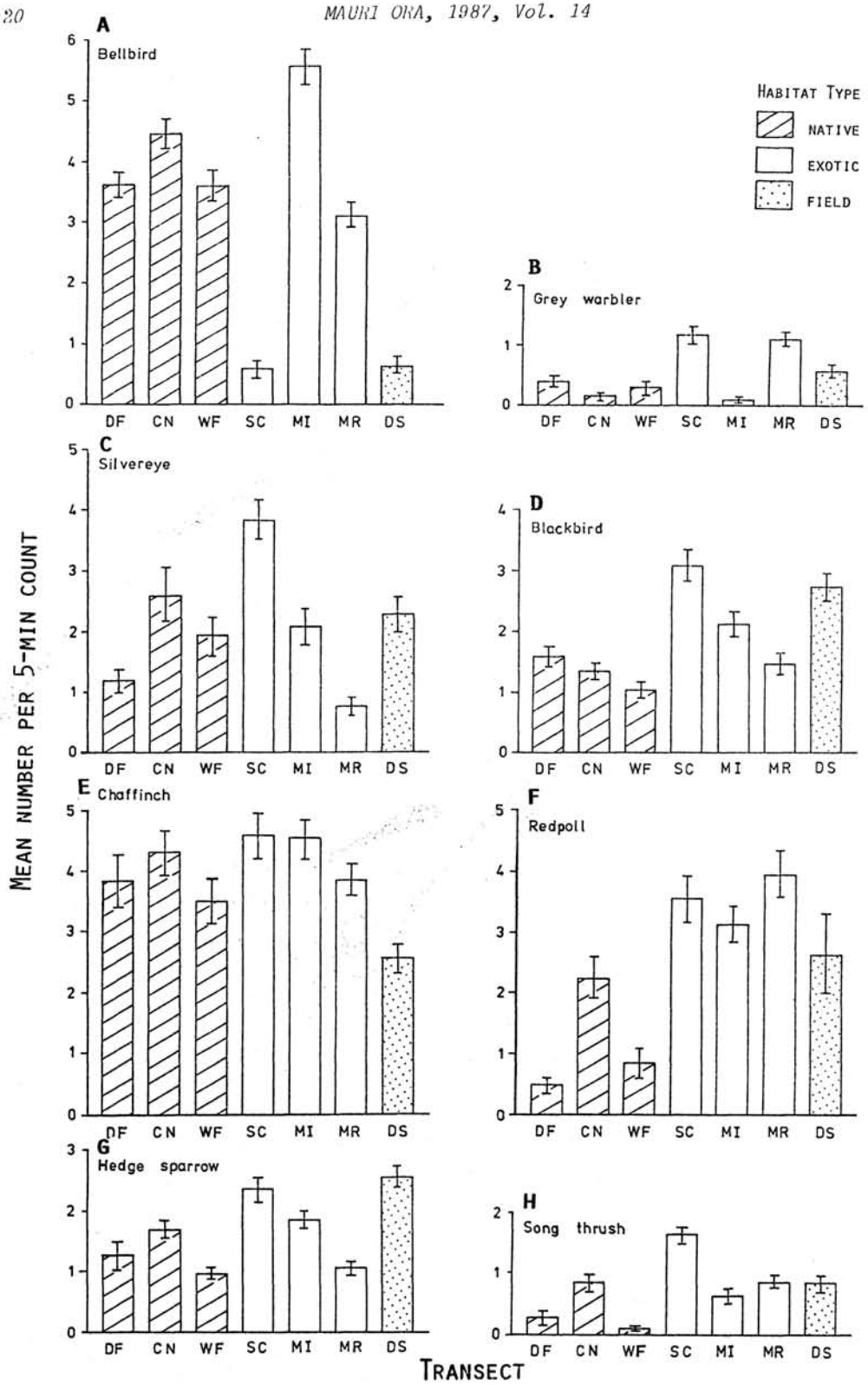
DISTRIBUTION OF EXOTIC BIRDS

We recorded 17 species of introduced birds. Five of these (chaffinch, lesser redpoll, blackbird, hedge sparrow, song thrush) were common in all of the study areas. The remaining twelve (greenfinch, yellowhammer, goldfinch, white-backed magpie, California quail, skylark, mallard duck, Canada goose, spur-winged plover, black swan, house sparrow, starling) were either absent or vagrant in most areas.

Chaffinches were the most ubiquitous finch throughout Hanmer Forest Park; they were slightly more abundant in exotic plantings than in native forests (Fig. 2e). Significant differences in abundance among the transects ($F(6,373)=4.68$, $P<.01$) were primarily due to the low number of chaffinches detected in the transect of young pines (DS). Chaffinch abundance in native areas was uniform ($F(2,147)=1.54$, $P=.22$) as was their abundance in the mature plantations ($F(2,167)=.90$, $P=.41$).

The relative abundance of redpolls did not vary significantly among the three mature exotic forests ($F(2,167)=1.22$, $P=.30$). In the native forests the mean number of redpolls counted per five minutes reflected slope aspect, the southwestern facing slopes (DF, WF) holding fewer redpolls than the southeastern facing slope (CN) (Fig. 2f).

Little variation occurred among blackbirds in the native areas ($F(2,147)=3.37$, $P=.04$). However, a significant difference was found among blackbirds in exotic plantations ($F(2,167)=13.37$, $P<.01$). Blackbirds were most common in the more open exotic areas (SC, DS) (Fig. 2d).


A
Bellbird
B
Grey warbler
C
Silvereye
D
Blackbird
E
Chaffinch
F
Redpoll
G
Hedge sparrow
H
Song thrush
HABITAT TYPE
NATIVE
EXOTIC
FIELD
DF CN WF SC MI MR DS
MEAN NUMBER PER 5-MIN COUNT
TRANSECT

Numbers of hedge sparrows differed significantly among habitat types ($F(6,373)=13.82$, $P<.01$), areas of native bush ($F(2,147)=6.65$, $P=.01$), and exotic forests ($F(2,167)=17.51$, $P<.01$). The southeastern facing native bush (CN) harboured more hedge sparrows than the other two native areas. Hedge sparrows were least abundant in the older pine plantations studied, seeming to prefer more open canopies or scrub (Fig 2g).

Song thrushes were virtually absent from native areas (Fig. 2h). The largest number of song thrushes was found in the mid-aged pine transect (SC) while the remaining three areas yielded only moderate numbers (Transect MI=.62, MR=.85, DS=.83).

GENERAL PATTERNS

Overall, the southeastern facing native bush (CN) contained more birds than the two southwestern facing beech areas (DF, WF). In exotic forests silvereyes, blackbirds, hedge sparrows and song thrushes favoured the more open habitat available in young plantations. The highest abundances of all bird species were in exotic plantations with no obvious patterns apparent in terms of the proximity of native forest. There was greater variability of bird species in the range of exotic forests studied than in the range of native forests studied.

DISCUSSION

European, North American, and Australian researchers have found that conifer plantations harbour fewer species of birds at lower total densities than do native forests (Clout and Gaze, 1984). New Zealand beech and podocarp forests, however, have similar numbers of bird species as conifer forests (Gibb 1961, Kikkawa 1966, Child 1981, Clout and Gaze 1984). The results of this study generally support this characteristic of New Zealand forests. We found similar bird species richness in both native and exotic forests and no evidence to suggest that native bird densities were higher in native forests.

The highly variable densities of bellbirds in exotic forests may be related to the hierarchy which is known to form among honeyeaters (Craig 1985). Tui, although too small in number for quantitative analysis in this study, were observed chasing bellbirds along exotic/native edges. Male bellbirds presumably similarly dominated female bellbirds (Craig 1985). Chasing may force bellbirds into areas without nectar or honeydew and may be the precursor to a more extensive use of exotic forests.

Figure 2. Mean (±SE) number of birds counted per 5 min according to species. Bellbirds, grey warblers, chaffinches, and blackbirds display relatively uniform abundances over the native transects. Only chaffinches and redpolls demonstrate similar abundances over the exotic areas. All of the eight species varied in abundance between habitat types.

Silvereyes are a recent immigrant to New Zealand and do not enter mature native forest housing a complex native bird community (Diamond and Veitch 1981). Their preference found here for relatively open and young exotic pines even when the adjacent native community is not complex, suggests that ecological factors are as important as the structure of the local bird community in determining silvereye distribution.

Riflemen, obligate hole-nesters, were virtually absent from exotic forests but could potentially live in mature pines. These pines, with their vast expanses of rough bark, could provide adequate food for riflemen should a local school or special interest organisation provide nest boxes.

The thirty three bird species seen during this study represent a significant attraction for tourism in the Hanmer area. We suggest that the Hanmer Forest Park should attempt to maintain as diverse a forest community as possible in the area in order to ensure that the bird species remain. Our data will help in long term assessment of the impact on the avifauna of forestry activities in the area.

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APPENDIX 1: Bird nomenclature

Common Name	Scientific Name	Maori Name
Bellbird	*Anthornis melanura*	Korimako
Black-backed gull	*Larus dominicanus*	Karoro
Brown creeper	*Finschia novaeseelandiae*	Pipipi
Fantail	*Rhipidura fuliginosa*	Piwakawaka
Grey warbler	*Gerygone igata*	Riroriro
Harrier	*Circus approximans*	Kahu
Kingfisher	*Halcyon sancta*	Kotare
Morepork	*Ninox novaeseelandiae*	Ruru
NZ falcon	*Falco novaeseelandiae*	Karearea
Paradise shelduck	*Tadorna variegata*	Putangitangi
Pipit	*Anthus novaeseelandiae*	Pihoihoi
Robin	*Petroica australis*	Toutouwai
Silvereye	*Zosterops lateralis*	Tauhau
SI rifleman	*Acanthisitta chloris*	Titipounamu
Tui	*Prosthemadera novaeseelandiae*	Tui
Wood pigeon	*Hemiphaga novaeseelandiae*	Kereru
Yellow-breasted tit	*Petroica macrocephala*	Ngirungiru
Blackbird	*Turdus merula*	
Black swan	*Cygnus atratus*	
California quail	*Lophortyx californicus*	
Canada goose	*Branta canadensis*	
Chaffinch	*Fringilla coelebs*	
Goldfinch	*Carduelis carduelis*	
Greenfinch	*Chloris chloris*	
Hedge sparrow	*Prunella modularis*	
House sparrow	*Passer domesticus*	
Lesser redpoll	*Carduelis flammea cabaret*	
Magpie	*Gymnorhina hypoleuca*	
Mallard duck	*Anas platyrhynchos*	
Skylark	*Alauda arvensis*	
Song thrush	*Turdus philomelos*	
Spur-winged plover	*Lobibyx novaehollandiae*	
Starling	*Sturnus vulgaris*	
Yellowhammer	*Emberiza citrinella*	