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BIRD COUNTS IN REGENERATED URBAN FOREST AT AUCKLAND DOMAIN

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ABSTRACT

From April 1987 to April 1988 (inclusive) I completed 195 5-min stationary bird counts at two forested sites in the Auckland City Domain. Auckland Domain has 22 species of passerines and near-passerines, more than half of them introduced. The mean annual counts – the first published for the North Island – showed a very high incidence of Silvereyes, Blackbirds and Fantails compared with beech-podocarp forests and conifer plantations of the northern South Island, and a low incidence of Grey Warblers and Shining Cuckoos. Whether these are general characteristics of northern or urban forests awaits further study.

INTRODUCTION

The simple technique of 5-min bird counts described by Dawson & Bull (1975) has been applied widely in New Zealand (Crook *et al.* 1977, Dawson *et al.* 1978, Gill 1980, Onley 1980, Bellingham *et al.* 1982, Gill 1983, Onley 1983, Clout & Gaze 1984), providing a wealth of data that allow indices of abundance to be compared species by species between areas. Counts have been undertaken in native forests and pine plantations, but no results have previously been published for urban parks.

Auckland Domain, including the forested parts, is a man-induced habitat entirely surrounded by urban and commercial areas. I undertook bird counts in two forested sections of the Domain to obtain indices of abundance of native and introduced birds there that could be compared with data from other parts of New Zealand, particularly native forests.

It is well known that several native song-birds – notably Fantail (*Rhipidura fuliginosa*), Grey Warbler (*Gerygone igata*) and Silvereye (*Zosterops lateralis*) – flourish in greatly modified habitats, and that a few introduced song-birds – notably Blackbird (*Turdus merula*) and Chaffinch (*Fringilla coelebs*) – do well in native bush (e.g. Turbott 1957). I knew that all these species occurred in the Domain forest, but as for their precise abundance, I had no reason to suppose that they would occur in anything other than average numbers compared with other forested sites, both native and exotic.

STUDY AREA

The Domain (c. 275 ha) is the oldest park in Auckland (174°50'E, 36°55'S) and was set aside in 1845. Much of it is open, but there are about 70 ha of forest, mainly in gullies. The forest is a curious mixture of native and exotic species, many planted in historical times, others self-sown. A true forest structure has developed in many areas, with canopy, understorey layers and ground cover. Gardner (1981) reported a flora of 53 naturally occurring native species. The closest large, unbroken block of native forest is on the Waitakere Ranges, 13 km away. (Rangitoto Island, 6 km away, has highly specialised forest.)

I established two sites 600 m apart at which I was surrounded by forest for at least 100 m in all directions. Only two such sites were possible given the distribution of forest. One site was at the centre of the bushy area south of Lower Domain Drive (NZMS260 R11 686 814); the other was between Domain Drive and the railway line (688 813). The altitude of both was about 50 m a.s.l. Both sites had a canopy about 15 m high dominated by exotic species, particularly large-leaved privet (*Ligustrum lucidum*), oaks (*Quercus* spp.), poplars (*Populus* spp.) and gymnosperms (e.g. *Cryptomeria*, *Araucaria*). The understorey was dense and included privet and numerous native shrubs and small trees. The ground cover was predominantly stinking iris (*Iris foetidissima*) and wild ginger (*Hedychium gardnerianum*). The exotic deciduous trees began to shed their leaves abundantly in May and were bare from July to September. This improved visibility at both sites.

METHODS

In general I followed the counting procedure laid down by Dawson & Bull (1975). I made 15 counts per month from April 1987 to April 1988 inclusive (13 months). On each counting day I made up to 4 counts (usually 3), which meant doubling back once or twice to count the previous station again. When a station was counted twice in one day the starting times were separated by about 25 minutes. I counted in fine weather (not wet or windy) and the counts for a month were spread between 0920h and 1530h (NZ Standard Time). I counted to a radius of 200 m. In some directions this distance went beyond the forest edge but I believe it made little difference. In practice most birds were seen within 50 m and very few were heard beyond 100-150 m.

Other noises during the counts were cicadas (stridulating in April 1987 and from November 1987 to April 1988), car traffic, trains, aircraft, ships' horns, sirens, naval gunfire, men working with machinery, human voices, barking dogs and running water in a stream. These noises were not significant, except that cicadas in February were so loud as to affect counting seriously. However, I recall a similar problem with counts at Kowhai Bush (Gill 1980) and suspect it happens in other studies.

Counts from this study were compared statistically with others by chi-squared tests on total numbers counted.

RESULTS

During the counts I recorded 17 species of birds – 7 native and 10 introduced – all of them passerines or near-passerines. The data (total numbers seen and heard) are summarised by month in Appendix 1. Table 1 shows the

number of birds per 5-min count averaged over one year (May 1987 to April 1988 inclusive) for 11 of the most counted species.

TABLE 1 — Mean annual bird counts at Auckland Domain and two South Island beech-podocarp sites (Dawson *et al.* 1978, Clout & Gaze 1984). The Fletcher Creek counts were bimonthly. Counts were significantly different between areas ($P < 0.001$) for all species except Chaffinch

Locality	Domain	Camp Bush	Fletcher Ck
Months	May 87-Apr 88	Nov 77-Oct 79	Apr 74-Feb 75
n(counts)	180	480	480
Silvereye	3.22	2.60	3.08
Blackbird	1.59	0.36	0.69
Fantail	1.40	0.28	1.17
Grey Warbler	0.52	1.25	1.25
Chaffinch	0.49	0.63	0.57
Song Thrush	0.31	0.10	0.23
Greenfinch	0.29	-	0.07
Tui	0.24	0.25	0.78
Kingfisher	0.19	0.02	0.01
Goldfinch	0.10	0.40	0.01
NZ Pigeon	0.02	0.31	0.59

No annual 5-minute counts were available for other North Island sites. Only Dawson *et al.* (1978), Gill (1980) and Clout & Gaze (1984) have published annual means — all for the South Island. For a particular comparison of the Domain annual means with data from native forest (Table 1) I chose two low-altitude beech-podocarp sites — Camp Bush (300 m a.s.l.) near Nelson (Clout & Gaze) and Fletcher Creek (230 m a.s.l.) near Reefton (Dawson *et al.*).

TABLE 2 — Mean April bird counts at Auckland Domain and Ohau Gorge, near Levin (Gill 1983). Counts were significantly different between areas ($P < 0.001$) for all species except Grey Warbler

Locality	Domain	Ohau Gorge
Years	1987+1988	1982
n(counts)	30	82
Silvereye	3.67	1.79
Fantail	1.47	0.68
Blackbird	1.47	0.27
Grey Warbler	0.57	0.70

Table 2 compares April counts of 4 species at Auckland Domain (April 1987 plus April 1988) with April counts for mixed podocarp-hardwood forest at Ohau Gorge near Levin (200 m a.s.l.; Gill 1983). Table 3 sets the only data available for another northern North Island site (Rakitu or Arid Island east of Great Barrier Island, December-January only; Bellingham *et al.* 1982) against comparable data for Auckland Domain for 8 species.

TABLE 3 — Mean December-January bird counts at Auckland Domain and Rakitu Island, off Great Barrier Island (Bellingham *et al.* 1982). Counts were significantly different between areas ($P < 0.005$) for all species except Fantail. (Song Thrush was not tested because one expected value was less than 5.)

Locality	Domain	Rakitu I.
Months	Dec 87+Jan 88	Dec 80+Jan 81
n(counts)	30	47
Silvereye	3.60	1.70
Blackbird	1.80	0.06
Fantail	0.80	0.47
Tui	0.43	1.28
Grey Warbler	0.33	0.98
Song Thrush	0.27	0.02
Kingfisher	0.20	0.89
NZ Pigeon	0	0.36

Species recorded in the counts

Silvereyes were more abundant in the Domain than at any other site (Tables 1-3). The annual mean (3.22) is exceeded in the literature only by 3.78 at Reefton Saddle (Dawson *et al.*). In the native and exotic forests studied by Clout & Gaze the greatest annual mean for Silvereye was 2.60 at Camp Bush. Flocking of Silvereyes diminished in August at the Domain, and resumed in December. I heard the first full song in September.

Fantails were more abundant in the Domain than at any site except Rakitu Island, where the difference was not significant (Tables 1-3). The Domain result (1.40) is the highest annual mean yet reported for Fantail.

Grey Warblers were less common in the Domain than at any other site except Ohau Gorge, where the difference was not significant (Tables 1-3). All four areas studied by Dawson *et al.* and 10 of the 12 native and exotic forests studied by Clout & Gaze had annual means for Grey Warbler greatly above 0.52.

The annual mean count for Blackbirds at Auckland Domain (1.59; Table 1) is the highest on record, the next largest being Fletcher Creek (0.69). The conifer plantations and native bush studied by Clout & Gaze had means for Blackbird of 0.16-0.38. In the Domain, sustained singing by Blackbirds was rare during the counting hours. I saw Blackbirds eating large-leaved privet berries.

Song Thrushes (*Turdus philomelos*) were more abundant in the Domain than in native forests (Tables 1 and 3). Clout & Gaze obtained annual means of 0.04-0.33, the latter in a mature conifer plantation. In the Domain I first heard full song in June, but it was seldom persistent during the hours of counting.

Mean annual counts of Chaffinches were not significantly different between areas (Table 1). The Domain mean (0.49) was low compared with

means of up to 1.52 in native forest and up to 2.02 in conifer plantations obtained by Clout & Gaze. Chaffinches sang from July to December and were present, but seldom noticed, in other months (Appendix 1). I disregarded the Rakitu Island counts of Chaffinch because December-January is a time of sudden change in conspicuousness.

Greenfinches (*Carduelis chloris*) were significantly more abundant in the Domain than at Fletcher Creek (Table 1). The highest annual mean of the 10 given by Clout & Gaze was only 0.13. I counted Greenfinches most often in winter when flocks frequented the canopy and subcanopy eating large-leaved privet berries and foraging in *Cryptomeria japonica*.

Goldfinches (*Carduelis carduelis*) were a minor species in the Domain. They passed through the canopy and I saw them foraging in *Cryptomeria japonica*. Clout & Gaze recorded annual means up to 0.94 in bush and up to 0.66 in conifers.

Tuis (*Prosthemadera novaeseelandiae*) were a minor species in the Domain, compared with their incidence at Fletcher Creek and Rakitu Island (Tables 1 and 3), though I recorded them nearly every month (Appendix 1).

Kingfishers (*Halcyon sancta*) were quite common in the Domain counts, especially from August to December (Appendix 1). In August I saw noisy mating displays within the forest. Kingfishers were merely incidental in the studies by Dawson *et al.* and Clout & Gaze, but were abundant on Rakitu Island (Table 3).

I only once heard a Shining Cuckoo (*Chrysococcyx lucidus*) during the 60 counts from October to January (mean = 0.02) when cuckoos were about. This compares with means of 0.11 at Kowhai Bush, Kaikoura (Gill 1980) and 0.23 at Fletcher Creek (Dawson *et al.*).

During the counts I occasionally saw Starlings (*Sturnus vulgaris*) in the canopy and subcanopy. Mynas (*Acridotheres tristis*), House Sparrows (*Passer domesticus*) and Feral Pigeons (*Columba livia*) were incidental species usually heard out towards the forest edge. One day I counted two Eastern Rosellas (*Platycercus eximius*) feeding in *Cryptomeria* and *Ligustrum*. New Zealand Pigeons (*Hemiphaga novaeseelandiae*) were similarly vagrant species.

Notes on other species

Five other passerines or near-passerines present in the Domain were not recorded in the counts – Morepork (*Ninox novaeseelandiae*) (nocturnal), Welcome Swallow (*Hirundo tahitica*), Yellowhammer (*Emberiza citrinella*), Magpie (*Gymnorhina tibicen*) and Malay Spotted Dove (*Streptopelia chinensis*). I saw the last occasionally – in grassy areas at the forest edge – as I walked between counting stations. Swallows, Magpies and Yellowhammers were common in open areas, the last seasonally. The avifauna of the Domain thus comprises 15 passerines and 7 near-passerines – a total of 22 species, 10 of them (46%) native.

Hedgesparrows (*Prunella modularis*) are absent from the Domain or very rare. In the early 1960s, Skylarks (*Alauda arvensis*) occurred in rough, open, grassy areas near the museum (E. G. Turbott, pers. comm.) but they disappeared, presumably as these areas were converted to mown grass.

DISCUSSION

There was no reason to predict that the native and introduced birds common in bush throughout New Zealand would occur in anything other than average numbers at the Domain compared with other forested areas, both native and exotic. It was therefore surprising to find Silvereyes, Fantails and Blackbirds in such abundance and Grey Warblers so poorly represented. Blackbirds appear to do well in the open parts of the Domain and the large number there spill over to produce high numbers in the forest. But it may be that northern or urban forests in general support high densities of these common song-birds. The Rakitu Island counts (Table 3) do not suggest this, but more studies in the north are needed.

The Domain counts were derived from only two counting stations. This increases the chance of bias from local "site effects" that are minimised in a study with many stations. However, it is a factor that cannot be helped if studies are to be made in small urban forests. It was gratifying to find a low incidence of Grey Warblers because it shows that the counts were not in some way consistently over-indicating the common species. I cannot account for the low numbers of Grey Warblers. Interestingly, the brood-parasite of this species (the Shining Cuckoo) was also poorly represented.

Some species are more conspicuous than others and so it is not strictly valid to compare the counts for different species. However, it does seem that Song Thrushes were less abundant in the Domain bush than Blackbirds. The same was generally the case in the studies by Dawson *et al.* (1978) and Clout & Gaze (1984). In whatever other ways the ecological niches of the two turdids may be alike or different in New Zealand, these results confirm the common belief that the Blackbird is the more successful in dense forest.

Kingfishers were most often counted from August to December. They may be more conspicuous then or they may use the forest for breeding and move away between times.

Eastern Rosellas are rare in the Domain, though they have been present for at least 60 years. In the late 1920s R. A. Falla saw them near the Robbie Burns Statue in the Domain (E. G. Turbott, pers. comm.). It seems strange that Hedgesparrows, so numerous in parks in Dunedin and Christchurch, for example, should shun the Domain. They prefer low, dense cover (Clout & Gaze 1984), but the Domain provides this in many places. E. G. Turbott (pers. comm.) has noted them only intermittently in his garden in Parnell, 0.6 km from the museum.

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APPENDIX 1 — Monthly summary of birds counted at Auckland Domain, April 1987 to April 1988. Year total is for May 1987 to April 1988 inclusive

	APR 87	MAY 87	JUN 87	JUL 87	AUG 87	SEP 87	OCT 87	NOV 87	DEC 87	JAN 88	FEB 88	MAR 88	APR 88	YEAR Total
n(counts)	15	25	15	15	15	15	15	15	15	15	15	15	15	180
Silvereye	43	43	67	65	47	22	42	39	46	62	26	53	67	579
Blackbird	18	19	17	27	16	29	27	43	37	17	11	17	26	286
Fantail	24	20	25	19	22	26	25	30	12	12	17	24	20	252
Grey Warbler	7	8	7	9	13	19	7	5	6	4	3	3	10	94
Chaffinch	9	4	1	1	11	9	7	13	29	4	0	2	7	88
Song Thrush	0	2	8	8	10	6	4	7	6	2	0	1	1	55
Greenfinch	0	7	11	18	6	0	2	4	4	1	0	0	0	53
Tui	3	2	2	7	3	6	3	2	4	9	2	3	0	43
Kingfisher	1	0	0	1	5	4	7	9	6	0	1	2	0	35
Goldfinch	0	3	4	0	0	4	4	1	0	1	0	0	0	16
Starling	3	3	0	5	4	1	0	1	0	0	0	0	0	14
House Sparrow	1	0	1	1	3	3	0	2	0	0	0	0	0	10
Myna	1	0	2	0	0	0	0	0	1	0	0	0	0	3
NZ Pigeon	0	0	2	1	0	0	0	0	0	0	0	0	0	3
Eastern Rosella	0	2	0	0	0	0	0	0	0	0	0	0	0	2
Rock Pigeon	0	0	0	0	0	0	0	0	0	0	1	0	0	1
Shining Cuckoo	0	0	0	0	0	0	1	0	0	0	0	0	0	1
UNIDENTIFIED	7	9	9	9	3	6	1	13	8	5	10	8	8	89