

First seen or first heard? A useful distinction when counting forest birds

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ABSTRACT

When interpreting counts of forest birds it is seldom possible to distinguish the effects of changing density from those of changing conspicuousness; these often arise from the birds' singing and calling. To investigate this, birds first seen were recorded separately from those first heard when counting birds in forest of the Orongorongo Valley, Wellington, New Zealand. Apparent changes in the frequency of Paradise Duck (*Tadorna variegata*) in the river valley, and of the Song Thrush (*Turdus philomelos*), Whitehead (*Mohoua albicilla*), Grey Warbler (*Gerygone igata*) and Chaffinch (*Fringilla coelebs*) in the forest coincided with changes in the frequency of their singing or calling; they were considered suspect. Changes in the frequency of the Black-backed Gull (*Larus dominicanus*) on the riverbed, and of N.Z. Pigeon (*Hemiphaga novaeseelandiae*), Blackbird (*Turdus merula*), Fantail (*Rhipidura fuliginosa*), Silvereye (*Zosterops lateralis*), Bellbird (*Anthornis melanura*), Tui (*Prosthemadera novaeseelandiae*), and Australian Magpie (*Gymnorhina tibicen*) did not show a similar correlation. Special study of the ways in which birds either advertise or conceal themselves is needed. Correction factors may never compensate completely for the effects of the birds' varying conspicuousness.

KEYWORDS: Bird counts, New Zealand forest, conspicuousness, singing

INTRODUCTION, STUDY AREA, AND METHODS

Counting birds in New Zealand forests became frequent in the 1970-80s (Dawson & Bull 1975; Dawson *et al.* 1978; Onley 1980; Clout & Gaze 1984; Wilson *et al.* 1988; see also Gibb 1961). Their interpretation was complicated by changes in the frequency of singing and calling. Therefore I recorded the proportions of birds either first seen or first heard around the Landcare Research (formerly DSIR) Field Station in the Orongorongo Valley, near Wellington, New Zealand, from November 1988 until April 1991.

The Orongorongo Valley is here steep, narrow and forested; the river is about 100m a.s.l. The vegetation was described by Campbell (1984); Fitzgerald *et al.* (1989) and Brockie (1992) gave further details of the area. The mean annual rainfall at the Field Station was 2370mm from 1966 to 1990 (Gibb 1994); the mean daily temperature was 15.9°C. in January, 7.5°C. in July (Campbell 1984). The forest is unlogged, but has been modified by browsing mammals, especially possums (*Trichosurus vulpecula*) and earlier by red deer (*Cervus elaphus*). Stoats (*Mustela erminea*), ship rats (*Rattus rattus*) and feral cats (*Felis catus*) are widespread. The effects of increasing public use need to be studied.

All birds seen or heard in successive 10-minute periods were recorded while I stood in the Field Station yard for 30-50 minutes between 0730h and 0830h, for at least five days a month. For the rest of the day I divided my time between forest near the Field Station and adjacent river flats, adding other species encountered. Birds first seen were always distinguished from those first heard. Pooling the years, I spent 48 days in the field in spring, 58 in summer, 50 in autumn, and 19 in winter.

RESULTS

Table 1 records the frequency with each bird species was seen or heard; Table 2 records the percentage of days per season when common species were recorded, and Figure 1 the percentages of days when one or more birds of each species was first seen or first heard. Members of some species were often both first seen and first heard at different times of the same day; so the total number of days on which the percentages in Fig.1 are based may exceed the number of days spent in the field. It would have been nice to record the number of birds first seen or first heard, but this was not possible because, for instance, one or a few calls often drew attention to a whole flock of unknown size and composition.

The following notes amplify Tables 1 & 2 and Fig.1. Scientific names of birds are in Table 1.

Paradise Duck. Absent 1966-74; first young 1976. Recorded most often in spring ($\chi^2=10.094$, d.f.=1, $P<0.01$). First heard on 69% of the days when recorded, most often in autumn ($\chi^2=4.455$, d.f.=1, $P<0.05$).

Southern Black-backed Gull. A colony of about 20 pairs became established on river flats 1.5km from the coast in 1988; they returned in later years. The gulls scavenged on the riverbed most often in summer ($\chi^2=5.812$, d.f.=1, $P<0.05$); and were first seen on 63% of the days when recorded.

New Zealand Pigeon. Recorded most often in summer ($\chi^2=5.919$, d.f.=1, $P<0.05$), least often in autumn. First heard (in loud flight) on 52% of the days when recorded.

Morepork. Recorded on 67.5% of all nights; least often in winter. Not seen.

Blackbird. Recorded most often in summer, least often in autumn-winter ($\chi^2=13.986$, d.f.=1, $P<0.001$). First heard on 67.9% of the days recorded. Song period

TABLE 1 - Number of days when species were recorded during 144 days in two years.

Recorded >70 days	Recorded 11-20 days
N.Z. Pigeon <i>Hemiphaga novaeseelandiae</i>	N.Z. Falcon <i>Falco novaeseelandiae</i>
Morepork <i>Ninox novaeseelandiae</i>	Spur-winged Plover <i>Vanellus miles</i>
Blackbird* <i>Turdus merula</i>	Shining Cuckoo <i>Chrysococcyx lucidus</i>
Silvereye <i>Zosterops lateralis</i>	Dunnock* <i>Prunella modularis</i>
Bellbird <i>Anthornis melanura</i>	Recorded 1-10 days
Tui <i>Prosthemadera novaeseelandiae</i>	Black Shag <i>Phalacrocorax carbo</i>
Australian Magpie* <i>Gymnorhina tibicen</i>	White-faced Heron <i>Ardea novaehollandiae</i>
Recorded 50-70 days	Grey Duck <i>Anas superciliosa</i>
Paradise Duck <i>Tadorna variegata</i>	Australasian Harrier <i>Circus approximans</i>
Grey Warbler <i>Gerygone igata</i>	California Quail* <i>Callipepla californica</i>
Fantail <i>Rhipidura fuliginosa</i>	E. Rosella* <i>Platycercus eximius</i>
Chaffinch* <i>Fringilla coelebs</i>	Sacred Kingfisher <i>Halcyon sancta</i>
Recorded 31-50 days	Rifleman <i>Acanthisitta chloris</i>
S. Black-backed Gull <i>Larus dominicanus</i>	Yellowhammer* <i>Emberiza citrinella</i>
Song Thrush* <i>Turdus philomelos</i>	Greenfinch* <i>Carduelis chloris</i>
Tomtit <i>Petroica macrocephala</i>	Goldfinch* <i>Carduelis carduelis</i>
Recorded 21-30 days	Redpoll* <i>Carduelis flammea</i>
Long-tailed Cuckoo <i>Eudynamys taitensis</i>	House Sparrow* <i>Passer domesticus</i>
Whitehead <i>Moboua albicilla</i>	Starling* <i>Sturnus vulgaris</i>

* = introduced species.

% days first seen % days first heard

100 50 0 50 100

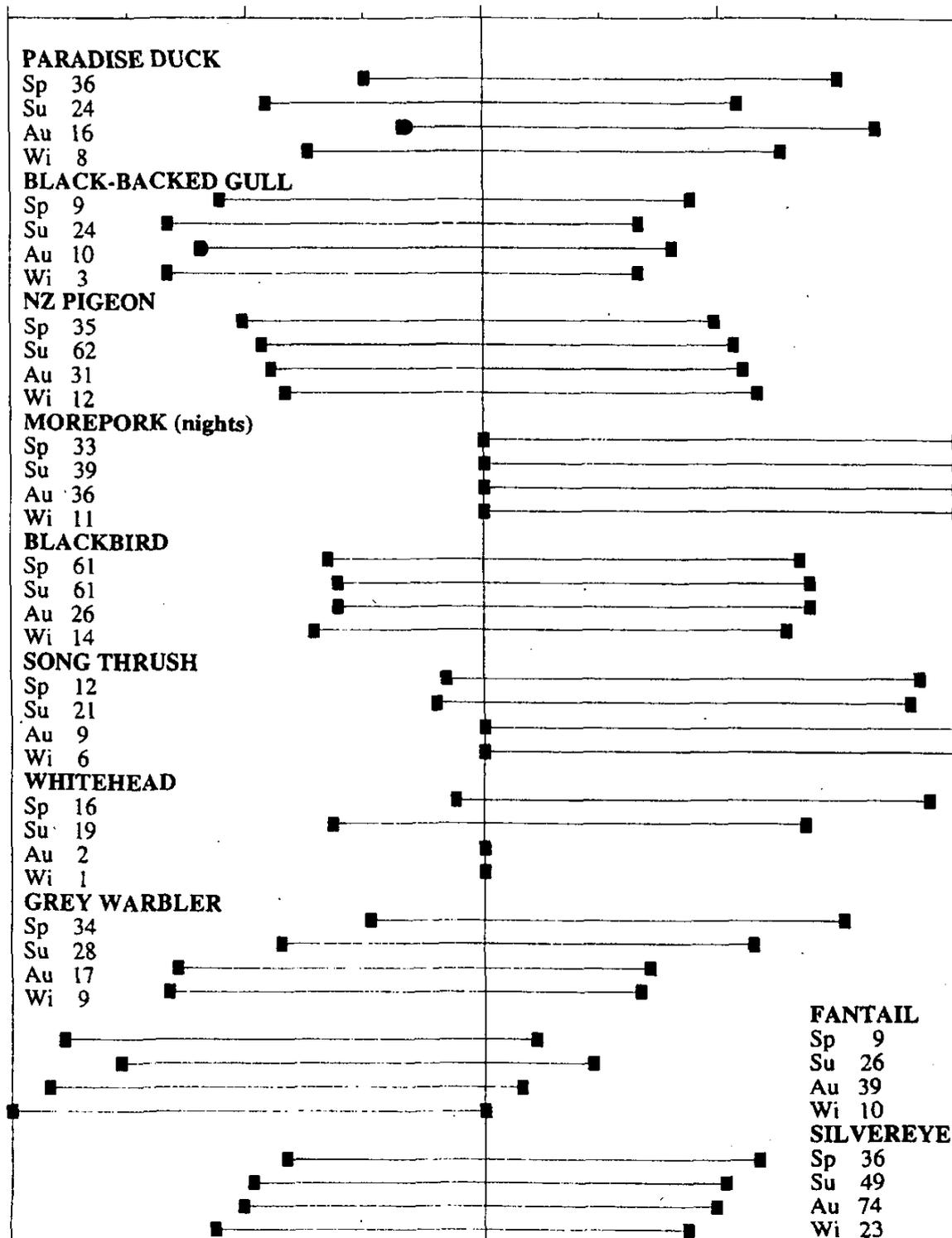


FIGURE 1 - Percentages of days per season when one or more of each species was either first seen or first heard. The number of days (n) includes only those when the species was recorded.

TABLE 2 - Percentage of days per season when common species were seen or heard.

Species	Percentage of days			
	Spring	Summer	Autumn	Winter
Paradise Duck	64.6	37.9	36	42.1
Black-backed Gull	16.7	31	14	15.8
N.Z. Pigeon	50	69	48	52.6
Morepork	68.8	67.2	72	57.9
Blackbird	93.8	77.6	42	52.6
Song Thrush	22.9	34.5	18	31.6
Whitehead	31.3	25.9	4	5.3
Grey Warbler	56.3	43.1	32	42.1
Fantail	16.7	37.9	72	52.6
Silvereye	56.3	72.4	88	84.2
Bellbird	97.9	98.3	96	94.7
Tui	60.4	67.2	60	68.4
Chaffinch	72.9	58.2	22	31.6

(Aug)Sep-Jan(Feb); frequently calls in other months.

Song Thrush. Most recorded summer and winter; seldom call, rarely first seen. Song period May-Jan.

Whitehead. Most often recorded spring-summer ($\chi^2=14.146$, 1d.f., $P<0.001$); usually first heard.

Grey Warbler. Most often in kanuka (*Kunzea ericoides*) on river flats. Fewer recorded autumn than spring ($\chi^2=5.848$, 1d.f., $P<0.05$). First heard on 67.7% of the days when recorded in spring-summer, 34.6% in autumn-winter ($\chi^2=6.946$, 1d.f., $P<0.01$). Sings all months, most often in spring; rarely calls.

Fantail. Most recorded in autumn ($\chi^2=12.535$, 1d.f., $P<0.001$), fewest in spring. Usually first seen, not heard.

Silvereye. Fewest recorded in spring ($\chi^2=10.411$, 1d.f., $P<0.01$), most in autumn. As often first seen (on 49.5% of the days when recorded) as first heard.

Bellbird. Recorded commonly, about equally often in all seasons; usually first heard.

Tui. Recorded less often than Bellbird, but also about equally in all seasons. First heard on 59.5% of the days when recorded.

Chaffinch. Recorded most often singing in summer, least often in autumn ($\chi^2=12.331$, 1d.f., $P<0.001$). First seen on 30.1% of the days when recorded in spring-summer, 55.6% in autumn-winter ($\chi^2=5.696$, 1 d.f., $P<0.05$).

Australian Magpie. Recorded most often in summer, least often in spring ($\chi^2=7.957$, 1d.f., $P<0.01$). First seen on 42.7% of the days when recorded.

Of the 34 species seen or heard here, the two cuckoos, California Quail, Rosella and Kingfisher were recorded only in spring or summer; no species was recorded only in autumn-winter. Black Shag, White-faced Heron, Grey Duck, Harrier, Quail and Rifleman were only seen, not heard, and the Morepork and Dunnock only heard.

DISCUSSION

Counts of forest birds rarely distinguish changes in conspicuousness from changes in numbers. Indices of abundance based solely on the numbers first seen would probably track the numbers present more accurately than would those including birds first heard; but, for instance, the use of a regular song-post can make some birds more visible. The song periods of New Zealand birds are poorly documented; the daily or hourly output of individual birds is rarely measured (cf. Gibb 1961 for Tomtits; Keast 1994).

If the variable frequency of singing/calling accounts for much of the seasonal variation in the birds' conspicuousness, then if apparent changes in their abundance (Table 2) coincide with simultaneous changes in the frequency with which they are first heard (Fig.1), then apparent changes in their abundance are suspect; but if the frequency of singing/calling remains unchanged, then apparent changes in the numbers recorded may indeed reflect real changes in the numbers present.

Statistically significant seasonal changes in the apparent abundance of many species (Paradise Duck, Black-backed Gull, N.Z. Pigeon, Blackbird, Song Thrush, Whitehead, Grey Warbler, Fantail, Silvereye, Chaffinch and Magpie) were recorded in Table 2. Simultaneous changes in the frequency of singing/calling were recorded for Paradise Duck, Song Thrush, Whitehead, Grey Warbler and Chaffinch: so the apparent changes in their abundance are suspect; but apparent changes in the abundance of the Black-backed Gull, N.Z. Pigeon, Blackbird, Fantail, Silvereye, Bellbird, Tui and Magpie cannot be faulted by this criterion.

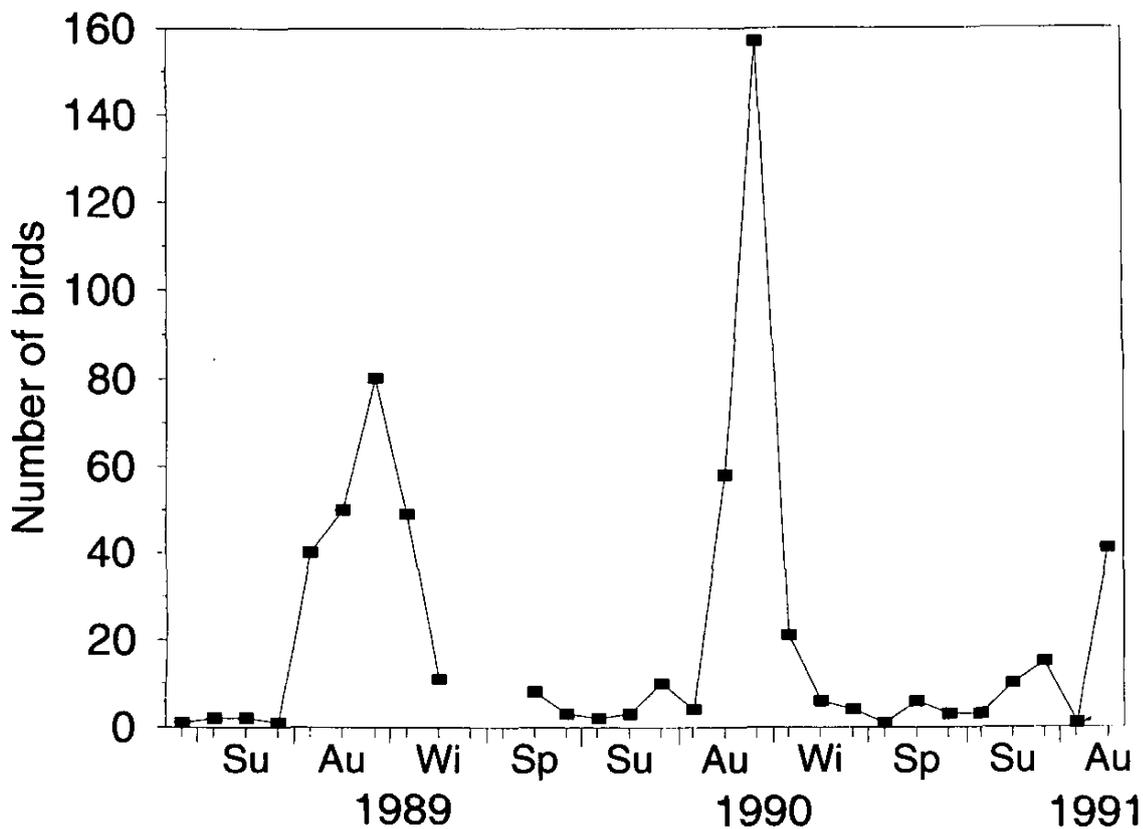


FIGURE 2 - Mean number of Silvereyes per 10 minutes. Mean counts per month 24.8 ± 11.7 individuals.

The proportions of Blackbirds first seen or first heard are surprisingly constant through the year - considering their distinct song period. There may be a sudden shift from singing to calling, and back, so that changes in their overall conspicuousness are slight. The same may apply to Bellbird and Tui, but their song is sometimes indistinguishable from their calls. The reality of the autumn peak in the numbers of Silvereyes is evident from Fig.2 (see also Fitzgerald & Karl 1979): there were big changes in numbers between months, not just seasons, probably related to the variable flowering of the rata vine *Metrosideros fulgens* (B.M.Fitzgerald unpubl.). The extent of their movement within New Zealand is not known; they are recognized long-distance migrants in south-eastern Australia (Chan 1995, Rooke 1984). Irregularities in singing and calling probably account for much variation in conspicuousness; but there are other, subtler ways in which birds either advertise or conceal themselves - from conspecifics, predators and human observers; consider for example the use of wing slots by the Bellbird and Tui (Craig 1984) and the devious ruses of cuckoos (Cuculidae) to make themselves at once easily heard but hard to see (Cramp & Simmons 1977). These devices are clearly important to the birds; they deserve proper study. There is at present no hope of producing correction factors to correlate conspicuousness with density. It might be more profitable to explore quite different, independent means of measuring the numbers of forest birds (see Ralph & Scott 1981).

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