Notornis, 2011, Vol. 58: 158-162
0029-4470

SHORT NOTE

A 1-year study of forest birds at Kennedy's Bush, Canterbury

JAMES A.J. MORTIMER
4A Avoca Valley Road, Heathcote Valley, Christchurch 8022, New Zealand

Kennedy's Bush is located in the Port Hills immediately south of Christchurch (NZTM 1569500 5169140), and supports a number of locally important plant and animal species (Crossland *et al*. 2009; Christchurch City Council 2008). It was the 1st of the Port Hills Summit Road nature reserves, established in 1906, and currently extends to 127.4 hectares. The majority of the site consists of regenerating and remnant old growth native forest, dominated by mahoe (*Melicytus ramiflorus*), kanuka (*Kunzea ericoides*) and kowhai (*Sophora tetraptera*) with some podocarps such as totara (*Podocarpus totara*) and matai (*Prumnopitys taxifolia*; Graf 2008). Since Dec 2005 there has been an ongoing programme of multi-species pest control at the site utilising bait stations containing the poisons brodifacoum and colicalceferal and a grid of double fenn traps (P. Crutchley, *pers. comm*.).

The conservation value of the reserve has been the subject of a number of studies, including several of the bird life (Freeman 1999; North *et al*. 2003; Crossland *et al*. 2009). The first 2 of these occurred prior to pest control. Crossland *et al.* (2009) studied the site 2 years after pest control had commenced, using a combination of transect and 5-minute bird count methods. However 5-minute bird count data were not available for every month of the 12-month study period, with no data for Sep and Oct 2007. My aim was to study the birds of Kennedy's Bush over a 1-year period, visiting the site regularly to gain insight into what species currently inhabit the reserve and how abundances vary through the seasons.

The site was visited once per month, from Jul 2010 to Jun 2011. On each visit, 5-minute bird counts, following the methodology in Dawson *et al*. (1975), were completed at 10 fixed stations. Over the 12-month period, a total of 120 counts were completed. All counts were carried out between the hours of 0750 and 1200, avoiding extreme weather conditions. The 5-minute bird count technique is a useful way of comparing relative abundances of birds, and has the advantage of being relatively quick and simple to complete. However, it has its limitations, which have been well-documented (Dawson *et al*. 1978; Gibb 1996), including variation in detectability of different species, differences in conspicuousness of birds at different times of the day, between seasons and during different weather conditions, and differences in observer ability to identify birds. Nevertheless, the 5-minute bird count technique has been widely-applied in New Zealand and can provide a relative measure of the abundance of most species.

Nineteen species of bird were recorded during the study period: 9 native and 10 non-native species. Table 1 shows the status of each species (resident,

Received 16 Aug 2011; accepted 20 Nov 2011
Correspondence: *jamesmort@rocketmail.com*

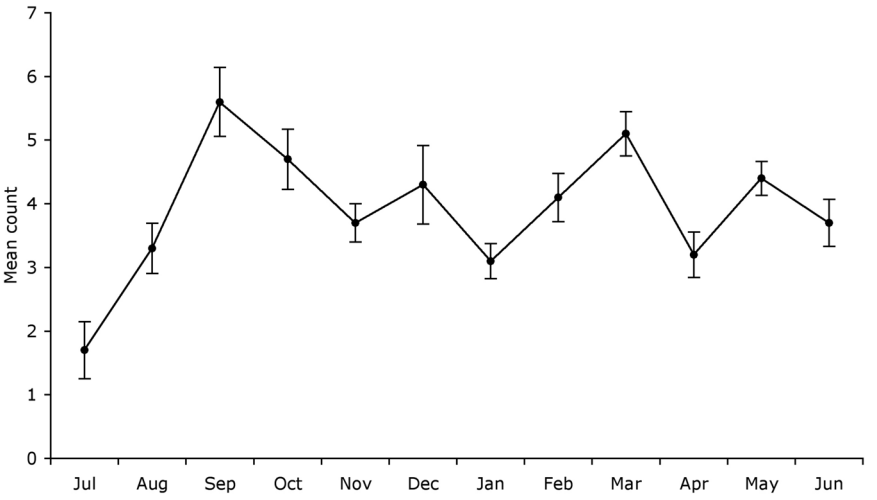

Fig. 1. Mean number of bellbirds recorded per count (± SE_{mean}) at Kennedy's Bush between Jul 2010 and Jun 2011.

seasonal migrant or occasional visitor), and the mean count, relative abundance and species-richness for each month of the study period. Relative abundance categories were based on the number of birds recorded in relation to the 1st quartile, median and 3rd quartiles for each species. Note that when a species was not recorded, this does not necessarily mean it was not present.

The mean number of species, or 'species-richness', recorded per survey visit was 11.3, with a minimum of 8 in winter (Jul) and a maximum of 14 in spring and summer (Sep, Nov and Jan). However, there was no significant difference between months ($\chi^2 = 4.29$, *d.f. = 11*, $P > 0.25$). The total number of individual birds recorded for each month fluctuated significantly ($\chi^2 = 48.11$, *d.f. = 11*, $P < 0.001$). The lowest counts were obtained from the winter months, whilst higher numbers were generally recorded during spring and summer (Sep to Jan), with an additional peak in autumn (Mar). I consider the 3 most commonly recorded native species in more detail below.

Bellbird was the most commonly recorded species, with an overall mean count of 3.91 (Table 1). It was recorded throughout the year, though numbers fluctuated significantly with month ($\chi^2 = 30.27$, *d.f. = 11*, $P < 0.002$). Counts peaked in Sep and were generally highest in spring and early autumn and lowest in winter (Fig. 1).

Silvereye, the 2nd-most commonly recorded species at the site, was also present all year with an overall mean count of 2.14 (Table 1). Again, there were significant fluctuations in numbers recorded across months ($\chi^2 = 70.55$, *d.f. = 11*, $P < 0.001$). Highest numbers were observed in autumn/early winter (Mar to Jun), with the peak count in Mar (Fig. 2). Numbers recorded were consistently lower from Jul through to Feb.

New Zealand pigeons were, as with bellbird and silvereye, present at Kennedy's Bush throughout the study period. The overall mean count was 0.81 pigeons/count (Table 1). Numbers recorded varied each month, with significant fluctuations ($\chi^2 = 21.14$, *d.f. = 11*, $P < 0.05$). The highest peaks in numbers recorded were in Sep and Mar (Fig. 3).

The results of my survey indicate that Kennedy's Bush has a moderate bird species diversity, in comparison to that of the local area. In a study of 72 sites across the Banks Peninsula (Schmechel 2010), 25 forest species were recorded (12 native, 13 non-native). In the present study of Kennedy's Bush, 17 of these forest species were recorded (8 native, 9 non-native) plus 2 additional open or coastal species.

The apparent abundance of most species was generally higher during spring and summer and lower in winter. Many birds may be more conspicuous during the breeding season, when using song and sometimes also visual displays to attract mates (MacKay 2001). A real increase in numbers at this time of year could be due to migration to the site in spring, breeding (and therefore presence of newly-fledged birds in the summer) and lower mortality rates in summer compared to the winter months (Dawson *et al*. 1978). Shining cuckoos and redpolls were apparently absent during winter. The former is a summer migrant and rarely found in New Zealand in winter (Heather *et al*. 2000), however redpolls are year-round residents. The lack of records of redpolls in winter could be due to seasonal movements between Kennedy's Bush and other sites or the result of low detectability at this time of year.

Not all species were recorded more frequently in the spring and summer, with silvereye the most notable exception. Numbers of silvereyes recorded were much higher in winter. This species is known to form flocks in autumn and migrate

Table 1. Bird species, status, mean count, apparent abundance and species-richness recorded at Kennedy's Bush between Jul 2010 and Jun 2011.

Species	Status	Mean count (*n*=120)	Recorded abundance											
			2010						2011					
			Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Native														
Bellbird (*Anthornis melanura*)	R	3.91												
Fantail (*Rhipidura fuliginosa*)	R	0.17												
Grey warbler (*Gerygone igata*)	R	0.52												
New Zealand pigeon (*Hemiphaga novaeseelandiae*)	R	0.81												
Silvereye (*Zosterops lateralis*)	R	2.14												
Tomtit (*Petroica macrocephala*)*	R	0.20												
Shining cuckoo (*Chrysococcyx lucidus*)	SM	0.09												
Australasian harrier (*Circus approximans*)	OV	0.08												
Welcome swallow (*Hirundo tahitica*)	OV	0.02												
Non-native														
Blackbird (*Turdus merula*)	R	0.38												
Chaffinch (*Fringilla coelebs*)	R	0.53												
Song thrush (*Turdus philomelos*)	R	1.05												
Redpoll (*Carduelis flammea*)	SM/R?	0.32												
Australian magpie (*Gymnorhina tibicen*)	OV	0.10												
Dunnock (*Prunella modularis*)	OV	0.10												
Greenfinch (*Carduelis chloris*)	OV	0.01												
House sparrow (*Passer domesticus*)	OV	0.03												
Skylark (*Alauda arvensis*)	OV	0.06												
Yellowhammer (*Emberiza citrinella*)	OV	0.03												
Number of species recorded (species-richness)			8	10	14	13	14	12	14	10	12	10	9	10

Status: R = Resident, SM = Seasonal Migrant, OV = Occasional Visitor.
Recorded abundance: for each species the median, 1st and 3rd quartiles were used to create abundance categories, described below.
■ = <1st quartile, ■ = 1st quartile to < median, ■ = median to <3rd quartile, ■ = 3rd quartile or higher.
*Occupied nest recorded Dec 2010

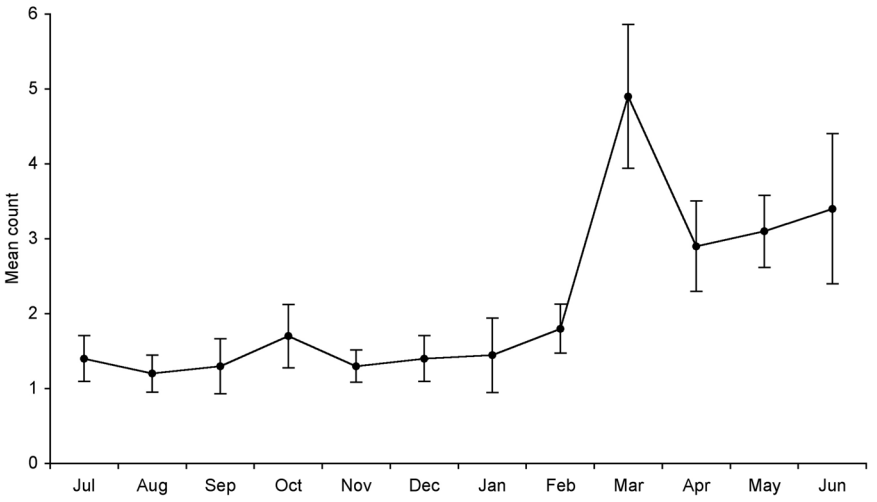

Fig. 2. Mean number of silvereyes recorded per count ($\pm SE_{mean}$) at Kennedy's Bush between Jul 2010 and Jun 2011.

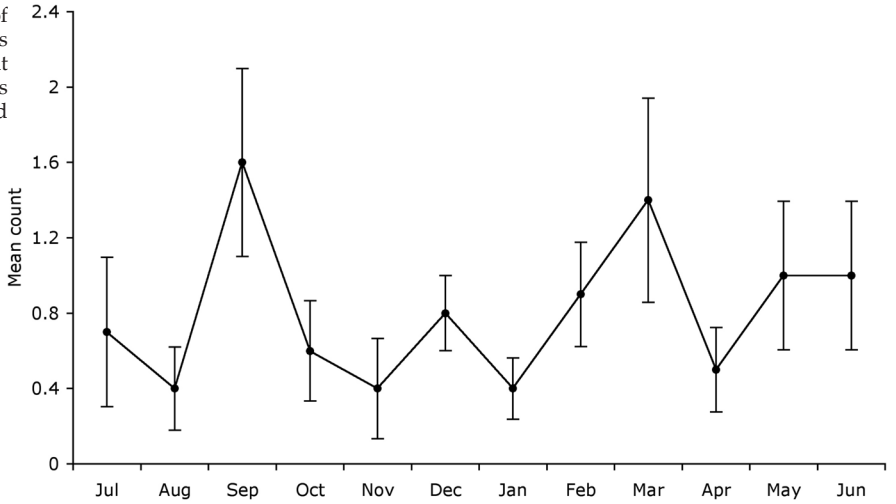

Fig. 3. Mean number of New Zealand pigeons recorded per count ($\pm SE_{mean}$) at Kennedy's Bush between Jul 2010 and Jun 2011.

to areas with richer food supplies (Onley 1980). The higher autumn numbers recorded could be due to birds either arriving at Kennedy's Bush or passing through on their way to other sites. Due to differences in study design (different locations and numbers of stations, different numbers of counts) and possible differences in observer ability, it was not possible to compare statistically the results of this study with previous studies of Kennedy's Bush. However, some qualitative comparisons can be made. Mean counts for most species were higher in the present study and the study reported by Crossland *et al*. (2009), than in the early 1990s as reported in Freeman (1999). It is possible that birds have generally increased in abundance at the site in response to ongoing pest management. The number of resident species has also increased since the early 1990s, from 7 species recorded by Freeman (1999) to 9 species recorded in the present study. Chaffinches, tomtits and song thrushes were all recorded as resident in the present study and by Crossland *et al*. (2009), whilst Freeman (1999) recorded these as seasonal migrant, occasional visitor and not present, respectively. Dunnock, recorded by Freeman (1999) as resident, was classed as an occasional visitor in the present study. The contact calls of dunnocks are similar to those of song thrushes and can easily be confused (A. Crossland, *pers. comm*.). This could have resulted in over-recording of song thrushes and under-recording of dunnocks, as Crossland *et al.* (2009) suggests that dunnocks were more abundant than indicated by the present study.

The 5-minute bird count technique requires recording birds based on how they were first detected (*i.e.,* either heard or seen), however the numbers heard/seen are often not analysed. In this study, from a total of 1368 individual birds recorded, 1169 (85.5%) were first identified by sound. The

proportion heard to that seen varied considerably from one species to another. Not surprisingly, those birds with loud calls, cryptic appearance and/or the habit of avoiding the observer, tended to be heard more often than seen. For example, bellbird (88.5% heard, 11.5% seen, n = 469), song thrush (99.2% heard, 0.8% seen, n = 126) and shining cuckoo (100% heard, 0% seen, n = 11) were all heard more often than they were seen. Conversely, those with relatively quiet calls and more conspicuous colouring and/or behaviour, tend to be 1st detected by sight more often than sound (*e.g.,* fantail: 45% heard, 55% seen, n = 20).

The high proportion of birds recorded as 1st heard emphasises the importance of the observer being skilled in bird-call identification. It is easy therefore to see how observer ability can have a major influence on the results. Even with experienced observers, abundant species may be under-recorded, as there is a limit to how many individuals can be distinguished by an observer. Dawson *et al*. (1978) noted that rarely were more than 8 individuals of the same species recorded in a single count. Indeed, in this study, 8 individual bellbirds was the maximum number recorded as heard at a single time. It is possible that more were present but I was unable to distinguish them as separate individuals. If this was the case, then the 5-minute bird count technique may be limited in its ability to detect changes in the abundance of the most frequently-recorded species.

ACKNOWLEDGEMENTS

Thanks to Andrew Crossland for providing a copy of the Christchurch City Council bird monitoring report and other information, and for comments on the manuscript. Thanks also to Phil Crutchley for details of pest control methods used at Kennedy's Bush. Finally, thanks to Lynette Hartley, Diana Clark, and 2 anonymous reviewers for providing comments on the manuscript and suggestions for improvement.

LITERATURE CITED

Christchurch City Council 2008. *Christchurch City Council Biodiversity Strategy 2008-2035*. Christchurch: Christchurch City Council.

Crossland, A.; Navis, P. 2009. *Christchurch woodland bird monitoring project report one: changes in bird species-richness and seasonal abundance at Kennedy's Bush.* Christchurch: Christchurch City Council.

Dawson, D.G.; Bull, P.C. 1975. Counting birds in New Zealand forests. *Notornis 22:* 101-109.

Dawson, D.G.; Dilks, P.J.; Gaze, P.D.; McBurney, J.G.R; Wilson, P.R. 1978. Seasonal differences in bird counts in forests near Reefton, South Island, New Zealand. *Notornis 25:* 257-278.

Freeman, A.N.D. 1999. Bird counts in Kennedy's Bush Scenic Reserve, Port Hills, Christchurch. *Notornis 46:* 388-404.

Gibb, J.A. 1996. First seen or first heard? A useful distinction when counting forest birds. *Notornis 43*: 7-13.

Graf, A. 2008. *Influencing habitat selection and use through conspecific attraction and supplementary feeding.* MSc Thesis. Lincoln: Lincoln University.

Heather, B.; Robertson, H. 2000. *The field guide to the birds of New Zealand.* Auckland: Viking. 440p.

MacKay, B.K. 2001. *Bird sounds: how and why birds sing, call, chatter and screech.* Mechanicsburg: Stackpole Books. 147p.

North, H.; Spurr, E.; Meurk, C.; Newell, C.; Drew, K.; Ferriss, S. 2003. Habitat and distribution of korimako/bellbird in and around Christchurch. *In:* Dawson, M.I. (ed.). *Greening the city: bringing biodiversity back into the urban environment. Proceedings of a Conference held by the Royal New Zealand Institute of Horticulture in Christchurch, 21–24 October 2003*. Christchurch: Royal New Zealand Institute of Horticulture.

Onley, D.J. 1980. Bird counts in lowland forests in the western Paparoas. *Notornis 27*: 335-362.

Schmechel, F. 2010. *Bird monitoring on Banks Peninsula: annual report for 2009.* Christchurch: Environment Canterbury.

Keywords Kennedy's Bush; 5-minute bird count; forest birds; seasonal abundance