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Dawn to dusk counts of common or garden birds, Wellington, New Zealand

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Abstract Common land-birds in a rural suburban garden, Wellington, New Zealand, were counted for 10 minutes twice an hour, twice a month for 2 years, from dawn to dusk. The birds' behaviour sometimes changed or they entered or left the study area during the day; so there is no ideal time of day for counting birds.

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Keywords common birds; gardens; dawn-dusk; counts; conspicuousness

INTRODUCTION

Calquhoun (1940) deplored ignorance about birds' conspicuousness yet he ignored diurnal variation. Several studies (e.g., Hartley 1953; Gibb 1954) have recorded bird behaviour in the morning supposing that it would remain unchanged throughout the day. However, birds are **not** equally conspicuous all day (e.g., Grey 1927).

For example, a rock pipit (*Anthus spinoletta*) watched for most of a few days in Britain spent much time feeding on foods exposed by the tide (Gibb 1956). Gibb (1955) recorded when adult tits (Paridae) fed their nestlings (cf. Gurr 1954). Diurnal variation in activity is rarely measured in New Zealand, so I recorded it in a few common birds from 1993 to 1995. This information should especially assist those planning to count birds.

STUDY AREA

I first counted birds in the Western Hutt hills (41°12′S, 174°55′E), from 1981 to 1992 (Gibb 2000). The vegetation here is mainly native and exotic trees and shrubs. There is little cultivated land and there are no lawns or fruit trees.

METHODS

To count birds I sat outside facing west. Twice a month for 2 years, I spent 20 min h^{-1} from dawn to dusk counting in 10-min periods (Table 1; Gibb 2000). As before (Gibb 1996), I noted which birds were first seen or first heard. Seasonal fluctuations resembled those already described (Gibb 2000).

To analyse wind speed at different times of day, the day was divided into four periods: early morning, late morning, early afternoon, late afternoon/evening. Exact times varied seasonally. Hourly records of wind speed were grouped as either Calm (Beaufort 0-1) or Windy.

Times of day (New Zealand Standard Time) refer to

Table 1 Total counts h^{-1} (New Zealand Standard Time); years pooled.

	Number of counts			
Time	Spr	Sum	Aut	Win
0600	20	23	4	
0700	26	26	26	18
0800	24	25	24	26
0900	24	26	24	27
1000	24	24	24	26
1100	24	22	27	25
1200	24	22	26	27
1300	24	20	24	24
1400	24	24	27	24
1500	24	25	26	24
1600	24	24	25	22
1700	24	24	17	9
1800	18	25	12	
1900	12	26	4	
2000	4	21		
2100		3		
Total	320	360	290	252

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the 60 min following the hour stated: thus '0600' spans 0600-0659 h. Spring includes Sep-Nov, summer Dec-Feb, autumn Mar-May, winter Jun-Aug.

RESULTS

The birds

Of 46 species recorded by Gibb (2000), 9 justified hourly analysis. Southern black-backed gulls commuted between Wellington and Porirua Harbours or elsewhere. Kingfishers were present only in spring-summer. Silvereyes were commonest when migrating in autumn. Starlings roosted elsewhere. The other 5 species seemed to be resident.

SOUTHERN BLACK-BACKED GULL (*Larus dominicanus*). The number flying over, always against the wind, ranged from 0 to >150 per 10 min. On average, there were more in autumn>summer>winter>spring (Fig. 1); and in spring-summer more before 1000 h than through the day (χ^2=7.91, 1df, P<0.001), and then more again in the evening (χ^2=18.89, 1df, P<0.001). In autumn-winter more were seen before 0800 h than later in the morning (χ^2=10.42, 1df, P<0.001), then more still in the evening (χ^2=9.36, 1df, P<0.001). The two highest counts (>150 in 10 min in winter) were both late in the day. This was no simple movement to feeding grounds in the morning and back in the evening since the birds always flew **against** the wind, presumably returning **with** the wind by a different route.

KINGFISHER (*Halcyon sancta*). Birds first seen/heard were pooled (Fig. 2). They were often detected early in the morning and in the evening (χ^2=5.29, 1df, P<0.05) when noisy.

NEW ZEALAND PIGEON (*Hemiphaga novaeseelandiae*). Pigeons roosted and bred in the bush here. I saw many more 0600-0759 h than later (χ^2=82.67, 1df, P<0.001), probably because some roosting here fed here in the valley (Gibb 2000). As Fig. 3 shows, this was less obvious in summer when heavy crops of tawa berries, following after pigeonwood, kept them here. Evidently pigeons may fly far from the roost to feed elsewhere.

BLACKBIRD (*Turdus merula*). Common, resident; 7% were first heard singing in spring, 18.2% in summer (χ^2=88.2, 1df, P<0.001) (Fig. 4). None sang in autumn-winter. In spring more were first heard singing in the afternoon than in the morning (χ^2=26.22, 1df, P<0.001), commonly from 1800-1959 h (χ^2=6.23, 1df, P<0.05).

SONG THRUSH (*Turdus philomelos*). (Fig. 5) Usually detected when singing (spring-summer) from 0600-0759 h (Table 2).

FANTAIL (*Rhipidura fuliginosa*). Often fed aerially above the canopy in autumn-winter when commonly calm (Gibb 1996, 2000), especially from 1200-1359 h (Fig. 6). Few were seen during spring-summer when it was often windy (Gibb, 2000). Dell (1959) thought that they left all other habitats to breed in the bush, but I think this unlikely. More information is needed to investigate possible diurnal changes in feeding (cf. Moeed & Fitzgerald 1982).

SILVEREYE (*Zosterops lateralis*). As elsewhere (Gibb 1996, 2000), this species was more numerous in autumn-winter than in spring-summer. Autumn peaks in numbers were not pronounced in 1993 or 1994, when almost as many were detected in winter as in autumn. In spring-summer more were detected from 1200-1559 h (χ^2=14.97, 1df, P<0.01), and more heard 0800-1159 h (χ^2=9.94, 1df, P<0.001), than at other times (Fig. 7); the difference between autumn and winter is not significant.

TUI (*Prosthemadera novaeseelandiae*). Birds first heard singing/calling were not differentiated, and diurnal changes in numbers were not significant (Fig. 8).

STARLING (*Sturnus vulgaris*). Many were detected early and late in the day flying from/to roost. More were detected between 0600–0959 h than later in the day (χ^2=99.22, 1df, P<0.001) (Fig. 9). In spring, more were first heard between 1600-1959 h than earlier in the afternoon. In summer, most were first seen from 0600-0759 h, then fewer until 1600-1759h. They were most often first heard from 0600-0959 h. In autumn they were often first seen from 0600–0959 h, first singing between 0800-1159 h, and first calling from 0600-0759 h. In winter they were often first seen between 0600-0859 h, and first heard between 0600-0959 h.

Wind

Strong winds reduced the numbers of birds detected. As found previously (Gibb 2000), it was windiest in summer, slightly less so in spring, calmer in winter and calmest in autumn. By day there was usually least wind at dawn (Table 3). It gradually strengthened through the day, then slackened for an hour or so before dusk (Table 3).

DISCUSSION

Of the 9 common species selected for analysis, 8 were recorded unevenly through the day. Either their numbers or their behaviour changed, or both.

Table 2 Percentage of songbirds detected when first seen (S), first singing (Sg), or first calling (C); or heard (H) if song and calls not differentiated.

	Spring				Summer				Autumn				Winter		
Time	S	Sg	C		S	Sg	C		S	Sg	C		S	Sg	C
Blackbird											(S Sg C)				
0600-0759	7	46	7		2	10	18				8	0	29		
0800-0959	4	35	0		2	16	12				0	0	14		
1000-1159	6	42	2		2	10	6				2	0	9		
1200-1359	4	69	2		2	19	2				0	0	5		
1400-1559	6	65	0		2	20	10				4	0	4		
1600-1759	2	63	6		0	15	10				1	0	15		
1800-1959	3	91	9		0	20	10				6				
2000-2159					4	33	8								
Silvereye			(S	Sg	C)										
0600-0759			2	0	2				13	0	0				
0800-0959			7	0	4				19	0	2		38	0	0
1000-1159			6	4	4				20	0	0		27	0	0
1200-1359			11	1	2				16	0	0		25	0	0
1400-1559			11	0	1				17	0	0		23	0	2
1600-1759			4	0	1				7	0	0		3	0	3
1800-1959			0	0	0				0	0	0		0	0	0
Tui			(S		H)		(S		H)		(S		H)		
0600-0759	20		28		14		10		2		0				
0800-0959	27		13		14		8		5		4				
1000-1159	27		27		20		17		3		3				
1200-1359	25		15		21		21		3		5				
1400-1559	31		35		10		18		4		4				
1600-1759	17		8		6		19		1		1				
1800-1959	38		18		9		15								
Starling															
0600-0759	64	30	28		80	12	27		90	17	33		67	22	17
0800-0959	73	38	27		65	18	8		100	46	13		53	40	11
1000-1159	35	2	0		54	2	7		59	43	2		18	0	0
1200-1359	21	0	0		40	2	2		56	8	8		8	2	0
1400-1559	38	0	4		59	2	9		58	23	4		13	25	0
1600-1759	35	19	2		71	0	6		53	26	0		13	3	0
1800-1959	15	15	9		55	0	4								

Table 3 Mean daily wind speed; seasons pooled. Early morning is up to 0859 h in autumn, 0959 h in winter, and 0759 h in spring and summer. Late afternoon is after 1700 h in all seasons.

	Hourly records								
Period	Calm	Windy	% calm	χ^2	P	χ^2	P	χ^2	P
Early a.m.	70	32	68.63	}					
				}31.3	<0.001				
Late a.m.	67	127	34.54	}		}			
						}9.61	<0.001		
Early p.m.	39	152	20.42			}		}	
								}20.07	<0.001
Late p.m.	44	52	45.83					}	

In autumn-winter, twice as many New Zealand pigeons were seen early in the morning than later probably because some left to feed elsewhere (Gibb 2000). In spring-summer (when they were present), kingfishers were often detected at daybreak and dusk. In spring, blackbirds sang longest and were often seen in late afternoon. Song thrushes too were also detected (usually singing) early in the morning and at dusk. In autumn-winter, more fantails were seen in the afternoon than during the morning, probably because flying insects were more common then

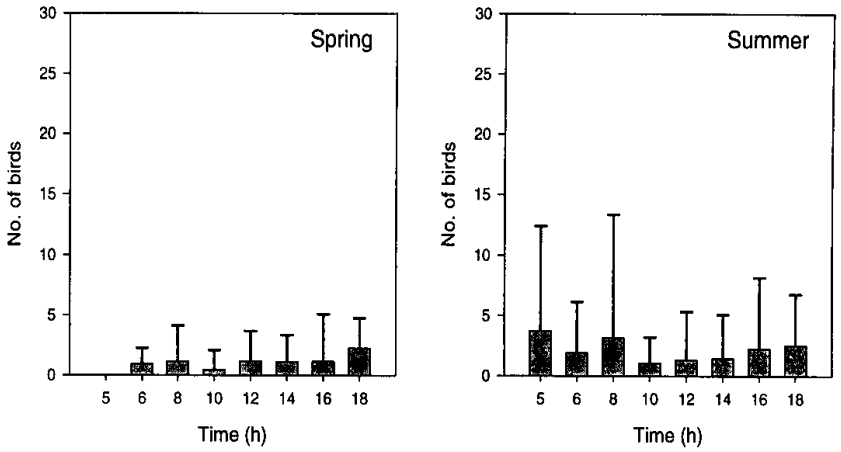


Fig. 1 Number of southern black-backed gulls (*Larus dominicanus*) recorded 10-min count^{-1} (solid bars) and 1 standard deviation (line bars) in spring, summer, autumn and winter. Times are: 5 = 0500-0559, 6 = 0600-0759 and at 2-h intervals to 18 = 1800-1959 h.

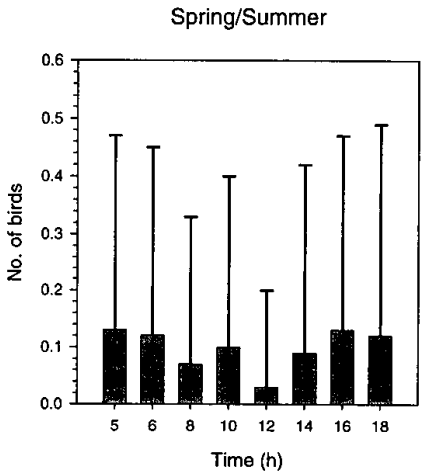
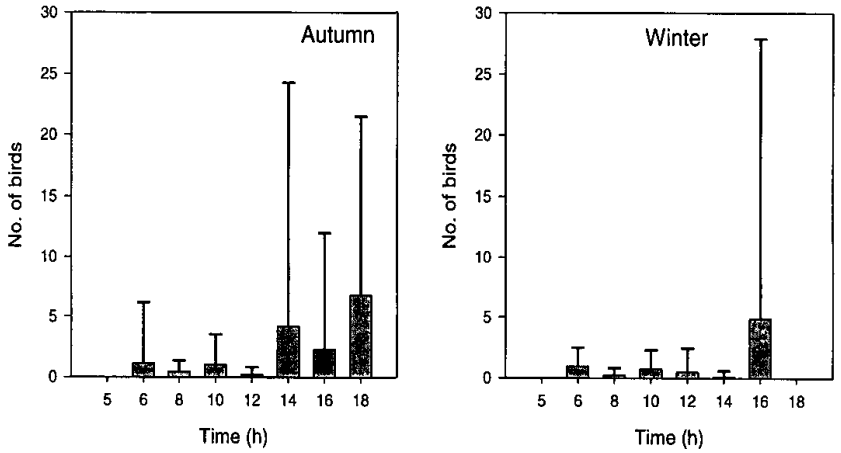
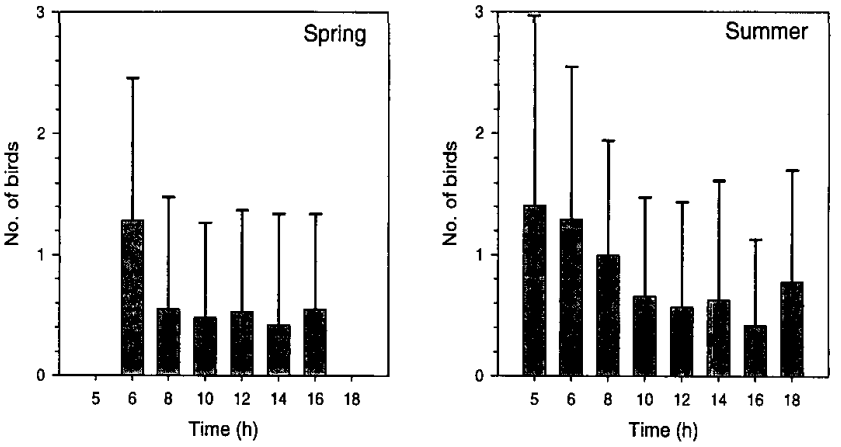


Fig. 2 Number of kingfishers (*Halcyon sanctus*) recorded 10-min count^{-1} (solid bars) and 1 standard deviation (line bars) in spring and summer. Times are: 5 = 0500-0559, 6 = 0600-0759 and at 2-h intervals to 18 = 1800-1959 h.





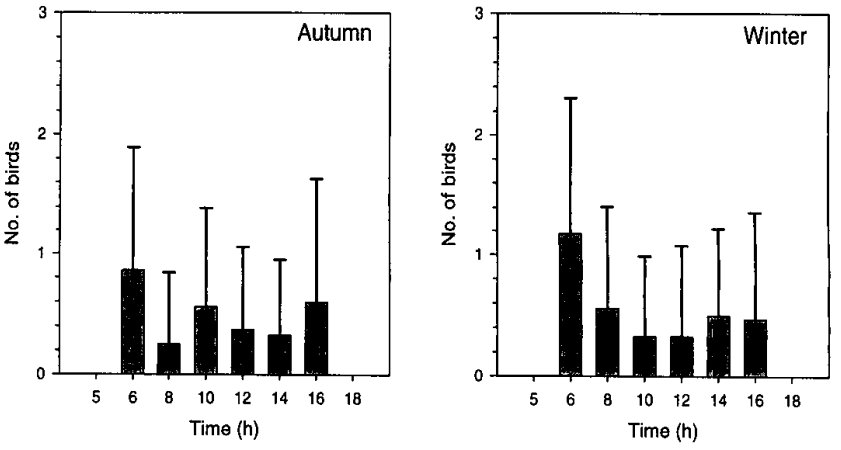


Fig. 3 Number of New Zealand pigeons (*Hemiphaga novaeseelandiae*) recorded 10-min count^{-1} (solid bars) and 1 standard deviation (line bars) in spring, summer and winter. Times are: 5 = 0500-0559, 6 = 0600-0759 and at 2-h intervals to 18 = 1800-1959 h.

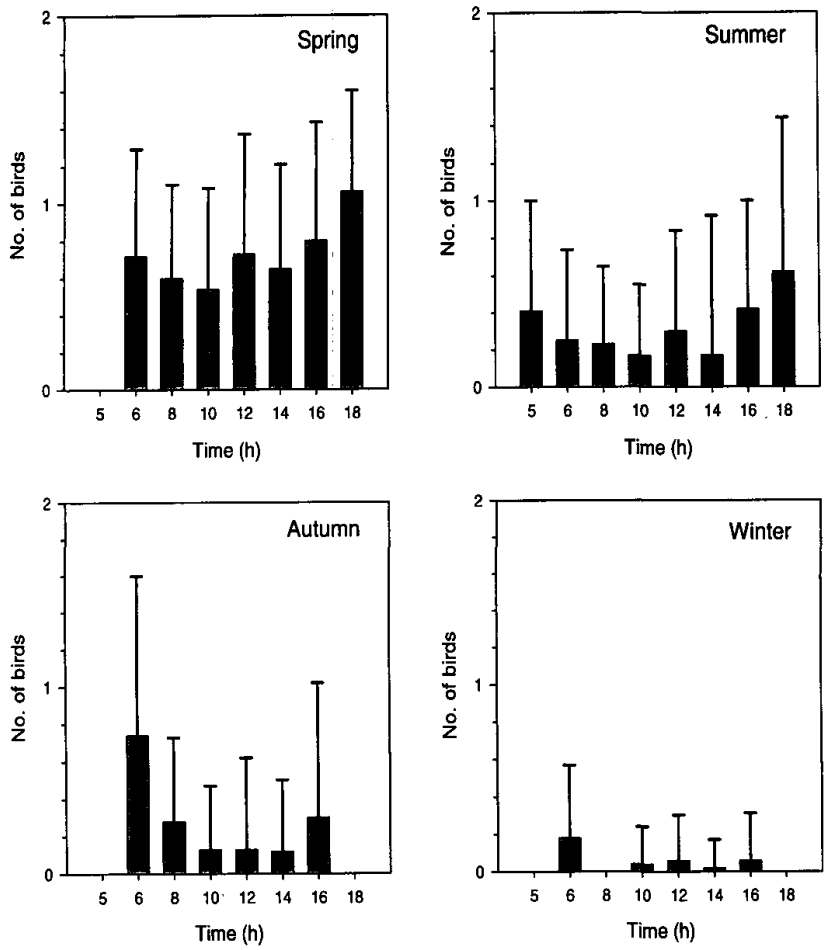


Fig. 4 Number of blackbirds (*Turdus merula*) recorded 10-min count^{-1} (solid bars) and 1 standard deviation (line bars) in spring, summer, autumn and winter. Times are: 5 = 0500-0559, 6 = 0600-0759 and at 2-h intervals to 18 = 1800-1959 h.

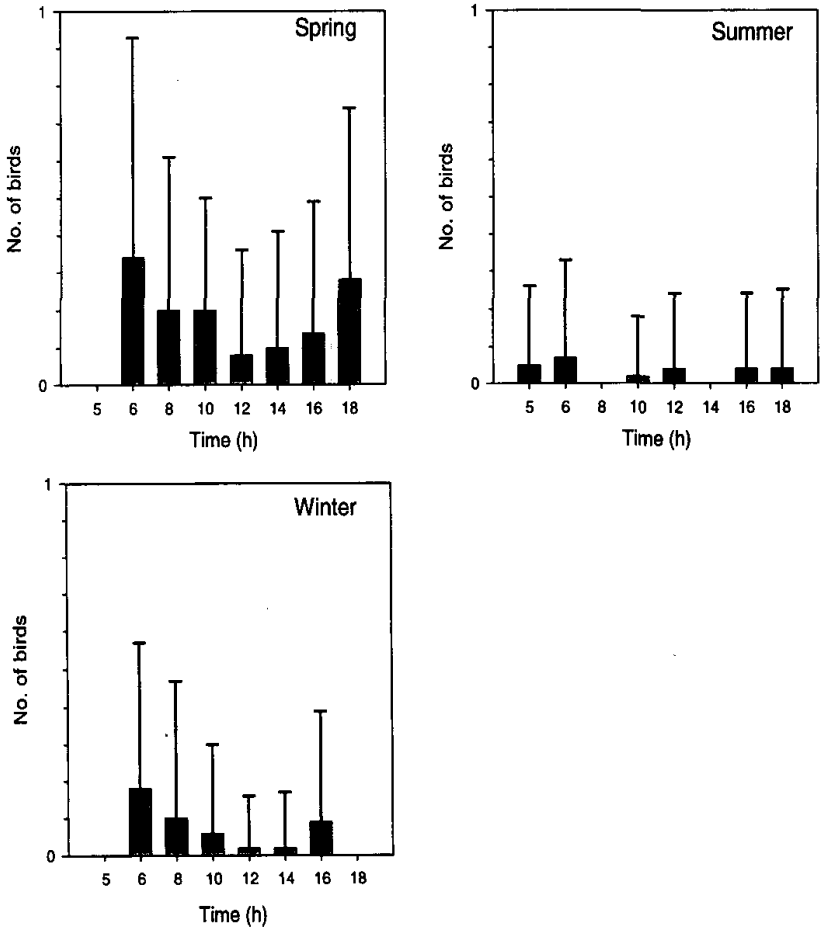


Fig. 5 Number of song thrushes (*Turdus philomelos*) recorded 10-min count^{-1} (solid bars) and 1 standard deviation (line bars) in spring, summer and winter. Times are: 5 = 0500-0559, 6 = 0600-0759 and at 2-h intervals to 18 = 1800-1959h.

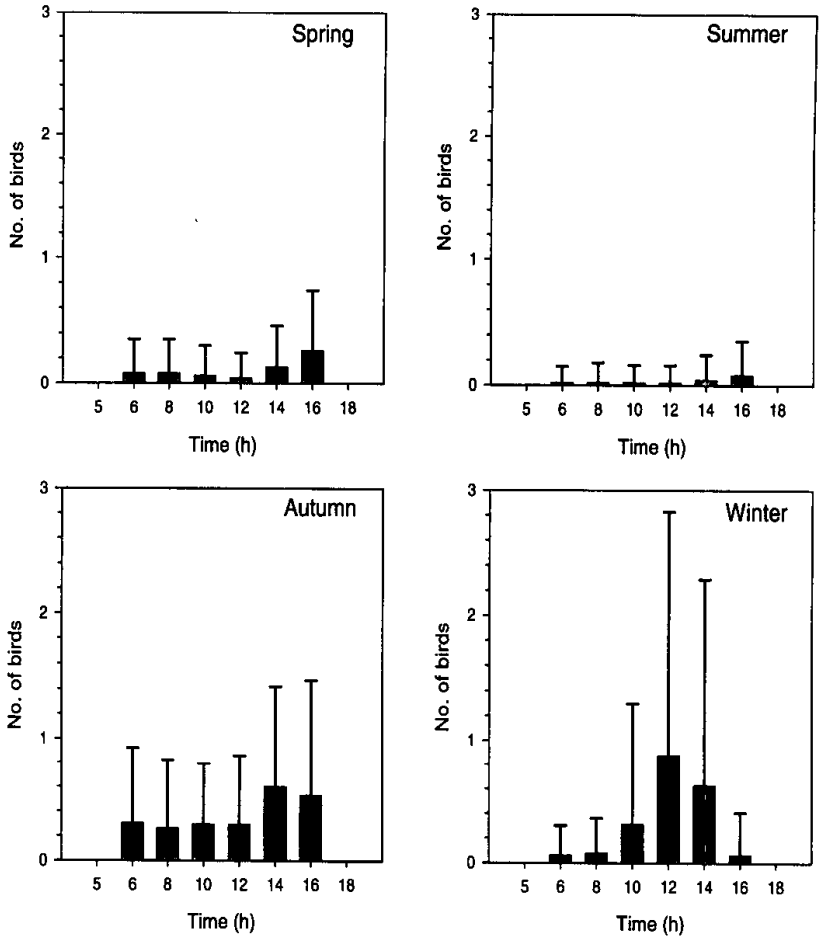


Fig. 6 Number of fantails (*Rhipidura fuliginosa*) recorded 10-min count^{-1} (solid bars) and 1 standard deviation (line bars) in spring, summer, autumn and winter. Times are: 5 = 0500-0559, 6 = 0600-0759 and at 2-h intervals to 18 = 1800-1959 h.

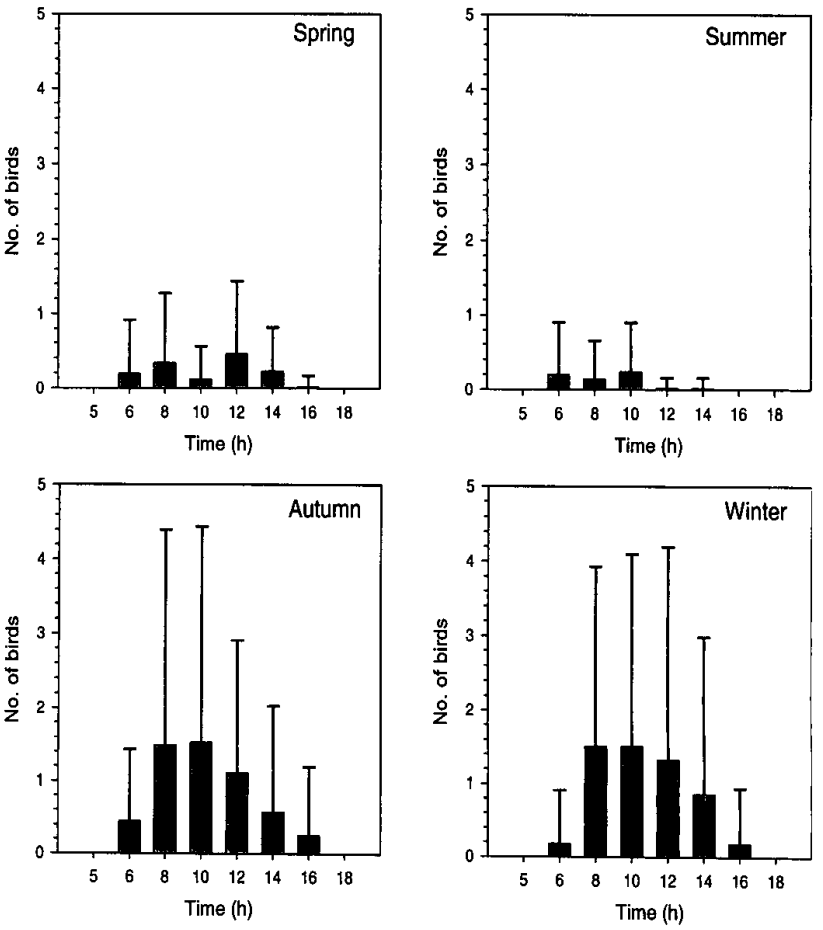
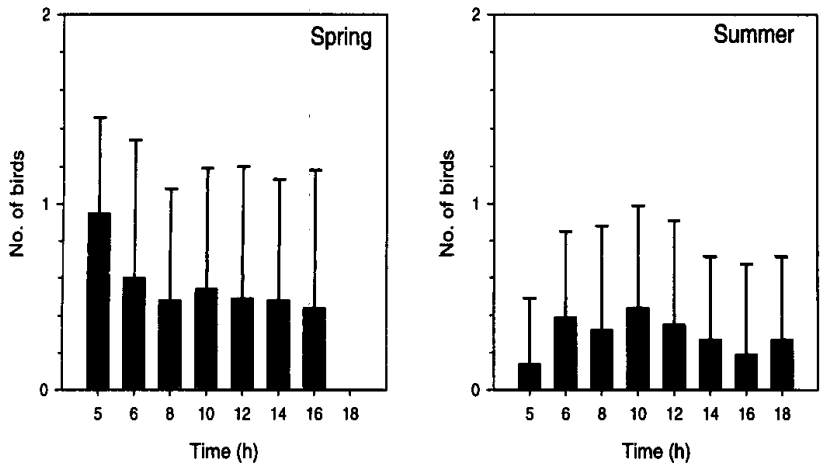


Fig. 7 Number of silvereyes (*Zosterops lateralis*) recorded 10-min count^{-1} (solid bars) and 1 standard deviation (line bars) in spring, summer, autumn and winter. Times are: 5 = 0500-0559, 6 = 0600-0759 and at 2-h intervals to 18 = 1800-1959 h.



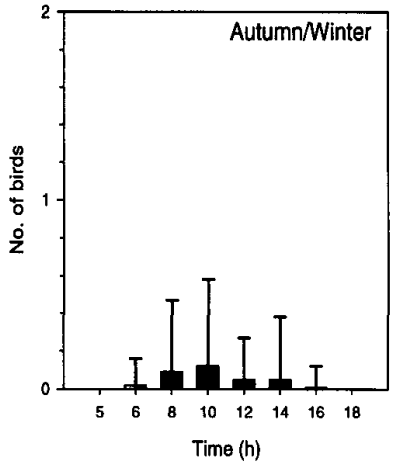
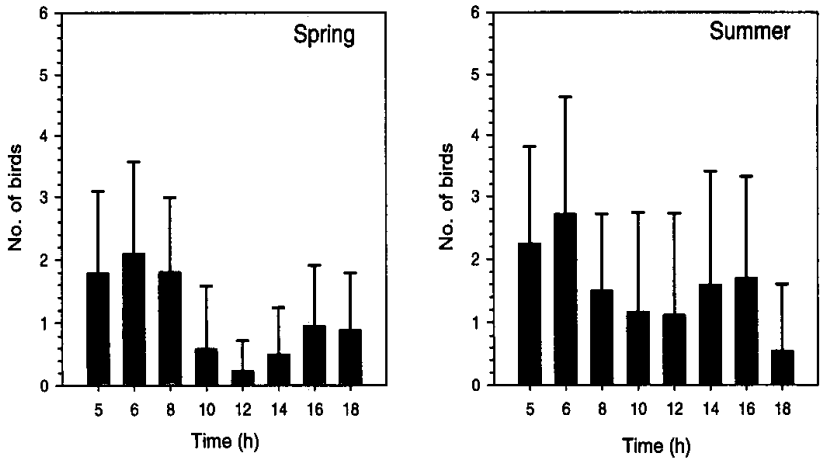


Fig. 8 Number of tui (*Prosthemadera novaeseelandiae*) recorded 10-min count^{-1} (solid bars) and 1 standard deviation (line bars) in spring, summer, autumn and winter. Times are: 5 = 0500-0559, 6 = 0600-0759 and at 2-h intervals to 18 = 1800-1959 h.



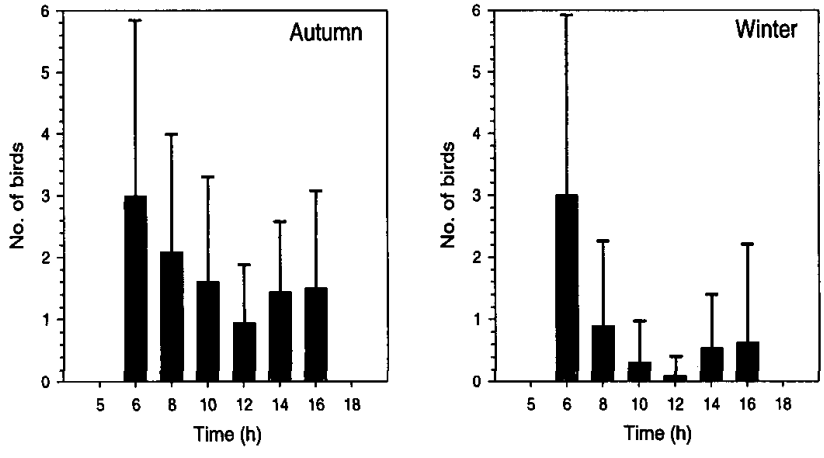


Fig. 9 Number of European starlings (*Sturnus vulgaris*) recorded 10-min count^{-1} (solid bars) and 1 standard deviation (line bars) in spring, summer, autumn and winter. Times are: 5 = 0500-0559, 6 = 0600-0759 and at 2-h intervals to 18 = 1800-1959 h.

(pers. obs.). Fantails were seldom seen at all in summer when it was often windy, probably because they fed inconspicuously beneath the canopy. In autumn, 3 times as many silvereyes were detected during the morning than during the afternoon, perhaps because numbers were boosted by migrants in the morning.

Of the 9 species recorded, 6 were liable to be either first seen or first heard singing or calling (Table 3). Blackbirds and thrushes were usually first detected in early morning or at dusk. Fantails were usually detected early in the morning in spring, late-afternoon in summer and autumn, and mid-afternoon in winter. Tui and silvereyes were detected irregularly through the day. Starlings were seen mainly early in the morning dispersing from their roosts during most of the year.

The potential sampling bias caused by the variation in conspicuousness of birds detected through the day is obvious enough. Other questions arise however. For instance, why are New Zealand pigeons inactive for so long? Small birds forage for most of the day (Gibb 1954, 1956); perhaps pigeons are inactive because they need to process food stored in the crop. Why are New Zealand pigeons so silent when other pigeons (e.g., wood pigeons (*Columba palumbus*) sing so often? Perhaps they can only defend large territories (home ranges?) by **visually** conspicuous displays? Why are so many bird species voluble during the **dawn** chorus when "all birds sing together" (Grey 1927)? One might expect them to feed first: smaller birds can barely survive a long winter's night without feeding (pers. obs.). Perhaps they sing first because territoriality or self-advertisement is important and there is usually less wind early in the morning to distort song.

In this connection, ornithologists often find birding more profitable in the morning than in the afternoon; perhaps this is because it is calmer in the morning. Several species resume singing at dusk (Grey 1927) when the wind slackens. The strength of the wind is clearly very important in determining the amount of song delivered.

Many such questions about bird behaviour seem intractable. Having recognised that they exist, the first step is to record the facts. This is not difficult.

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