

DET KGL. NORSKE VIDENSKABERS SELSKAB, MUSEET

rapport

ZOOLOGISK SERIE 1977-12

Bird song activity in relation
to breeding cycle, spring weather
and environmental phenology
— statistical data

Tore Slagsvold



AVDELING



Universitetet i Trondheim

K. norske Vidensk. Selsk. Mus. Rapport Zool. Ser. 1977-12

BIRD SONG ACTIVITY IN RELATION TO BREEDING CYCLE, SPRING
WEATHER AND ENVIRONMENTAL PHENOLOGY - STATISTICAL DATA.

Tore Slagsvold

Universitetet i Trondheim
Det Kgl. Norske Videnskabers Selskab, Museet
Trondheim, august 1977

ISBN 82-7126-146-0

ABSTRACT

Slagsvold, Tore 1977. Bird song activity in relation to breeding cycle, spring weather and environmental phenology - statistical data.

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Tables are given showing basic results from correlation and linear regression analysis between various song activity variables themselves and relationships with spring weather and phenophases of the environment; localities in South Norway 1968-74.

Tore Slagsvold, Zoological Institute, University of Trondheim, Rosenborg, 7000 Trondheim, Norway.

INTRODUCTION

Seasonal variation in song activity of forest bird species in South Norway was studied in 1968-74. The present paper gives basic results from correlation and linear regression analysis between the song activity variables themselves and relationships with spring weather and phenophases of the environment. Conclusions drawn and further discussion of the tables are given by Slagsvold (1977).

DEFINITIONS AND ABBREVIATIONS

R	the plot at Røa
S	the plots in Sørkedal
T	the plots at Trondheim (Tiller and Bratsberg)
V	the plots in Valdres
M1	the date of the first maximum of song activity
M2	the date of the second maximum of song activity
MIN	the date of the minimum of song activity during the period between M1 and M2
F30, F60	the date when the graph reaches 30% and 60%, respectively, of the value obtained at M1 for the first time
L60, L30	the date when the graph has a value that corresponds to 60% and 30%, respectively, of the value obtained at M1 for the last time
$M2^{\sigma\sigma} / M1^{\sigma\sigma}$	the size of M2 in proportion to the size at M1
$MIN^{\sigma\sigma} / M1^{\sigma\sigma}$	the size of MIN in proportion to the size at M1
B20, B80	the date when 20% and 80%, respectively, of the plot is free from snow in spring
BUD	the mean date on which the tips of the birch leaves protude 2 mm beyond the bud scales
BP	the mean date on which the petioles of the birch leaves are visible for the first time in spring
LEAFING	the mean date on which the birch leaves attain 75% of their final length (cf. Slagsvold 1976a)
Stage 0.58 of <i>Oncopsis</i>	the date on which the mean breadth of the carapace (vertex) measured across the eyes reaches 0.58 mm
Stage 1-2 of <i>M. morio</i>	the date on which the femur length of <i>Mitopus morio</i> attains the mean for the juveniles stages 1 and 2
r	simple correlation coefficient
n	sample size
Fix date r	the r value for a relationship in which the temperature or precipitation recorded over a certain period, terminating on a fixed date, forms the independent variable (cf. Slagsvold 1976b)

Critr

the highest r (absolute) value obtained for temperature or precipitation as the independent variable, for periods of varying length for which the starting and termination dates were tested (cf. Slagsvold 1975a and b).

Table I. Correlation coefficients for the relationship between certain song variables and the time of the first song peak (M1). Significant values shown in italics. (For key see DEFINITIONS AND ABBREVIATIONS.)

Species	n	MIN	M2	L60	L30	M2♂♂/ M1♂♂
<i>Anthus trivialis</i>	8-10	.82	.57	.50	.06	-.05
<i>Prunella modularis</i>	18-19	.36	-.12	.30	.13	.31
<i>Sylvia atricapilla</i>	5	-	-	-.20	-.17	-
<i>Phylloscopus trochilus</i>	10-17	.57	.68	.11	-.04	-.17
<i>Regulus regulus</i>	13-16	.30	.11	-.15	-	.03
<i>Ficedula hypoleuca</i>	8	-	-	.48	.11	-
<i>Erithacus rubecula</i>	13-14	.66	.49	.68	.30	.23
<i>Turdus pilaris</i>	7-10	.92	.63	.75	.57	.10
<i>Turdus merula</i>	5-6	.73	-.66	-.36	-.66	-.12
<i>Turdus iliacus</i>	18	.86	.55	.78	.72	.64
<i>Turdus philomelos</i>	15-16	.49	.44	-.02	-.13	.15
<i>Parus montanus</i>	7-8	-.58	-.28	.73	.49	.29
<i>Parus ater</i>	10-12	.43	.71	.77	.72	.55
<i>Parus major</i>	9	.47	.15	.47	.39	.40
<i>Certhia familiaris</i>	5	.68	-.24	-.22	.51	.84
<i>Fringilla coelebs</i>	20	.40	.66	.57	.76	.43
<i>Fringilla montifringilla</i>	9-13	.69	.01	.67	.60	.75
<i>Carduelis spinus</i>	16	.89	.34	.03	-.01	-.24
Community	19-20	.57	.60	.16	.46	.25

Table II. Regression coefficients between song variables and snow disappearance, birch phenophases and start of growth by *Mitopus morio*. Significant values shown in italics. For the date of the first song maximum the whole regression equation is given. The dates refer to a baseline of March 1 = 1. n is the number of records used in the regression, excepting those in the two right-hand columns, viz. n = 5-16 for LEAFING and n = 5-11 for Stage 1-2 of *M. morio*. (For key see DEFINITIONS AND ABBREVIATIONS.)

	Vari- able	B20	B80	BUD	BP	LEAF- ING	Stage1-2 of <i>M.</i> <i>morio</i>	Vari- able	B20	B80	BUD	BP	LEAF- ING	Stage1-2 of <i>M.</i> <i>morio</i>
<i>Anthus trivialis</i> n=10														
F30	.14	.16	.26	.19	.32	-.22		F30	.80	.79	1.02	.89	.80	1.26
F60	.14	.12	.34	.24	.19	-.23		F60	.73	.73	.94	.80	.74	1.22
M1	.18x	.15x	.24x	.19x	.18x	-.31x		M1	.67x	.59x	.93x	.80x	.63x	1.21x
	+73.5	+74.1	+66.6	+68.7	+67.4	+109.9			+32.4	+32.2	+4.2	+8.3	+12.2	-39.6
Min	.09	.12	.10	.08	-.00			Min	.60	.61	.85	.68	.56	1.14
M2	.23	.25	.34	.27	.21			M2	.21	.20	.23	.18	.05	.33
L60	.43	.18	.48	.46	.51	.29		L60	.66	.52	.87	.76	.55	.84
L30	.47	.48	.71	.59	.28	.94		L30	.60	.46	.95	.88	.77	.91
<i>Prunella modularis</i> n=20														
F30	.63	.59	.67	.63	.68	.74		F30	.77	.70	.84	.79	.81	1.00
F60	.76	.70	.79	.74	.74	.96		F60	.82	.72	.91	.84	.78	1.07
M1	.56x	.53x	.56x	.50x	.49x	.85x		M1	.85x	.81x	.96x	.85x	.75x	.89x
	+36.4	+34.3	+27.9	+29.5	+22.4	-11.8			+17.9	+13.4	-3.1	-.6	-4.0	-18.5
Min	.44	.41	.72	.60	.42	.17		Min	.53	.51	.64	.56	.44	.60
M2	.05	.01	.21	.16	.05	-.49		M2	.21	.19	.32	.28	.23	.34
L60	.32	.52	.43	.27	.41	.44		L60	1.50	1.52	1.74	1.49	1.32	1.86
L30	-.10	-.01	-.11	-.10	.03	.46		L30	.65	.70	.71	.62	.51	.84
<i>Sylvia atricapilla</i> n=5														
F30	1.14	.96	2.62	2.38				F30	1.19	.94	1.90	1.54		
F60	.52	.32	.58	.69				F60	1.03	.79	1.83	1.45		
M1	.43x	.22x	.27x	.43x				M1	.84x	.68x	1.47x	1.27x		
	+75.7	+84.1	+79.1	+66.4					+19.7	+22.9	-34.7	-30.0		
L60	.96	.94	2.40	1.93				Min	.32	.19	.22	.22		
L30	.72	.66	2.00	1.76				M2	-.45	-.41	-1.31	-1.09		
								L60	-.84	-.71	-1.45	-1.45		
								L30	-.85	-.74	-1.76	-1.67		

Vari- able	B20	B80	BUD	BP	LEAF- ING	Stage1-2 of M. orio	Vari- able	B20	B80	BUD	BP	LEAF- ING	Stage1-2 of M. orio							
<i>Phylloscopus trochilus</i> n=17																				
F30	.23	.24	.15	.14	.24	.39	F30	.68	.74	.76	.72	.64	.96							
F60	.35	.35	.32	.30	.37	.52	F60	.53	.56	.69	.61	.51	.81							
M1	.39x	.36x	.33x	.29x	.47x	.40x	M1	.53x	.56x	.72x	.63x	.47x	.78x							
	+62.0	+60.9	+60.9	+61.3	+38.2	+45.2		+37.0	+30.4	+16.3	+18.2	+24.4	-6.5							
Min	.04	.02	.08	.07	.14	.14	Min	.66	.62	.59	.63	.63	.95							
M2	.23	.22	.39	.31	.47	.50	M2	.53	.53	.40	.46	.50	1.04							
L60	.40	.30	.54	.50	.40	.48	L60	.19	.33	-.11	.05	.37	2.31							
L30	.30	.22	.47	.42	.16	.35	L30	-.17	-.03	-.29	-.23	.08	1.04							
<i>Regulus regulus</i> n=16																				
F30	.73	.50	.68	.57	.67	.30	F30	.65	.44	-.82	.44	.20	-.26							
F60	.66	.54	.57	.49	.63	.44	M1	.82x	.74x	2.01x	1.58x	.45x	.89x							
M1	.53x	.48x	.67x	.54x	.36x	.30x		+21.0	+18.0	-72.3	-53.1	+24.4	-17.5							
	+44.7	+43.4	+27.7	+33.4	+41.5	+46.3	Min	-.68	-.79	-1.58	-.55	-.76	.51							
Min	.81	.69	.97	.85	.77	.51	M2	.37	.09	.50	.88	.12	1.48							
M2	.54	.51	.51	.52	.49	.50	L60	3.35	3.07	8.38	5.13	2.94	3.09							
L60	-.17	-.41	-.37	-.28	-.16	.18	<i>Parus montanus</i> n=8													
<i>Ficedula hypoleuca</i> n=8																				
F30	.10	.22	-.19	.04	.22	.93	F30	1.08	.74	1.60	1.25	1.14	.52							
F60	.09	.09	-.20	-.12	-.05	1.09	F60	-.03	-.20	-.29	-.60	.05	-.59							
M1	.17x	.20x	-.18x	-.05x	.10x	.46x	M1	.98x	.83x	1.91x	1.53x	1.60x	1.67x							
	+78.3	+75.1	+98.3	+90.1	+76.8	+27.5		+12.5	+13.2	-65.6	-49.1	-76.9	-83.6							
L60	.73	.61	.63	.70	.03	.95	Min	-.13	-.20	.39	.25	.01	.79							
L30	.51	.37	-.21	.18	.34	.54	M2	.69	.50	1.85	1.32	.82	1.60							
<i>Erethacus rubecula</i> n=13																				
F30	.78	.64	1.49	1.32	.97	.93	F30	1.08	.74	1.60	1.25	1.14	.52							
F60	.74	.65	1.74	1.39	.79	1.09	F60	-.03	-.20	-.29	-.60	.05	-.59							
M1	.32x	.32x	1.03x	.74x	.23x	.46x	M1	.98x	.83x	1.91x	1.53x	1.60x	1.67x							
	+51.3	+48.9	-.8	+14.0	+48.3	+27.5		+12.5	+13.2	-65.6	-49.1	-76.9	-83.6							
Min	.91	.78	1.49	1.34	.78	.95	Min	-.13	-.20	.39	.25	.01	.79							
M2	.45	.47	.77	.60	.58	.54	M2	.69	.50	1.85	1.32	.82	1.60							
L60	.39	.42	1.47	1.08	-.10	.89	L60	2.32	2.25	3.89	3.30	4.11	3.35							
L30	.33	.51	.54	.24	.12	.59	L30	1.17	1.08	1.84	1.59	2.09	1.67							

Vari- able	B20	B80	BUD	BP	LEAF- ING	Stagel-2 of M. orio	Vari- able	B20	B80	BUD	BP	LEAF- ING	Stagel-2 of M. orio
<i>Parus major</i> n=9													
F30	1.69	1.90	1.07	1.50	1.98	2.94	F30	.62	.71	.48	.51	.52	1.37
F60	.54	.77	-.12	.10	.77	1.31	F60	.61	.67	.43	.49	.56	1.44
M1	.46x	.48x	.90x	.95x	.61x	.63x	M1	.83x	.93x	.75x	.76x	.77x	1.70x
	+50.9	+46.8	+14.7	+5.6	+22.4	+20.0		+22.9	+9.1	+17.3	+11.0	-1.3	-86.2
Min	.33	.35	1.42	1.09	.69	.76	Min	.40	.54	.41	.38	.38	.53
M2	.57	.50	1.07	.99	.97	.82	M2	-.10	-.21	-.34	-.18	-.12	.26
L60	1.41	1.35	1.85	1.83	3.20	2.05	L60	1.03	1.37	.90	1.05	1.06	2.78
L30	1.75	1.57	1.82	2.07	2.17	1.74	L30	1.07	1.43	1.02	1.09	.99	2.03
<i>Fringilla montifringilla</i> n=13													
<i>Carduelis spinus</i> n=18													
F60	2.01	1.99	-.83	-.06	2.36	-1.14	F60	1.99	1.80	1.90	1.83	1.92	1.71
M1	.79x	.97x	1.60x	.76x			M1	1.01x	.96x	.87x	.89x	.80x	1.38x
	+22.5	+2.6	-44.4	+8.7				+18.6	+13.2	+13.7	+6.7	+9.0	-53.7
Min	.78	1.08	2.84	1.32			Min	.54	.46	.49	.50	.32	.56
M2	.03	-.15	1.77	.79	-.62	1.01	M2	.13	.00	.11	.12	-.11	-.19
L60	-.46	-.22	1.15	.24			L60	.96	.96	.81	.80	.43	1.40
L30	.62	1.34	3.91	1.66									
<i>Fringilla coelebs</i> n=20													
F30	1.13	1.02	1.40	1.22	1.18	1.21	F30	1.24	1.21	1.41	1.23	1.24	1.43
F60	.85	.71	.97	.89	.89	.78	F60	.76	.69	.86	.78	.79	.82
M1	.46x	.42x	.59x	.50x	.42x	.40x	M1	.68x	.64x	.77x	.70x	.57x	.88x
	+51.6	+50.2	+35.0	+38.1	+39.1	+39.8		+35.5	+32.3	+18.4	+19.4	+20.5	-7.7
Min	.47	.43	.31	.36	.44	.76	Min	.45	.41	.51	.51	.37	.84
M2	.51	.49	.62	.54	.63	.60	M2	.36	.35	.46	.42	.37	.55
L60	.58	.53	1.03	.75	.64	.68	L60	.07	.10	.14	.05	.10	.27
L30	.52	.45	.72	.57	.49	.41	L30	.18	.17	.22	.19	.23	.40

Table III. Correlation coefficients obtained between the date of the first song maximum (M1) and temperature during various periods in spring, Sørkedal 1966, 1968-72 (mean value in each year). To find the highest value of Fix date r and Critr, the period lengths tested were 5, 6, 7, ..., 48, 49 and 50 days (from middle of March to the time of M1). Significant values are shown in italics. (For key see DEFINITIONS AND ABBREVIATIONS.)

Species	No. of Fixed years	Fix date r, period length					Highest r		Highest r		
		10	20	30	40	50	Length	Fix date r	Period	Length	Critr
<i>Phylloscopus trochilus</i>	5	22/5 .38	.35	.23	-.38	-.61	50	-.61	28/3-21/4	25	-1.00
<i>Regulus regulus</i>	6	12/5 .07	-.67	-.76	-.76	-.84	50	-.84	24/3-28/4	36	-.89
<i>Ficedula hypoleuca</i>	5	26/5 -.05	.08	.30	.40	-.08	34	.59	1/4-14/4	14	-.99
<i>Erithacus rubecula</i>	6	6/5 -.58	-.84	-.72	-.69	-.73	18	-.85	18/4-30/4	13	-.97
<i>Turdus iliacus</i>	6	4/5 -.87	-.60	-.29	-.27	-.36	11	-.89	28/4-2/5	5	-.93
<i>Turdus philomelos</i>	6	3/5 -.71	-.91	-.77	-.74	-.80	22	-.92	12/4-2/5	21	-.92
<i>Parus major</i>	5	11/5 .08	-.89	-.99	-.73	-.81	30	-.99	12/4-12/5	31	-.99
<i>Fringilla coelebs</i>	6	14/5 .08	-.45	-.82	-.72	-.73	33	-.84	18/4-25/4	8	-.93
Community	6	9/5 -.31	-.95	-.93	-.84	-.92	22	-.97	12/4-4/5	23	-.99

Table IV. Correlation coefficients obtained between M1 and precipitation in Sørkedal; details as in Table III.

Species	No. of years	Fix date r, period length				
		10	20	30	40	50
<i>Regulus regulus</i>	6	-.62	-.74	-.68	-.73	-.70
<i>Parus major</i>	5	-.34	.45	.62	.41	.48
<i>Fringilla coelebs</i>	6	-.46	-.17	-.10	-.02	-.13
<i>Turdus iliacus</i>	6	.32	.37	.27	.13	.29
<i>Erithacus rubecula</i>	6	.02	.40	.45	.59	.50
<i>Turdus philomelos</i>	6	.50	.42	.37	.42	-.14
<i>Phylloscopus trochilus</i>	5	-.66	-.84	-.56	-.19	-.11
<i>Ficedula hypoleuca</i>	5	-.55	-.71	-.64	-.53	-.30
Community	6	.12	.41	.44	.42	.41

Table V. Correlation coefficients obtained between the date of the first song maximum (M1) and temperature and precipitation during various periods in spring, all plots and years (1968-74). Fixed dates were the mean dates for M1. Significant values are shown in italics. (For key see DEFINITIONS AND ABBREVIATIONS.)

Species	n	Temperature					Precipitation				
		Fix date r, period length					Fix date r, period length				
		10	20	30	40	50	10	20	30	40	50
<i>Anthus trivialis</i>	10	-.34	-.33	-.29	-.33	-.36	-.22	-.27	-.18	-.16	-.05
<i>Prunella modularis</i>	19	-.44	-.55	-.58	-.65	-.62	-.05	-.04	-.03	-.01	-.03
<i>Sylvia atricapilla</i>	5	-.54	-.52	.36	-.51	-.70	.28	-.44	-.66	-.39	-.15
<i>Phylloscopus trochilus</i>	17	-.24	-.16	-.23	-.34	-.40	-.58	-.66	-.48	-.27	-.12
<i>Regulus regulus</i>	16	-.03	-.36	-.44	-.41	-.57	-.53	-.60	-.57	-.57	-.68
<i>Ficedula hypoleuca</i>	8	.31	.29	.18	.17	-.03	-.42	-.66	-.73	-.50	-.06
<i>Erethacus rubecula</i>	14	-.46	-.67	-.67	-.54	-.57	-.22	.42	.61	.46	.35
<i>Turdus pilaris</i>	10	-.77	-.73	-.71	-.63	-.68	-.51	-.24	-.00	-.29	-.51
<i>Turdus merula</i>	6	-.57	-.88	-.82	-.52	-.47	.38	.43	.57	.60	.52
<i>Turdus iliacus</i>	18	-.75	-.78	-.74	-.78	-.81	-.06	-.19	-.33	-.34	-.34
<i>Turdus philomelos</i>	16	-.75	-.79	-.74	-.73	-.73	-.16	-.25	-.19	-.14	-.15
<i>Parus montanus</i>	8	-.61	-.67	-.64	-.41	-.35	-.22	.33	.32	.12	.47
<i>Parus ater</i>	12	-.56	-.65	-.68	-.42	-.24	.26	.24	.33	.46	.74
<i>Parus major</i>	9	-.22	-.75	-.87	-.76	-.65	-.23	-.04	.44	.55	.42
<i>Certhia familiaris</i>	5	-.84	-.85	-.74	-.78	-.64	.21	-.17	-.16	-.00	.64
<i>Fringilla coelebs</i>	20	-.30	-.43	-.53	-.48	-.55	-.29	-.21	-.28	-.32	-.26
<i>Fringilla montifringilla</i>	13	-.70	-.82	-.79	-.79	-.72	-.09	-.17	-.13	-.06	-.18
<i>Carduelis spinus</i>	16	-.46	-.70	-.72	-.72	-.74	.07	-.11	-.04	-.11	-.19
Community	20	-.48	-.77	-.83	-.81	-.85	-.38	-.36	-.30	-.26	-.34

Table VI. Correlation coefficients obtained between the dates of song variables and temperature and precipitation during two periods in spring, for each species (all plots and years, 1968-74). The periods were all of 30 days duration, terminating on the mean date of M1 and the mean date of the song variable, respectively. Significant values are shown in italics. (For key see DEFINITIONS AND ABBREVIATIONS.)

Species	n	M2 in relation to			L60 in relation to			L30 in relation to							
		Temperature ending at M1	Precipitation ending at M2	n	Temperature ending at M1	Precipitation ending at M1	n	Temperature ending at M1	Precipitation ending at M1	n					
<i>Anthus trivialis</i>	8	-0.46	-0.44	-0.25	0.31	10	-0.21	-0.28	0.39	0.23	10	-0.54	-0.47	0.49	-0.07
<i>Prunella modularis</i>	18	-0.12	-0.04	-0.56	-0.09	20	-0.03	-0.08	-0.14	0.11	20	0.12	0.06	-0.17	-0.07
<i>Sylvia atricapilla</i>	-	-	-	-	-	5	-0.04	-0.06	0.02	-0.20	5	0.32	-0.04	-0.18	-0.51
<i>Phylloscopus trochilus</i>	10	-0.33	-0.40	-0.32	0.34	17	-0.47	-0.53	-0.44	0.37	17	-0.53	-0.58	-0.29	-0.04
<i>Regulus regulus</i>	13	-0.66	-0.43	0.17	-0.14	16	0.23	0.28	0.07	-0.34	-	-	-	-	-
<i>Ficedula hypoleuca</i>	-	-	-	-	-	8	0.00	0.08	-0.27	-0.12	8	-0.52	0.24	0.34	-0.67
<i>Erithacus rubecula</i>	14	-0.53	-0.39	0.37	0.24	14	-0.40	-0.10	0.47	-0.19	14	-0.06	-0.37	0.20	0.40
<i>Turdus pilaris</i>	7	-0.31	-0.39	0.55	-0.15	10	-0.68	-0.68	-0.05	-0.49	10	-0.76	-0.81	-0.19	0.57
<i>Turdus merula</i>	5	0.55	0.55	-0.54	-0.09	6	-0.12	0.73	-0.68	-0.61	6	0.21	0.24	-0.65	0.25

Species	M2 in relation to				L60 in relation to				L30 in relation to						
	Temperature		Precipitation		Temperature		Precipitation		Temperature		Precipitation				
	n	Fix date r ending at M1 M2	n	Fix date r ending at M1 M2	n	Fix date r ending at M1 L60	n	Fix date r ending at M1 L60	n	Fix date r ending at M1 L30	n	Fix date r ending at M1 L30			
<i>Turdus iliacus</i>	18	-.46	-.31	-.29	.02	18	-.64	-.51	-.07	.21	18	-.63	-.42	-.01	.03
<i>Turdus philomelos</i>	15	-.67	-.43	-.08	-.01	16	-.11	-.12	-.04	-.02	16	-.02	.03	.09	.04
<i>Parus montanus</i>	7	-.51	-.10	.61	.41	8	-.89	-.40	.12	.46	8	-.62	.22	-.39	-.68
<i>Parus ater</i>	10	-.60	-.48	.34	.12	12	-.67	-.68	.38	.22	12	-.74	-.35	.27	-.01
<i>Parus major</i>	9	-.54	.02	.26	-.29	9	-.58	-.25	.28	.07	9	-.70	-.10	.78	.16
<i>Certhia familiaris</i>	6	-.28	-.09	.35	-.07	5	.19	-.18	-.24	.12	5	-.32	-.34	-.30	-.23
<i>Fringilla coelebs</i>	20	-.50	-.52	-.24	.40	20	-.36	-.45	-.67	.23	20	-.48	-.29	-.34	.33
<i>Fringilla monti-fringilla</i>	9	-.10	.23	.74	.04	13	-.51	-.52	.31	.56	13	-.48	-.60	.19	.54
<i>Carduelis spinus</i>	17	-.17	-.03	-.03	-.25	18	-.33	-.48	-.01	.30	17	-.44	-.54	-.16	.34
Community	19	-.87	-.75	-.04	.23	20	.05	.03	-.17	.06	20	-.28	-.27	-.33	.27

Table VII. Correlation coefficients obtained between the proportional size of the second song maximum in relation to the size of the first peak ($M2\sigma\sigma/M1\sigma\sigma$) and temperature and precipitation during various periods in spring, each period terminating on the mean date of M2. Data for all plots and years, 1968-74. Significant values shown in italics. (For key see DEFINITIONS AND ABBREVIATIONS.)

Species	n	Temperature					Precipitation				
		Fix date r, period length					Fix date r, period length				
		10	20	30	40	50	10	20	30	40	50
<i>Anthus trivialis</i>	10	.62	.63	.49	.50	.44	<i>-.69</i>	<i>-.83</i>	<i>-.44</i>	<i>-.43</i>	<i>-.49</i>
<i>Prunella modularis</i>	20	.06	<i>-.01</i>	.08	.11	.13	.13	.14	.12	.06	.09
<i>Sylvia atricapilla</i>	5	<i>-.80</i>	<i>-.83</i>	<i>-.70</i>	<i>-.65</i>	<i>-.57</i>	<i>-.27</i>	<i>-.75</i>	<i>-.69</i>	<i>-.56</i>	<i>-.16</i>
<i>Phylloscopus trochilus</i>	17	<i>-.33</i>	<i>-.45</i>	<i>-.46</i>	<i>-.43</i>	<i>-.44</i>	<i>-.20</i>	.33	.32	.36	.43
<i>Regulus regulus</i>	16	.12	.22	.23	.26	.30	<i>-.06</i>	<i>-.10</i>	.07	<i>-.07</i>	<i>-.08</i>
<i>Erithacus rubecula</i>	14	<i>-.13</i>	<i>-.30</i>	<i>-.33</i>	<i>-.21</i>	<i>-.13</i>	.30	.32	.43	.29	.17
<i>Turdus pilaris</i>	10	<i>-.06</i>	<i>-.31</i>	<i>-.38</i>	<i>-.38</i>	<i>-.39</i>	<i>-.03</i>	.03	.19	.17	.04
<i>Turdus merula</i>	6	.53	.37	.59	.52	.43	<i>-.56</i>	<i>-.48</i>	<i>-.84</i>	<i>-.92</i>	<i>-.87</i>
<i>Turdus iliacus</i>	18	<i>-.27</i>	<i>-.44</i>	<i>-.53</i>	<i>-.49</i>	<i>-.49</i>	.36	.44	.40	.28	.25
<i>Turdus philomelos</i>	16	<i>-.39</i>	<i>-.23</i>	<i>-.26</i>	<i>-.26</i>	<i>-.26</i>	.26	.05	.05	.12	.07
<i>Parus montanus</i>	8	<i>-.14</i>	.21	.35	.18	.19	<i>-.09</i>	<i>-.41</i>	<i>-.47</i>	<i>-.40</i>	<i>-.30</i>
<i>Parus ater</i>	12	<i>-.71</i>	<i>-.47</i>	<i>-.61</i>	<i>-.61</i>	<i>-.64</i>	.48	.35	.25	.42	.33
<i>Parus major</i>	9	<i>-.03</i>	<i>-.14</i>	<i>-.14</i>	<i>-.25</i>	<i>-.32</i>	.40	.23	.15	<i>-.02</i>	<i>-.01</i>
<i>Certhia familiaris</i>	5	.40	.45	<i>-.01</i>	<i>-.01</i>	<i>-.17</i>	<i>-.56</i>	<i>-.63</i>	.04	.15	<i>-.07</i>
<i>Fringilla coelebs</i>	20	<i>-.35</i>	<i>-.23</i>	<i>-.28</i>	<i>-.25</i>	<i>-.21</i>	<i>-.05</i>	<i>-.12</i>	<i>-.03</i>	<i>-.07</i>	<i>-.11</i>
<i>Fringilla montifringilla</i>	13	<i>-.28</i>	<i>-.47</i>	<i>-.47</i>	<i>-.47</i>	<i>-.50</i>	.35	.28	.33	.39	.39
<i>Carduelis spinus</i>	17	<i>-.26</i>	<i>-.21</i>	<i>-.26</i>	<i>-.21</i>	<i>-.18</i>	<i>-.01</i>	.39	.33	.46	.36
Community	20	.12	.10	.09	.09	.13	.15	.03	.04	<i>-.04</i>	<i>-.01</i>

Table VIII. Mean air temperature ($^{\circ}\text{C}$), with range at M1 in brackets, for the morning and evening surveys and for the survey that preceded M1 and for that which followed immediately afterwards, all for the bird community. Only the plots have been used for which the surveys were carried out (and temperature measured) at the same fixed intervals in relation to sunrise and sunset (see Slagsvold 1973).

Area	Morning surveys			Evening surveys				
	n	Before	At M1	After	n	Before	At M1	After
R	2	1.7	5.1(3.6-6.6)	5.4	2	3.9	15.1(14.6-15.5)	15.3
S	6	3.2	4.2(1.9-6.8)	5.3	8	9.6	10.7(8.3-12.8)	9.0
T	4	2.4	5.1(3.4-7.3)	2.0	4	5.1	9.3(7.4-12.8)	7.2
V	2	2.7	3.4(2.5-4.2)	9.3	4	4.9	8.2(5.8-12.5)	6.9
Total	14	2.7	4.5(1.9-7.3)	4.9	18	6.9**	10.3(5.8-15.5)	8.8*

Significantly different from the value at M1, * $P < 0.05$ ** $P < 0.01$.

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