Do sex-specific densities affect local survival of free-ranging great tits?

Michler, Stephanie P. M.; Nicolaus, Marion; Ubels, Richard; van der Velde, Marco; Both, Christiaan; Tinbergen, Joost M.; Komdeur, Jan

Published in:
Behavioral Ecology

DOI:
10.1093/beheco/arr066

SUPPLEMENTARY DATA

The following supplementary data is available for this article online.

Legends

Figure S1: The number of male juveniles (left hand panels) and the number of female juveniles (right hand panels) observed per month from June till October in and around nest box plots per experimental plot sex ratio treatment (black squares are male-biased sex ratio treatment plots, grey triangles are control sex ratio plots and open circles are female-biased sex ratio treatment plots). The observed number of juvenile males and females were calculated from observations of individually colour marked successfully fledged juveniles during the post fledging period in the whole study area in 2005 (1866 sightings of 903 juveniles) and 2006 (1345 sightings of 663 juveniles). Observations followed a regular schedule with at least biweekly observations. Via coordinates each sighting of an individual young was associated to the nearest nest box plot (first sighting in each month) to calculate the observed number of male and female young in and around each nest box plot per month. Upper graph shows data from 2005 and lower graph shows data from 2006, no observation were done in 2007. Standard errors are based on raw data.

Table S1: Overview of average natural (top in cell) and experimental (bottom in cell) values per treatment group for brood sex ratio, brood size, plot sex ratio (proportion of male nestlings at day 6) and plot density (number of nestlings at day 6) for the three study years 2005-2007 in the great tit study population. Sample size for the brood treatments indicate numbers of broods while for the plot treatments they indicate number of plots.

Table S2: Model summary statistics from Cormack-Jolly-Seber models in program MARK examining survival (Φ) and resighting probability (P) of adult great tits in relation to time (t, breeding season) and sex (s) for the years 2005-2008. The logit was used as the default link function. AIC values were adjusted for overdispersion (c-hat = 0.178 ± 0.147SE) resulting in QAIC values.

Table S3: Model summary of analysis on juvenile natal dispersal distances (distance between the nest box of fledging and the nest box of breeding the next year), examining the effects of juvenile sex, breeding pair density, fledgling density, same-sex fledgling density, opposite-sex fledgling density, plot sex ratio treatment and density treatment and the interaction between sex and all other variables for the three study years 2005-2007 (n = 451). Natal dispersal distance was log10 transformed to allow analysis as a normal response variable in a mixed-model in MLwiN, with the random effects plot, cohort (all broods within a plot in a given year), nest and individual. Correlated explanatory variables were tested sequentially.

Figure S1

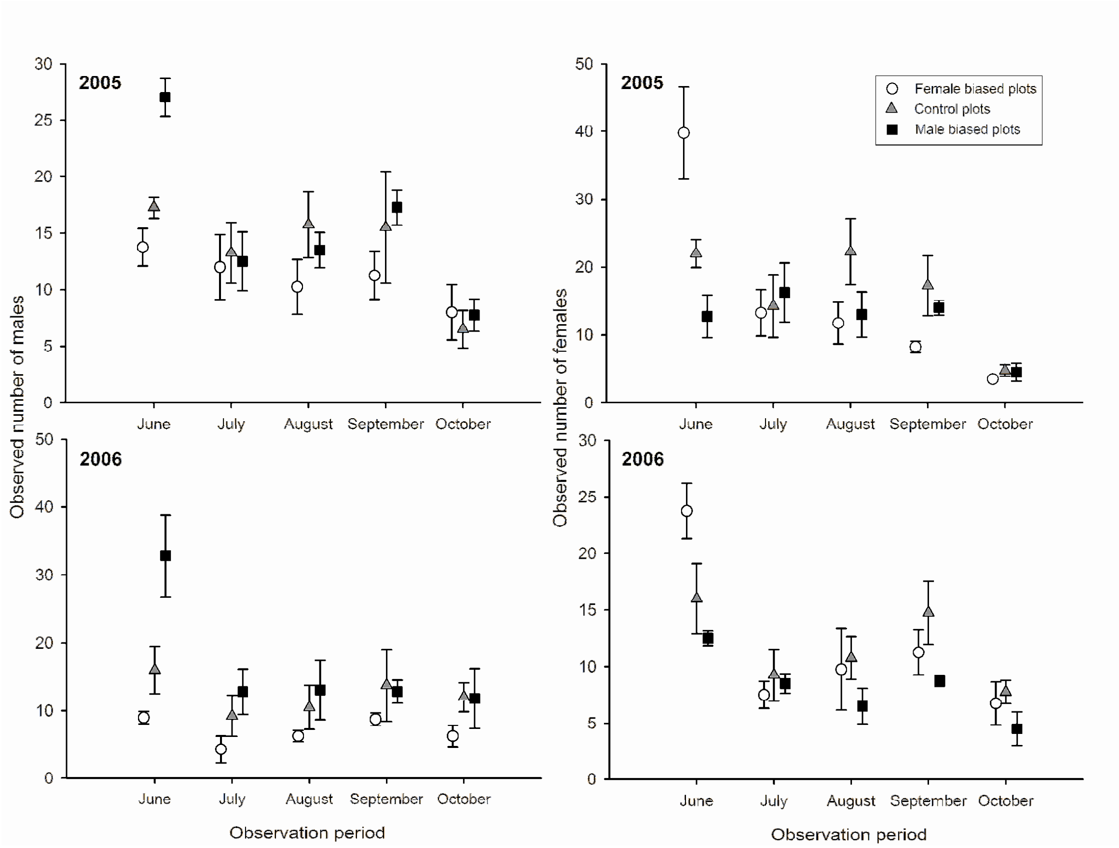
2005
2005
2006
2006
Female biased plots
Control plots
Male biased plots
Observed number of males
Observed number of females
June
July
August
September
October
Observation period
0
5
10
15
20
25
30
40
50

Table S1

Treatment group	2005 mean±SD	2005 n	2006 mean±SD	2006 n	2007 mean±SD	2007 n
Female-biased broods	0.46±0.18 0.22±0.07	79	0.48±0.16 0.24±0.08	60	0.44±0.18 0.22±0.06	90
Control broods	0.48±0.19 0.49±0.07	89	0.51±0.17 0.49±0.06	57	0.52±0.17 0.51±0.07	82
Male-biased broods	0.51±0.18 0.76±0.07	75	0.50±0.17 0.79±0.07	49	0.51±0.19 0.78±0.06	75
Reduced brood size	7.39±1.69 5.22±0.52	106	8.74±1.42 5.88±0.32	61	6.86±1.50 4.69±0.52	106
Control brood size	7.75±1.80 8.05±0.65	60	9.18±1.43 8.81±0.65	38	7.28±1.65 7.58±0.70	57
Enlarged brood size	8.06±1.62 10.83±0.59	77	9.06±1.25 11.87±0.42	67	7.86±1.40 10.39±0.49	84
Female-biased plots	0.49±0.02 0.24±0.01	4	0.46±0.06 0.24±0.02	4	0.45±0.02 0.24±0.03	4
Control plots	0.47±0.02 0.49±0.01	4	0.51±0.02 0.49±0.01	4	0.51±0.05 0.51±0.04	4
Male-biased plots	0.50±0.03 0.73±0.02	4	0.48±0.06 0.77±0.05	4	0.52±0.05 0.76±0.01	4
Low plot density	156.83±28.27 137.83±26.35	6	134.33±48.73 119.67±48.90	6	166.83±19.57 143.00±22.02	6
High plot density	161.50±16.28 181.17±17.32	6	118.00±27.62 132.67±32.67	6	144.83±34.50 168.67±42.97	6

Table S2

No.	Model	No. par	$QAIC_c$	$\Delta QAIC_c$	QAICc weights
1	Φ(t) P(s)	5	1017.67	0.00	0.459
2	Φ(t+s) P(s)	6	1019.38	1.71	0.195
3	Φ(t) P(t+s)	6	1019.59	1.92	0.134
4	Φ(t+s) P(t+s)	7	1021.24	3.57	0.059
5	Φ(t+s) P(t)	6	1024.39	6.76	0.012
6	Φ(t+s) P(t*s)	9	1025.29	7.62	0.008
7	Φ(t*s) P(t*s)	10	1026.17	8.50	0.005
8	Φ(s) P(t+s)	6	1031.47	13.80	<0.001

Table S3

Explanatory variables		β (SE)	χ^2	df	P
Final model					
Intercept		0.185 (0.078)	5.64	1	0.017
Sex		-0.402 (0.092)	18.96	1	<0.001
Random effects σ² (SE)	*plot*	0.022 (0.020)	1.31	1	0.252
	cohort	-	-	-	-
	nest	-	-	-	-
	individual	0.935 (0.063)	219.73	1	<0.001
Rejected terms					
Year 2006		-0.041 (0.112)	1.21	1	0.547
Year 2007		-0.131 (0.123)			
Fledgling density		0.001 (0.001)	0.37	1	0.541
Breeding pair density		-0.007 (0.007)	1.03	1	0.311
Same-sex fledgling density		0.001 (0.001)	0.63	1	0.426
Opposite-sex fledgling density		-0.0004 (0.002)	0.05	1	0.827
Plot sex ratio female bias		0.085 (0.118)	0.01	2	0.878
Plot sex ratio male bias		0.092 (0.119)			
Plot density treatment		-0.026 (0.094)	0.08	1	0.779
Sex × year 2006		0.136 (0.230)	0.80	2	0.671
Sex × year 2007		0.095 (0.248)			
Sex × fledgling density		-0.0003 (0.003)	0.01	1	0.912
Sex × breeding pair density		0.008 (0.014)	0.37	1	0.544
Sex × same-sex fledgling density		0.001 (0.003)	0.17	1	0.682
Sex × opposite-sex fledgling density		-0.001 (0.004)	0.03	1	0.860
Sex × plot sex ratio female bias		0.194 (0.250)	1.29	2	0.525
Sex × plot sex ratio male bias		-0.078 (0.204)			
Sex × plot density treatment		-0.074 (0.191)	0.15	1	0.699