

Electronic Supplementary Material

to the article

Which birds participate in mass concentrations of Bramblings *Fringilla montifringilla*? – Ring recoveries, biometry, age and sex composition

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Table S1. For museum specimens, dependence of wing-length, the lengths of P9, P8, P7 and P6, wing pointedness and the difference between P7 and P8, each as the dependent variable in a General Linear Model, on sex, age, their interaction, longitude, latitude and month (beginning in August when the plumage is freshly moulted, feather-month). Pointedness is the summed differences between P7 (on average the longest primary) and P6, P8 and P9, divided by P7. The difference between P7 and P8 is the length of P7 minus the length of P8. Effect sizes $\pm$ SE are given for males (*versus* females), juveniles (*versus* adults), and juvenile males (for the interaction). Year as a continuous variable (i.e., testing for a change of the wing over the years 1856 - 1982) was not significant ($p > 0.3$) and excluded from the model. $n = 556$. + = $p < 0.1$, * = $p < 0.05$, ** = $p < 0.01$, *** = $p < 0.001$

	Wing-length	P9	P8	P7	P6	Pointedness	Difference P7-P8
Intercept	869.9 $\pm$ 5.1***	670.4 $\pm$ 4.8***	682.4 $\pm$ 4.6***	687.8 $\pm$ 4.6***	671.6 $\pm$ 5.0***	0.056 $\pm$ 0.006***	5.600 $\pm$ 1.611***
Sex	57.1 $\pm$ 2.8***	44.2 $\pm$ 2.7***	49.1 $\pm$ 2.6***	51.4 $\pm$ 2.6***	48.8 $\pm$ 2.8***	0.013 $\pm$ 0.004**	2.231 $\pm$ 0.912 ⁺
Age	-2.041 $\pm$ 2.933***	0.258 $\pm$ 2.824*	0.627 $\pm$ 2.696***	-0.266 $\pm$ 2.685***	-5.80 $\pm$ 2.93***	0.0055 $\pm$ 0.0037	-0.913 $\pm$ 0.941***
Sex $\times$ Age	-11.04 $\pm$ 3.55***	-8.11 $\pm$ 3.41*	-13.82 $\pm$ 3.26***	-16.07 $\pm$ 3.24***	-15.85 $\pm$ 3.53***	-0.013 $\pm$ 0.004**	-2.276 $\pm$ 1.135*
Longitude	0.025 $\pm$ 0.022	0.026 $\pm$ 0.021	0.012 $\pm$ 0.020	-0.010 $\pm$ 0.020	-0.014 $\pm$ 0.022	-7.654E-5 $\pm$ 2.784E-5**	-0.024 $\pm$ 0.007***
Latitude	-0.025 $\pm$ 0.090	0.045 $\pm$ 0.087	0.020 $\pm$ 0.083	-0.017 $\pm$ 0.082	0.030 $\pm$ 0.089	-2.038E-4 $\pm$ 1.126E-4 ⁺	-0.039 $\pm$ 0.029
Feather-month	-0.631 $\pm$ 0.317*	-0.576 $\pm$ 0.305 ⁺	-0.601 $\pm$ 0.290*	-0.611 $\pm$ 0.288*	-0.314 $\pm$ 0.315	-4.155E-4 $\pm$ 3.967E-4	-0.009 $\pm$ 0.101

Table S2. Dependence of the length of P8 of autumn migrants on Col de Bretolet on sex, age and its interaction, Julian day and whether the following winter had a mass concentration (MC) in Switzerland. Effect sizes $\pm$ SE are given for males (*versus* females), juveniles (*versus* adults), juvenile males (for the interaction), and for years without a mass concentration. In addition, there are significant differences between the 19 ringers involved. $n = 6021$. $+ = p < 0.1$, $* = p < 0.05$, $** = p < 0.01$, $*** = p < 0.001$.

	P8
Intercept	67.55 $\pm$ 0.441***
Sex	4.854 $\pm$ 0.072***
Age	-0.118 $\pm$ 0.069***
Sex $\times$ Age	-0.863 $\pm$ 0.092***
Julian day	0.004 $\pm$ 0.003
MC	-0.052 $\pm$ 0.065
Ringer	***

Table S3. Mean wing-length $\pm$ SD (sample size) of Bramblings from Switzerland and data from the literature. The means given by Arizaga et al. (2012) are with 95% confidence intervals (CI).

	Adult males	Juvenile males	Adult females	Juvenile females
Col de Bretolet	95.08 $\pm$ 1.92 (57)	93.28 $\pm$ 1.46 (39)	89.08 $\pm$ 1.57 (36)	88.68 $\pm$ 1.75 (66)
Basel	94.65 $\pm$ 1.76 (20)	92.77 $\pm$ 1.59 (65)	88.90 $\pm$ 1.29 (5)	88.09 $\pm$ 1.47 (33)
Röserental	93.37 $\pm$ 2.20 (99)	91.72 $\pm$ 1.93 (43)	87.22 $\pm$ 1.85 (54)	86.98 $\pm$ 1.44 (41)
Kernwald	93.45 $\pm$ 1.98 (401)	92.13 $\pm$ 1.82 (162)	87.89 $\pm$ 1.80 (115)	87.63 $\pm$ 1.32 (89)
Neuenkirch	94.19 $\pm$ 1.82 (230)	92.94 $\pm$ 1.89 (140)	88.17 $\pm$ 1.69 (84)	88.42 $\pm$ 1.70 (98)
Central Norway, July – October (Ålbu 1983)	95.09 $\pm$ 1.92 (364)	93.92 $\pm$ 1.94 (1445)	89.15 $\pm$ 1.85 (110)	88.96 $\pm$ 1.82 (950)
Falsterbo, south Sweden, autumn migrants (Falsterbo Bird Observatory)	94.30 $\pm$ 1.72 (56)	93.18 $\pm$ 1.97 (451)	88.03 $\pm$ 1.89 (70)	88.44 $\pm$ 1.81 (558)
Near Stockholm, Sweden, January - April 1977 (Widemo 1977)	94.20 $\pm$ 1.46 (29)	92.90 $\pm$ 1.91 (197)		88.00 $\pm$ 1.54 (56)
Northern Spain, winter 1993/94 (Robson 1996)	92.97 $\pm$ 1.59 (19)	91.60 $\pm$ 1.82 (49)	87.05 $\pm$ 1.60 (19)	86.96 $\pm$ 2.00 (26)
Northern Spain, winter 2010/11 (Arizaga et al. 2012)	92.9 $\pm$ 0.2 CI (398)	91.9 $\pm$ 0.3 CI (365)	87.4 $\pm$ 0.2 CI (329)	87.1 $\pm$ 0.2 CI (511)

Table S4. Mean bill measures $\pm$ SD (sample size) of Brambling museum skins (ages combined, because of no significant difference). Bill length is measured from the skull to the tip, bill height and width at the proximal end of the nostrils. The p -value refers to a t-test.

	Males	Females	p
Bill length (mm)	14.15 $\pm$ 0.60 (359)	14.03 $\pm$ 0.57 (194)	0.022
Bill height (mm)	7.51 $\pm$ 0.32 (127)	7.37 $\pm$ 0.28 (49)	0.011
Bill width (mm)	6.16 $\pm$ 0.25 (135)	6.06 $\pm$ 0.22 (52)	0.019

Fig. S1. Locations abroad ($n = 23$: 16 in May, 1 in July, 6 in August) of Bramblings ringed in Switzerland during autumn or winter and recovered in the breeding area, or ringed in the breeding area and recovered in Switzerland in autumn or winter, subdivided according to the winter in Switzerland with (dots) or without a mass concentration (circles).

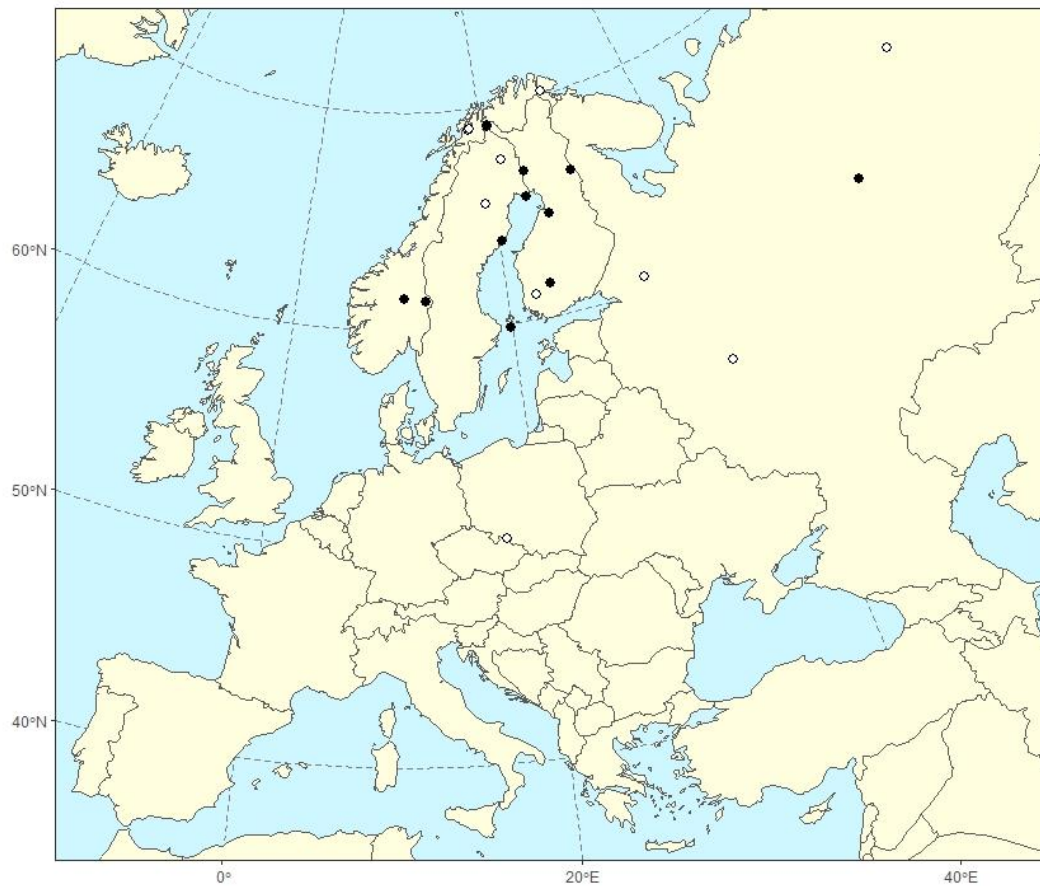


Fig. S2. Locations abroad of Bramblings ringed in Switzerland in winter and recovered during a following winter abroad or in Switzerland, or ringed during winter abroad and recovered during a following winter in Switzerland, subdivided according to the winter in Switzerland without (A) or with (B) a mass concentration.

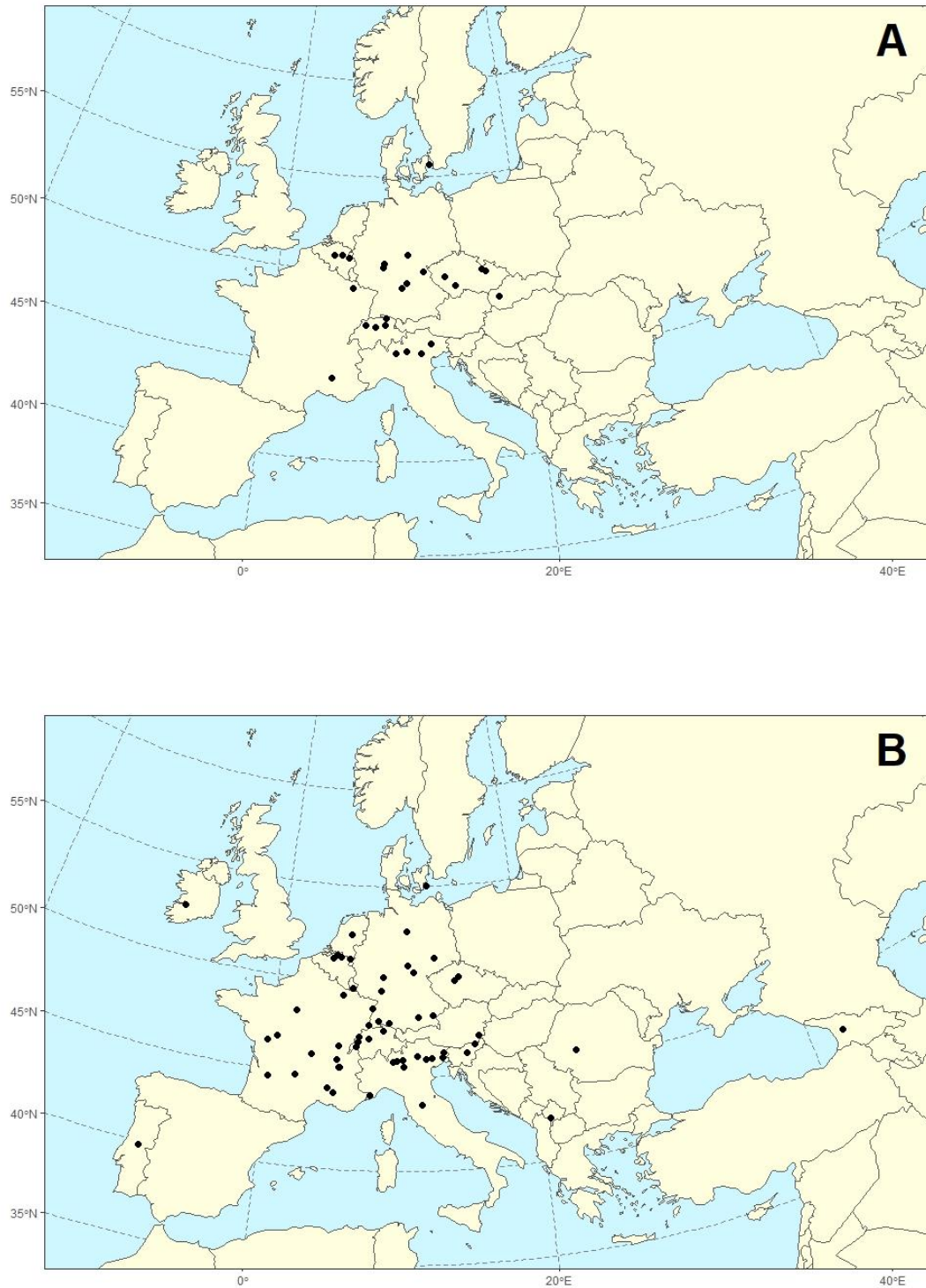


Fig. S3. Recovery locations of Bramblings ringed during autumn migration in Switzerland and recovered during the following winter in years without (A) or with (B) a mass concentration in Switzerland.

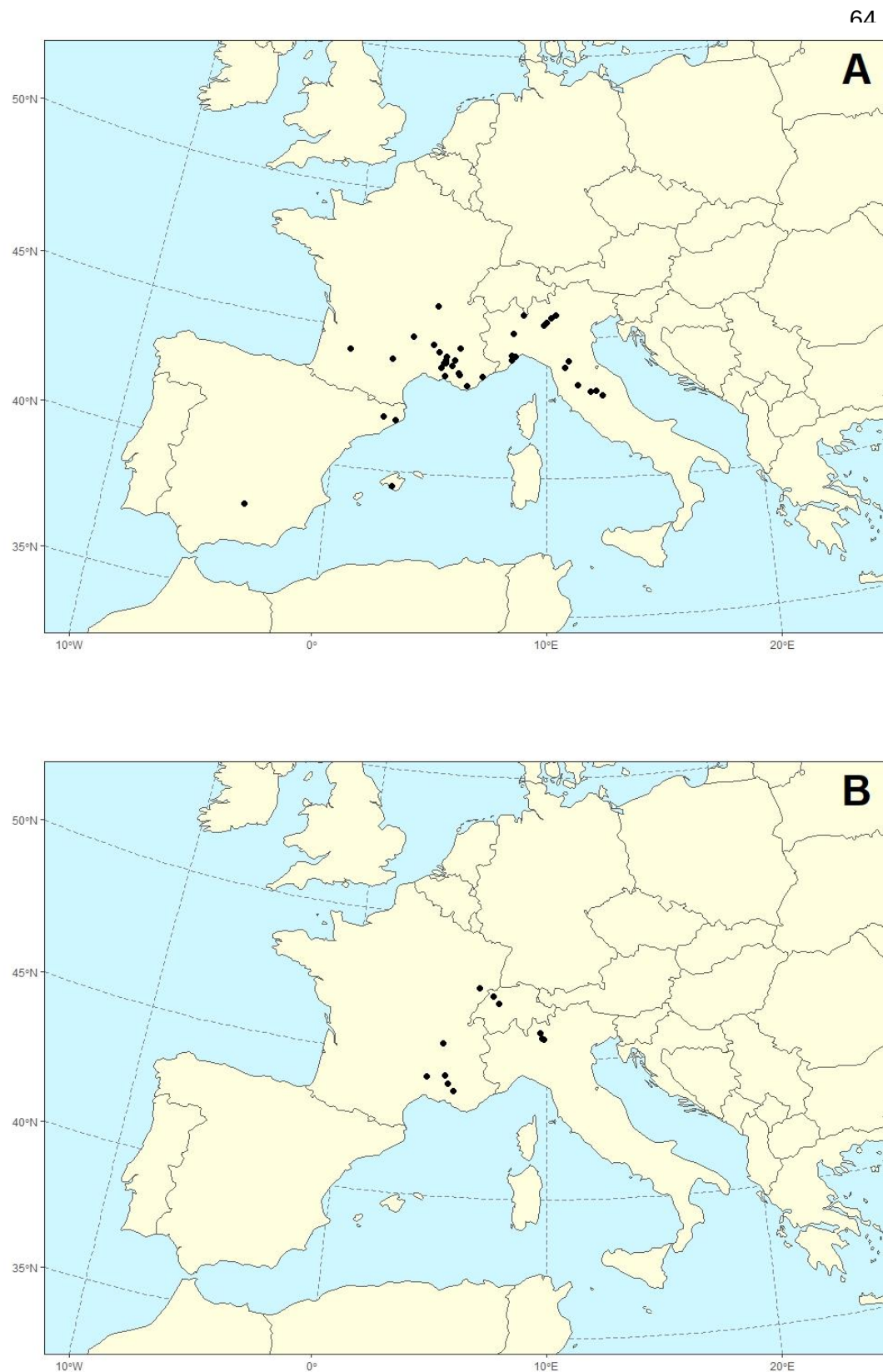
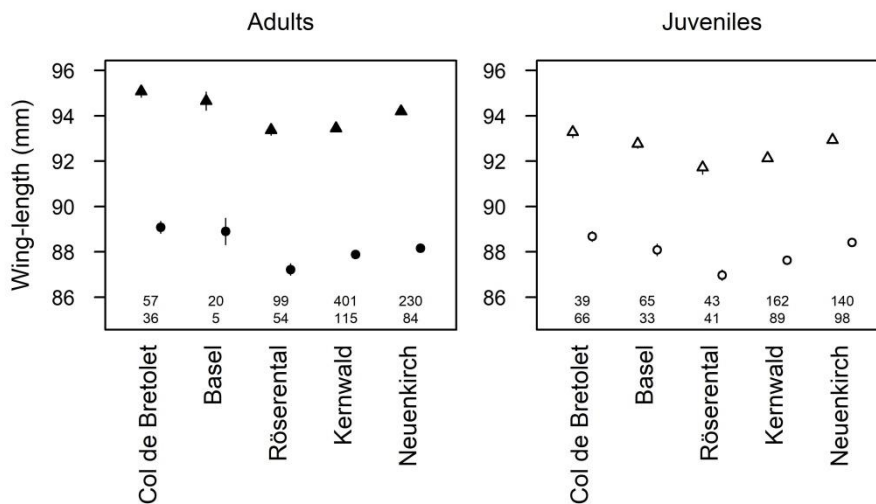


Fig. S4. Mean wing-length ($\pm$ SE) of birds during autumn migration (Col de Bretolet), at a small roost in Basel, and at three large roosts in Switzerland (Röserental, Kernwald, Neuenkirch) of male (triangles) and female (dots) adults (left) and juveniles (right). Numbers in the graphs are sample sizes of males (upper row) and females (lower row).



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References

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