

RINGING DATA AND OCCURRENCE  
OF BLUE TITS *Cyanistes caeruleus*  
AND GREAT TITS *Parus major*  
IN SOMBOR (NW SERBIA)  
FOR THE PERIOD 1981–2013

**Obročkovaški podatki in pojavljanje  
plavčkov *Cyanistes caeruleus* in velikih sinic  
*Parus major* v mestu Sombor (SZ Srbija)  
med letoma 1981 in 2013**

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Ringling and recapture data of Blue Tits *Cyanistes caeruleus* and Great Tits *Parus major* in rural habitats have been reported, and the migration of these two species tracked (Blue Tit: SMITH & NILSSON 1987, NOWAKOWSKI & CHRUSCIEL 2004, NYQUIST 2006, NILSSON *et al.* 2008, GYURÁČZ *et al.* 2011; Great Tit: SOKOLOV *et al.* 1999, NOWAKOWSKI 2001, NOWAKOWSKI 2003, NOWAKOWSKI & VÁHÁHALO 2003). There is, however, little long-term ringling data for these two species in urban and semi-urban habitats such as towns. The cited studies reported various findings based on ringling data. For example, the migration rates of the two tit species of various ages and the two sexes differ insignificantly (NOWAKOWSKI & CHRUSCIEL 2004). The intraspecific differences in migration among different ages and sexes in Blue Tits (SMITH & NILSSON 1987) and factors determining migration dynamics in tits (GYURÁČZ *et al.* 2011) have been reported. Blue Tits were found to be the slowest long distant migrants, moving in a south-westerly direction in autumn (NILSSON *et al.* 2008). However, there are, apparently, no studies discussing differences among various urban habitats such as gardens and parks.

The numbers of the two tit species in Sombor increase, mainly in the autumn and at the end of winter, while the number of wintering individuals is lower (MÉRÓ & ŽULJEVIĆ 2010). CSÖRGÖ *et al.* (2009) and MÉRÓ & ŽULJEVIĆ (2010) suggest that, in general, the majority of the individuals found in the Carpathian basin during autumn and winter originate from north-east Europe. In the migration and wintering periods, tits greatly prefer urban areas due to the higher probability

of survival during the cold seasons in settlements than in rural habitats (JOKIMÄKI & KAISANLAHTI-JOKIMÄKI 2012, MØLLER *et al.* 2013). The aim of the present study was (1) to present detailed ringling and recapture data of the Great and Blue Tits in the town of Sombor, (2) to test the relationship between average maximum temperatures for autumn and winter and the number of ringed individuals for the study period in the two species, and (3) to investigate the differences between captures in parks and in gardens.

The study was conducted in the town of Sombor (city centre coordinates 45.78 N, 19.09 E) in north-western Serbia. Bird ringling was performed at 21 sites within the town (Table 1). Detailed descriptions of the study area and of the distribution of the study sites are reported in MÉRÓ & ŽULJEVIĆ (2014).

Ringling of tits was conducted between 1981 and 2013 over the entire year, with greater intensity in autumn (October, November and December) and winter (January, February and March). Further details about ringling and circumstances have been reported by MÉRÓ & ŽULJEVIĆ (2014). The sexes of the majority of ringed Blue Tits could not be determined, so sex as a factor was excluded from the study. EURING codes were used in describing the age of tits: 2 – fully-grown, able to fly freely, but age otherwise unknown; 3 – 1<sup>st</sup> year, fully grown bird hatched in the breeding season of the current calendar year; 4 – after 1<sup>st</sup> year, fully grown bird hatched before this calendar year, birth

**Table 1:** The ringling locations in the town of Sombor (source MÉRÓ & ŽULJEVIĆ 2014)

**Tabela 1:** Kraji obročkanja v mestu Sombor (vir MÉRÓ & ŽULJEVIĆ 2014)

Location/ Kraj	Habitat	Location/ Kraj	Habitat
L1	park	L12	avenue
L2	park	L13	garden
L3	garden	L14	avenue
L4	garden	L15	garden
L5	garden	L16	garden
L6	garden	L17	garden
L7	garden	L18	garden
L8	reed bed	L19	reed bed
L9	park	L20	shrubbery
L10	garden	L21	reed bed
L11	shrubbery		

year otherwise unknown; 5 – 2<sup>nd</sup> year, a bird hatched last calendar year and now in its second calendar year; 6 – after the 2<sup>nd</sup> year, a fully grown bird hatched before the last calendar year, birth year otherwise unknown (SPEEK *et al.* 2001).

For both species we summarized the number of individuals, both ringed and recaptured. Student's t-test was applied to check the differences between the numbers of ringed birds in categories 3 and 5 and between 4 and 6 for both species. The numbers of ringed male and female Great Tits are given. The maximum and the mean numbers of days elapsed, with standard error (SE), between ringing and the last recapture,

were calculated. Simple linear regression was applied to determine the relationship between the autumn and winter (previous year September–December and ensuing year January–March), the average maximum temperatures and the number of ringed individuals for that period. Temperature data were obtained from the National Hydrometeorological Service of Sombor, measured by the meteorological station in Sombor. Student's t-test was applied to investigate the differences in numbers of ringed individuals in parks and gardens. In this analysis we included the study sites (L1, L2, L3, L5, L7, L9 and L10) where ringing was performed near feeders and at least three or four times

**Table 2:** Age of ringed and recaptured Blue Tits *Cyanistes caeruleus* and Great Tits *Parus major* in Sombor over the period 1981–2013. For key to locations see MÉRŐ & ŽULJEVIĆ (2014).

**Tabela 2:** Starost obročkanih in ponovno ujetih plavčkov *Cyanistes caeruleus* in velikih sinic *Parus major* v Somborju med letoma 1981 in 2013. Za razlago krajev obročkanja glej MÉRŐ & ŽULJEVIĆ (2014).

Location/ Kraj	Blue Tit / Plavček <i>Cyanistes caeruleus</i>						Great Tit / Velika sinica <i>Parus major</i>					
	Ringed individuals/ Obročkani osebki			Recaptured individuals/ Ponovno ujeti osebki			Ringed individuals/ Obročkani osebki			Recaptured individuals/ Ponovno ujeti osebki		
	2	3/5	4/6	2	3/5	4/6	2	3/5	4/6	2	3/5	4/6
L1	36	449	109	1	121	24	249	1623	265	2	355	59
L2		31	8		7	2	5	150	30		20	5
L3	3	283	78	3	65	24	8	862	170	1	289	43
L4	101	2		5	1	1	840	11		50	21	6
L5	66	50	10	3	10	5	674	661	88	7	138	16
L6		1	2				3	80	18		4	4
L7	2	30	21	1	15	9	37	488	101	5	163	28
L8	3	125	19		32	4		2			1	0
L9		167	37		60	13	22	1040	138	1	229	25
L10	5			1			105	4	2	21		
L11							50					1
L12	5						60					1
L13	1	3	2				4	43	7		2	
L14		2	1				1	36	4		1	
L15												
L16		1						65	6		12	
L17								3	1			
L18		9					4	72	20		6	
L19		11	2					5	1			
L20									1			
L21								1				
Total / Skupaj	222	1164	289	14	311	82	2062	5146	852	87	1242	188

per month (for detailed methodological descriptions see MÉRŐ & ŽULJEVIĆ 2014). Statistical analyses were implemented in SPSS statistical software.

Great Tits were ringed on 1192 occasions over 1092 days and Blue Tits on 532 occasions over 502 days. We ringed a total of 1675 Blue Tits (mean (SE) 51 (31.5) individuals/year) and 8062 Great Tits (mean (SE) 244 (9.2) individuals/year). Although we ringed more 3 or 5 age than other age birds in the two species (Table 2), the difference was non-significant (Blue Tit: Student's  $t$ -test,  $t_{23} = 1.366$ ,  $P = 0.185$ ; Great Tit:  $t_{30} = 1.975$ ,  $P = 0.058$ ). We ringed 3036 male, 4764 female and 262 non-determined sex Great Tits. TÖRÖK (2009B) reports similarly that the majority of ringed Great Tits were females. During the study period we recaptured 407 Blue Tits and 1517 Great Tits (Table 2).

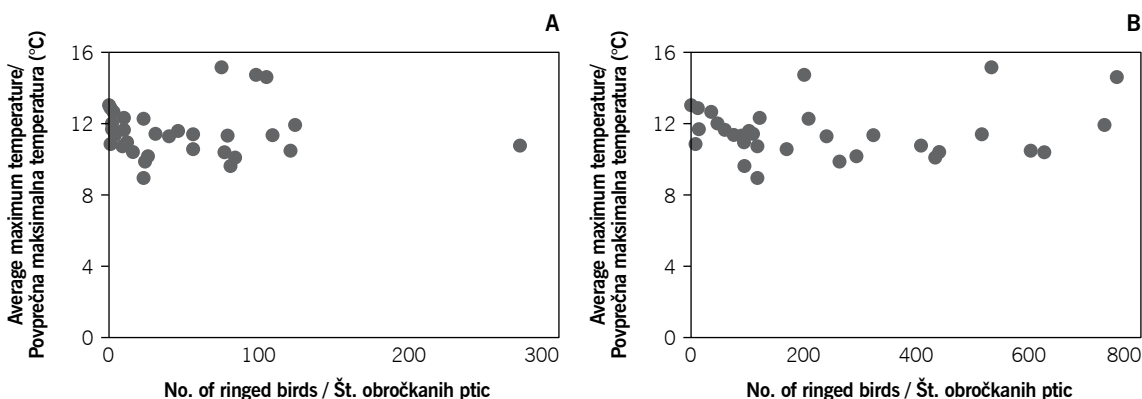
The oldest Blue Tit was at least 3 years and 29 days old (8 Feb 2005–9 Mar 2008). The mean number of days elapsing between ringing date and the last recapture was 83 (SE 7.4, range 1–1125 days). In other studies, the oldest bird was much older than in ours, e.g. 5 years 10 months and 3 days (ČIKOVIĆ 2013B), 7 years 8 months and 5 days (TÖRÖK 2009A), and 11 years and 7 months (FRANSSON *et al.* 2010). The oldest Great Tit recorded here was 5 years 3 months and 26 days old (22 Nov 1995–17 Mar 2001). Other studies recorded older birds, e.g. 6 years 11 months and 27 days (ČIKOVIĆ 2013A), 7 years 4 months and 15 days (TÖRÖK 2009B), and 15 years and 5 months (FRANSSON *et al.* 2010). The mean number of days between ringing date and last recapture per individual was 77 (SE 3.8, range 0–1942 days).

There was no relation in either species between the numbers of tits ringed and the average maximum

temperature between September and March in the ensuing year (Blue Tit: linear regression,  $F_{1,30} = 0.008$ ,  $P = 0.931$ , Figure 1A; Great Tit:  $F_{1,30} = 0.311$ ,  $P = 0.581$ , Figure 1B). In contrast to our results, other authors reported a significant positive relationship between temperature and abundance of birds. For example, the abundances of wintering woodland birds and tits increased with global warming, i.e. with the increase of annual average temperatures (CARRASCAL *et al.* 2012). Similarly, BÁLDI & CSÖRGŐ (1991) reported that the number of Blue Tits increased continuously over six study years, despite the temperature fluctuation, although, during harsh winters the abundance of Great Tit was lower. Even though the abundance of tits was not found to be related to temperature in our study, very low numbers of tits were recorded during some seasons (Figure 1A & B). There is no clear explanation for this trend, but we assume that the tits could have changed their wintering area in those years.

For both species we found no differences in the numbers of ringed individuals in parks and in gardens (Blue Tit:  $t_5 = 0.851$ ,  $P = 0.433$ ; Great Tit:  $t_5 = 0.650$ ,  $P = 0.544$ ). However, the presence of tits in our study depended strongly on that of feeders, thus influencing their local occurrence in the different habitat types. MÉRŐ & ŽULJEVIĆ (2014) found that the movements of tits between different habitat types in the town were affected by rainy weather rather than by other environmental factors. This suggests that habitat quality factors (mainly in winter) are less important than availability of resources and weather.

In conclusion, we found that the oldest Blue Tit recorded here was considerably younger than those in other studies, while the oldest Great Tit was nearly



**Figure 1:** The linear regression between the average maximum temperature between September of the current year and March next year and the number of ringed Blue Tits *Cyanistes caeruleus* (A) and Great Tits *Parus major* (B) for that period.

**Slika 1:** Linearna regresija med povprečno maksimalno temperaturo med septembrom tekočega leta in marcem prihodnje leto ter številom obročkanih plavčkov *Cyanistes caeruleus* (A) in velikih sinic *Parus major* (B) v tem obdobju.

as old as the individual reported by ČIKOVIĆ (2013A). Other studies have recorded much older individuals. The abundances of the two tit species were not related to the average maximum temperature for autumn and winter. Finally, the non-significant difference in the number of ringed tits between parks and gardens indicates that food supply and weather conditions are major factors in determining their presence or absence in a habitat type.

**Acknowledgements:** The study was supported by the Nature Protection and Study Society – NATURA, Sombor. We thank the citizens who enabled us to ring birds in their gardens.

### Povzetek

Objavljanje in osnovna analiza obročkovaških podatkov sta sicer pogosti temi člankov, redko pa so objavljeni podatki iz posameznega mesta, kot je denimo Sombor v premalo raziskani regiji Srbije. Predstavljamo podatke o obročkanju in ponovnem ulovu plavčkov *Cyanistes caeruleus* in velikih sinic *Parus major* za obdobje 32 let. Dodatno smo preverili vpliv povprečne najvišje temperature jeseni (september–december) in pozimi (januar–marec) na njihovo številčnost ter pojavljanje v dveh osnovnih habitatnih tipih (parki in vrtovi) v mestu Sombor. Skupno smo obročkali 1675 plavčkov (ponovno ujeti osebkki N = 407) in 8062 velikih sinic (ponovno ujeti osebkki N = 1517). Pri obeh vrstah so prevladovali mladi osebkki (koda EURING 3 oz. 5). Najstarejše obročkane ptice obeh vrst so bile mlajše kot zabeleženo v drugih evropskih raziskavah. Številčnost obeh vrst ni bila povezana s povprečno najvišjo jesensko oziroma zimsko temperaturo. Število obročkanih ptic v parkih in vrtovih se ni pomembno razlikovalo. Glede na ugotovitve predhodnih raziskav sklepamo, da je njihova številčnost v posameznem habitatnem tipu odvisna od razpoložljivost hrane in vremenskih razmer, ne pa drugih okoljskih dejavnikov.

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Prispelo / Arrived: 24. 3. 2015

Sprejeto / Accepted: 20. 6. 2015