

Breeding bird community of a block-building estate in the city of Wrocław, a comparison between 1996 and 2009

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A b s t r a c t: Breeding bird community in a densely built-up area (mainly block buildings with abundant trees and shrubs) in the city of Wrocław (96.8 ha) were compared between the year 1996 and 2009. In 2009, 25 breeding species were recorded. *Columba livia* and *Passer domesticus* were eudominants comprising together 60.2% of the bird community, while *Apus apus* and *Passer montanus* were dominants (together 11.1%). The most common were granivores (66.8%; 4 species) and insectivores (19.0%, 14 species). In comparison with 1996, the following species have increased in numbers by the year 2009: *Columba palumbus*, *Pica pica*, *Corvus cornix*, *Parus caeruleus*, *Passer montanus*, *Carduelis chloris*, *Sylvia atricapilla*, *Falco tinnunculus* and *Turdus pilaris*; while *Corvus monedula*, *Phoenicurus ochruros*, *Turdus merula*, *Fringilla coelebs*, *Muscicapa striata*, *Hippolais icterina* and *Streptopelia decaocto* have decreased.

K e y w o r d s: bird communities, censuses, urban ornithology

Introduction

Several years ago, quantitative studies on breeding bird communities were conducted in a few habitat types in the city of Wrocław, Lower Silesia, SW Poland (Dyrz 1963; Jakubiec, Bluj 1977; Tomiało, Profus 1977; Lontkowski 1989; Kopij 2004a, 2004b; Orłowski et al. 2006). Since then, species composition, dominance structure and densities of particular species in these communities could have changed significantly. Some species may adapt rapidly to the urbanised habitats, some other may withdraw as a result of habitat alternations, interspecific competition or increased predation pressure. In order to show such changes, a study plot has been selected in 2009, exactly the same one, where breeding community has been quantified in 1996 by Orłowski et al. (2006).

Study area

The study plot is located in a close proximity (1.6 km) to the city hall of Wrocław, Lower Silesia, SW Poland. It is irregular quadrangle, 96.8 ha in size, with the following streets as its border lines: Gajowicka, Szczęśliwa, Radosna, Trwała, Drukarska, Wiśniowa and Hallera, with Powstańców Śląskich Square in its centre. The plot is a densely built-up area, comprising mostly block-buildings constructed both before the II World War as well as after. The blocks have also different height, length and architecture. Two- and three-stories blocks predominate. Street sides and block surroundings are well-timbered with trees and shrubs. Larger clumps of these are located in Powstańców Śląskich Square (2.5 ha; mainly oaks) and between Pretficza, Sztabowa and Spadochroniarzy streets (1.5 ha; several broad-leaved tree species). Garden allotments are located along Drukarska and Słowicza streets (c. 3 and 2 ha respectively).

In comparison with 1996, no marked changes took place in the built-up areas. Only the tallest building, so called Poltegor, has been totally destroyed and removed in 2007, while from 2009, a new building is being erected in the same site. No changes took place also in the size of timbered areas. However, over the last 13 years, trees and shrubs have grown and new specimens were also planted in some places.

Methods

The mapping method has been employed to quantify the bird community (Bibby et al. 1992; Kopij 2006, 2008a, 2008b). In total, eight counts were conducted, on the following days: 5, 18, 28 April; 2, 11, 23 May; 7, 19 June 2009. Each count lasted 3-4 hours and was conducted in the mornings.

In the case of the Magpie, Hooded Crow and Jackdaw, also their occupied nests were searched for and plotted on the map. As in other parts of the city of Wrocław (Kopij 2004a, 2006, 2008), the estimation of the number of breeding pairs of the Feral Pigeon was based on the number of birds feeding on the ground; so obtained figure was divided by two. The number of breeding pairs of the House Sparrow was based on counting males, which were calling from buildings they had occupied (Hustings et al. 1989); this has been conducted during the first two counts, i.e. 5 and 18 April. The number of breeding pairs of the Swift was assessed using the method elaborated by Falkenberger et al. (2004).

In 1996, Orłowski et al. (2006) quantified the bird community using also the mapping method. However, they conducted six, instead of 8 counts, and excluded were from counting the most common species, i.e. Feral Pigeon, House Sparrow, Swift and Starling.

The Sorensen Index has been used to compare the bird community in 2009 and 1996: $S=2z/(x+y)$, where x – number of species in the community in 2009, y – number of species in the community in 1996, z – number of species common in 1996 and 2009.

Results

A total of 25 breeding species were recorded in the study plot in 2009 (Table 1). Two species, the Feral Pigeon and House Sparrow were eudominants and comprised together 60.2% of all breeding pairs of all species. The Swift and Starling were classified as dominants and comprised together 11.1%. The group of subdominants was composed of Wood Pigeon, Collared Dove, Magpie, Jackdaw, Hooded Crow, Blue Tit and Great Tit (together 21.1%). Eudominants, dominants and subdominants constituted together 92.4% of all breeding pairs.

The most numerous (66.8%) was the feeding guild of granivores, although it was represented by four species only. The guild of insectivores was represented by 14 species, but comprised 19.0% only. The omnivores and frugivores were much less numerous (8.3% with 3 species and 6.5% with 3 species respectively), while carnivores (raptors) comprised merely 0.3%.

On 5 April 2009 a pair of Hawfinch *Coccothraustes coccothraustes*, single singing males of the Willow Warbler *Phylloscopus trochilus*, Chiffchaf *Phylloscopus collybita* and Goldencrest *Regulus regulus* were recorded in the study plot, while a singing male of the Wood Warbler *Phylloscopus sibilatrix* was heard on 28 April 2009. None of these species was recorded in the study plot again, and therefore, following the recommendations for the mapping method, they could not be regarded as breeding.

There was a rookery *Corvus frugilegus* (nine nests) on the border of the study plot (Hallera Str.). In the allotment gardens along the border line with Wiśniowa Str., a breeding pair of the Long-tailed Tit *Aegithalos caudatus* was recorded. In the small (1.1 ha) parkland between Gajowicka, Wróbla, Sztabowa and Pretficza streets bordering to the study plot, 12 species were breeding: a few pairs of the Starling (8 pairs), Tree Sparrow (6), Wood Pigeon (4), Great Tit (2), Blue Tit (2); and single pairs of the Hooded Crow, Magpie, Blackcap, Nuthatch, Short-toed Treecreeper *Certhia brachydactyla*, Chaffinch and Green Finch.

Discussion

In comparison with 1996 (Orłowski et al. 2006), in the 'Poltegor' study plot statistically significant increase in the number of the Wood Pigeon, Magpie, Hooded Crow, Blue Tit, Tree Sparrow, Green Finch; and significant decrease in numbers of the Collared Dove, House Redstart, Blackbird and Chaffinch have been recorded in 2009 (Table 1). Only in 2009, the Kestrel, Blackcap and Nuthatch, while only in 1996, the Spotted Flycatcher, Icterine Warbler, Nightingale, Tawny Owl and Long-eared Owl were recorded. The two last species could nest in 2009, but were not detected. The Sorensen index of similarity between 1996 and 2009 was $S=0.82$. The total number of breeding pairs of all species counted both in 1996 and 2009 was significantly higher in 2009 ($N=220$) than in 1996 ($N=160$) (chi-square test: $\chi^2=9.47$; $p<0.01$). The difference could account on the diversification of green areas and growth of trees and shrubs over the last 17 years. It should be also noted, that data from 1996 were based on 6

counts, while those from 2009 on 8 counts. Breeding pairs of some elusive species could pass, therefore, undetected in 1996.

It is interesting to note the absence of breeding Spotted Flycatcher and Icterine Warbler in the 'Poltegor' study plot in 2009 (in 1996, each species were represented by 3-4 pairs). In other parts of the city of Wrocław, an increase in their numbers has been evidenced by Kopij (2004a, 2004b). A re-appearance of the Kestrel as breeding species in the study plot is coincided with a general increase of this raptor in Wrocław, as well as in other Polish cities and towns (Kopij et al. 2009). A similar increase is also apparent in the Blackcap, Green Finch, Magpie and Wood Pigeon.

Population densities of the House Sparrow, Tree Sparrow, Starling and Hooded Crow shown in the 'Poltegor' study area in 2009, were similar to those recorded in a suburb area, Biskupin, in the same city (Kopij 2008a). In the Biskupin study plot, however, higher densities of Blue Tit, House Redstart, Collared Dove, Green Finch, Blackcap and Serine; and lower densities of Feral Pigeon, Wood Pigeon and Magpie were recorded. Similar differences exist if 'Poltegor' bird community is compared with recently studied bird communities in two other Wrocław suburbs: Zalesie (Kopij 2008b) and Sępólno (Kopij 2004a).

In urban habitats, the increase in numbers of the Hooded Crow and Magpie could have caused a decline in numbers of the Collared Dove, Blackbird, Chaffinch, Icterine Warbler or House Redstart. However, contrary to expectation, the increase of corvids has no effect on the population densities of the Wood Pigeon and Blackcap. It has also no effect on the population densities of hole-nesting species, as their nests are not accessible for them.

In conclusion, although no marked differences were recorded in species composition between 1996 and 2009, marked and/or significant differences in densities were recorded for more than half of them.

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Table 1: Breeding bird community in block-building housing estate in Krzyki, Wrocław, in 1996 and 2009. Data from 1996 according to Orłowski et al. (2006).

P – number of pairs, Z – density (pairs/10 ha), D - dominance

Species	2009			1995		Chi ² -test
	P	Z	D	P	Z	
<i>Columba livia</i>	c.240	24,8	31,4	-	-	-
<i>Passer domesticus</i>	c.220	22,7	28,8	-	-	-
<i>Apus apus</i>	c.46	4,8	6,0	-	-	-
<i>Stunus vulgaris</i>	c.39	4,0	5,1	-	-	-
<i>Columba palumbus</i>	30	3,1	3,9	11	1,1	4,4; p<0,05
<i>Pica pica</i>	26	2,7	3,4	5	0,5	6,5; p<0,05
<i>Parus caeruleus</i>	25	2,6	3,3	15	1,5	1,3; p>0,05
<i>Parus major</i>	22	2,3	2,9	21	2,2	0,0; p>0,05
<i>Corvus monedula</i>	22	2,3	2,9	8	0,8	2,8; p>0,05
<i>Streptopelia decaocto</i>	21	2,2	2,7	37	3,8	1,9; p>0,05
<i>Corvus cornix</i>	15	1,5	2,0	1	0,1	5,3; p<0,05
<i>Passer montanus</i>	13	1,3	1,7	4	0,4	1,9; p>0,05
<i>Phoenicurus ochruros</i>	11	1,1	1,4	22	2,3	1,5; p>0,05
<i>Sylvia atricapilla</i>	7	0,7	0,9	0	0,0	-
<i>Carduelis chloris</i>	7	0,7	0,9	1	0,1	1,6; p>0,05
<i>Turdus merula</i>	3	0,3	0,4	6	0,6	0,9; p>0,05
<i>Phoenicurus phoenicurus</i>	3	0,3	0,4	2	0,2	1,6; p>0,05
<i>Fringilla coelebs</i>	3	0,3	0,4	7	0,7	0,5; p>0,05
<i>Carduelis carduelis</i>	3	0,3	0,4	3	0,3	0,0; p>0,05
<i>Serinus serinus</i>	2	0,2	0,3	4	0,4	0,1; p>0,05
<i>Sylvia curruca</i>	2	0,2	0,3	2	0,2	0,0; p>0,05
<i>Falco tinnunculus</i>	2	0,2	0,3	0	0,0	-
<i>Certhia brachydactyla</i>	1	0,1	0,1	1	0,1	0,0; p>0,05
<i>Turdus pilaris</i>	1	0,1	0,1	0	0,0	-
<i>Sitta europaea</i>	1	0,1	0,1	0	0,0	-
<i>Hippolais icterina</i>	0	0,0	0,0	4	0,4	-
<i>Muscicapa striata</i>	0	0,0	0,0	3	0,3	-
<i>Asio otus</i>	0	0,0	0,0	1	0,1	-
<i>Strix aluco</i>	0	0,0	0,0	1	0,1	-
<i>Luscinia megarhynchos</i>	0	0,0	0,0	1	0,1	-
Total	765	79,0	100,0			

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