

## WINTER AVIFAUNA OF LUBLIN – SPECIES COMPOSITION, DISTRIBUTION AND NUMBERS

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**Abstract.** The study concerned the whole administrative area of Lublin (SE Poland), but intensive observations were performed only in the municipal zone. The research was performed in the years 1975–2003. Quantitative study covered 49 areas (total 690.7 ha) representing characteristic environments of Lublin. Among them, there were 6 housing estates, 11 parks and cemeteries, 4 allotment gardens, 14 squares, 13 open areas and wastelands, and one census plot representing industrial built-up areas. During the season, 8–9 census visits at 10–15-day intervals were performed commencing with the first snowfalls until the end of February. They were always performed in the morning, usually at the same time and in the same order in each of the census plots. 88 species were found to occur in Lublin in the winter period. 75 among them were observed in the city zone. Rook, Great Tit and Magpie were registered in all areas investigated quantitatively. At the same time, Rook and Great Tit (in parks and cemeteries), Great Tit and Tree Sparrow (in garden allotment), House Sparrow (in housing estates) as well as Jackdaw, Fieldfare, and Tree Sparrow (in open areas) were decisive for the numbers of the communities. In most plots, Rook was definitely the most numerous. The image of winter avifauna of Lublin was largely shaped by species coming from the North: Rook, Jackdaw, Crow, Fieldfare and Bullfinch.

**Key words:** Lublin, fauna, wintering birds, birds of cities, synurbization.

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**Зимняя авифауна Люблина – видовой состав, распространение и численность. - В. Бядунь. - Беркут. 14 (1). 2005. - Исследования проводились в 1975–2003 гг. в характерных для города местобитаниях (49 участков общей площадью 690,7 га). В течение сезона проводилось 8–9 учетов с 10–15 дневным интервалом от выпадения первого снега до конца февраля. Учеты проходили утром, обычно, в одно и то же время. Всего в зимний период в Люблине было зарегистрировано 88 видов птиц, 75 из них – в самом городе. На большинстве участков наиболее многочисленным был грач. В парках и на кладбищах преобладали грач и большая синица, в садах – большая синица и полевой воробей, среди застройки – домовый воробей, на открытых территориях – галка, рябинник и полевой воробей. Облик зимней авифауны в значительной степени определяется прилетающими с севера видами.**

The first studies of the avifauna of Polish cities were conducted only after World War 2. Within a dozen or so years, monographs were published concerning birds of Wrocław (Szarski, 1955; Przybyła, Szarski, 1957), Cracow (Ferens, 1957), Poznań (Sokołowski, 1957), Lublin (Riabinin, 1959), Toruń (Strawiński, 1963), Warsaw (Luniak et al., 1964) and Olsztyn (Okulewicz, 1971). Most of them only covered the species composition of breeding communities, and referred to the winter period only sporadically.

With the introduction of the mapping method (Enemar, 1959; Luniak, 1969; Tomia-

łojć, 1980a, 1980b), quantitative research of the wintering avifauna was undertaken in numerous cities. In Poland, fairly representative data were obtained for Legnica (Tomiałojć, 1970), Słupsk (Górski, 1981, 1982), and Warsaw (Luniak, 1980, 1981). At the same time, numerous papers on birds inhabiting specific areas of various cities were published (e. g., Luniak, 1974; Jakubiec, Bluj, 1977; Tomiałojć, Profus, 1977, or Górski, Górski, 1979). This period of research was summed up by, among others, Tomiałojć (1977), Luniak (1977, 1983), as well as Luniak and Głazewska (1987). Relatively few publications contain



quantitative data on bird communities wintering in Polish cities (Górska, Górski, 1980; Luniak, 1980, 1981, 1994; Górski, 1981; Biaduń 1994b, 1996a, 1996b, 2001; Nowakowski et al., 2004).

There are only a couple of papers concerning the avifauna of Lublin before 1980. Riabinin (1959) was the author of the first paper describing the species composition of breeding and wintering avifauna. On the basis of research conducted from 1951 to 1956, he determined the occurrence of 86 species, including 63 breeding ones. His following research (Riabinin, 1973) dealt with changes in the city's avifauna in the period of 1951–1969. Materials gathered from 1951 to 1983 were summed up by Riabinin and Olearnik (1985a, 1985b). On the whole, they listed 109 species, 46 of which they counted among the wintering ones. In the last publication presenting a citywide study of avifauna (Riabinin, 1986), a qualitative analysis of the communities of the distinguished environments was performed.

At the beginning of the 1980's, the author undertook quantitative research of the breeding and, a little later, wintering avifauna of the most important tall vegetation areas in Lublin (Biaduń 1989, 1994a, 1994b). In the 1990's, the research also encompassed selected housing estates (Biaduń, 1996a) and allotment gardens (1996b). In the second part of the 1990's breeding and wintering communities of open spaces and wastelands were also investigated (Biaduń, 2001).

## STUDY AREA

Lublin (Fig. 1) within its present administrative boundaries spans between latitudes 51° 08' and 51° 18' north and longitudes 22° 27' and 22° 41' east. The city's latitudinal span equals 17.7 km, and longitudinal – 15.5 km. Since 1989 it has occupied an area of 147.55 km<sup>2</sup> (Stochlak, 1993). It has almost 400 thousand inhabitants and is the biggest Polish city east of the Vistula river.

The city lies in the northern part of the Lublin Upland macroregion. The Bystrzyca river

valley, which cuts the municipal area in two parts, plays a special part in the formation of natural and climatic conditions. Its width varies from 300 to 1500 m. The area occupied by the city is generally colder than the areas of Central Poland. Average yearly air temperature is 7.9 °C. The coldest month is January (–3.6 °), the warmest – July (18.6 °). Winter is longer and colder than in Central Poland. Spring starts relatively late and is cold, especially in its initial period. Green areas within the administrative boundaries of Lublin measure 2883 ha (19.5 %), exclusive of the domestic and industrial green areas. Waters have a very small share in the administrative area of Lublin – 423 ha (2.9 %). The only reservoir is Zemborzycki Artificial Lake (282 ha) created in the 1970's. Within the city area, the Bystrzyca River measures 22.5 out of its 74 km of total length. The mean width of its bed is 10.4 m. Short sections of the Czerniejówka and Czechówka rivers, small tributaries of the Bystrzyca, also flow through Lublin. In addition, within the municipal zone there is a small (8.4 ha) complex of neglected ponds as well as settling tanks of “Lublin” sugar plant (11.5 ha). The city's housing estates occupy 4295 ha (29.1 %), communication routes – 1311 ha (8.9 %), and agricultural land, excluding garden allotments—5593 ha (37.9 %) (Stochlak, 1993).

## METHODS

The study concerned the whole administrative area of Lublin, but intensive observations were performed only in the municipal zone, i. e., in the building area including the green areas and the Bystrzyca river valley situated within that area.

The research was performed in the years 1975–2003. Quantitative research covered 49 areas representing Lublin's characteristic environments. Their total area was 690.7 ha. Among them, there were 6 housing estates with various types of buildings, 11 parks and cemeteries, 4 allotment gardens, 14 city squares, 13 open areas (with fragments of newly estab-

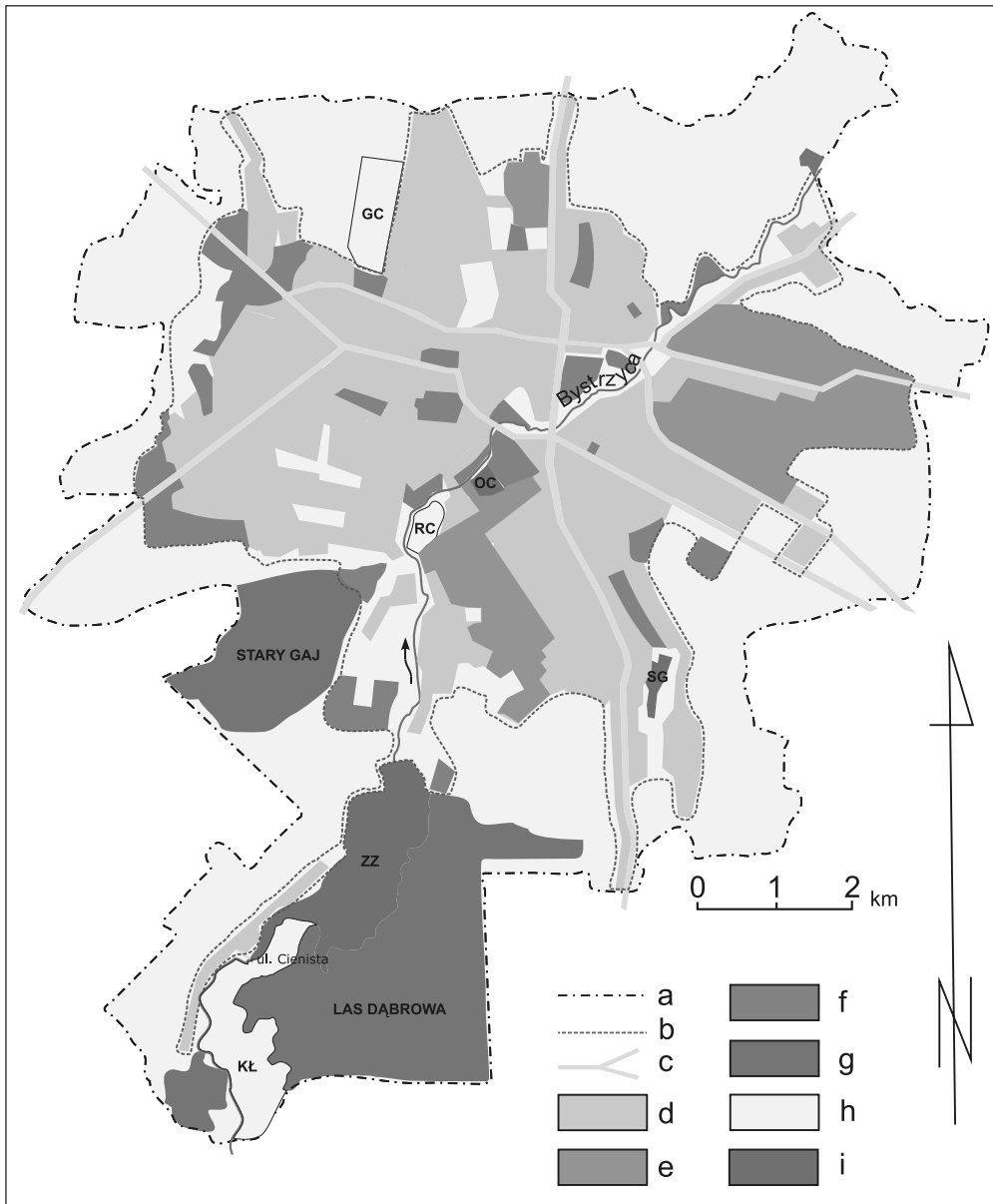


Fig. 1. Lublin – main habitats.

Explanations: a – municipal boundaries, b – boundaries of the urban zone, c – main streets, d – built-up areas, e – industrial built-up areas, f – urban green areas (parks, cemeteries and allotment gardens), g – woods and forest parks of outskirts, h – agricultural and open areas and wasteland, i – water bodies, GC – “Czechowskie” Hills, KŁ – meadows at the Cienista St, OC – sedimentation reservoirs of sugar refinery, RC – flooded area at the Ciepła St, SG – ponds at the Głuska St, ZZ – Zemborzycki Lake.

Рис. 1. Люблин – основные местообитания.



lished parks, agrocenoses, wastelands, ruderal areas and streets), and one census plot representing industrial parts of the city (Figs. 2, 3).

In most of the census plots, research was conducted only in one winter season. During the season, 8–9 census visits at 10–15-day intervals were performed commencing with the first snowfalls (turn of November) until the end of February (exceptionally, the beginning of March). They were always performed in the morning, usually at the same time and in the same order in each of the census plots. This increased the census effectiveness (see, e. g., Górska, Górski, 1980; Rollfinke, Yahner, 1990). It was demonstrated (Biaduń, 1994b), that the regularity of census visits in a given plot (performed at 10–15-day intervals) considerably improved their accuracy. Opinions (e. g., Luniak, 1981) that two or three censuses give a sufficiently good picture of the avifauna were proved wrong.

All censuses were performed personally. This improved the accuracy of the methods, as the results had a similar margin of error. This has been pointed to by several authors (Svensson, 1974; Best, 1975; Kavanagh, Recher, 1983; Morozow, 1994). The data obtained in quantitative research were analysed according to the generally adopted rules. To describe the wintering communities, a parameter of “individual/10 ha/census” was used, which was obtained as a mean of the conducted censuses. In the cases when the research lasted more than one season, the results were expressed as mean numeric dominance or density. Among the wintering species, a division into constant and irregular ones was introduced. The former included those which were found in at least 3 censuses and constituted no less than 0.1 % of the complex.

The communities were compared using Renkonen’s (Re) and Sorensen’s (QS) indices. Communities with Re over 70 % and QS over 80 % were assumed to be identical. Those with indices over 50 % and 60 %, respectively, were assumed to be similar (Głowaciński, 1975).

Regular observations were also conducted at the sedimentation reservoirs of “Lublin”

sugar refinery, the Bystrzyca river, the ponds at Głuska St., and Zemborzycki Artificial Lake with its adjoining forest and meadow complexes. At the same time, when possible, all other areas of the city were checked. The present paper also includes materials from the Archives of Lublin Ornithological Society (Lubelskie Towarzystwo Ornitologiczne – LTO). Based on them, the author supplemented list of species found in Lublin and the status of some of those observed during the research.

## RESULTS

### Avifauna of the particular environments

The characterisation of the avifauna was based on the quantitative research of the wintering avifauna of various types of census plots (Tables 3–8). The analysis given below most often refers to the results of studies of the avifauna of Warsaw (Luniak, 1980, 1981; Szczepanowski, 1984; Nowicki, 1992, 1997, 2001; Luniak, 1994, 1996), Jasło (Stój, Dyczkowski, 2002), Słupsk (Górski, 1981, 1982), Olsztyn (Nowakowski et al., 2004), and Lviv (Bokotey, 1998). These data (e. g., Nowicki’s and Bokotey’s) were often obtained with methods differing from the ones used in this research.

### Housing estates

Quantitative research in this environment was performed in the period of 1992–1996 (Fig. 2, Table 1). In winter, 31 species were found (Table 3). Luniak’s research (1994, 1996) on the housing estates of Warsaw reported 17 wintering species, whereas Górska and Górski’s studies (1980) of Poznań – 16. More species (27) were found in a housing area in Olsztyn (Nowakowski et al., 2004). Compared to these data, the avifauna of Lublin was considerably richer. However, in later publications on Warsaw (Luniak, 1996; Nowicki, 1997), higher values were given: 22–23 and 33 species, respectively.

The core of the avifauna wintering in housing estates practically consisted of two spe-



Table 1  
The list of census plots. Description of plots 1–7, 10–21 and 36–48 in: Biaduń 1994a, 1996a, 1996b, 2001

Name and symbol	Size (ha)	Years of study
1. House estate "Bronowice Nowe" – BN	11.5	1992/1993
2. House estate "Poręba" – OP	10.0	1992/1993
3. House estate "M. Konopnicka" – OK	18.7	1992/1993
4. House estate "A. Mickiewicz" – OM	39.0	1992/1993
5. Villa quarter – DW	13.4	1994/1995
6. Old city – SM	10.6	1994/1995
7. Ludowy Park – PL	30.1	1988/1989-1990/1991
8. Museum of Lublin Countryside – MWL	24.5	1994/1995
9. Botanic Garden – OB	18.0	1990/1991, 1994/1995
10. Wooded area "Czechów" – LC	6.0	1990/1991
11. Bronowicki Park – PB	2.5	1988/1989-1990/1991
12. Saski Garden – OS	12.9	1988/1989-1990/1991
13. Akademicki Park – PA	5.5	1988/1989-1990/1991
14. Kalinowszczyzna Cemetery – CK	2.7	1988/1989-1990/1991
15. Majdanek Cemetery – CM	16.4	1990/1991
16. Lipowa St. Cemetery – CL	18.4	1988/1989-1990/1991
17. Unicka St. Cemetery – CU	11.0	1988/1989-1990/1991
18. Allotment garden "T. Kościuszko" – KO	12.6	1992/1993
19. Allotment garden "A. Mickiewicz" – MI	14.0	1992/1993
20. Allotment garden "Łącznościowiec" – OŁ	8.2	1992/1993
21. Allotment garden "Podzamcze" – PO	34.1	1992/1993
22. Litewski Square – PLL	1.6	1992/93, 1994/95, 1997/98
23. Podzamcze Park – PP	5.4	1992/93, 1997/98
24. "Krańcowa" square – KR	1.2	1997/1998
25. "Betonowa" square – SB	0.4	1997/1998
26. "Dworzec Płn." square – DP	2.0	1997/1998
27. "Długa" square – SD	0.6	1997/1998
28. "Peowiaków" square – SP	1.2	1997/1998
29. "Wspólna" square – SW	0.6	1997/1998
30. "Farbiarska" square – SF	0.2	1997/1998
31. "Świętoduska" square – SS	0.7	1997/1998
32. "Krochmalna" square – SK	1.0	1997/1998
33. "Ewangelicka" square – SE	0.5	1997/1998
34. "Unia" square – SU	0.8	1997/1998
35. "Słomiany Rynek" square – SSR	1.2	1997/1998
36. Wasteland of "Orkana" – NO	7.0	1996/1997
37. Wasteland of "Jutrzenki" – NJ	10.0	1996/1997
38. Wasteland of "Słonecznik" – NS	10.0	1996/1997
39. Fields of "Diamentowa" – PD	5.0	1996/1997
40. Fields of "Diamentowa/Samsonowicza" – DS	12.0	1996/1997
41. "LSM" ravine – WL	45.0	1996/1997
42. "Poręba" ravine – WP	23.4	1996/1997
43. "Czechów" ravine – WC	24.0	1996/1997
44. "Łęgi" ravine – WŁ	17.0	1996/1997
45. "Rusałka" square – SR	11.2	1996/1997
46. "Bystrzyca" meadows – ŁB	28.0	1996/1997
47. "Solidarności avenue" – AS	17.0	1996/1997
48. Open area "Chodźki" – UC	14.5	1996/1997
49. Car's Factory – FS	129.0	1992/1993

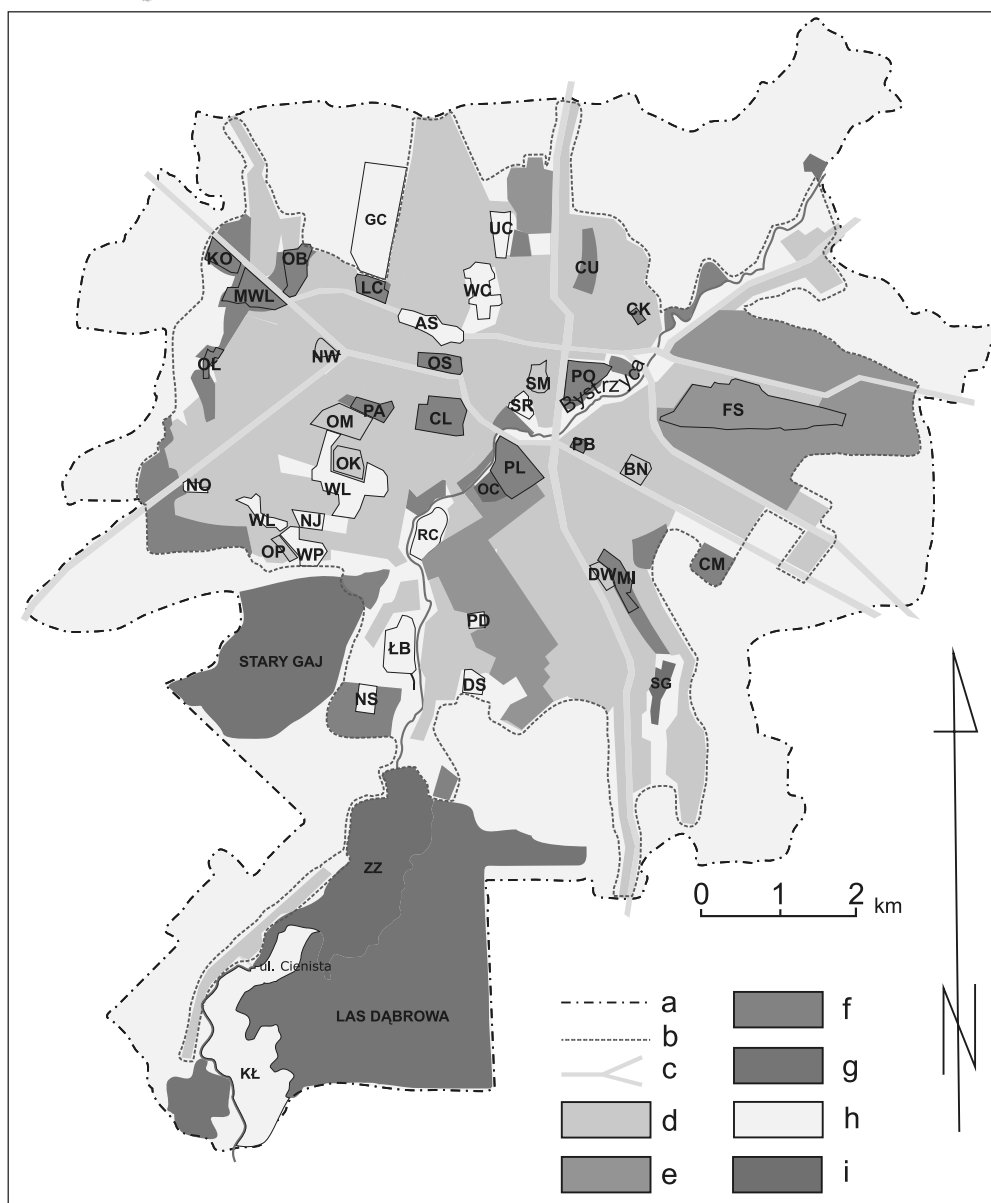


Fig. 2. Distribution of census plots within the municipal boundaries of Lublin – built-up areas, parks, cemeteries, allotment gardens, open areas and wastelands.

Explanations: see Fig. 1 and Table 1.

Рис. 2. Размещение учетных площадок в пределах муниципальных границ Люблина – селитебная зона, парки, кладбища, садовые участки, открытые территории и пустыри.

cies: Rook (*Corvus frugilegus*) and House Sparrow (*Passer domesticus*) (Table 3). They occurred as dominants in all the investigated

plots. Their combined share amounted to 46–78%. Apart from them, Jackdaw (*Corvus monedula*), Great Tit (*Parus major*), Tree Spar-

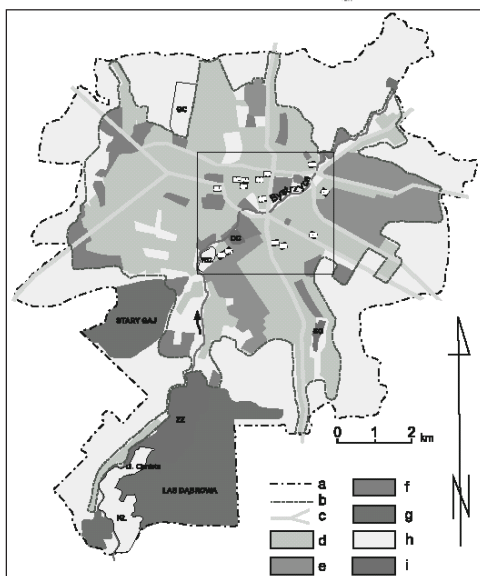




Fig. 2. Distribution of census plots within the municipal boundaries of Lublin – the inner city squares.

Explanations: see Fig. 1 and Table 1.

Рис. 2. Размещение учетных площадок в пределах муниципальных границ Люблина – центральная часть города.



row (*Passer montanus*) and Magpie (*Pica pica*) were found in all plots. The dominants constituted from 85 to 98 % of wintering communities. The density of Jackdaw greatly varied in each housing estate. The Great Tit was more numerous in plots richer in green. Tree Sparrow was among the dominants in housing estates neighbouring with open areas. More and more Starlings (*Sturnus vulgaris*) and Chaffinches (*Fringilla coelebs*) winter in Lublin. Syrian Woodpecker (*Dendrocopos syriacus*) has also become a constant element of the winter avifauna of the discussed areas. During the quantitative research, it was observed only in the Old Town (SM), but in the following years, it was observed also in other housing estates.

The density of communities wintering in the investigated housing estates was considerably diversified (Table 3). It was definitely higher where the birds were fed. In the Bronowice Nowe housing estate, it was 50 % higher than the highest value reported, up till now, by other authors. This was connected with very high numbers of Rook, House Sparrow, and Collared Dove (*Streptopelia decaocto*). High density – much higher than in Warsaw –

was determined for Great Tit and, in some housing estates, Jackdaw and Fieldfare (*Turdus pilaris*). A large share of Tree Sparrow in the Konopnicka housing estate was due to the nature of the adjoining biotopes (lawns, weedy plots and garden allotments). The numbers of House Sparrow, Rook and Collared Dove were low in a residential area. The values mentioned for a similar environment by Górska and Górski (1980) were definitely higher. Also the numbers of Feral Pigeon (*Columba livia*) (outside the Old Town) are much lower than those given by Luniak (1994) and Nowicki (1997) for Warsaw housing estates.

Comparisons of communities wintering in the mentioned census plots in Lublin, Poznań and Warsaw in most cases showed a similarity or identity of species composition (QS: 41–86 %). The results of a comparison of the structure of dominance are different. The avifauna of the housing estates of Lublin and Warsaw showed, in respective comparisons, a similarity or identity (Re: 51–81 %). In the case of Poznań, differences were found in most of the comparisons of communities (Re: 24–66 %), which was largely due to the clearly lower

Table 2

Wintering species recorded on the Lublin area within the municipal boundaries in period 1973–2003

Зимующие виды, зарегистрированные в Люблине в пределах муниципальных границ в 1973–2003 гг.

Species	Status	1	2	3	4	5	6	7	8
<i>Tachybaptus ruficollis</i>	w								w
<i>Phalacrocorax carbo</i>	w(K)*								w
<i>Ardea cinerea</i>	w*							w	
<i>Cygnus olor</i>	W								W
<i>C. cygnus</i>	w(K)								w
<i>Anser fabalis</i>	w(K)*								w
<i>A. anser</i>	w(K)*								w
<i>Tadorna tadorna</i>	w(K)*								w
<i>Anas penelope</i>	w(K)*								W
<i>A. platyrhynchos</i>	W			w		w		w	W
<i>A. querquedula</i>	w*								w
<i>Netta rufina</i>	w(K)*								w
<i>Aythya ferina</i>	w*								w
<i>A. fuligula</i>	w*								w
<i>Melanitta fusca</i>	w(K)*								w
<i>Mergus merganser</i>	w(K)*								w
<i>Accipiter gentilis</i>	W			w			W	w	
<i>A. nisus</i>	W	w		W	w	W	w	W	w
<i>Buteo buteo</i>	w*			w			w		
<i>B. lagopus</i>	w*			w				w	
<i>Falco tinnunculus</i>	w*	w							
<i>F. columbarius</i>	w*			w					
<i>Perdix perdix</i>	W	w	w	w		W		W	W
<i>Phasianus colchicus</i>	W		w	W		W		W	W
<i>Fulica atra</i>	w*								w
<i>Larus ridibundus</i>	W							w	W
<i>L. canus</i>	w*								W
<i>L. argentatus</i>	w(K)*								w
<i>Columba livia</i>	W	W	w	w	W	w		w	
<i>Streptopelia decaocto</i>	W	W	w	W	W	w		w	
<i>Athene noctua</i>	w			w					
<i>Strix aluco</i>	W			W	w				
<i>Asio otus</i>	W			W					
<i>Alcedo atthis</i>	W								W
<i>Picus viridis</i>	W	w		W					
<i>Dryocopus martius</i>	W						W		
<i>Dendrocopos major</i>	W			W		w	W	w	
<i>D. syriacus</i>	W	w		W	w	w		w	
<i>D. medius</i>	W			W		w	W		





Continuation of the Table 2

Species	Status	1	2	3	4	5	6	7	8
<i>D. minor</i>	W	w		W		w	w	w	
<i>Galerida cristata</i>	w							w	
<i>Alauda arvensis</i>	w*							w	
<i>Motacilla alba</i>	w(K)*							w	
<i>Bombycilla garrulus</i>	W	w		W	W			w	
<i>Troglodytes troglodytes</i>	W		w	W		w		W	w
<i>Prunella modularis</i>	w*			w					w
<i>Erithacus rubecula</i>	w	w		w	w	w	w	w	
<i>Turdus merula</i>	W	w	w	W	w	w	w	w	w
<i>T. pilaris</i>	W	W	W	W	W	W		W	
<i>T. philomelos</i>	w*	w		w					w
<i>T. iliacus</i>	w*							w	
<i>T. viscivorus</i>	w*			w					
<i>Regulus regulus</i>	W	w		W			W		
<i>Aegithalos caudatus</i>	W						W		
<i>Parus palustris</i>	w			w			w	w	
<i>P. montanus</i>	w			w		w	w	w	
<i>P. cristatus</i>	w*						w		
<i>P. ater</i>	W			W			W		
<i>P. caeruleus</i>	W	w	w	W	W	w	w	w	w
<i>P. major</i>	W	W	W	W	W	W	w	W	W
<i>Sitta europaea</i>	W			W	w		W		
<i>Certhia familiaris</i>	W			w			W		
<i>C. brachydactyla</i>	W	w	w	W	w	w		w	
<i>Garrulus glandarius</i>	W	w					W		
<i>Pica pica</i>	W	W	w	W	W	W	w	w	W
<i>Nucifraga caryocatactes</i>	w*(K)						w		
<i>Corvus monedula</i>	W	W	W	W	W	w		W	W
<i>C. frugilegus</i>	W	W	W	W	W	w		W	W
<i>C. corone</i>	W		w	w	w	W	W	W	W
<i>C. corax</i>	w*						w		
<i>Sturnus vulgaris</i>	W	W		w	w	w		w	w
<i>Passer domesticus</i>	W	W	w	w	W	w		w	w
<i>P. montanus</i>	W	w	W	w	w	W	w	W	w
<i>Fringilla coelebs</i>	W	w		W	w	W		W	w
<i>F. montifringilla</i>	w	w		w		w			
<i>Serinus serinus</i>	w*							w	
<i>Carduelis chloris</i>	W	w	w	W	w	w		w	
<i>C. carduelis</i>	W	w	W	w	w	w		w	w
<i>C. spinus</i>	W			W		w	W	w	
<i>C. cannabina</i>	w			w		w		w	
<i>C. flavirostris</i>	w(K)*							w	
<i>C. flammea</i>	w							w	w
<i>Pyrrhula pyrrhula</i>	W	w	w	W	w	w	w	w	

End of the Table 2

Species	Status	1	2	3	4	5	6	7	8
<i>Coccythraustes coccythraustes</i>	W	w	w	w	w	w		W	
<i>Plectrophenax nivalis</i>	w(K)*							w	
<i>Emberiza citrinella</i>	W	w		w		w	w	W	
<i>E. schoeniclus</i>	w			w				w	w
<i>Miliaria calandra</i>	w(K)*							w	
<b>Total</b>		<b>88</b>	<b>31</b>	<b>20</b>	<b>52</b>	<b>25</b>	<b>34</b>	<b>28</b>	<b>48</b>

**Comments.** 1 – built-up areas, 2 – industrial built-up areas, 3 – parks and cemeteries, 4 – squares, 5 – allotment gardens, 6 – woods and forest parks of outskirts, 7 – agricultural and open areas and wasteland, 8 – water bodies. Explanations: w – wintering (great letters – main habitats, little – secondary habitats), \* – exceptionally registered (1–10 observations), (K) – data from file of Lublin Ornithological Society.

share of Rook in the wintering communities of Poznań.

### Industrial areas

Industrial areas are among the most characteristic urban environments. They are usually omitted in the research of urban avifauna and there is little information about them in the literature. The object of the present research was the biggest (129 ha) area of this character in Lublin – the FSC Lorry Factory (at present called Daewoo Motor Poland) (Fig. 2).

In the investigated area, 20 species were found in the winter of 1992/1993, including 16 constant ones (Table 4). The most numerous ones were Rook, Great Tit, Jackdaw and Tree Sparrow. House Sparrow was not particularly numerous. It is possible, though, that part of the individuals of this species resided inside the factory buildings. Collared Dove was even more scarce, which was due to the lack of anthropogenic food (no bird feeding was ever observed). Partridge (*Perdix perdix*), Pheasant (*Phasianus colchicus*) and Hooded Crow (*Corvus corone*) were encountered in low numbers but constantly throughout the whole period of research. Constant was also a flock of Blackbirds (*Turdus merula*) feeding among a dozen or so fruit trees. As in other environments, the characteristic species of the community was Magpie.

In Warsaw's industrial areas, 18 species were found in winter (Nowicki, 1997), and in Lwów – 34 (Bokotey, 1998). The communities wintering in Lublin and Lviv differed from each other more than the breeding communities (QS = 63 %). It was due to the absence of Black-headed Gull (*Larus ridibundus*), Woodpeckers and Waxwing (*Bombycilla garrulus*) in Lublin. However, the species composition of the avifauna of Lublin's industrial quarter was similar to the one found in Warsaw (73.7 %).

### Urban green areas

Winter avifauna of urban green areas is much less known than the breeding one. Moreover, the differences in the methodologies used in the research (Okulewicz, 1971; Górska, Górski, 1980; Górski, 1981; Luniak, 1981; Szczepanowski, 1984; Riabinin, Olearnik 1985a; Nowicki, 1997; Bokotey, 1998; Nowakowski et al., 2004) result in the fact that the findings can be compared only to some limited extent.

The characterisation of the wintering avifauna has been based on quantitative research conducted in census plots (Table 1). The obtained results have been supplemented based on regular censuses in the trees at the Bystrzyca river and other additional observations conducted in this environment. The avifauna of



Table 3

Winter avifauna of the housing estates in Lublin

Species-dominants (over 5 %) are in bold. Symbols of the areas – see Table 1 (Biaduń 2004)

Зимняя авифауна жилых массивов в Люблине

Species	BN 11.5 ha	OP 10.0 ha	OK 18.7 ha	OM 39.0 ha	DW 13.4 ha	SM 10.6 ha
<i>Accipiter nisus</i>	+					
<i>Perdix perdix</i>		+				
<i>Columba livia</i>	8.6		2.5	22.8		<b>154.2</b>
<i>Streptopelia decaocto</i>	<b>262.6</b>		24.9	<b>40.0</b>	4.2	13.4
<i>Dendrocopos syriacus</i>	+					0.3
<i>D. minor</i>	+			+		
<i>Erithacus rubecula</i>				+		+
<i>Turdus merula</i>				0.9	+	1.1
<i>T. pilaris</i>	<b>57.2</b>		6.3	6.7	0.3	11.1
<i>T. philomelos</i>			+			
<i>Regulus regulus</i>				+		
<i>Parus caeruleus</i>	1.0		1.1	2.0	2.6	.7
<i>P. major</i>	9.7	1.6	26.3	18.2	<b>11.9</b>	14.2
<i>Certhia brachydactyla</i>	+			+		
<i>Pica pica</i>	1.1	2.4	1.4	5.7	3.7	6.1
<i>Corvus monedula</i>	<b>76.1</b>	<b>35.1</b>	<b>41.3</b>	9.4	<b>10.0</b>	8.2
<i>C. frugilegus</i>	<b>302.5</b>	<b>60.7</b>	<b>251.3</b>	<b>317.0</b>	<b>90.8</b>	<b>40.6</b>
<i>Sturnus vulgaris</i>	+		12.8	4.7		+
<i>Passer domesticus</i>	<b>366.5</b>	<b>42.4</b>	<b>146.6</b>	<b>113.2</b>	<b>39.5</b>	<b>143.5</b>
<i>P. montanus</i>	+	<b>9.4</b>	<b>31.2</b>	4.1	5.4	+
<i>Fringilla coelebs</i>		+				<b>1.0</b>
<i>F. montifringilla</i>				+		
<i>Carduelis chloris</i>		+	1.6	2.3	+	+
<i>C. carduelis</i>				+	4.4	+
<i>Pyrrhula pyrrhula</i>	+			0.6	0.5	2.5
<i>Coccothraustes coccothraustes</i>				+		1.4
<b>Total species</b>	<b>16</b>	<b>9</b>	<b>13</b>	<b>21</b>	<b>13</b>	<b>19</b>
<b>Density (ind./10 ha/census visit)</b>	<b>1085.3</b>	<b>151.6</b>	<b>547.3</b>	<b>547.6</b>	<b>173.3</b>	<b>399.2</b>

this environment was the richest among all the selected environments within the city. Overall, 58 species were found in the urban tall vegetation areas in winter (Table 2).

**Parks and cemeteries.** The observations were conducted in all larger concentrations of tall vegetation in the city. In eleven of them this was quantitative research (Fig. 1, Table 1). In total, 52 species were observed in winter (Table 5). For downtown parks and cemeteries in Warsaw, Nowicki (1997, 2001) mentions 62 species. However, their total census plot equalled almost 1000 ha. For Lviv, Bokotey (1998) enumerates 38 species, and Nowakowski et al. (2004) mention only 27

species in Olsztyn. Quantitative research conducted in Poznań also revealed a surprisingly low species diversity (Górska, Górski, 1980). In typical tree areas (a municipal park and the ZOO) only 18 species were observed. A clearly lower (32) number of species, compared to Lublin, was found in Warsaw's parks (Luniak, 1981). That was probably the effect of the adopted method (2–3 censuses per season), which fails to register up to a third of the species (Biaduń, 1994b). This view is supported by Szczepanowski's research (1984) on 7 parks of Warsaw. During two seasons, he listed 40 species, though the number was influenced by the proximity of the Vistula and the fact that



Wintering avifauna of industrial built-up areas (FS) in Lublin (species-dominants are in bold) (Biaduń, 2004)  
Зимняя авифауна зоны индустриальной застройки

Species	Density, ind./10 ha/census visit	Dominance, %
<i>Perdix perdix</i>	0.3	0.9
<i>Phasianus colchicus</i>	0.1	0.3
<i>Columba livia</i>	0.8	2.3
<i>Streptopelia decaocto</i>	0.1	0.3
<i>Troglodytes troglodytes</i>	+	+
<i>Turdus merula</i>	0.5	1.4
<i>T. pilaris</i>	1.3	3.7
<i>Parus caeruleus</i>	0.2	0.6
<i>P. major</i>	5.5	<b>15.8</b>
<i>Certhia brachydactyla</i>	+	+
<i>Pica pica</i>	0.5	1.4
<i>Corvus monedula</i>	4.4	<b>12.6</b>
<i>C. frugilegus</i>	15.7	<b>45.1</b>
<i>C. corone</i>	0.1	0.3
<i>Passer domesticus</i>	1.5	4.3
<i>P. montanus</i>	2.6	<b>7.5</b>
<i>Carduelis chloris</i>	0.1	0.3
<i>C. carduelis</i>	1.1	3.2
<i>Pyrrhula pyrrhula</i>	+	+
<i>Coccothraustes coccothraustes</i>	+	+
<b>Number of wintering species</b>		<b>20</b>
<b>Ind./10 ha/census visit</b>	<b>34.8</b>	

the observations were conducted until the end of March.

The number of species in some census plots (CL, CU, OB and PL) clearly exceeded the highest numbers recorded up till now for comparable environments (Górska, Górski, 1980; Luniak, 1981; Szczepanowski, 1984). Even in the smallest plots (CK – 19 and PB – 21) it did not differ much from that given by Luniak (1983) for areas which were a couple of times larger.

In Lublin, the characteristic species were Syrian Woodpecker, Middle Spotted Woodpecker (*Dendrocopos medius*) and Green Woodpecker (*Picus viridis*), as well as Long-eared Owl (*Asio otus*), a bird encountered in Poland only sporadically in Toruń (Strawiński, 1963) and Słupsk (Górski, 1981) but com-

monly occurring in daytime communities in German cities (Creutz, 1979; Herzig, König, 1980).

The most numerous species wintering in Lublin's parks and cemeteries were Rook (an average of 46.2 %) and Great Tit (14.2 %), always present among the dominants. The remaining common wintering species were much less numerous. Only Magpie, Bullfinch, and Collared Dove were identified 4–5 times among the dominants, the last of them completely absent in three census plots. Blue Tit (*Parus caeruleus*), Blackbird and Fieldfare were observed everywhere, though. Greenfinch (*Carduelis chloris*), Tree Sparrow, Jackdaw, and Hawfinch (*Coccothraustes coccothraustes*) were not registered only in individual cases. The above-mentioned group was in most areas supplemented by Treecreeper (*Certhia familiaris*), Short-toed Treecreeper (*C. brachydactyla*), House Sparrow, and Sparrowhawk (*Accipiter nisus*). In some census plots, Siskin (*Carduelis spinus*),

Pheasant, Goldcrest (*Regulus regulus*) and Long-eared Owl were also noticed among the constant species. The core of the wintering avifauna of Lublin's parks and cemeteries consisted of 15–20 species. Apart from them, the family of Woodpeckers was relatively well represented (5 species). Their occurrence was usually limited to larger plots with older forest stand. Starling, Robin (*Erithacus rubecula*), or Chaffinch, the majority of whose population is migratory, have clearly marked their presence. The great majority of the species (16) were observed very rarely. The structure of quantitative dominance was a bit different than that recorded in Luniak's (1981) and Szczepanowski's (1984) research in Warsaw. Although Rook and Great Tit prevailed in both cities, a strong share of Pigeon, Mallard (*Anas*



Table 5

Winter avifauna of parks and cemeteries of Lublin (average dominance – %).

Species-dominants (over 5 %) are in bold. Symbols of areas – see Table 1 (Biaduń, 2004)

Зимняя авифауна парков и кладбищ Люблина (среднее доминирование – %)

Species	PL (30.1 ha)	MWL (24.5 ha)	OB (18.0 ha)	LC (6.0 ha)	PB (2.5 ha)	OS (12.9 ha)	PA (5.5 ha)	CK (2.7 ha)	CM (16.4 ha)	CL (18.4 ha)	CU (11.0 ha)
<i>Anas platyrhynchos</i>		+	+								
<i>Accipiter gentilis</i>	+							+			
<i>A. nisus</i>	+	0.2	0.5	+			+	+	+	+	0.1
<i>Buteo buteo</i>	+										
<i>B. lagopus</i>									+		
<i>Falco columbarius</i>										+	
<i>Perdix perdix</i>		3.0	+								
<i>Phasianus colchicus</i>	+	0.9	3.1			+			2.5		
<i>Columba livia</i>						+					
<i>Streptopelia decaocto</i>	<b>14.6</b>				<b>10.2</b>	<b>6.9</b>	2.3	3.5	+	<b>7.5</b>	0.5
<i>Athene noctua</i>									1.4		
<i>Strix aluco</i>			0.7			0.3				+	0.1
<i>Asio otus</i>									<b>12.0</b>	+	1.0
<i>Picus viridis</i>	+	+	0.5			0.1	+			+	+
<i>Dendrocopos major</i>	0.2		0.5		0.5	0.2	0.1			0.2	0.2
<i>D. syriacus</i>	0.1	+	0.2		+	+	+				0.2
<i>D. medius</i>	+				0.1	0.1				0.1	
<i>D. minor</i>	+		0.2		+	+				+	
<i>Bombycilla garrulus</i>	+						+	+	+	1.1	+
<i>Troglodytes troglodytes</i>		0.9	0.1			+	+	+		0.1	+
<i>Prunella modularis</i>	+										
<i>Erithacus rubecula</i>	+						+	+	+	+	+
<i>Turdus merula</i>	1.8	+	3.0	+	0.3	1.9	3.6	0.2	+	1.2	0.2
<i>T. pilaris</i>	0.8	0.9	1.0	+	+	+	1.3	<b>6.3</b>	+	0.3	+
<i>T. philomelos</i>	+										
<i>T. viscivorus</i>									+		
<i>Regulus regulus</i>			0.1			+	+		1.9	0.6	0.7
<i>Parus palustris</i>	+										
<i>P. montanus</i>	+		0.4	2.1			+				
<i>P. ater</i>							+		3.3	1.5	<b>5.0</b>
<i>P. caeruleus</i>	2.5	3.0	<b>6.4</b>	<b>16.8</b>	1.9	2.6	2.3	0.8	0.8	2.6	1.3
<i>P. major</i>	<b>13.8</b>	<b>8.9</b>	<b>20.7</b>	<b>29.8</b>	<b>12.0</b>	<b>15.3</b>	<b>18.1</b>	<b>6.2</b>	<b>10.3</b>	<b>9.5</b>	<b>11.9</b>
<i>Sitta europaea</i>	0.1		1.7		0.2	1.1				0.8	
<i>Certhia familiaris</i>	+		+		+	+	+		0.8	+	0.1
<i>C. brachydactyla</i>	0.3		0.2		0.1	0.2	0.2		+	0.3	0.1
<i>Pica pica</i>	<b>5.4</b>	<b>9.8</b>	<b>9.6</b>	<b>11.3</b>	1.8	0.8	2.8	0.9	<b>25.4</b>	2.0	4.0
<i>Corvus monedula</i>	+	<b>20.1</b>	<b>16.0</b>		+	<b>6.2</b>	+	<b>12.4</b>	4.8	0.5	4.1
<i>C. frugilegus</i>	<b>37.6</b>	<b>21.9</b>	<b>19.8</b>	<b>35.5</b>	<b>66.7</b>	<b>57.0</b>	<b>61.3</b>	<b>64.4</b>	<b>22.9</b>	<b>61.3</b>	<b>60.2</b>
<i>C. corone</i>	2.0	1.4	2.5			+	+			+	0.3
<i>Sturnus vulgaris</i>	+		+			+		+		+	+
<i>Passer domesticus</i>	+	<b>5.7</b>	+		3.7	3.8	+	0.2	<b>6.4</b>		2.0
<i>P. montanus</i>	1.3	<b>9.6</b>	1.7		+	0.2	+	3.8	3.6	0.2	0.6
<i>Fringilla coelebs</i>	0.6	1.1	0.8	+		+	+			+	
<i>F. montifringilla</i>									+		
<i>Carduelis chloris</i>	0.3	0.7	0.3		+	+	0.2	0.9	3.1	0.1	1.6
<i>C. carduelis</i>	3.5	+		+	+				+	+	+
<i>C. spinus</i>	4.4		2.5			+	0.6		+	<b>8.7</b>	<b>8.0</b>
<i>C. cannabina</i>							+		+		
<i>Pyrrhula pyrrhula</i>	<b>10.0</b>	<b>6.8</b>	<b>7.2</b>	4.5	2.2	3.3	<b>7.1</b>	0.3	0.6	1.3	2.4
<i>Coc. coccothraustes</i>	0.5	+	0.2		0.1	+	0.1	+	+	+	+
<i>Emberiza citrinella</i>		<b>5.0</b>							+	+	+
<i>E. schoeniclus</i>		+									
<b>Total species</b>	<b>36</b>	<b>24</b>	<b>31</b>	<b>11</b>	<b>21</b>	<b>30</b>	<b>29</b>	<b>19</b>	<b>30</b>	<b>34</b>	<b>31</b>
<b>Ind./10 ha/census visit</b>	<b>98.0</b>	<b>43.8</b>	<b>51.2</b>	<b>62.0</b>	<b>330.4</b>	<b>210.3</b>	<b>188.4</b>	<b>619.6</b>	<b>35.8</b>	<b>181.2</b>	<b>153.3</b>

Wintering avifauna of the inner city squares of Lublin  
(ca 17.4 ha)

Зимняя авифауна центральной части Люблина

Species	%	n	
		total	as dominant
<i>Accipiter nisus</i>	+	2	
<i>Columba livia</i>	<b>6.1</b>	6	4
<i>Streptopelia decaocto</i>	4.7	14	5
<i>Strix aluco</i>	+	1	
<i>Dendrocopos syriacus</i>	+	3	
<i>Bombycilla garrulus</i>	+	1	
<i>Erithacus rubecula</i>	+	2	
<i>Turdus merula</i>	0.2	6	
<i>T. pilaris</i>	1.9	7	1
<i>Parus caeruleus</i>	2.7	14	2
<i>P. major</i>	<b>7.6</b>	14	10
<i>Sitta europaea</i>	+	1	
<i>Certhia brachydactyla</i>	+	2	
<i>Pica pica</i>	0.9	11	1
<i>Corvus monedula</i>	<b>10.4</b>	14	7
<i>C. frugilegus</i>	<b>47.4</b>	14	14
<i>C. corone</i>	+	1	
<i>Sturnus vulgaris</i>	+	4	
<i>Passer domesticus</i>	<b>14.9</b>	12	9
<i>P. montanus</i>	1.6	7	1
<i>Fringilla coelebs</i>	+	2	
<i>Carduelis chloris</i>	0.7	6	1
<i>C. carduelis</i>	+	1	
<i>Pyrrhula pyrrhula</i>	0.3	5	
<i>Coc. coccothraustes</i>	0.4	5	
<b>Total species</b>	<b>25</b>		
<b>Number of species on single plot/average</b>	<b>5–22/12</b>		

**Explanations.** % – average dominance (species-dominants are in bold), n – number of plots with species abundance.

*platyrhynchos*), and House Sparrow was also recorded in Warsaw. In Lublin, Collared Dove, Siskin, and Bullfinch were among the most numerous birds. The density of the communities wintering in the peripheral areas equalled 36–62 ind./10 ha/census, and in the downtown areas it reached the level of a couple of hundred individuals per 10 ha (Table 7). The obtained results were typical for suchlike environments (Luniak, 1981, 1983; Szczepanowski, 1984). According to various authors (Górska, Górski, 1980; Luniak, 1981; Szczepanowski, 1984), density depends primarily on feed-

ing. In Lublin, no direct feeding was observed in the investigated areas. It seems that the number of birds was influenced by the mere presence of people, who accidentally and involuntarily created opportunities for the birds to obtain some food. This phenomenon should, therefore, be looked at as a special form of replenishing the birds' food supplies.

**City squares.** Avifauna of this environment was characterised on the basis of quantitative research conducted in 14 downtown squares of the total area of 17.4 ha (Fig. 3, Table 1). An analysis of the obtained results was done based on a comparison with Luniak's data (1981) from his research on Warsaw's parks.

Among the 25 species observed during the winter period, 15 were counted among the constant ones (Table 6). In all squares, Collared Dove, Blue Tit, Great Tit, Jackdaw, and Rook were recorded. House Sparrow and Magpie completed the list of the commonest species. The remaining species occurred in half of the census plots at most, and some of them (Nuthatch (*Sitta europaea*), Goldfinch (*Carduelis carduelis*), Hooded Crow, Waxwing, Tawny Owl

(*Strix aluco*), Short-toed Treecreeper, Robin, Chaffinch, and Sparrowhawk) – only in 1 or 2. The research conducted in two squares (PLL, PP) for three and two winter seasons, respectively, showed that the species composition varied minimally (QS: 84–96 %). The dominance structure demonstrated slightly larger changes (Re: 58–87 %), which was mainly due to the falling share of Rook and simultaneous increase of the population of Pigeon, more and more numerous in downtown areas.

Rook, House Sparrow, and Jackdaw



proved to be the most numerous in winter. Great Tit and Pigeon were also among the dominants. In total, the dominants constituted 86.4 % of the wintering communities.

The density of birds wintering in squares reached maximum figures for the city. The highest (1710 ind./10 ha/census) were observed in Litewski Square – Lublin's central square. It was the effect of feeding, and the main species to profit from it were Pigeon, the House Sparrow, and Rook.

Communities wintering in Lublin's squares are particularly varied. Luniak (1981) recorded, in total, 17 species in areas 1–5.5 ha large (n = 10). In individual areas, he observed 5–11 species (5–19 in Lublin). However, from the point of view of species composition, the wintering communities of Lublin and Warsaw proved to be very similar (QS = 76 %).

#### Allotment gardens.

Quantitative research was conducted in four allotment gardens of the total area of 68.9 ha (Fig. 2, Table 1). Irregular observations were also conducted in other allotments. In winter (Table 7) 34 species in total were found in all areas. Eight of them were at least once among the dominants. These were Rook, Great Tit, and Tree Sparrow (in all areas) as well as Magpie, Pheasant, Fieldfare, House Sparrow, and Partridge. Overall, the dominants constituted 87–92 % of the

Winter avifauna of the allotment gardens in Lublin  
Species-dominants (over 5 %) are in bold. Symbols of the areas – see Table 1 (Biaduń, 2004)

Зимняя авифауна садовых участков в Люблине

Table 7

Species	KO 12.6 ha	MI 14.0 ha	OŁ 8.2 ha	PO 34.1 ha
<i>Anas platyrhynchos</i>		+		
<i>Accipiter nisus</i>	+	0.3	0.8	0.1
<i>Perdix perdix</i>	+	+	+	8.4
<i>Phasianus colchicus</i>	2.4	1.0	<b>7.0</b>	1.1
<i>Columba livia</i>				+
<i>Streptopelia decaocto</i>		+		0.2
<i>Dendrocopos major</i>	+			
<i>D. syriacus</i>			+	0.1
<i>D. medius</i>				+
<i>D. minor</i>	+	+		
<i>Troglodytes troglodytes</i>	+	+		
<i>Erethacus rubecula</i>	+		+	
<i>Turdus merula</i>	+		1.5	+
<i>T. pilaris</i>	<b>5.7</b>	0.9	2.9	0.4
<i>Parus montanus</i>	0.6		0.6	
<i>P. caeruleus</i>	2.1	2.7	1.2	0.9
<i>P. major</i>	<b>17.3</b>	<b>32.1</b>	<b>13.0</b>	<b>9.0</b>
<i>Certhia brachydactyla</i>	0.3			
<i>Pica pica</i>	<b>8.6</b>	6.0	<b>6.2</b>	<b>7.6</b>
<i>Corvus monedula</i>	0.8	3.2	+	0.5
<i>C. frugilegus</i>	<b>11.0</b>	<b>77.0</b>	<b>12.5</b>	<b>31.3</b>
<i>C. corone</i>	0.5	+	0.5	0.5
<i>Sturnus vulgaris</i>		+		
<i>Passer domesticus</i>	<b>5.9</b>	1.9		1.2
<i>P. montanus</i>	<b>13.4</b>	<b>10.5</b>	<b>22.6</b>	<b>8.5</b>
<i>Fringilla coelebs</i>		1.8	0.8	0.1
<i>F. montifringilla</i>		+		
<i>Carduelis chloris</i>	+	+	+	+
<i>C. carduelis</i>	+	+	+	0.3
<i>C. spinus</i>	+			
<i>C. cannabina</i>				+
<i>Pyrrhula pyrrhula</i>	1.9	+	+	
<i>Coc. coccothraustes</i>	1.4	+	0.9	+
<i>Emberiza citrinella</i>	+			
<b>Total species</b>	<b>25</b>	<b>23</b>	<b>20</b>	<b>22</b>
<b>Density (ind./10 ha/census visit)</b>	<b>72</b>	<b>137</b>	<b>71</b>	<b>70</b>

communities. In downtown gardens, the most numerous species was Rook. In 2 remaining ones, it gave way to Great Tit as well as Tree Sparrow. Among other species, apart from Blue Tit which was present everywhere, one relatively often observed Jackdaw, Sparrow-

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Table 8

Wintering avifauna of the agricultural and open areas and wasteland in Lublin (density – ind./10 ha/census visit). Species-dominants (over 5%) are in bold. Symbols of areas – see Table 1 (Biaduń, 2004).

Зимняя авифауна сельскохозяйственных и открытых территорий и пустошей в Люблине

Species	NO 7.0 ha	NJ 10.0 ha	NS 10.0 ha	PD 5.0 ha	DS 12.0 ha	WL 45.0 ha	WP 23.4 ha	WC 24.0 ha	WL 17.0 ha	SR 11.2 ha	LB 28.0 ha	AS 17.0 ha	UC 14.5 ha
<i>Ardea cinerea</i>			+										
<i>Anas platyrhynchos</i>													
<i>Accipiter nisus</i>			+	+	<b>4.2</b>	0.1		+	+	+	+	+	+
<i>Perdix perdix</i>		+	+	+	0.4	0.2	1.2	1.4	0.8		0.9		2.9
<i>Phasianus colchicus</i>				+			+	0.4	+	+	0.2		1.3
<i>Larus ridibundus</i>			<b>3.5</b>										
<i>Columba livia</i>									+	+			0.5
<i>Streptopelia decaocto</i>						+			+	+			
<i>Dendrocopos major</i>						+			+	+			0.5
<i>D. syriacus</i>						+			+	0.6			+
<i>D. minor</i>													
<i>Alauda arvensis</i>											+		
<i>Bombycilla garrulus</i>					+								
<i>Troglodytes troglodytes</i>			+			+		0.1				+	
<i>Erethacus rubecula</i>						0.1		+	0.4	+		0.2	+
<i>Turdus merula</i>						<b>32.1</b>		4.2	<b>37.8</b>	1.4	<b>10.7</b>	2.3	<b>17.8</b>
<i>T. pilaris</i>			+		0.4			+					
<i>T. iliacus</i>						+							
<i>Parus palustris</i>						+							
<i>P. montanus</i>						+							
<i>P. caeruleus</i>	1.4	+	<b>2.3</b>	+	2.1	1.1	0.6	0.8	2.4	1.0	+	1.4	<b>1.6</b>
<i>P. major</i>	1.4	1.5	+	<b>2.9</b>	<b>12.2</b>	5.5	1.9	<b>7.4</b>	<b>16.8</b>	<b>9.4</b>	+	<b>11.4</b>	<b>12.9</b>
<i>Certhia brachydactyla</i>						2.4	1.9	2.0	4.3	4.1	0.7	+	<b>8.6</b>
<i>Pica pica</i>	2.4	1.4	<b>2.0</b>	1.8	3.9	2.4	1.9	2.0	4.3	4.1	0.7	+	<b>8.6</b>
<i>Corvus monedula</i>	<b>24.1</b>	<b>8.8</b>	+	<b>7.3</b>	<b>7.3</b>	<b>8.5</b>	<b>6.1</b>	3.6	<b>13.9</b>	<b>7.0</b>	<b>4.5</b>	2.7	<b>9.7</b>
<i>C. frugilegus</i>	<b>102.4</b>	<b>23.2</b>	+	<b>40.7</b>	<b>56.0</b>	<b>66.2</b>	<b>25.0</b>	<b>39.2</b>	<b>55.7</b>	<b>54.4</b>	<b>14.7</b>	<b>46.9</b>	<b>65.4</b>
<i>C. corone</i>	+			+	1.2	+			0.6	0.6	0.6		1.0
<i>Sturnus vulgaris</i>	+					1.0			+	2.8	+	+	



End of the Table 8

Species	NO	NJ	NS	PD	DS	WL	WP	WC	WL	SR	LB	AS	UC
<i>Passer domesticus</i>	+	+				+	0.3	+	0.5	9.6		1.2	0.6
<i>P. montanus</i>	+	0.5		+	5.7	3.5	3.6	37.2	61.2	5.5		7.5	4.1
<i>Fringilla coelebs</i>				0.9		0.6		+	0.5	+		+	+
<i>Serinus serinus</i>				+		0.7		+	0.2	+		+	+
<i>Carduelis chloris</i>			+		3.5	0.7		+	+	+		+	+
<i>Carduelis carduelis</i>						+			+				
<i>C. spinus</i>						1.0							
<i>C. camabina</i>		+				0.4							
<i>Pyrrhula pyrrhula</i>				2.7	0.4	0.9		0.4	1.3	+		0.7	0.8
<i>Coc. coccyzoides</i>					1.8	0.6		+	+				
<i>Emberiza citrinella</i>							4.1		+	5.6			
<b>Total species</b>	<b>10</b>	<b>9</b>	<b>11</b>	<b>13</b>	<b>14</b>	<b>27</b>	<b>10</b>	<b>19</b>	<b>20</b>	<b>22</b>	<b>13</b>	<b>18</b>	<b>20</b>
<b>Density (ind./10 ha/census visit)</b>	<b>131.7</b>	<b>35.4</b>	<b>7.8</b>	<b>56.3</b>	<b>99.1</b>	<b>125.6</b>	<b>44.7</b>	<b>96.7</b>	<b>195.8</b>	<b>102.0</b>	<b>32.3</b>	<b>77.0</b>	<b>127.7</b>

hawk, Hooded Crow and Chaffinch. In peripheral gardens (KO, OŁ), these were also Hawfinch and Willow Tit (*Parus montanus*).

Tree Sparrow and Pheasant turned out to be characteristic species for wintering communities, which was reflected in their strong share in the dominance structure. Only in two other areas of the city (WL and WC), Tree Sparrow's density showed higher values.

Winter avifauna of garden allotments is not nearly as well studied as the breeding one (Górska, Górski, 1980; Luniak, 1980; Nowicki 1997, 2001; Nowakowski et al., 2004). In total, 34 species were found in the four gardens in Lublin (20–25 in individual areas). Only a slightly smaller number (31) was recorded in Olsztyn (Nowakowski et al. 2004). In 7 gardens in Warsaw, 22 species in total were found (Luniak, 1980), with their number varying from 6 to 12 depending on the plot. The winter avifauna of Lublin's gardens was therefore much richer. This is probably connected to a certain extent with the different method used (see Biaduń, 1994b). Nevertheless, censuses conducted in one of the garden allotments in Poznań (Górska, Górski, 1980) also showed a clearly smaller (14) number of species. Whereas Nowicki (2001) obtained comparable results (35 species) in downtown gardens in Warsaw, yet their total area (235 ha) was much larger. The avifauna of garden allotments in Lublin and Warsaw turned out to be identical (QS = 84 %).

Total density of the wintering community ranged from 70 to 137 ind./10 ha/census and was similar to the one recorded by Luniak (1980). It was smaller, however, than the one given by Górska and Górski (1980) for Poznań.

### Agricultural land, open grounds and wasteland

Quantitative research was conducted in 13 census plots of the total area of 224.1 ha (Fig. 2). Overall, in winter, 39 species were observed in the census plots. Nine more: Goshawk (*Accipiter gentilis*), Rough-legged Buzzard (*Buteo lagopus*), Crested Lark (*Galerida cristata*), White Wagtail (*Motacilla alba*), Twite (*Car-*

Table 9

Frequency of occurrence (o) and mean density (D – ind./10 ha/census visit) of some wintering species in different zones of Lublin

Частота встречаемости и средняя плотность некоторых зимующих видов в различных зонах Люблина

Species	Census plots localization					
	inner city (n = 14)		district part of inner city (n = 24)		outskirts (n = 11)	
	o	D	o	D	o	D
<i>Corvus frugilegus</i>	14	206.4	24	94.0	11	20.9
<i>Parus major</i>	14	28.1	24	14.3	11	17.5
<i>P. caeruleus</i>	14	8.6	24	2.8	10	2.4
<i>Corvus monedula</i>	14	28.8	24	22.0	9	8.0
<i>Passer domesticus</i>	13	110.3	21	20.5	6	8.9
<i>Streptopelia decaocto</i>	14	42.0	18	6.4	1	+
<i>Pica pica</i>	12	4.1	23	4.1	11	4.6
<i>Turdus merula</i>	11	2.7	11	0.7	6	0.5
<i>Accipiter nisus</i>	5	+	12	+	8	0.1
<i>Corvus corone</i>	3	+	11	0.4	6	0.8
<i>Phasianus colchicus</i>	1	+	8	0.5	9	1.8
<i>Perdix perdix</i>	–	–	9	1.5	9	0.8

*duelis flavirostris*), Common Redpoll (*C. flammea*), Snow Bunting (*Plectrophenax nivalis*), Corn Bunting (*Miliaria calandra*), and Reed Bunting (*Emberiza schoeniclus*) were observed in similar environments not covered by the quantitative research (Table 2). 9 (NJ) to 27 (WL) were registered in individual areas. The density was extremely varied. In peripheral areas, it amounted to a few individuals or several dozen and increased to over 100 ind./10 ha/census visit in some plots situated in the downtown zone (Fig. 2, Table 8).

11 species (2–6 in each census plot) occurred as dominants. Rook and Jackdaw were recorded among them 12 and 10 times, respectively. From the remaining species, only Fieldfare, Great Tit, Magpie, and Tree Sparrow occurred at least twice in this group. In all census plots, Blue Tit, Great Tit, Magpie, and Rook were observed. The characteristic species of most communities were Fieldfare, Tree Sparrow and Hawfinch. Sparrowhawk, Partridge, Pheasant, Starling, House Sparrow, and Chaffinch repeatedly marked their presence. At the same time, as many as 17 species were found only in one or two plots and at times these were single observation instances. It is

difficult to point to characteristic species for the open environments in winter, but one cannot avoid mentioning Fieldfare, which achieves its highest share (up to 33.1 %) in the dominance structure in this very environment.

The number of wintering species in the investigated environment was slightly lower than the one recorded for Warsaw (Luniak, 1996; Rowiński, 1997; Nowicki, 2001), but it was clearly higher than the one recorded in Lviv (25) (Bokotey 1998). In individual census plots (9–27, 16 on average), it was higher than the number recorded in similar environments both in Poznań (11–18, 13 on average) and in Warsaw (3–13, overall 20) (Górska, Górski; 1980; Luniak, 1981). At times, it was even higher than the number recorded in some of Lublin's cemeteries and garden allotments (Biaduń, 1994a, 1996b).

Up till now, quantitative research of the winter avifauna of open areas and city wasteland was conducted only in 2 cities: Warsaw and Poznań. It is difficult to generalize based on such limited data. It seems, however, that Lublin's avifauna compared to Warsaw's was quite rich (Lublin's area is over three times smaller).



The density (8–196 ind./10 ha/census) estimated for the investigated areas depended primarily on the plot's location. The highest values were registered for downtown plots and they mainly depended on the Rook's share. Similar regularities were observed in the research of wintering communities both in environments of similar character (Górska, Górski, 1980; Luniak, 1981) and in utterly different ones (Biaduń, 1994b, 1996b). At the same time, the registered densities were higher, apart from single cases, than those obtained by Tryjanowski (1995) for fields situated in agricultural landscape.

#### Water bodies

Lublin's municipal zone is not rich in water biotopes. Research has been conducted in the above-mentioned environments since as early as the 1970's. It mostly consisted in observations during which all species were registered and the numbers were determined only for water and marsh species. In winter 1990/1991 regular censuses of avifauna were conducted in the city's section of the Bystrzyca and the sugar plant's settling tanks.

Overall, 40 species were found including 20 typically waterfowl species (Table 2). Among the latter, Mallard and Black-headed Gull were the most numerous ones. They occurred both in Zemborzycki Artificial Lake and the Bystrzyca, as well as in the sugar plant's settling tanks. Mallard's numbers were sometimes estimated at a couple of hundred (the settling tanks, the Bystrzyca) or a couple of thousand (Zemborzycki). The highest number of wintering Black-headed Gulls did not exceed 150 (settling tanks) – 200 individuals (Zemborzycki). There were winters, though, when both species were not encountered in

Main part of wintering avifauna of Lublin  
(data from 38 census plots)

Основная часть зимней авифауны Люблина

Table 10

Species	Frequency	As dominant
<i>Corvus frugilegus</i>	38	37
<i>Parus major</i>	38	26
<i>Pica pica</i>	38	11
<i>Parus caeruleus</i>	37	3
<i>Corvus monedula</i>	36	21
<i>Passer montanus</i>	35	15
<i>Turdus pilaris</i>	33	7
<i>Passer domesticus</i>	31	11
<i>Coc. coccothraustes</i>	29	1
<i>Carduelis chloris</i>	29	
<i>Turdus merula</i>	25	
<i>Carduelis carduelis</i>	23	
<i>Streptopelia decaocto</i>	22	6
<i>Pyrrhula pyrrhula</i>	24	4
<i>Accipiter nisus</i>	24	
<i>Fringilla coelebs</i>	20	
<i>Corvus cornix</i>	20	
<i>Phasianus colchicus</i>	18	2
<i>Sturnus vulgaris</i>	18	
<i>Perdix perdix</i>	17	1
<i>Dendrocopos syriacus</i>	15	

those areas at all. Kingfisher (*Alcedo atthis*) proved to be the bird regularly wintering on the rivers. It was encountered both on the Bystrzyca (up to 4 indiv.) as well as the Czerniejówka. Recently, Little Grebe (*Tachibaptus ruficollis*) and Mute Swan (*Cygnus olor*) have been observed more and more often. Several times, Whooper Swan (*C. cygnus*), Red-crested Pochard (*Netta rufina*), Tufted Duck (*Aythya fuligula*), Coot (*Fulica atra*), Common Gull (*Larus canus*), and Herring Gull (*Larus argentatus*) were observed. Some other species were observed only exceptionally, including Cormorant (*Phalacrocorax carbo*), Shelduck (*Tadorna tadorna*), Wigeon (*Anas penelope*), Velvet Scoter (*Melanitta fusca*), and Goosander (*Mergus merganser*).

From among the remaining wintering species, Sparrowhawk, Fieldfare, Blue Tit, Great



Tit, Magpie, Jackdaw, Rook, House Sparrow, Tree Sparrow, or Goldfinch were common also in other wintering communities.

### General characteristics of Lublin's winter avifauna

**Species composition.** In the years 1973–2003, 88 species were found to occur in Lublin in the winter period (Table 2). Considerable part of the peripheral zone were forest complexes and Zemborzycki Artificial Lake. Many of the forest and water species observed there did not occur in the city zone.

Compared to other cities, the breeding avifauna of Lublin exhibits a certain richness. Apart from Warsaw (95 species occurring regularly), in all the compared cities fewer species were encountered in winter than in Lublin.

In winter, 75 species were found in the city zone. Rook, Great Tit and Magpie were registered in all areas investigated quantitatively. At the same time, Rook and Great Tit (in parks and cemeteries), Great Tit and Tree Sparrow (in garden allotments), House Sparrow (in housing estates) as well as Jackdaw, Fieldfare, and Tree Sparrow (in open areas) were decisive for the numbers of the communities (Table 3, 5, 7, 8, 9, 10). The group of the most numerous birds also included Collared Dove, Blue Tit, Greenfinch and Hawfinch. Less frequently encountered were Blackbird and Bullfinch, which is typical for winter. Sparrowhawk proved to be very frequent and it was observed in all environments not excluding the downtown. Hooded Crow, Pheasant and Partridge were also observed regularly, mainly in the peripheral areas (Table 9). The constant species for some plots were Chaffinch and Starling. Robin also exhibited a tendency for an increase of its wintering population numbers (Table 3, 5, 7, 8).

Great (*Dendrocopos major*) and Lesser (*D. minor*) Spotted Woodpecker, Short-toed Treecreeper and Yellowhammer (*Emberiza citrinella*) proved to be more numerous than in the breeding season. Some species were birds cha-

racteristic for Lublin's city area only in the winter period. These are, among others, Middle Spotted Woodpecker, Waxwing, Wren (*Troglodytes troglodytes*), Goldcrest, Coal Tit (*Parus ater*), Treecreeper and Siskin (Table 5). A dozen or so others are particularly rare in winter, not only in the city. These include Merlin (*Falco columbarius*), Dunnock (*Prunella modularis*), Song Thrush (*Turdus philomelos*), Redwing (*T. iliacus*), and Serin (*Serinus serinus*).

In winter, Lublin was a site of mass night roosting of a few species, mainly Corvidae. The Rook's numbers were estimated in some years at over 100,000. Jackdaw was less numerous and even more rare was Crow. These three species roosted together at nights. This phenomenon is characteristic for many Polish and European cities (Jadczyk, Jakubiec, 1995). Even greater congregations were registered in some cities in Silesia, e. g., in Wrocław and Opole (Jakubiec, Jadczyk, 2001). Within a couple of years, the number of birds wintering in Wrocław rose almost twofold (up to 350–400 thousand), whereas in the same period in Warsaw it dropped by half (Jadczyk, 1994; Jakubiec, Jadczyk, 2001; Luniak et al., 2001). The author's estimates come from the 1980's and the situation has not been recently verified. Magpie was also detected night-roosting usually in several places in the city. In December 1992, 998 birds were registered in one of those spots. Communities of Collared Dove, House Sparrow, Starling, and even Goldfinch (up to 300 individuals in PL) were found. One should also pay special attention to the winter communities of Long-eared Owl, found in two cemeteries in Lublin (Table 5).

The avifauna recorded in Jasło (Stój, Dyczkowski, 2002) is the most similar to Lublin's winter avifauna. But in comparisons with other cities, similarity or identity of species composition were also demonstrated.

**Avifauna numbers.** The density of wintering communities primarily depended, for any area, on the situation with respect to the city's centre, irrespective of the area's character. The highest mean value was recorded in



Litewski Square (PLL) – Lublin's central square (1348 ind./10 ha/census, 1710 in the winter of 1997/1998), and not much smaller (1085) – in the Bronowice Nowe (BN) housing estate. These are densities which clearly exceed all values given so far in the literature. A fairly high density of wintering individuals (330–620) was also found in a cemetery in Kalinowszczyzna (CK), as well as in the Konopnicka (OK) and Mickiewicz (OM) housing estates and in Bronowicki park (PB). At the same time, in areas far from the city centre, the density dropped and was often lower than 100 ind./10 ha/census. In most plots, Rook was definitely the most numerous (Tables 3–9).

**Changes composition and numbers.** Among the constant wintering species, there appeared Syrian Woodpecker and – in the city zone – Jay (*Garrulus glandarius*). The numbers of Mallard and Black-headed Gull clearly rose during the winter period. Also Mute Swan, Feral Pigeon, Blackbird, Robin, Starling, Magpie, Reed Bunting, Chaffinch and Hawfinch increased their numbers. On the other hand, the numbers of Little Owl (*Athene noctua*) and Crested Lark dropped drastically. The populations of the Yellowhammer, Corn Bunting and – probably – House Sparrow and Tree Sparrow also decreased. After reaching its peak numbers at the turn of the 1980/1990's, there came a huge drop in the population of Collared Dove. For many species, strong numerical fluctuations were observed in winter. These include, among others, Waxwing, Coal Tit, Brambling (*Fringilla montifringilla*), Siskin, Twite, Common Redpoll, and Snow Bunting.

**The avifauna of Lublin compared to the avifauna of other cities.** Lublin is a city of an average size, both as regards its area and the number of inhabitants. What makes it different from other cities of similar parameters is the lack of a big river and the scarcity of other water biotopes. The presence of two larger peripheral forest complexes also seems to be of little importance, as practically none of them is directly adjacent to typically urban areas. This greatly influences the state and the ten-

dencies in the changes of the avifauna of the city itself. In spite of this, when compared to other cities Lublin seems to be a city rich in avifauna.

Based on the conducted research, it was found that:

- the species composition of Lublin's wintering avifauna is identical or similar to the one inhabiting other cities;
- the image of winter avifauna was largely shaped by species coming from the North: Rook (decidedly a dominant), Jackdaw, Crow, Fieldfare and Bullfinch;
- more and more species and in greater numbers make attempts at wintering; this is true for, e. g., Little Grebe, Mute Swan, Mallard, Black-headed Gull, Robin, Starling, Chaffinch and Reed Bunting.

## REFERENCES

- Best L.B. (1975): Interpretational errors in the "mapping method" as a census technique. - Auk. 92: 452-460.
- Biaduń W. (1989): [The birds of cemetery at Lipowa St. at Lublin]. - Not. ornitol. 30: 37-45. (in Polish).
- Biaduń W. (1994a): The breeding avifauna of the parks and cemeteries of Lublin (SE Poland). - Acta Ornithol. 29: 1-13.
- Biaduń W. (1994b): Winter avifauna of urban parks and cemeteries in Lublin (SE Poland). - Acta Ornithol. 29: 15-27.
- Biaduń W. (1996a): [Breeding and wintering avifauna of the housing estates in Lublin]. - Not. ornitol. 37: 83-95. (in Polish).
- Biaduń W. (1996b): [Avifauna of the allotment gardens in Lublin]. - Not. ornitol. 37: 247-258. (in Polish).
- Biaduń W. (2001): [Breeding and wintering bird communities of open grounds and wasteland]. - Not. ornitol. 42: 177-192. (in Polish).
- Biaduń W. (2004): [The birds of Lublin]. AM Lublin. (in Polish).
- Bokotey A.A. (1998): Avifauna of Lvov – composition, distribution and changes. - Doctor thesis. Warszawa: Muzeum i Instytut Zoologii PAN.
- Creutz G. (1979–1980): Winterliche Ansammlung von Waldohreulen (*Asio otus*). - Abh. und Ber. Naturkundemus. Görlitz. 53: 27-29.
- Enemar A. (1959): On the determination of the size and composition of a passerine bird population during the breeding season. - Vår Fågelvärld. Suppl. 2: 1-114.
- Ferens B. (1957): [The birds of Cracow, their protection and restitution]. - Ochr. Przyr. 24: 272-336. (in Polish).
- Głowaciński Z. (1975): [Birds of the Niepołomice Forest





- (A faunistic-ecological study)]. - Acta Zool. Crac. 20: 1-87. (in Polish).
- Górska E., Górski W. (1980): [Birds wintering in Poznań]. - Acta Ornithol. 17: 271-296. (in Polish).
- Górski W. (1981): [Species composition, number and biomass of the bird community of town Słupsk and its surroundings in the different phenological periods of the year]. - Słupskie Prace Mat.-Przyr. Słupsk. 2: 199-235. (in Polish).
- Górski W. (1982): [The breeding birds of Słupsk and its suburban areas]. - Acta Zool. Crac. 26: 31-93. (in Polish).
- Górski W., Górska E. (1979): [Quantitative investigations on the breeding avifauna of Poznań and Koszalin in 1972]. - Acta Ornithol. 16: 513-533. (in Polish).
- Herzig L., König J. (1980): Beobachtungen an einer Waldohreulen (*Asio otus*) Geselligschaft im Fuldaer Stadtgebiet während der Wintermonate 1978/79 nebst Ergebnissen von Gewollanalysen. - Beitr. Naturk. Ost-hessen. 16: 127-132.
- Jadczyk P. (1994): Winter roosting of rooks *Corvus frugilegus* in Wrocław. - Acta Ornithol. 29: 39-47.
- Jadczyk P., Jakubiec Z. (1995): [Winter roosts of rooks *Corvus frugilegus* in Europa]. - Prz. Zool. 39: 297-312. (in Polish).
- Jakubiec Z., Bluj Cz. (1977): [Birds of allotments]. - Acta Ornithol. 16: 179-211. (in Polish).
- Jakubiec Z., Jadczyk P. (2001): [Winter aggregations of the Rook *Corvus frugilegus* in Silesia]. - Not. ornitol. 42: 257-268. (in Polish).
- Kavanagh R., Recher H.F. (1983): Effects of observer variability on the census of birds. - Corella. 7: 93-100.
- Luniak M. (1969): [International standard for the mapping method of bird censuses]. - Not. ornitol. 10 (4): 70-73. (in Polish).
- Luniak M. (1974): The birds of park biotopes in small towns of central-eastern Poland. - Acta Ornithol. 14: 56-94.
- Luniak M. (1977): [Studies on birds of Polish towns]. - Wiad. Ekol. 23: 399-406. (in Polish).
- Luniak M. (1980): Birds of allotment gardens in Warsaw. - Acta Ornithol. 17: 297-319.
- Luniak M. (1981): The birds of the park areas in Warsaw. - Acta Ornithol. 18: 335-374.
- Luniak M. (1983): The avifauna of urban green areas in Poland and possibilities of managing it. - Acta Ornithol. 19: 3-61.
- Luniak M. (1994): The development of bird communities in new housing estates in Warsaw. - Memorabilia Zool. 49: 257-267.
- Luniak M. (1996): Inventory of the avifauna of Warsaw – species composition, abundance, and habitat distribution. - Acta Ornithol. 31: 67-80.
- Luniak M., Głazewska E. (1987): [Birds of urban built up areas in Poland – a review of studies]. - Not. ornitol. 28: 3-15. (in Polish).
- Luniak M., Kalbarczyk W., Pawłowski W. (1964): [Birds of Warsaw]. - Acta Ornithol. 8: 175-285. (in Polish).
- Luniak M., Kozłowski P., Nowicki W., Plit J. (2001): [Birds of Warsaw 1962–2000]. Warszawa: PAN, IGiPZ. (in Polish).
- Morozow N.S. (1994): Inter-analyst variation in the combined version of the mapping method: the role of experience. - Acta Ornithol. 29: 89-99.
- Nowakowski J., Dulisz B., Górski A., Lewandowski K., Jankowski K. (2004): [Species composition and quantitative structure of bird communities wintering in Olsztyn city]. - Urban Fauna of Central Europe in the 21<sup>st</sup> Century. Bydgoszcz: Wyd. LOGO. 349-373. (in Polish).
- Nowicki W. (1992): [Changes in the breeding avifauna of the parks of Warsaw (1975–1985), and the use of nest-boxes to manage it]. - Acta Ornithol. 27: 65-92. (in Polish).
- Nowicki W. (1997): Skład, charakterystyka ekologiczna i zmiany awifauny w warunkach silnej urbanizacji – przykład śródmieścia Warszawy. - Praca doktorska. Warszawa: Muzeum i Inst. Zoologii PAN. Cz. I, II.
- Nowicki W. (2001): [Birds of inner Warsaw]. Warszawa: Muzeum i Instytut Zoologii PAN. (in Polish).
- Okulewicz J. (1971): [Birds of Olsztyn and its vicinity]. - Acta Ornithol. 13: 127-171. (in Polish).
- Przybyła S., Szarski K. (1957): [Protection and restitution of birds in Wrocław]. - Ochr. Przyr. 24: 360-381. (in Polish).
- Riabinin S. (1959): [Birds of Lublin in years 1951–1956]. - Ochr. Przyr. 26: 419-449. (in Polish).
- Riabinin S. (1973): [Changes in avifauna of Lublin in 1951–1969]. - Ann. UMCS. Sect. C. 28: 265-290. (in Polish).
- Riabinin S. (1986): [Lublin as an agglomeration of habitats of birds]. - Folia Soc. Sci. Lubl. Biol. 28: 55-64. (in Polish).
- Riabinin S., Olearnik M. (1985a): [From observations on bioecology of birds of Lublin during winter season]. - Ann. UMCS. 40: 133-143. (in Polish).
- Riabinin S., Olearnik M. (1985b): [Changes in Lublin avifauna in 1951–1983]. - Ann. UMCS. 40: 145-173. (in Polish).
- Rollfinke B.F., Yahner R.H. (1990): Effects of time of day and season on winter bird counts. - Condor. 92: 215-219.
- Rowiński P. (1997): [Avifauna of planned nature reserve Zakole Wawerskie in Warsaw]. - Kulon. 2: 177-194. (in Polish).
- Sokołowski J. (1957): [The protection and restitution of birds in the parks of Poznań]. - Ochr. Przyr. 24: 337-359. (in Polish).
- Stój M., Dyczkowski J. (2002): [The birds of Jasło – its numbers, distribution and protection]. - Bogucki Wydawnictwo Naukowe, Poznań. (in Polish).
- Stochłak J. (red.). (1993): Raport o stanie środowiska miasta Lublin. Lublin.
- Strawiński S. (1963): [The birds of the town of Toruń]. - Acta Ornithol. 7: 115-156. (in Polish).
- Svensson S. (1974): Interpersonal variation in species map evaluation in bird census work with the mapping method. - Acta Ornithol. 14: 322-338.
- Szarski K. (1955): [The birds of Wrocław in 1946–1952]. Acta Ornithol. 5: 1-49. (in Polish).





- Szczepanowski R. (1984): Zimowanie ptaków w parkach Warszawy (próba analizy). - Master thesis. Warszawa: Uniwersytet Warszawski.
- Tomiałojć L. (1970): [Quantitative studies on the synanthropic avifauna of Legnica and its environs]. - Acta Ornithol. 12: 293-392. (in Polish).
- Tomiałojć L. (1977): [Birds census work in Poland – a progress report]. - Prz. Zool. 21: 244-252. (in Polish).
- Tomiałojć L. (1980a): [The combined version of the mapping method]. - Not. ornitol. 21: 33-54. (in Polish).
- Tomiałojć L. (1980b): Podstawowe informacje o sposobie prowadzenia cenzusów z zastosowaniem kombinowanej metody kartograficznej. - Not. ornitol. 21: 55-61.
- Tomiałojć L., Profus P. (1977): Comparative analysis of breeding birds communities in two parks of Wrocław and in an adjacent *Quercus-Carpinetum* forest. - Acta Ornithol. 16: 117-177.
- Tryjanowski P. (1995): The composition and dynamics of a wintering bird community in an agricultural area of western Poland. - Acta Ornithol. 30: 153-160.

Замітки	Беркут	14	Вип. 1	2005	23
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## НОВОЕ МЕСТО ГНЕЗДОВАНИЯ РЕЛИКТОВОЙ ЧАЙКИ В КАЗАХСТАНЕ

**New breeding site of the Relict Gull in Kazakhstan. - G.V. Boyko. - Berkut. 14 (1). 2005.** - A colony with 20–30 nests was found in Pavlodar region near the village of Akku on an island among the small saline lake Aksor (51.27 N, 77.51 E) on 18.05.2005. Birds nested jointly with other gulls, terns and waders. Measurements of 9 eggs from 3 clutches: 56,3–64,0 x 41,8–44,1 mm, on average 59,5 x 43,0 mm. This colony is situated in 600 km to the northwest from the nearest known breeding site on the Alakol lake. It is the northernmost from found colonies. [Russian].

Поселение реликтовой чайки (*Larus relictus*) обнаружено весной 2005 г. во время экспедиции, основной целью которой было выявление мест гнездования тонкоклювого кроншнепа (*Numenius tenuirostris*) и сбор сведений по птицам Восточного Казахстана и прилегающих областей России.

При прохождении веломаршрута по Павлодарской области республики Казахстан 18.05 в восточных окрестностях п. Акку (бывшее Лебяжье) на соленом озере Аксор на маленьком плоском островке среди озера (около 30 x 40 м; 51° 27' с. ш., 77° 51' в. д.) была обнаружена гнездовая колония реликтовой чайки, по предварительной оценке насчитывающая 20–30 гнезд и состоящая из нескольких микроколоний. Птицы гнездились совместно с морским голуб-

ком (*Larus genei*, основная масса гнезд на острове), чайконосой крачкой (*Gelochelidon nilotica*), шилоклювкой (*Recurvirostra avosetta*), хохотуньей (*Larus cachinnans*, единичные пары) и сизой чайкой (*L. canus*, единичные пары). Гнезда реликтовой чайки содержали по 2–3 яйца, размеры яиц из трех кладок: (n = 9) 56,3–64,0 x 41,8–44,1 мм, в среднем 59,5 x 43,0 мм. Часть гнезд находилась в непосредственной близости от гнезд морского голубка. Кладки в гнездах были слабонасиженные и свежие. На близлежащем острове, расположенном на несколько сотен метров ближе к берегу, находилась колония чегравы (*Hydroprogne caspia*, более 100 гнезд) и хохотуньи (15–20 гнезд), также держалось несколько пар черноголового хохотуна (*Larus ichthyaetus*).

Данная колония реликтовой чайки расположена более чем на 600 км к северо-западу от известной ранее колонии на оз. Алаколь (Зубакин, 1988) и является самой северной из обнаруженных.

## ЛИТЕРАТУРА

Зубакин В.А. (1988): Реликтовая чайка. - Птицы СССР. Чайковые. М.: Наука. 69-76.

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