

## BIRD COMMUNITY OF OPEN HABITATS OF KOTLINA ORAWSKO-NOWOTARSKA VALLEY IN NON-BREEDING SEASON

Michał Ciach, Dominik Wikar, Małgorzata Bylicka

**Abstract.** During the 2002/03 – 2004/05 non-breeding seasons the bird species composition and density was analysed in the open habitats of Kotlina Orawsko-Nowotarska valley. Permanent transects having a total length of 31,5 km were controlled in the middle and at the end of each month from October to March. The results were analysed in four meteorological periods (autumn, early winter, winter and early spring) determined on the basis of multi-annual meteorological data. A total of 77 species was observed (from 36 to 56 during individual periods). Total mean density changed significantly and for individual periods were respectively: 152,7; 43,9; 58,6; 167,1 ind./10 km. Relatively distinct and constant was the group of dominant species, which includes Black Grouse, Common Buzzard, Fieldfare, Rook, Raven and Common Crossbill, and temporary Skylark, Jackdaw, Starling and Goldfinch as well. During individual periods the degree of domination underwent changes. The density of Black Grouse was 6,3–7,6 ind./10 km; Common Buzzard 3,9–7,1 ind./10 km; Fieldfare 1,5–59,4 ind./10 km; Rook 0,1–10,9 ind./10 km; Raven 4,7–7,5 ind./10 km and Common Crossbill 1,7–7,5 ind./10 km. High number of recorded species result from the rich structure of the environment which makes Kotlina Orawsko-Nowotarska valley similar to extensively developed river valleys but different from the typical farmlands of lowlands. Probably severe atmospheric conditions are responsible for the low total density of birds during the winter as well as the domination of birds with large bodies of which densities were significantly higher than in lowlands.

**Key words:** winter birds community, southern Poland, habitat.

**Address:** M. Ciach, Department of Forest Zoology and Wildlife Management, Agricultural University of Kraków, Faculty of Forestry, al. 29 Listopada 46, 31–425 Kraków, Poland; e-mail: mciach@ar.krakow.pl.

**Население птиц открытых биотопов Оравско-Новотарской котловины в негнездовой период.** - М. Цях, Д. Викар, М. Былицка. - Беркут. 15 (1-2). 2006. - Исследования видового состава и плотности населения проводились в 2002/03 – 2004/05 гг. Учеты велись на постоянных маршрутах общей протяженностью 31,5 км в середине и конце каждого месяца с октября по март. Результаты анализировались по четырем метеорологическим периодам (осень, начало зимы, зима и начало весны), выделенным по многолетним метеоданным. Всего было отмечено 77 видов (от 36 до 56 за отдельные периоды). Средняя плотность населения достоверно изменялась, для отдельных периодов она составила соответственно: 152,7; 43,9; 58,6; 167,1 ос./10 км. Относительно четкой и постоянной была группа доминирующих видов: тетерев, канюк, рябинник, грач, ворон, клест-еловик и временами полевой жаворонок, галка, скворец и шегол. В отдельные периоды степень доминирования изменялась. Плотность населения тетерева составляла 6,3–7,6 ос./10 км, канюка – 3,9–7,1 ос./10 км, рябинника – 1,5–59,4 ос./10 км, грача – 0,1–10,9 ос./10 км, ворона – 4,7–7,5 ос./10 км, клеста-еловика – 1,7–7,5 ос./10 км. Большое количество зарегистрированных видов объясняется богатой структурой среды в котловине. В этом отношении она близка к интенсивно используемым долинам рек, но отличается от типичного агроландшафта на равнине. Низкая плотность населения птиц зимой возможно связана с суровыми атмосферными условиями.

### Introduction

The mortality during the winter has a significant influence on the population density of breeding birds as well as on their breeding success (Nilsson, 1987; Desrochers et al., 1988; Kostrzewa, Kostrzewa, 1991). Furthermore it is important to know the structure and dynamics of non-breeding bird communities as well as the migration and wintering of par-

ticular species. This type of research in farmland areas has been done in various countries (Yahner, 1981; Tucker, 1992), as well as in Poland (Pinowski, 1954; Foksowicz, Sokołowski, 1956; Witkowski, 1964; Wiatr, 1975; Górski, 1976; Kujawa, 1995; Jędrzejewski, 2000; Dombrowski, 2001; Kasprzykowski, Goławski, 2003; Dombrowski, 2004). However research has not been done in mountainous terrain and in foothills. The paper of Kunysz



(1995) which was done in the open terrain of the Pogórze Przemyskie foothills dealt exclusively with birds of prey. Walasz (2000) includes information about birds in south-eastern Poland during three winter months – however his atlas data are too generalized to do detailed density analysis.

The aim of this paper was to determine the quality and quantity of bird community during non-breeding seasons in climatic and orographic conditions of mountain valley, as well as to determine their intra-seasonal changes.

### Study area

Kotlina Orawsko-Nowotarska is an extensive homogeneous landscape valley. Within Poland it has a surface area of approximately 370 km<sup>2</sup>. The valley's floor is about 500–600 m a. s. l., bordering with the Beskidy Zachodnie mountain ranges, which exceed 1000 m a. s. l. (Kondracki, 1998). The terrain is located in a moderately warm climatic zone. However the local climate of the valley is noted for being continental and differs from neighbouring mountain chains. The mean temperature of the warmest month (July) is 15,6°C, and for the coldest month (January) it is –6,0°C, with a mean annual temperature of 5,3°C. Due to the orography of the terrain, thermal inversion, when temperatures fall to –35°C, occurs frequently. The first snow usually falls at the beginning of second decade of October and the last usually falls during the first decade of May. There is a lasting snow cover for a mean of 83 days from December 26 to March 18. There are prevailing west and north-eastern winds (Konček, 1974).

Within the valley a geobotanical sub-district has been identified, known as Bory Nowotarskie forests, which has an unusual pine-spruce forest described as *Calamagrostio villosae Pinetum*, as well as an extensive high peat bogs overgrown with Mountain Pine (*Pinus mugo*) and *Pinus x rhaetica* (Pawłowski, 1977). The largest high peat bog complex within the Polish Carpathians, having a total surface area of 1100 ha, is located in the

Kotlina Orawsko-Nowotarska. It is made up of fifteen fragments, of which the largest – Puścizna Wielka – is covering 500 ha (Denisiuk, Pioterek, 1990). In spite of many attempts to protect this region, only “Bór na Czerwonym” peat bog reserve (covering 50 ha) is actually protected. The remaining peat bogs, although included within the Nature 2000 UE program and recognized as a Birds Important Area of European importance (Sidło et al., 2004), have been destroyed by individual and industrial peat mining.

Most of the open terrain is farmed extensively and divided into small plots. Meadows, pastures, unused land and to a small extent arable land covered 5–10 m wide and several hundred meters long belts.

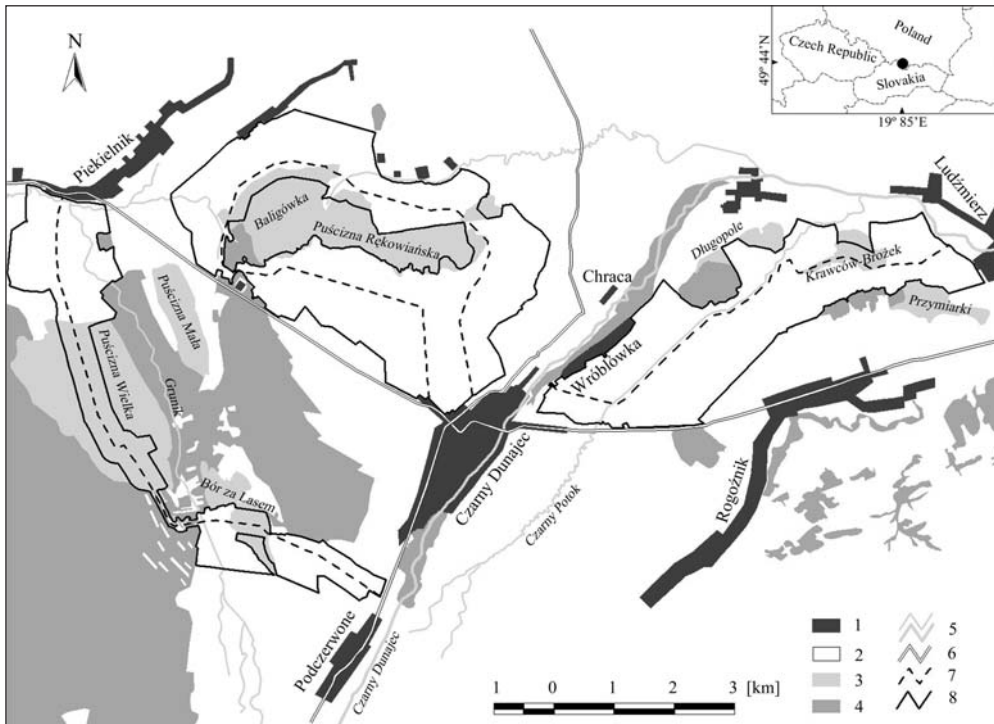
All these kinds of biotopes create a varied mosaic of open terrain crossed with streams, drainage ditches, afforestations and communication routes.

Observations were conducted on permanent transects with a total length of 31,5 km located on open areas between Czarny Dunajec (49° 44'N; 19° 85'E), Piekienik (49° 47'N; 19° 76'E) and Ludźmierz (49° 46'N; 19° 97'E) (Fig.).

Transect I – “Torfownia” – 9,8 km total length, located between Podczerwone and Piekienik villages, where about 70 % of the surface area is a mosaic of hayed meadows and unused land, while the rest is afforestations, fragments of poorly developed forests and peat bogs. The largest is “Puścizna Wielka”, which has been partially devastated by industrial peat mining.

Transect II – “Baligówka” – 13,7 km total length, located north-west of Czarny Dunajec includes farmlands, surrounded by the “Baligówka” and “Puścizna Rękowiańska” peat bog complexes. The area is equally covered by hayed or used for grazing meadows or unused lands. A small percent is arable. There is much afforestation.

Transect III – “Ludźmierz” – 8,0 km long, located between Wróblówka and Ludźmierz villages. Approximately 70 % of the area is hayed or grazed. The remaining part is cov-



The location of transects in the Kotlina Orawsko-Nowotarska valley.

1 – buildings, 2 – open terrain, 3 – high peat bogs, 4 – forest, 5 – rivers and streams, 6 – main roads, 7 – transects, 8 – border belt on which birds were counted.

Размещение маршрутов в Оравско-Новотарской котловине.

ered by afforestations and “Krawców – Brożek” peat bog. The percent of arable and unused land is small.

### Methods

Research was carried out during the 2002/03 – 2004/05 seasons from October to March (during the first season from the end of November). Controls were conducted regularly on the marked transects in the middle and at the end of each month. The width of the belt on which birds were counted was marked by a characteristic objects such as a clump of trees, afforestations, single trees, power lines, communication routes, buildings and the orography of the terrain. It ranged from 200 to 1000 m on each side of the transect. Larger birds within eyesight were counted across the entire

breadth of the belt. These included birds of the order *Galloanserae*, *Pelecaniformes*, *Ciconiiformes*, *Falconiformes* and the families *Corvidae* and *Laridae*, as well as Great Grey Shrike (*Lanius excubitor*) and Lapwing (*Vanellus vanellus*). However, smaller birds and those more difficult to detect were counted within a distance of 200–300 m. These included birds of the orders *Charadriiformes* (apart from Lapwing and *Laridae*), *Columbiformes*, *Strigiformes*, *Piciformes*, *Passeriformes* (apart from *Corvidae* and Great Grey Shrike). Bird density of both groups was calculated on 10 km of transect. All of the transects were controlled the same day. The persons observing moved on foot (with speed of 2–3 km/h) surveyed the terrain carefully with binoculars, recorded the information on a form and marked it on a map with a scale of 1:30000.

Table 1

Characteristic differences in meteorological periods according to Konček (1974) and the numbers of controls

Характеристика различий метеорологических периодов и количество учетов

Period	Autumn	Early winter	Winter	Early spring
Dates	25.09–22.11	23.11–25.12	26.12–18.03	19.03–12.04
Number of days	59	33	83	24
Temperature [°C]	10 – 0	< 0	< 0	0 – 5
Extended snow cover	none	none	26.12–18.03	none
Number of controls	7	6	17	4

The length of transects and the width of belts where birds were counted were established by using GPS and an orthophotomap with a 1:5000 scale.

Controls were classified into four meteorological periods (Table 1.) divided on the basis of dates determining thermal seasons as well as the dates of appearance and disappearance of lasting snow cover (Konček, 1974). To compare the results with other papers the mean density for early winter and winter was used.

Some observations made apart from transects or regular control and research seasons were also used. They are clearly indicated in the text.

## Results

A total of 77 bird species were recorded (Table 2.). The numbers of species seen in the autumn and early spring were similar and were 68,8 % and 72,7 % of the total numbers of recorded species respectively. During the early winter and winter the numbers of recorded species were lower and were 46,7 % and 63,6 %, respectively, of the total number of recorded species.

During the autumn Fieldfare (*Turdus pilaris*) definitely dominated. Next to them there was a relatively narrow group of subdominants which included Black Grouse (*Tetrao tetrix*), Common Buzzard (*Buteo buteo*), Raven (*Corvus corax*), Goldfinch (*Carduelis carduelis*) and Yellowhammer (*Emberiza citrinella*),

which made up a total of 23,5 % of the bird community. The percent of the remaining bird species rarely exceed 3 %. During the early winter Black Grouse, Common Buzzard, Raven and Common Crossbill (*Loxia curvirostra*) definitely dominated and made up a total of 57,5 % of the bird community. The remaining species rarely exceed 3–4 %. These same four species also decidedly dominated in the winter when their total was 42,5 % of the bird community. The dominant group was complemented by Fieldfare, Rook (*Corvus frugilegus*) and Jackdaw (*C. monedula*), making up 70,4 % of the community together. The remaining species rarely exceed 2–3 %. During early spring Skylark (*Alauda arvensis*), Fieldfare and Starling (*Sturnus vulgaris*) clearly dominated, making up 46,5 % of the community.

There was a high density of Black Grouse in the researched area. In spite of changes of its percent of domination during individual periods its density was relatively stable and was within a range of 6,3–7,6 ind./ 10 km, with a mean in early winter and winter of 7,4 ind./ 10 km. There was a high density of Common Buzzard: 3,9–7,1 ind./ 10 km with a mean in early winter and winter of 4,9 ind./ 10 km. There was a wide range of density for Fieldfare from 59,4 ind./ 10 km in autumn, to 1,5 ind./ 10 km during early winter. The density of the Raven during individual periods was 4,7–7,5 ind./ 10 km, with a mean in early winter and winter of 6,1 ind./ 10 km. The density



Table 2

Bird community in non-breeding season in the open habitats of Kotlina Orawsko-Nowotarska valley during 2002/03–2004/05 seasons

Население птиц в негнездовой период открытых биотопов Оравско-Новотарской котловины в сезоны 2002/03–2004/05 гг.

Species	Autumn			Early winter			Winter			Early spring		
	N	%	D	N	%	D	N	%	D	N	%	D
1	2	3	4	5	6	7	8	9	10	11	12	13
<i>Anas crecca</i>	1	+	+				1	+	+			
<i>A. platyrhynchos</i>	38	1,1	1,7	2	0,2	+	20	0,6	0,4	11	0,5	0,9
<i>Tetrao tetrix</i>	144	4,3	6,5	<b>137</b>	<b>16,5</b>	<b>7,2</b>	<b>408</b>	<b>13,0</b>	<b>7,6</b>	79	3,8	6,3
<i>Perdix perdix</i>				5	0,6	0,3	8	0,3	0,1	2	0,1	0,2
<i>Phasianus colchicus</i>							1	+	+			
<i>Phalacrocorax carbo</i>							33	1,1	0,6			
<i>Ardea cinerea</i>	11	0,3	0,5	6	0,7	0,3	16	0,5	0,3	2	0,1	0,2
<i>Ciconia ciconia</i>										20	1,0	1,6
<i>C. nigra</i>										1	+	0,1
<i>Haliaeetus albicilla</i>							1	+	+			
<i>Circus cyaneus</i>	9	0,3	0,4	3	0,4	0,2	4	0,1	0,1	5	0,2	0,4
<i>Circus sp.</i>	2	0,1	0,1	1	0,1	0,1	1	+	+	2	0,1	0,2
<i>Accipiter gentilis</i>	2	0,1	0,1	1	0,1	0,1	4	0,1	0,1	2	0,1	0,2
<i>A. nisus</i>	10	0,3	0,5	1	0,1	0,1	1	+	+	2	0,1	0,2
<i>Buteo buteo</i>	157	4,7	7,1	<b>110</b>	<b>13,3</b>	<b>5,8</b>	<b>211</b>	<b>6,7</b>	<b>3,9</b>	59	2,8	4,7
<i>B. lagopus</i>	1	+	+	3	0,4	0,2	25	0,8	0,5	4	0,2	0,3
<i>Buteo sp.</i>	8	0,2	0,4				5	0,2	0,1			
<i>Aquila chrysaetos</i>							3	0,1	0,1			
<i>Falco tinnunculus</i>	15	0,4	0,7	2	0,2	0,1	3	0,1	0,1	9	0,4	0,7
<i>Vanellus vanellus</i>	4	0,1	0,2							75	3,6	6,0
<i>Gallinago gallinago</i>	11	0,3	0,5							15	0,7	1,2
<i>Tringa ochropus</i>				2	0,2	0,1	7	0,2	0,1			
<i>Scolopax rusticola</i>	1	+	+									
<i>Larus canus</i>										1	+	0,1
<i>L. ridibundus</i>										11	0,5	0,9
<i>Columba palumbus</i>	2	0,1	0,1							6	0,3	0,5
<i>Asio otus</i>				1	0,1	0,1						
<i>A. flammeus</i>				1	0,1	0,1	1	+	+			
<i>Asio sp.</i>										1	+	0,1
<i>Picus viridis</i>							1	+	+			
<i>Dryocopus martius</i>							1	+	+	1	+	0,1
<i>Dendrocopos major</i>	11	0,3	0,5	9	1,1	0,5	36	1,2	0,7	3	0,1	0,2
<i>D. minor</i>							1	+	+			
<i>Dendrocopos sp.</i>							2	0,1	+			
<i>Alauda arvensis</i>	8	0,2	0,4							<b>242</b>	<b>11,5</b>	<b>19,2</b>
<i>Hirundo rustica</i>	2	0,1	0,1									
<i>Anthus trivialis</i>										5	0,2	0,4

Continuation of the Table 2

1	2	3	4	5	6	7	8	9	10	11	12	13
<i>A. pratensis</i>	89	2,6	4,0							65	3,1	5,2
<i>Anthus sp.</i>										1	+	0,1
<i>Motacilla alba</i>	3	0,1	0,1							10	0,5	0,8
<i>Bombycilla garrulus</i>				17	2,1	0,9	12	0,4	0,2			
<i>Troglodytes troglodytes</i>	3	0,1	0,1	1	0,1	0,1						
<i>Erithacus rubecula</i>										8	0,4	0,6
<i>Phoenicurus ochruros</i>	12	0,4	0,5							12	0,6	1,0
<i>Oenanthe oenanthe</i>										4	0,2	0,3
<i>Saxicola torquata</i>										5	0,2	0,4
<i>Turdus iliacus</i>										8	0,4	0,6
<i>T. merula</i>	1	+	+				1	+	+	8	0,4	0,6
<i>T. pilaris</i>	<b>1309</b>	<b>38,9</b>	<b>59,4</b>	28	3,4	1,5	<b>275</b>	<b>8,8</b>	<b>5,1</b>	<b>297</b>	<b>14,1</b>	<b>23,6</b>
<i>T. philomelos</i>										35	1,7	2,8
<i>T. viscivorus</i>	2	0,1	0,1							7	0,3	0,6
<i>Phylloscopus collybita</i>	2	0,1	0,1							5	0,2	0,4
<i>Regulus regulus</i>	25	0,7	1,1	19	2,3	1,0	37	1,2	0,7	3	0,1	0,2
<i>Aegithalos caudatus</i>	6	0,2	0,3	17	2,1	0,9	13	0,4	0,2	3	0,1	0,2
<i>Parus palustris</i>	2	0,1	0,1				5	0,2	0,1			
<i>P. montanus</i>	28	0,8	1,3	9	1,1	0,5	29	0,9	0,5	7	0,3	0,6
<i>P. cristatus</i>	3	0,1	0,1	3	0,4	0,2	14	0,4	0,3	2	0,1	0,2
<i>P. ater</i>	15	0,4	0,7	13	1,6	0,7	67	2,1	1,3	2	0,1	0,2
<i>P. caeruleus</i>	57	1,7	2,6	31	3,7	1,6	28	0,9	0,5	1	+	0,1
<i>P. major</i>	35	1,0	1,6	32	3,9	1,7	14	0,4	0,3	25	1,2	2,0
<i>Sitta europaea</i>							1	+	+			
<i>Certhia sp.</i>	1	+	+				3	0,1	0,1			
<i>Lanius excubitor</i>	41	1,2	1,9	16	1,9	0,8	61	1,9	1,1	31	1,5	2,5
<i>Garrulus glandarius</i>	42	1,2	1,9	9	1,1	0,5	19	0,6	0,4	2	0,1	0,2
<i>Pica pica</i>	30	0,9	1,4	41	4,9	2,2	98	3,1	1,8	10	0,5	0,8
<i>Corvus monedula</i>	37	1,1	1,7	36	4,3	1,9	<b>197</b>	<b>6,3</b>	<b>3,7</b>	61	2,9	4,8
<i>C. frugilegus</i>	46	1,4	2,1	1	0,1	0,1	<b>401</b>	<b>12,8</b>	<b>7,5</b>	<b>137</b>	<b>6,5</b>	<b>10,9</b>
<i>C. cornix</i>	54	1,6	2,4	6	0,7	0,3	68	2,2	1,3	32	1,5	2,5
<i>C. corax</i>	151	4,5	6,8	<b>88</b>	<b>10,6</b>	<b>4,7</b>	<b>402</b>	<b>12,8</b>	<b>7,5</b>	79	3,8	6,3
<i>Corvus sp.</i>							94	3,0	1,8	80	3,8	6,3
<i>Sturnus vulgaris</i>	100	3,0	4,5				4	0,1	0,1	<b>439</b>	<b>20,9</b>	<b>34,8</b>
<i>Fringilla coelebs</i>	106	3,1	4,8							83	3,9	6,6
<i>F. montifringilla</i>	2	0,1	0,1							3	0,1	0,2
<i>Serinus serinus</i>	18	0,5	0,8									
<i>Carduelis chloris</i>	115	3,4	5,2	1	0,1	0,1				3	0,1	0,2
<i>C. carduelis</i>	<b>174</b>	<b>5,2</b>	<b>7,9</b>	7	0,8	0,4	69	2,2	1,3	21	1,0	1,7
<i>C. spinus</i>	122	3,6	5,5				43	1,4	0,8			
<i>C. cannabina</i>	40	1,2	1,8							3	0,1	0,2
<i>Loxia curvirostra</i>	42	1,2	1,9	<b>142</b>	<b>17,1</b>	<b>7,5</b>	<b>314</b>	<b>10,0</b>	<b>5,9</b>	22	1,0	1,7
<i>Pyrrhula pyrrhula</i>	42	1,2	1,9	17	2,1	0,9	56	1,8	1,0			
<i>Plectrophenax nivalis</i>							1	+	+			



End of the Table 2

1	2	3	4	5	6	7	8	9	10	11	12	13
<i>Emberiza citrinella</i>	162	4,8	7,3	11	1,3	0,6	17	0,5	0,3	30	1,4	2,4
<i>E. schoeniclus</i>	12	0,4	0,5				1	+	+	3	0,1	0,2
Total number of ind.	3366	100	152,7	829	100	43,9	3138	100	58,6	2105	100	167,1
Number of controls		7			6			17			4	
Total number of species		53			36			49			56	

Symbols: N – number of individuals, % – dominance, D – mean density (ind./ 10 km/ control), + – value less than 0,1. Bold shows species with greater than 5 % domination in a given meteorological period.

of Common Crossbill was within a range of 1,7–7,5 ind./ 10 km, with an early winter and winter mean of 6,7 ind./ 10 km.

### Review of the selected species

**Teal (*Anas crecca*).** Single females were recorded twice: 01.02.2003 on the Czarny Potok stream in the vicinity of the Wróblówka village as well as 24.10.2004 on the “Puścizna Wielka” peat bog.

**Black Grouse (*Tetrao tetrix*).** Observed a total of 135 times. The biggest flock of males – 32 ind. – was recorded on 17.01.2004 in the vicinity of the Czarny Dunajec town. The biggest flock of females – 13 ind. – was recorded on 15.03.2003 on the northern edge of the “Baligówka” peat bog. The largest mixed flock of 25 ind. was recorded on 14.12.2002 on the northern edge of the “Puścizna Rękowiańska” peat bog and 19.12.2003 north of the Czarny Dunajec town.

**Grey Partridge (*Perdix perdix*).** Six records: 06.12.2003 – 5 ind. in the Ludźmierz town, 04.01.2004 – 8 ind. in the vicinity of the Wróblówka village, 11.02.2004 – 10 ind. in the Rogoźnik village, 01.04.2004 – 2 ind. in the vicinity of the Podczerwone village, 04.03.2005 – a flock of 5 and 13 ind. amidst the buildings of the Czarny Dunajec town, as well as 19.03.2005 – 7 ind. in the vicinity of the Chraca village.

**Pheasant (*Phasianus colchicus*).** A single

male was recorded on 17.01.2004 in the vicinity of the Grunik stream.

**Cormorant (*Phalacrocorax carbo*).** A passing flock of 33 birds was observed on 15.03.2003.

**Black Stork (*Ciconia nigra*).** A single bird was recorded on 28.03.2003 soaring over the “Baligówka” peat bog and in the same day a bird was recorded in the vicinity of the “Bór za Lasem” peat bog but not during the transect control.

**White-tailed Eagle (*Haliaeetus albicilla*).** Single birds were recorded on 11.11.2002 in the vicinity of the “Bór za Lasem” peat bog as well as 01.02.2005 in the vicinity of the “Długopole” peat bog.

**Hen Harrier (*Circus cyaneus*).** During the 2002/2003 and 2004/2005 birds were recorded 11 and 9 times, respectively, but during the 2003/2004 season was recorded only once. They do not winter in the Kotlina Orawsko-Nowotarska valley area. The latest autumnal date that they were seen was 30.11.2002 and the earliest spring date was 15.03.2003.

**Rough-legged Buzzard (*Buteo lagopus*).** During the 2002/2003 and 2004/2005 seasons they were recorded 22 and 9 times, respectively. They were not seen during the 2003/04 season. The largest flock of 3 ind. was seen 01.02.2003. The earliest record was made 11.11.2002 – 3 ind. birds. The latest single bird was seen 03.04.2005.

**Golden Eagle (*Aquila chrysaetos*).** Single



birds were recorded on 16.02.2003 in the vicinity of the “Długopole” peat bog, 05.12.2004 in the vicinity of the “Puścizna Mała” peat bog as well as 12.02.2005 – 2 ind. in the vicinity of the “Puścizna Rękowiańska” and the “Przymiarki” peat bogs. Furthermore one single bird was seen 20.12.2000 apart from research seasons in the vicinity of the “Bór za Lasem” peat bog.

**Kestrel (*Falco tinnunculus*).** Wintering. Single birds were recorded on 14.12.2002 in the vicinity of the “Krawców-Brożek” peat bog, 01.02.2003 near the Piekelnik village, 16.02.2003 in the vicinity of the “Baligówka” peat bog, 19.12.2003 near the Wróblówka village as well as 15.01.2005 male in the vicinity of the “Puścizna Rękowiańska” peat bog.

**Green Sandpiper (*Tringa ochropus*).** Wintering. Single birds were recorded between 14.12.2002 – 02.03.2003 and 19.12.2003 – 28.02.2004 on the Czarny Potok stream near the “Długopole” peat bog.

**Long-eared Owl (*Asio otus*).** A single bird was recorded on 14.12.2002 on the “Puścizna Wielka” peat bog. Furthermore, a bird was heard 27.03.2003, but not during a transect control, in a neighbour of a peat precessing plant.

**Short-eared Owl (*A. flammeus*).** Single birds were recorded on 30.11.2002 in the eastern part of the “Puścizna Rękowiańska” peat bog and 15.03.2003 on the “Puścizna Wielka” peat bog. Furthermore, on 24.11.2002 3 ind. on the “Puścizna Wielka” peat bog as well as 2 ind. on the eastern edge of the “Puścizna Rękowiańska” peat bog, as well as a single individual on 31.01.2003 between the “Baligówka” and the “Puścizna Rękowiańska” peat bogs were recorded, but apart from the transect controls. Also recorded, but apart from research seasons, were one bird on the western part of the “Bór za Lasem” peat bog – 20.03.1999 (D. Nowak, T. Skrzydłowski, pers. com.), 2 ind. on the “Bór na Czerwonem” peat bog on 27.10.2001 (M. Rachel, pers. com.) and 1 ind. on the “Baligówka” peat bog on 14.04.2002.

**Waxwing (*Bombycilla garrulus*).** In the 2004/2005 season it was recorded twice: 18.12.2004 – 17 ind. on the eastern part of the

“Bór za Lasem” peat bog and 01.02.2005 – 12 ind. on the southern part of the “Baligówka” peat bog.

**Wheatear (*Oenanthe oenanthe*).** Early records were made on 28.03.2003 – 1 ind. on the northern part of the “Puścizna Rękowiańska” peat bog and 03.04.2005 – 2 ind. in the Czarny Dunajec town and 1 ind. on the north-western part of the “Puścizna Rękowiańska” peat bog.

**Redwing (*Turdus iliacus*).** A flock of 8 ind. was recorded on 03.04.2005 in the northern part of the “Krawców-Brożek” peat bog. Not during line transect control a single bird was observed on 19.03.2005 near the village of Chraca.

**Mistle Thrush (*T. viscivorus*).** On 01.04.2004 four birds were recorded in the eastern part of the “Bór za Lasem” peat bog and one bird in the vicinity of a heading of a strip mine on the “Puścizna Wielka” peat bog, as well as 07.11.2004 – 2 ind. in the eastern part of the “Długopole” peat bog and 19.03.2005 – one bird in the southern part of the “Baligówka” peat bog and one bird in the eastern part of the “Bór za Lasem” peat bog.

**Brambling (*Fringilla montifringilla*).** Three and two individuals were recorded respectively on 28.03.2003 and 15.10.2004 in the southern part of the “Puścizna Rękowiańska” peat bog.

**Common Crossbill (*Loxia curvirostra*).** Observed a total of 93 times. The largest flocks were recorded in the vicinity of the “Puścizna Wielka” peat bog: 01.02.2005 – 62 ind., 12.02.2005 – 50 ind. and 05.12.2004 – 42 ind.

**Snow Bunting (*Plectrophenax nivalis*).** A single male was recorded on 04.03.2005 in the vicinity of the Czarny Potok stream, near the village of Wróblówka.

## Discussion

The numbers of species recorded in the autumn and early spring in the Kotlina Orawsko-Nowotarska valley were both high. The drop in numbers of species in the early winter and winter is probably due to the severe atmospheric conditions. The somewhat larger num-





Table 3

A comparison of mean densities of selected bird species during the winter in various regions of Poland

Сравнение средних плотностей населения некоторых видов птиц зимой в различных регионах Польши

Species	Central-east Poland river valleys (Jędrzejewski, 2000) [ind./10 km/ season]	Wysoczyzna Siedlecka – farmlands (Dombrowski, 2001) [ind./10 km/ control]	Kraina Gór Święto- krzyskich highland – river valley (Wilniewiczyc, Polak 2002) [ind./10 km/ control]	Kotlina Orawsko- Nowotarska valley – open habitats [ind./10 km/ control]
<i>Tetrao tetrax</i>	–	–	–	7,4
<i>Buteo buteo</i>	1,3	0,6	2,7	4,9
<i>Turdus pilaris</i>	15,4	–	17,1	3,3
<i>Parus major</i>	11,5	–	19,8	1,0
<i>Lanius excubitor</i>	0,2	1,1	0,9	1,0
<i>Corvus corax</i>	1,1	0,6	0,7	6,1
<i>Carduelis carduelis</i>	5,4	0,2	2,4	0,8
<i>Carduelis spinus</i>	38,2	–	447,0	0,4
<i>Carduelis cannabina</i>	0,7	42,2	21,0	–
<i>Loxia curvirostra</i>	–	–	–	6,7
<i>Pyrrhula pyrrhula</i>	6,1	–	12,1	0,9
<i>Emberiza citrinella</i>	11,4	42,0	29,8	0,4
Total	91,3	86,7	553,5	32,8
Total length of transects [km]	619,0*	64,5	14,0	31,5
Number of seasons	10	1	1	3

\* – the mean length from ten research seasons.

ber of species seen in the winter is related to the appearance of species trophically associated with tree trunks or feeding on pine seeds. The availability of seed makes the terrain suitable in winter for Woodpeckers and Nuthatches.

Number of wintering species in the entire Kotlina Orawsko-Nowotarska valley recorded by Walasz (2000) was underestimated. That author mentioned a total of 49 species in all kinds of biotopes, while in this research during early winter and winter on transects which included only open habitats 52 species were recorded.

In winter in the farmlands of Wysoczyzna Siedlecka a total of 18 bird species was recorded (Dombrowski, 2001; Kasprzykowski, Goławski, 2003). Definitely larger number of bird species was observed in the mosaic of farmland (Kujawa, 2000; Dombrowski, 2004). In Wielkopolska the number of recorded species was more than two times higher, and the richest in terms of species composition was found in afforested areas (Kujawa, 1995). They were an insignificant percent of the research area, but 80 % of the recorded species were concentrated there (Tryjanowski, 1995). The structure of lowland farmlands causes the num-



ber of wintering species to be relatively low. Extensively farmed areas in river valleys are significantly richer with respect to species diversity. In Kraina Gór Świętokrzyskich highlands during one winter season 49 bird species were recorded (Wilniewicz, Polak, 2002). In river valleys in central-eastern Poland a mean of 51 land bird species was recorded (Jędrzejewski, 2000). Richness of afforestations and highly varied biotopes structure of the Kotlina Orawsko-Nowotarska valley cause species composition, as in river valleys, is definitely richer than in lowland farmlands.

The species composition in the Kotlina Orawsko-Nowotarska and in lowland farmlands differs significantly. Species forming the main wintering bird group in the farmlands in Wielkopolska and Wysoczyzna Siedlecka – Yellowhammer, Linnet (*Carduelis cannabina*), Tree Sparrow (*Passer montanus*) and Corn Bunting (*Miliaria calandra*) (Tryjanowski, 1995; Dombrowski, 2001; Kasprzykowski, Goławski, 2003) – were not seen at all or their presence were not significant in the researched area. Also presence of Siskin (*Carduelis spinus*), the dominant species in river valleys, was not significant (Jędrzejewski, 2000; Wilniewicz, Polak, 2002). Only the percent of Fieldfare in the Kotlina Orawsko-Nowotarska valley bird community was similar to results from other parts of the country (Kujawa, 1995, Jędrzejewski, 2000; Kasprzykowski, Goławski, 2003). Black Grouse and Common Crossbill were characteristic of the Kotlina Orawsko-Nowotarska valley but were not found in other regions of Poland.

The total density of birds in the Kotlina Orawsko-Nowotarska was significantly lower than in other parts of the country (Jędrzejewski, 2000; Dombrowski, 2001; Wilniewicz, Polak, 2002). However, the density of Common Buzzard and Raven was definitely higher. A relatively high density of Black Grouse and Common Crossbill was also found (Table 3.). These were the dominating species during early winter and winter, when an increase in the numbers of the Common Crossbill was particularly visible. It can be assumed that this

results from the appropriate biotype and food base. There is also a strong local population of Black Grouse (Kamieniarczyk, 2002).

The differences in the species composition and density between the Kotlina Orawsko-Nowotarska valley and lowland farmlands probably result from the severe climate of the valley. The long lasting snow coverage limits the accessibility of food and definitely influences the numbers of birds (Witkowski, 1964; Górski, 1976). Low temperatures negatively influence the energy balance. Small birds are especially susceptible (Cawthorne, Marchant, 1980). Their mortality can reach as high as 100 % during very cold winters (Hilden, 1982). Larger sized birds are less susceptible to severe atmospheric conditions (Kostrzewa, Kostrzewa, 1991; Kamieniarczyk, 2002), which means that their percent of bird community in the Kotlina Orawsko-Nowotarska valley is significant.

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Замітки	Беркут	15	Вип. 1-2	2006	65
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## НАБЛЮДЕНИЕ ЖУРАВЛЕЙ-АНТИГОН К СЕВЕРО-ВОСТОКУ ОТ ДЕЛИ

A record of Sarus Cranes to the North-east from Delhi. - G.V. Boyko. - *Berkut*. 15 (1-2). 2006. - 3 cranes were observed in a grass moor between cities Deoband and Muzaffarnagar (Uttar Pradesh, India) on 5.04.2006. [Russian].

5.04.2006 г. мною были отмечены три особи журавлей-антигон (*Grus antigone*) на

травянистой болотистой местности близ железной дороги между городами Деобанд (Deoband) и Музаффарнагар (Muzaffarnagar), ближе к последнему (Индия, штат Уттар-Прадеш).



Г.В. Бойко

а/я 54,  
г. Екатеринбург, 620137,  
Россия (Russia).