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COMPARISON OF BIRD FAUNA OF THE VOLGA AND THE VISTULA RIVERS DURING AUTUMN MIGRATION

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Abstract. Counts of birds migrating within the main river stream were conducted along 104 km of the lower Volga river in the period 3–10.08.2002 and along 98 km of the middle Vistula river in on 2–4.08.2003. Along the Volga 12 209 waterbirds from 53 species were encountered. The most numerously represented ecological groups were birds hunting from flight, and considering food preferences – ichthyophags. Along the Vistula 5539 individuals from 39 species were recorded, domination of grassland birds and entomophags was stated.

Key words: Volga river, Vistula river, migration, fauna, ecological groups.

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Сравнение фауны птиц Волги и Вислы во время осенней миграции. - А. Голавский, З. Каспрыковский. - Беркут. 13 (1). 2004. - Учеты птиц, мигрирующих по основному руслу рек, проводились на участке в 104 км на нижней Волге 3–10.08.2002 г. и 98 км – на средней Висле 2–4.08.2003 г. На Волге учтено 12 209 околоводных птиц 53 видов. Наибольшую долю составляли птицы, охотящиеся с полета, по питанию – ихтиофаги. На Висле учтено 5539 птиц 39 видов. Преобладали луговые птицы и энтомофаги. Различия между реками объясняются в основном их географическим расположением и величиной.

Introduction

The middle Vistula valley and the mouth section of the Volga including its delta are counted among areas of international importance considering big numbers migratory species of waterbirds they hold (Heath, Evans, 2000). The aim of the study was to compare the species composition and numbers of waterbirds that migrate along main stream of both rivers during the initial part of the autumn season of passage.

Study areas and methods

Observations of the autumn passage of waterbirds along the Volga were conducted in the lower section of the river along 104 km of its main stream below Volgograd, between the villages Solodniki (45° 16′ E, 48° 25′ N) and Solenoye Zaymishche (46° 09′ E, 47° 56′ N). In this fragment the river valley has a natural character and reaches the width from 10.6 km to 28.4 km. The river crosses steppe and semi-desert zones (Butorin, 1978), and its main stream has the width 0.4–2.2 km. In the southern part, distinguished by Butorin (1978), the Volga reaches the mean water flow of 7740 m^3/s (range – 4680–11600 m^3/s), controlled by water discharge from dam reservoirs situated over Volgograd.

The compared fragment of the Vistula river (98 km) belongs to its middle section and is situated between the towns of Pulawy (21° 57′ E, 51° 25′ N) and Gora Kalwaria (21° 14′ E, 50° 59′ N). Along this section the river has also preserved its natural character and the interference in the riverbed has been limited only to creation of several groins. The valley has the width of 2.2–7.3 km, and its main stream – of 0.2–0.9 km. The water flow reaches ca 1200 m^3/s (Kot et al., 1987), so that it is over six-fold smaller in comparison with that of the Volga. Despite differences in size and geographical location along the described fragments both rivers are very similar with respect to the character of habitats. The main similar feature is a large number of islands at different stages of development: from sandy to strongly overgrown sandbars. Moreover, both rivers have a longitudinal course.

The controls on the Volga were done in the

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Table 1

Characteristics of bird communities on Volga and Vistula rivers: DN – density (ind./10 km), D – domination (%), Mean – the mean size of flocks, Max. flock – the size of a maximal flock; + – domination below 0,1%.
Характеристика населения птиц на Волге и Висле: DN – плотность (ос./10 км), D – участие (%), Mean – средняя величина стай, Max. flock – максимальная величина стай; + – участие меньше 0,1%.

Species	Volga river (104 km)				Vistula river (98 km)			
	DN (ind./10 km)	D (%)	Mean	Max. flock	DN (ind./10 km)	D (%)	Mean	Max. flock
1	2	3	4	5	6	7	8	9
Podiceps cristatus	0,7	0,1	3,5	6	–	–	–	–
P. nigricollis	1,3	0,1	7,0	11	–	–	–	–
Phalacrocorax carbo	208,5	17,8	65,7	1400	0,2	+	2,0	2
Ciconia nigra	–	–	–	–	2,4	0,4	1,4	4
C. ciconia	–	–	–	–	0,5	0,1	1,7	3
Ixobrychus minutus	0,1	+	1,0	1	–	–	–	–
Nycticorax nycticorax	0,3	+	3,0	3	–	–	–	–
Egretta garzetta	1,0	0,1	5,0	8	0,2	+	2,0	2
E. alba	3,0	0,3	4,4	11	–	–	–	–
Ardea cinerea	8,1	0,7	4,4	40	29,3	5,2	3,9	21
Cygnus olor	1,1	0,1	11,0	11	–	–	–	–
Anser anser	4,9	0,4	51,0	51	–	–	–	–
Tadorna ferruginea	5,0	0,4	52,0	52	–	–	–	–
Anas platyrhynchos	3,3	0,3	4,9	19	51,1	9,0	20,0	130
A. crecca	–	–	–	–	1,5	0,3	2,5	7
A. querquedula	4,7	0,4	12,3	19	0,8	0,1	8,0	8
A. clypeata	–	–	–	–	0,1	+	1,0	1
Mergus merganser	–	–	–	–	7,1	1,3	5,8	12
Bucephala clangula	0,5	+	2,5	4	–	–	–	–
Milvus migrans	0,4	+	1,3	2	–	–	–	–
Circus aeruginosus	0,1	+	1,0	1	0,5	0,1	1,3	2
Haliaeetus albicilla	4,4	0,4	1,4	4	–	–	–	–
Haematopus ostralegus	4,3	0,4	2,5	7	–	–	–	–
Burhinus oedicnemus	0,1	+	1,0	1	–	–	–	–
Himantopus himantopus	0,1	+	1,0	1	–	–	–	–
Charadrius dubius	8,1	0,7	1,9	10	5,6	1,0	1,9	8
Ch. hiaticula	1,0	0,1	2,0	6	6,2	1,1	1,7	6
Pluvialis squatarola	0,1	+	1,0	1	–	–	–	–
P. apricaria	–	–	–	–	0,1	+	1,0	1
Vanellus vanellus	17,8	1,5	9,7	100	199,8	35,3	16,9	373
Calidris alba	0,1	+	1,0	1	0,1	+	1,0	1
C. ferruginea	1,7	0,1	3,6	9	0,3	0,1	1,5	2
C. alpina	0,5	+	5,0	5	0,7	0,1	1,8	3
C. minuta	2,0	0,2	7,0	16	0,3	0,1	1,5	2

End of the Table 1

1	2	3	4	5	6	7	8	9
C. temminckii	1,3	0,1	1,8	3	2,7	0,5	2,4	6
Limicola falcinellus	0,1	+	1,0	1	–	–	–	–
Philomachus pugnax	30,1	2,6	39,1	300	4,4	0,8	3,3	16
Numenius arquata	–	–	–	–	0,2	+	1,0	1
Limosa limosa	2,5	0,2	13,0	19	0,2	+	1,0	1
Tringa totanus	0,9	0,1	1,5	4	1,0	0,2	1,4	2
T. erythropus	–	–	–	–	0,3	0,1	1,5	2
T. nebularia	8,1	0,7	2,5	12	14,0	2,5	2,4	17
T. glareola	0,3	+	1,5	2	27,8	4,9	3,8	22
T. ochropus	0,8	0,1	1,3	3	1,7	0,3	1,4	6
T. stagnatilis	0,5	+	1,3	2	–	–	–	–
Actitis hypoleucos	16,5	1,4	1,6	9	50,9	9,0	3,4	18
Xenus cinereus	4,4	0,4	1,7	4	–	–	–	–
Gallinago gallinago	1,1	0,1	3,7	5	0,6	0,1	1,5	3
Larus minutus	0,2	+	1,0	1	–	–	–	–
L. ridibundus	91,7	7,8	9,1	220	28,4	5,0	5,5	74
L. melanocephalus	–	–	–	–	0,1	+	1,0	1
L. canus	0,3	+	1,0	1	5,4	1,0	2,9	9
L. ichthyaetus	9,0	0,8	4,1	18	–	–	–	–
L. cachinnans	43,4	3,7	9,6	180	23,0	4,1	4,0	26
Gelochelidon nilotica	6,4	0,5	11,2	30	–	–	–	–
Sterna hirundo	402,6	34,3	29,7	230	63,6	11,2	7,3	55
S. albifrons	25,4	2,2	3,2	50	25,2	4,5	5,0	25
S. caspia	0,9	0,1	1,8	2	–	–	–	–
Chlidonias niger	9,8	0,8	12,8	40	8,5	1,5	5,9	25
Ch. leucopterus	232,8	19,8	42,5	570	–	–	–	–
Ch. hybridus	1,8	0,2	2,4	5	0,1	+	1,0	1
Alcedo atthis	0,1	+	1,0	1	0,2	+	1,0	1
Total	1173,9	100	–	–	565,2	100	–	–

period 3–10.08.2002 and on the Vistula on 2–4.08.2003. We canoed along the main stream, approaching places where birds gathered. Counts were done from a canoe with a binocular 10 x 42. All waterbirds were noted keeping the division into flocks and single individuals. In order to avoid noting startled individuals twice, their movements were focused as precisely as it was possible. In this way, comparable results were obtained for both rivers.

Stated species were qualified to trophic and morpho-ecological groups according to the division of Jakubiec (1978). To calculate the similarity of species composition between the rivers there was used index

$$QS = (2W/(A + B)) \times 100\%,$$

(W – the number of common species; A – the number of species in the community A; B – the number of species in the community B). In order to determine the index of similarity of densities, index

$$PZ = (2C/(A + B)) \times 100\%$$

(C – the sum of minimal values of densities of common species; A – the density of the community A; B – the density of the community B) was used after Wesołowski (1975).

Table 2

Indices of similarity of species composition (QS) between the described rivers
Индексы сходства видового состава между описываемыми реками

QS	Vistula	Ili	Dnestr
Volga 45°16′E, 48°25′N	65,2	**72,0**	59,7
Vistula 21°57′E, 51°25′N		58,1	66,7
Ili 76°41′E, 44°19′N			**47,9**
Dnestr 25°16′E, 48°19′N			

Table 3

Indices of similarity of densities (PZ) between rivers.
Индексы сходства плотности населения между реками

PZ	Vistula	Ili	Dnestr
Volga 45°16′E, 48°25′N	**25,4**	9,9	**9,3**
Vistula 21°57′E, 51°25′N		19,3	17,7
Ili 76°41′E, 44°19′N			23,4
Dnestr 25°16′E, 48°19′N			

Results

Along the Volga 12 209 individuals from 53 species of waterbirds were recorded, and along the Vistula 5539 birds from 39 species were encountered (Table 1). Among the total number of 62 species recorded on both rivers, 23 species were encountered only on the Volga, 9 – only on the Vistula and 30 were common for both rivers (QS = 65.2 % – Table 2). The most numerous species along the Volga were: Great Cormorant (*Phalacrocorax carbo*), Black-headed Gull (*Larus ridibundus*), Common Tern (*Sterna hirundo*) and White-winged Tern (*Chlidonias leucopterus*). Dominant species recorded on the Vistula were as follows: Mallard (*Anas platyrhynchos*), Lapwing (*Vanellus vanellus*) and Common Tern. Species that differed the rivers occurred in low numbers except for: Greylag Goose (*Anser anser*), Ruddy Duck (*Tadorna ferruginea*), Goosander (*Mergus merganser*), Great Black-headed Gull (*Larus ichthyaetus*), Gull-billed Tern (*Gelochelidon nilotica*) and White-winged Tern, for which at least 50 individuals were observed. Among species stated along both rivers the greatest differences in densities were recorded for: Cormorant, Mallard, Lapwing, Ruff (*Philomachus pugnax*), Wood Sandpiper (*Tringa glareola*) and Common Gull (*Larus canus*), and the index of similarity of densities (PZ) reached only 25.4 % (Table 3). Additionally, differences in the size of flocks of common species were distinct and large discrepancies occurred for: Great Cormorant, Mallard, Ruff, Yellow-legged Gull (*Larus cachinnans*) and Common Tern (Table 1).

The most numerously represented ecological group on the Volga were birds hunting from flight, while along the Vistula river – grassland birds. Swimmers were represented in remarkable percentages on both rivers, while percentages of semi-aquatic birds and birds of reed and bush were marginal (Fig. 1, G-test, $G = 66.2$, $df = 4$, $p < 0.001$). Considering food preferences in the Volga river ichthyophags were most abundant thanks to high numbers of the Common Tern. In contrast, in the Vistula river entomophags predominated due to the high percentage of the Lapwing (G-test, $G = 31.1$, $df = 5$, $p < 0.001$). Differences laid also in the percentage of phytophags, while poliphags, zoophags and predators occurred in similar percentages on both rivers (Fig. 2).

Discussion

Both the higher number of recorded species and the two-fold higher densities of birds on the Volga than on the Vistula result mainly from differences in geographical location of both rivers and their size. In addition, the fact that the Volga crosses the zone of steppes and semi-desert, being often the only foraging

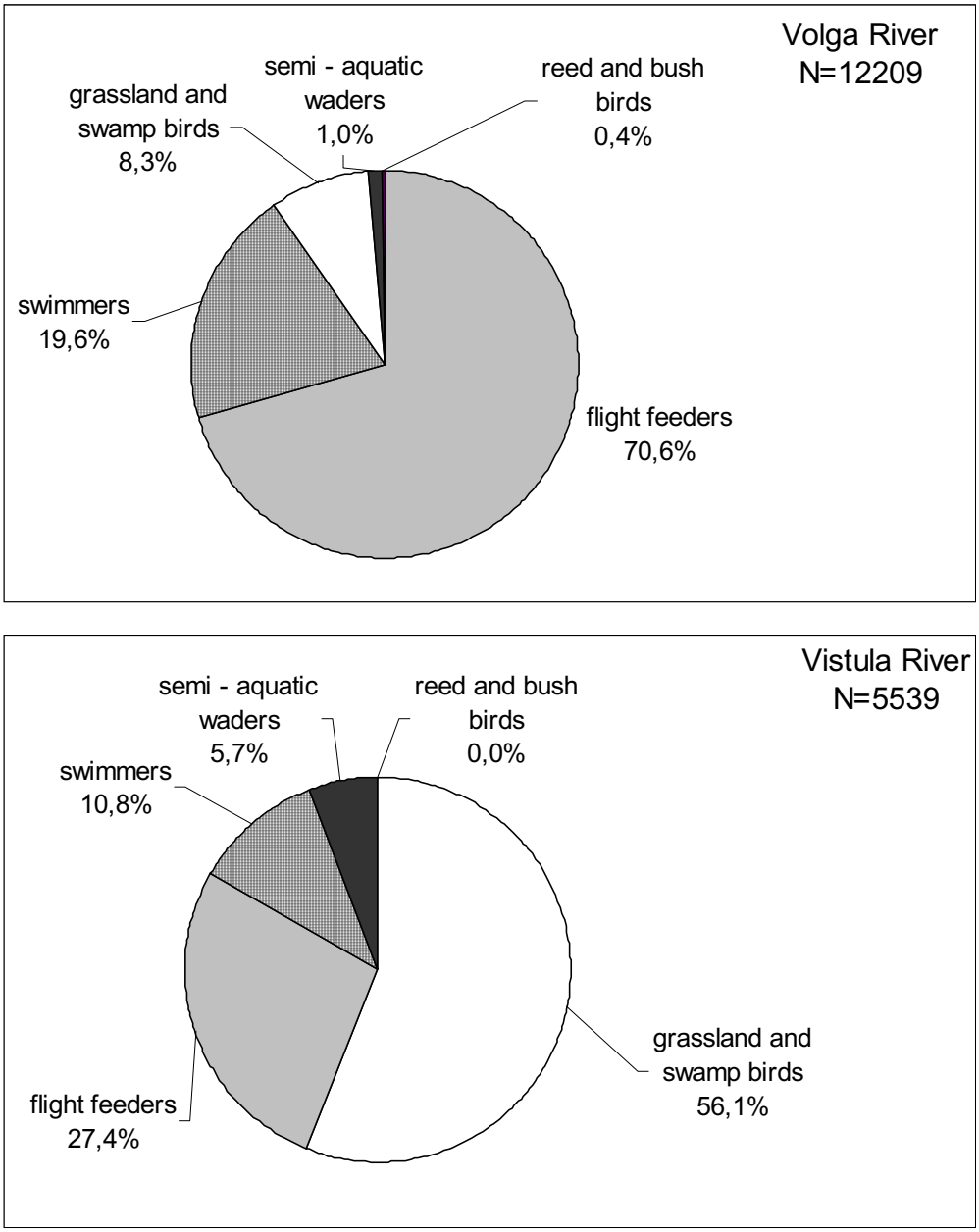
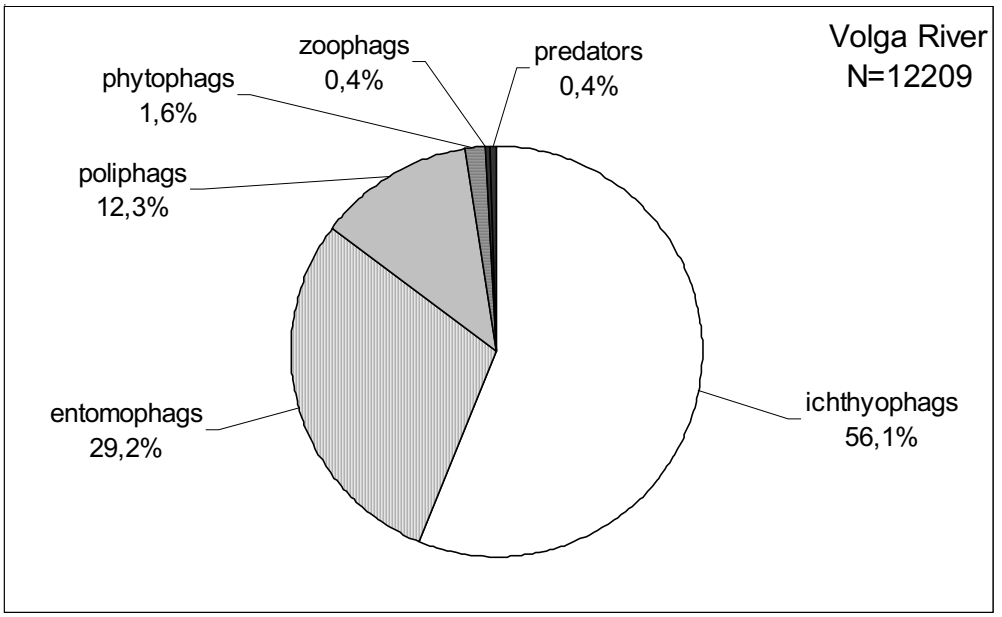


Fig. 1. Percentage of ecological groups on the Volga and the Vistula rivers.
Рис. 1. Соотношение экологических групп на Волге и Висле.

place in a region, could influence these differences remarkably. In contrast, in central Poland except for the Vistula river valley several smaller rivers and complexes of fishponds are located, where birds can stopover during migration. Both rivers, unregulated along the studied sections, provided suitable foraging places for birds, but their diversity and num-



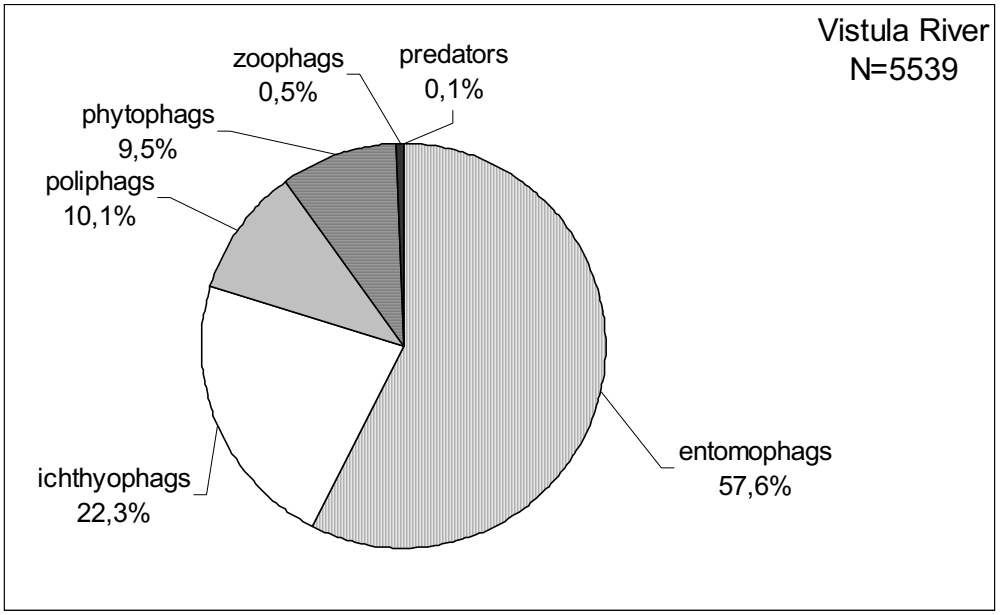


Fig. 2. Percentage of trophic groups on the Volga and the Vistula rivers.
Рис. 2. Соотношение трофических групп на Волге и Висле.

ber were much greater along the Volga, mainly due to high variation of the water flow. The predominance of ichthyophags along the Volga could result from its abundance in fish, as in its lower course as much as 58 species have been recorded (Butorin, 1978). Common Terns hunting on fish in flocks of even 230 birds and high numbers of Great Cormorants were ob-

served there during the present study, which was not encountered along the Vistula.

The species composition and densities of bird along the Volga and the Vistula were compared with these parameters calculated for the rivers Ili in Kazakhstan (Dmoch, Goławski, 1999) and Dnestr in Ukraine (Goławski, Szynkarczyk, 2000), where data were collected in a close period using a similar method. The similarity index of species composition (QS) between the studied rivers was in general related with their geographical location (Table 2) – the gradient of width of rivers was as follows: Volga – Vistula – Ili – Dnestr. Despite the Ili being smaller river than the Vistula, its species composition was more similar to the closer located Volga than to the Vistula. The index of similarity of densities (PZ) showed a distinct dependence on the size (width) of rivers and in all cases it showed low similarity between these 4 rivers (Table 3).

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