

## THE BREEDING BIRD SPECIES FROM THE MIDDLE HYDROGRAPHICAL BASIN OF THE ARGEŞ RIVER (ROMANIA) AND THEIR PROTECTION STATUS

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**Abstract.** The author made ornithological observations during 2003 - 2010 in the middle basin of the river Argeş, and observed 122 breeding species that are included in 13 orders, 38 families and 83 genera. 96 of them are certainly breeding species and 26 are probably breeding species. The results of the researches were cumulated with the data from the Atlas of the Romanian breeding species. By reference to the Atlas data, it is noticeable that 95 of the 106 breeding species cited in the Atlas were again recorded. 27 new breeding species were identified. Regarding the occupied habitat, most of the breeding species (72%) live in the terrestrial habitat. The summer visitor species and the sedentary species are preponderant; they are followed by the partially migrant species. 22 breeding species are listed in Annex I of the Birds Directive.

**Keywords:** bird species, breeding, Argeş River, Romania

### INTRODUCTION

The Argeş River is the most important running water from the Argeş County. A series of artificial lakes was built on its course. These are, from upstream to downstream: Vidraru, Oieşti, Cerbureni, Zigoneni, Vâlcele, Budeasa, Bascov, Piteşti, Goleşti [1]. Besides their important hydroenergetic role, these artificial lakes have had a significant impact on the landscape, influencing the composition and also the spatial and temporal dynamics of the bird species in the area [6, 7, 9, 10, 11, 15, 16]. The avifauna is relatively diversified. The birds find here optimal living conditions during the whole year. These basins represent important areas of wintering, feeding and breeding for many bird species. They also constitute important landmarks for the migrant birds. The middle course of the Argeş River is the continuation of the Rucăr – Bran Corridor, a well-known crossing flyway for the migrant birds in the Southern Carpathians Mountains [17].

Data concerning the Romanian biodiversity are still missing at European level [13, 22]. As far as the avifauna is concerned, in order to fill the gaps in the deficient data, efforts have been made in recent years for the more accurate knowledge of biodiversity [9, 18, 19] and for the adoption of effective measures to protect it [18, 21, 22].

The lakes are part of the “Lacurile de acumulare de pe Argeş” (ROSPA0062), a site included in the Important Bird Areas Program and in the Nature 2000 Network.

The Important Bird Areas Program is a worldwide effort to identify the most important areas in order to maintain the wild bird populations and to focus on the conservation activities to protect these areas. The Nature 2000 Network, the European Union's main instrument for nature conservation, is a network of natural or semi-natural areas where both vulnerable plant and animal species and natural habitats should be protected [21, 22].

### MATERIALS AND METHODS

The observations were made during 2003 – 2010 in the middle hydrographical basin of the Argeş River on

the artificial lakes: Vâlcele (408 ha), Budeasa (412 ha), Bascov (162 ha), Piteşti (122 ha), Goleşti (649 ha), (Fig. 1).

The Argeş River is 344 km long the surface of its hydrographical basin measures 12.550 square km. In the Argeş County it is 140 km long. Its general flow direction is NW – SE. Together with its tributaries, it drains the most part of the southern versant of the Făgăraş Mountains, the Sub-Carpathian Hills, the eastern side of the Getic Piedmont and most of the Romanian Plain. Thus it meets on its way most of the natural landscapes of our country.

The site is placed in the hill area, which is covered mainly with leaf forests, orchards and agricultural crops. Its vegetation is characteristic to the water zones; it is represented by species of the genera: *Ceratophyllum*, *Myriophyllum*, *Carex*, *Juncus*, *Phragmites*, *Typha*, *Salix*, *Alnus*, *Populus*, *Rosa*, *Rubus*, etc. The main habitat is represented by the aquatic habitat (the surface of the water and the permanent flooded rush-bed). The amphibious habitat is represented by the temporary flooded rush-bed, the edge of the forest and the pastures temporary flooded. The terrestrial habitat is represented by the arborescent, subarborescent vegetation and the agricultural crops. The fauna is rich. The vertebrates, besides the bird species, are represented by fish (*Esox lucius*, *Abramis brama*, *Cyprinus carpio*, *Perca fluviatilis*, *Leuciscus cephalus*, *Chondrostoma nasus*), amphibians (*Hyla arborea*, *Bombina variegata*, *Bombina bombina*, *Rana ridibunda*, *Rana esculenta*, *Salamandra salamandra*), reptiles (*Emys orbicularis*, *Natrix natrix*, *Natrix tessellata*, *Lacerta viris*, *Anguis fragilis*) and mammals (*Neomys fodiens*, *Apodemus agrarius*, *Arvicola terrestris*, *Lutra lutra*, *Ondatra zibethica*, etc.) [1].

From the physical and chemical point of view, it is first-class water and the climate is temperate-continental [1].

The ecological study was conducted between 2003 and 2010. We used the itinerary and the fixed point observation methods, too [2, 8, 12]. We walked on the banks of every basin in order to observe the avifauna of the entire water surface and of the neighbourhoods. Two field observations were conducted every month, mainly in the morning and in the evening. For

identification, we utilized 10 x 50 binoculars, terrestrial scope 10 x 45 and field guides [3, 22, 23, 24].

**RESULTS**

During the research, on the artificial lakes situated in the middle hydrographical basin of the Argeș River, we recorded 122 breeding bird species, which

belong to 13 orders, 38 families and 83 genera (Table 1). 96 of them are certainly breeding species and 26 are probably breeding species. The results of the researches were cumulated with the data from the Atlas of the breeding species of Romania, published by the Romanian Ornithological Society in 2002 (for the square KX2 of 50x50 km<sup>2</sup>, by the U.T.M. system) [3, 20].

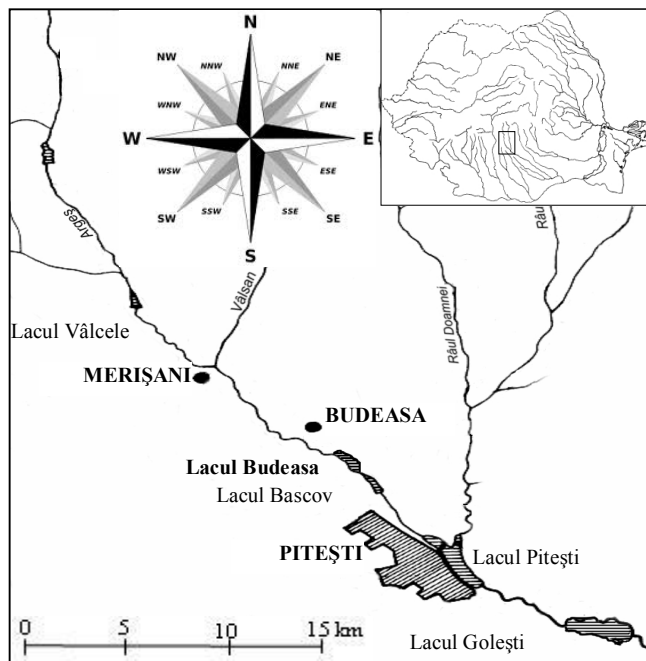


Figure 1. The upper and middle hydrographical basin of the Argeș River.

Table 1. List of breeding birds identified in the studied area.

No.	Species	The Atlas of the breeding birds of Romania	Personal research	The minimum and the maximum of the estimated number (pairs)	Habitat	Phenological category	Relative frequency during the breeding	Birds Directive
0	1	2	3	4	5	6	7	8
1.	<i>Tachybaptus ruficollis</i>	CB	CB	120-200	Aq	SV, SW	RR	-
2.	<i>Podiceps cristatus</i>	CB	CB	70-90	Aq	SV, SW	RR	-
3.	<i>Podiceps nigricollis</i>	-	PB	4-6	Aq	PM	VR	-
4.	<i>Ixobrychus minutus</i>	PB	CB	60-80	Am	SV	C	AI
5.	<i>Nycticorax nycticorax</i>	-	CB	15-30	Aq	SV	RC	AI
6.	<i>Ardea cinerea</i>	-	PB	1-2	Aq	SV, SW	RC	-
7.	<i>Ardea purpurea</i>	-	PB	0-2	Aq	SV	VR	AI
8.	<i>Botaurus stellaris</i>	-	PB	0-2	Am	SV, SW	VR	AI
9.	<i>Ardeola ralloides</i>	-	PB	2-4	Aq	SV	VR	AI
10.	<i>Ciconia ciconia</i>	CB	CB	2	T	SV	RR	AI
11.	<i>Cygnus olor</i>	-	CB	2-4	Aq	PM	C	AII2
12.	<i>Anas platyrhynchos</i>	CB	CB	150-280	Aq	PM, WV	C	AII1, AIII1
13.	<i>Anas crecca</i>	-	CB	5-10	Aq	P, WV, SV	C	AII1, AIII2
14.	<i>Anas querquedula</i>	PB	PB	10-18	Aq	SV, P	RC	AII1
15.	<i>Aythya fuligula</i>	-	PB	0-2	Aq	WV, SV	RC	AII1, AIII2
16.	<i>Aythya ferina</i>	PB	CB	120-200	Aq	PM	C	AII1, AIII2
17.	<i>Aythya nyroca</i>	-	PB	0-1	Aq	SV, SW	VR	AI
18.	<i>Accipiter gentilis</i>	PB	PB	0-2	T	R	R	-
19.	<i>Accipiter nisus</i>	-	PB	0-2	T	R, WV	R	-
20.	<i>Accipiter brevipes</i>	PB	-	-	-	-	-	-
21.	<i>Circus aeruginosus</i>	-	CB	3-6	T	SV, SW	RR	AI
22.	<i>Buteo buteo</i>	CB	CB	1-2	T	PM	C	-

0	1	2	3	4	5	6	7	8
23.	<i>Falco tinnunculus</i>	PB	CB	4-8	T	PM	RC	-
24.	<i>Falco vespertinus</i>	PB	-	-	-	-	-	-
25.	<i>Falco subbuteo</i>	-	CB	1-3	T	SV	RC	-
26.	<i>Perdix perdix</i>	CB	CB	15-30	T	R	RR	AII1, AIII1
27.	<i>Coturnix coturnix</i>	PB	CB	20-30	T	SV	C	AII2
28.	<i>Phasianus colchicus</i>	CB	CB	30-50	T	R	C	AII1, AIII1
29.	<i>Rallus aquaticus</i>	PB	CB	30-50	Am	PM	RC	AII2
30.	<i>Crex crex</i>	PB	PB	2-3	T	SV	VR	AI
31.	<i>Gallinula chloropus</i>	CB	CB	50-100	Am	SV	C	AII2
32.	<i>Fulica atra</i>	CB	CB	150-250	Aq	PM	C	AII1, AIII2
33.	<i>Charadrius dubius</i>	CB	CB	15-20	Am	SV	RC	-
34.	<i>Vanellus vanellus</i>	PB	CB	20-30	Am	SV	C	AII2
35.	<i>Chroicocephalus ridibundus</i>	-	PB	10-14	Aq	PM	C	AII2
36.	<i>Sterna hirundo</i>	-	CB	7-10	Aq	SV	C	AI
37.	<i>Chlidonias hybridus</i>	-	CB	7-14	Aq	SV	C	AI
38.	<i>Columba palumbus</i>	CB	CB	6-12	T	SV, SW	R	AIII1
39.	<i>Columba oenas</i>	CB	-	-	-	-	-	-
40.	<i>Streptopelia decaocto</i>	CB	CB	30-50	T	R	C	AII2
41.	<i>Streptopelia turtur</i>	CB	CB	4-6	T	SV	RR	AII2
42.	<i>Cuculus canorus</i>	CB	CB	6-12	T	SV	C	-
43.	<i>Otus scops</i>	PB	CB	1-3	T	SV	VR	-
44.	<i>Athene noctua</i>	CB	CB	3-6	T	R	RC	-
45.	<i>Strix aluco</i>	PB	PB	1-2	T	R	VR	-
46.	<i>Strix uralensis</i>	PB	-	-	-	-	-	-
47.	<i>Asio otus</i>	PB	PB	1-3	T	R	VR	-
48.	<i>Caprimulgus europaeus</i>	CB	PB	2-4	T	SV	VR	AI
49.	<i>Alcedo atthis</i>	CB	CB	10-15	Aq	PM	RC	AI
50.	<i>Merops apiaster</i>	PB	CB	6-12	T	SV	RC	-
51.	<i>Coracias garrulus</i>	CB	PB	0-1	T	SV	VR	AI
52.	<i>Upupa epops</i>	CB	CB	6-12	T	SV	RC	-
53.	<i>Jynx torquilla</i>	CB	CB	4-6	T	SV	RC	-
54.	<i>Picus canus</i>	CB	CB	5-10	T	R	RC	AI
55.	<i>Picus viridis</i>	CB	CB	7-12	T	R	RC	-
56.	<i>Dendrocopos major</i>	CB	CB	15-20	T	R	C	-
57.	<i>Dendrocopos syriacus</i>	CB	CB	7-14	T	R	RC	AI
58.	<i>Dendrocopos medius</i>	CB	CB	3-5	T	R	RR	AI
59.	<i>Dendrocopos minor</i>	CB	CB	4-7	T	R	R	-
60.	<i>Galerida cristata</i>	CB	CB	40-80	T	R	C	-
61.	<i>Lullula arborea</i>	CB	CB	6-12	T	SV	RR	AI
62.	<i>Alauda arvensis</i>	CB	CB	70-140	T	PM	C	AII2
63.	<i>Riparia riparia</i>	CB	CB	50-150	T	SV	RC	-
64.	<i>Hirundo rustica</i>	CB	CB	3-7	T	SV	C	-
65.	<i>Delichon urbica</i>	CB	CB	40-80	T	SV	C	-
66.	<i>Anthus campestris</i>	-	CB	5-10	T	SV	RR	AI
67.	<i>Anthus trivialis</i>	PB	PB	10-15	T	SV	RR	-
68.	<i>Motacilla flava</i>	CB	CB	60-120	T	SV	C	-
69.	<i>Motacilla cinerea</i>	CB	-	-	-	-	-	-
70.	<i>Motacilla alba</i>	CB	CB	40-80	T	SV	C	-
71.	<i>Cinclus cinclus</i>	CB	-	-	-	-	-	-
72.	<i>Troglodytes troglodytes</i>	PB	PB	30-40	T	SV, SW	RC	-
73.	<i>Erithacus rubecula</i>	CB	CB	30-50	T	SV, SW	C	-
74.	<i>Luscinia luscinia</i>	PB	PB	3-5	Am	SV	VR	-
75.	<i>Luscinia megarhynchos</i>	CB	CB	15-25	T	SV	RC	-
76.	<i>Phoenichurus phoenichurus</i>	PB	PB	1-2	T	SV	VR	-
77.	<i>Phoenichurus ochruros</i>	CB	CB	20-30	T	SV	C	-
78.	<i>Saxicola rubetra</i>	PB	PB	2-3	T	SV	R	-
79.	<i>Saxicola torquata</i>	PB	CB	10-15	T	SV	C	-
80.	<i>Oenanthe oenanthe</i>	PB	CB	5-10	T	SV	RC	-
81.	<i>Turdus merula</i>	CB	CB	30-50	T	PM	C	AII2
82.	<i>Turdus pilaris</i>	-	CB	2-5	T	PM, WV	RR	AII2
83.	<i>Turdus philomelos</i>	CB	CB	20-40	T	SV	C	AII2
84.	<i>Turdus viscivorus</i>	-	CB	10-15	T	PM	RR	AII2
85.	<i>Locustella fluviatilis</i>	CB	CB	5-10	Am	SV	RR	-
86.	<i>Locustella luscinioides</i>	-	CB	10-15	Am	SV	RC	-
87.	<i>Acrocephalus schoenobaenus</i>	CB	CB	200-300	Am	SV	C	-
88.	<i>Acrocephalus scirpaceus</i>	CB	CB	150-300	Am	SV	C	-

0	1	2	3	4	5	6	7	8
89.	<i>Acrocephalus arundinaceus</i>	CB	CB	30-70	Am	SV	C	-
90.	<i>Acrocephalus palustris</i>	-	CB	30-60	Am	SV	C	-
91.	<i>Hippolais icterina</i>	CB	PB	4-6	T	SV	VR	-
92.	<i>Sylvia nisoria</i>	PB	PB	2-4	T	SV	VR	AI
93.	<i>Sylvia curruca</i>	CB	CB	50-100	T	SV	C	-
94.	<i>Sylvia communis</i>	CB	CB	20-30	T	SV	C	-
95.	<i>Sylvia borin</i>	-	PB	4-6	T	SV	R	-
96.	<i>Sylvia atricapilla</i>	CB	CB	40-60	T	SV	C	-
97.	<i>Phylloscopus collybita</i>	CB	CB	80-120	T	SV	C	-
98.	<i>Muscicapa striata</i>	CB	CB	15-30	T	SV	RC	-
99.	<i>Ficedula albicollis</i>	-	CB	10-20	T	SV	RC	AI
100.	<i>Aegithalos caudatus</i>	CB	CB	8-16	T	R	RC	-
101.	<i>Parus palustris</i>	PB	CB	10-15	T	R	RC	-
102.	<i>Parus lugubris</i>	CB	-	-	-	-	-	-
103.	<i>Cyanistes caeruleus</i>	CB	CB	20-50	T	R	C	-
104.	<i>Parus major</i>	CB	CB	30-60	T	R	C	-
105.	<i>Sitta europaea</i>	CB	CB	7-14	T	R	C	-
106.	<i>Certhia familiaris</i>	-	PB	4-6	T	R	RR	-
107.	<i>Remiz pendulinus</i>	-	CB	2-4	Am	PM	RR	-
108.	<i>Oriolus oriolus</i>	CB	CB	15-30	T	SV	C	-
109.	<i>Lanius collurio</i>	CB	CB	15-30	T	SV	C	AI
110.	<i>Lanius minor</i>	-	CB	2-4	T	SV	R	AI
111.	<i>Lanius excubitor</i>	PB	CB	4-8	T	PM, WV	R	-
112.	<i>Garrulus glandarius</i>	CB	CB	10-16	T	R	RC	AII/2
113.	<i>Pica pica</i>	CB	CB	30-60	T	R	C	AII/2
114.	<i>Corvus monedula</i>	CB	CB	40-50	T	R	C	AII/2
115.	<i>Corvus frugilegus</i>	-	CB	60-120	T	R	C	AII/2
116.	<i>Corvus corone cornix</i>	CB	CB	10-20	T	R	C	AII/2
117.	<i>Corvus corax</i>	CB	PB	1-2	T	R	RC	-
118.	<i>Sturnus vulgaris</i>	CB	CB	40-60	T	PM	C	AII/2
119.	<i>Passer domesticus</i>	CB	CB	200-400	T	R	C	-
120.	<i>Passer montanus</i>	CB	CB	60-150	T	R	C	-
121.	<i>Fringilla coelebs</i>	CB	CB	50-100	T	PM	C	-
122.	<i>Serinus serinus</i>	CB	PB	1-2	T	SV	R	-
123.	<i>Carduelis chloris</i>	CB	CB	20-40	T	R	C	-
124.	<i>Carduelis carduelis</i>	CB	CB	50-100	T	R, WV	C	-
125.	<i>Carduelis spinus</i>	PB	-	-	-	-	-	-
126.	<i>Carduelis cannabina</i>	CB	CB	30-60	T	PM	RC	-
127.	<i>Pyrrhula pyrrhula</i>	PB	-	-	-	-	-	-
128.	<i>Coccothraustes coccothraustes</i>	CB	CB	30-70	T	R	RC	-
129.	<i>Emberiza cirius</i>	PB	-	-	-	-	-	-
130.	<i>Emberiza citrinella</i>	CB	CB	50-100	T	R	C	-
131.	<i>Emberiza cia</i>	CB	-	-	-	-	-	-
132.	<i>Miliaria calandra</i>	CB	CB	20-30	T	PM	C	-
133.	<i>Emberiza schoeniclus</i>	-	CB	20-40	Am	PM	RC	-

Note: Breeding: CB - certain breeding; PB - probable breeding; Habitat: Aq – aquatic habitat; Am – amphibious habitat; T – terrestrial habitat; Phenology: WV – winter visitor; SV – summer visitor; SW – scarce during winter; PM – partial migrant; P - passage migrant; R - resident; Relative frequency: VR - very rare species, R-rare species, RR - relatively rare species, RC – relatively common species, C – common species; Birds Directive: AI – Annex I; AII/1 – annex II, part 1; AII/2 – annex II, part 2; AIII/1 – annex III, part 1; AIII/2 – annex III, part 2.

By reference to the Atlas data, it is noticeable that 95 of the 106 breeding species (certainly breeding and probably breeding) cited in the Atlas were again recorded. We identified 27 new breeding species: 16 certainly breeding species (*Nycticorax nycticorax*, *Cygnus olor*, *Sterna hirundo*, *Anthus campestris*, *Turdus pilaris*, *Turdus viscivorus*, *Ficedula albicollis*, *Remiz pendulinus*, *Lanius minor* and *Corvus frugilegus*) and 11 probably breeding species (*Ardea cinerea*, *Botaurus stellaris*, *Ardeola ralloide*, *Sylvia borin*).

We estimated the current number for every species. Thus, the following species: *Tachybaptus ruficollis*, *Ixobrychus minutus*, *Anas platyrhynchos*, *Aythya ferina*, *Acrocephalus schoenobaenus*, are distinguishable through their higher number.

Regarding the occupied habitat, 88 of the 122 species, (72 % - *Buteo buteo*, *Dendrocopos major*, *Galerida cristata*, *Lanius excubitor*, etc.) live in the terrestrial habitat (T), 15 species (12 % - *Gallinula chloropus*, *Vanellus vanellus*, *Tringa ochropus*, etc.) live in the amphibious habitat (Am), and 19 species (16 % - *Podiceps cristatus*, *Nycticorax nycticorax*, *Ardea cinerea*, etc.) live in the aquatic habitat (Ac) (Table 1 & Fig. 2).

The majority is represented by the common species (53 species, 44%) and the relatively common species (30 species, 25 %), followed by the very rare species (15 species, 12 %) and relatively rare species (15 species, 12%); only 9 species are rare (7%). This fact certifies the richness of the resources in this area (Table 1 & Fig. 3).

From the phenological point of view, 1 species (1%) in the researched area is a mainly winter visitor, 66 species (54%) are summer visitors and mainly summer visitors, 21 species (17%) are partially migratory species and mainly partially migratory species, 1 species (1%) is mainly a migrant species, and 33 species (27%) are sedentary or mainly sedentary species (Table 1 & Fig. 4).

According to the Birds Directive, 22 species of the 122 species breeding in the studied area are listed in Annex I (the species mentioned in Annex I shall be subjected to special conservation measures concerning their habitat in order to ensure their survival and reproduction in their area of distribution).

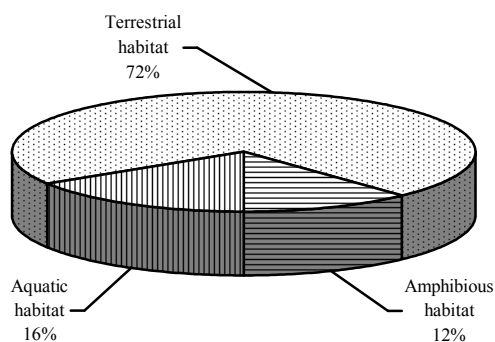


Figure 2. The bird species distribution according to habitat.

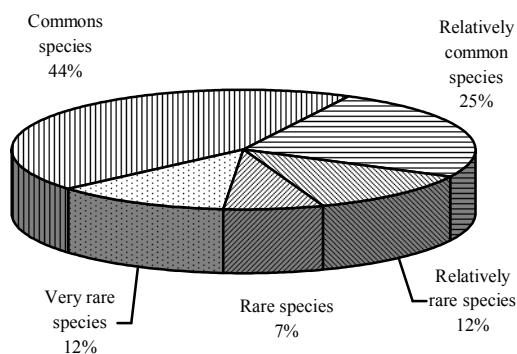


Figure 3. The bird species distribution by their relative frequency.

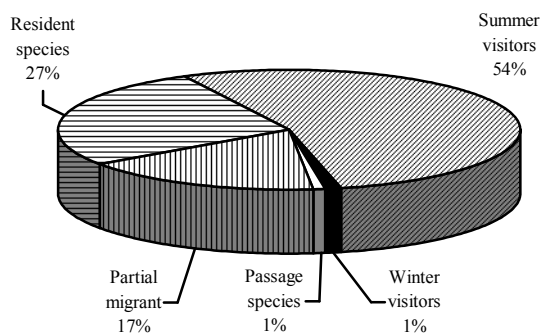


Figure 4. The distribution of the birds according to their phenology.

## DISCUSSIONS

The breeding avifauna of the artificial lakes from the middle basin of the Argeş River comprises 122 species that belong to 13 orders, 38 families and 83 genera.

96 of them are certainly breeding species and 26 are probably breeding species.

We combined these data with the data from the Atlas of the breeding species of Romania and we reached the conclusion that the list of the birds that breed in the area should consist of 133 species. 101 of them are certainly breeding and 27 probably breeding [20]. We identified 27 new breeding species: 16 certainly breeding species and 11 probably breeding species. The large number of the estimated pairs (*Acrocephalus schoenobaenus*, *Acrocephalus scirpaceus*, *Anas platyrhynchos*, *Aythya ferina*, *Fulica atra*, *Gallinula chloropus*, etc.) is due to the large surface covered by the *Phragmitetum australis*. The trophic resources of these basins exceed all the availabilities of the natural aquatic ecosystems from the area, a fact that attracts a rich avifauna (regarding the number of species and individuals, Table 1). The major restrictive aspect of breeding is keeping the critical minimal distance from the disturbance factors. This explain the large number of the breeding species on the Budeasa artificial lake (a basin that is subjected to a lesser anthropogenic influence than the Bascov artificial lake, strongly exposed to the anthropogenic influence).

Regarding the occupied habitat, most of the breeding species live in the terrestrial habitat. There are many species that live in the aquatic habitat. The fewest are found in the amphibious habitat. These remarks are valid for all the artificial lakes from the upper and middle hydrographical basins of the Argeş River [4, 5, 14].

Regarding the relative frequency, the majority is represented by common species and relatively common species, followed by the very rare species and relatively rare species. Only 9 species are rare. This fact certifies the richness of the resources in this area [4, 5, 9]. There is a big fluctuation of bird species as the lakes are the continuation of the Rucăr-Bran migratory route. This fact was also remarked by Mătieş who concluded that the hydrographical basin of the Argeş River is the main crossing flyway for many birds that cross the Carpathian Mountains [17]. As far as diversity is concerned the migration period is the richest, especially its beginning. The overlapping of the trophic resources, places of breeding, places of rest (favourable factors for the avifauna) provide a high level of biodiversity in the areas of these artificial lakes [5, 22].

The summer visitor species and the sedentary species are preponderant; they are followed by the partially migrant species. This fact permits us to conclude that the avifauna of these artificial lakes is relatively rich and varied.

22 breeding species are listed in Annex I of the Birds Directive [25].

The diverse and rich avifauna (122 breeding species) is the result of the richness of the trophic resource and their accessibility, of the existence of favourable breeding places and of the critical minimal distance from the disturbance factors.

These artificial lakes are the only breeding places from the area for a important number of species (*Podiceps cristatus*, *Ixobrychus minutus*, *Anas*

*platyrhynchos, Anas crecca, Aythya ferina, Aythya nyroca, Rallus aquaticus, Fulica atra, Gallinula chloropus, etc.*)

We consider that the number of breeding species in the studied area will continue to increase in correlation with the continuance of the silting process (that involving the enlargement of the rush-bed surface).

In the future, enlarging the researched area and adopting efficient measures for the protection of birds, the list of breeding species presented here may increase.

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