

Aspects on the bird fauna's diversity in the sector Golăiești - Cotul Bran (Iași county, Romania)

DIANA-ROXANA TOFĂNESCU  AND CARMEN GACHE 

Abstract. The present study had followed to evaluate the bird fauna's diversity and the seasonal dynamic of birds' population in the sector of Golăiești – Cotul Bran, related to the common Jijia and Prut Rivers' basin. We did our fieldwork in the years 2014 and 2015. The bird fauna's list includes 117 bird species. The typically woodland bird species are dominant like diversity, but also through their effectiveness. The wetland bird species present small populations, appearing during the migration time. The breeding bird fauna include 77 certainly breeding species, other 6 species being irregular or probably breeding species in the area. During our study, we identified 21 bird species that appear in the Annex 1 of Birds' Directive, respectively, 12 bird species included in the Romanian Red Book of Vertebrates.

Keywords: bird fauna, habitats, Natura 2000 network, threatening risks.

Aspecte ale diversității ornitofaunei în sectorul Golăiești - Cotul Bran (Iași, România)

Rezumat. Studiul nostru a urmărit evaluarea stării actuale a diversității, dar și dinamica sezonieră a ornitofaunei din sectorul Golăiești – Cotul Bran aparținând luncii comune a Jijiei și Prutului. Activitatea de monitorizare a păsărilor s-a desfășurat în perioada anilor 2014 – 2015, cu deplasări lunare pentru acoperirea tuturor etapelor ciclului biologic anual caracteristic păsărilor. Lista ornitofaunistică este formată din 117 specii de păsări, dominante fiind speciile forestiere atât prin diversitate, cât și prin efectivele prezente în regiune. Majoritatea speciilor caracteristice ecosistemului acvatic prezintă efective mici, cele mai multe fiind semnalate pe durata migrației. Ornitofauna clocitoare este reprezentată prin 77 specii regulat clocitoare, alte 6 specii fiind probabil sau neregulat clocitoare în zona investigată. Pe durata studiului nostru, am identificat 21 de specii de păsări incluse în Anexa 1 a Directivei Păsări, respectiv, 12 specii incluse în Cartea Roșie a Vertebratelor din România

Cuvinte cheie: ornitofaună, habitate, rețeaua Natura 2000, factori de risc.

1. INTRODUCTION

The location of Golăiești commune (Iași County) is in the area between Romania and the Republic of Moldova, located in the middle sector of Prut River basin. The Jijia

and Prut rivers form a common meadow area there, their valleys presenting a parallel transect and covering a width of 4 – 7 kilometres (km). Regarding geomorphology, the territory belongs to the Moldavian Plateau at the limit between the Moldavia Plain and the Prut Plain. The Jijia River presents a meandering and regularised sector on the territory of commune Golăiești, along 18 km before the confluence point with the Bahlui River. The Prut River represents the eastern limit of the commune along 23 km, presenting large meanders [1]. There was no recorded flooding phenomenon on the territory of the villages crossed by the Jijia River (Cotu lui Ivan, Grădinari, Golăiești and Podu Jijiei) after the hydrotechnic arrangements of Jijia (1985 – 1989) and in the condition of prolonged droughts affecting this region during the last two decades.

The climate is temperate-continental, with hot and dry summers, while the winters are frosty, and it has been poor in snowfalls during the last decade. The average annual temperature is 9.5° C. The effects of global climate changes are visible in this region. We notice a high amplitude of the thermal variation between summer and winter, while the rainfall regime has become deficient, falling below the multiannual average value of 471.2 mm/annual. The ice-bed covers the river bed for about 90 days.

On the territory of Golăiești commune, the habitats are characteristic for the dry steppe and forest areas, the cultivated lands and grasslands covering the largest surfaces. On the cultivated lands, we saw cereals, corn and sunflower, other agricultural crops covering small surfaces. The grasslands (*Festuca* sp., *Stipa* sp., *Poa* sp., *Trifolium* sp. etc.) with shrubs and bushes (*Prunus spinosa*, *Sambucus nigra*, *Cornus mas*, *Rosa canina*, *Rhamnus frangula* etc.) represent the second habitat type as surface in the area. The mixed hardwood forest (*Quercus* sp., *Fraxinus* sp., *Ulmus* sp., *Tilia* sp., *Acer* sp., *Prunus avium*) and acacia plantations (*Robinia pseudacacia*) appear on the slopes from the right side of the Jijia and Prut Rivers valleys. The natural meadow forest (*Populus alba*, *Salix* sp.) is present along the bed of the Prut River, with a well-preserved sector in the perimeter of Cotul Bran, near the village Podu Jijiei [2]. Extensive plantations of Euro-American poplar (*Populus eurocanadensis*) are present on the bank of the Prut River. We found a well-preserved woodland with pedunculated oak (*Quercus robur*) near the village Petrești-Medeleni, belonging to a private owner that dug a deep ditch around the perimeter of forest. The reed beds cover small areas in the perimeter of Old Jijia (the former natural meanders of river) and some pointed areas along the right bank of the Prut River.

The fauna is relatively poor. The groups of insects present the highest diversity between the invertebrates. The fish fauna of Prut River belongs to the barbel zones (*Barbus barbus*, *Cyprinus carpio*, *Abramis brama*, *Tinca tinca*, *Esox lucius*, *Silurus glanis*), while the

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Cypriniformes are dominant in the water of the Jijia River (*Cyprinus carpio*, *Carasius gibelio*, *Scardinius erythrophthalmus*, *Alburnus alburnus*, *Misgurnus fossilis*). We notice the presence of amphibians (species complex *Pelophylax kl. esculentus*, *Hyla orientalis*, species complex *Hyla arborea*, *Bombina bombina*, *Pelobates fuscus*, *Bufo viridis*, *Triturus cristatus*, and *Lissotriton vulgaris*) and some reptile species (*Emys orbicularis*, *Lacerta viridis*, *Lacerta agilis*, *Natrix natrix*, *Natrix tessellata*). The rodents (*Lepus europaeus*, *Spermophilus citellus*, *Cricetus cricetus*, *Nannospalax leucodon*, *Apodemus agrarius* etc.) are the most dominant from the mammal group, but there are other species also present in the area as the ungulates (*Capreolus capreolus*, *Sus scrofa*) and carnivorous (*Vulpes vulpes*, *Lutra lutra*, *Meles meles*, *Mustela putorius*, and *Mustela nivalis*).

It is no previous study regarding the bird fauna from the territory of commune Golăiești. Available old data related to the presence of birds in the perimeter of the Prut and Jijia Rivers appear in the studies done five decades ago [3, 4, 5, 6], as well as results of recent researches following the bird fauna as a whole [7, 8, 9, 10] or some groups of species [11, 12, 13, 14]. Dan Stănescu presented observation on the diversity of birds in the wetlands of the Prut River 55 years ago [15], studying an area located in the southern vicinity of Golăiești commune, in the perimeter of Bosia – Cristești (these wetlands disappeared).

The territory of Golăiești commune overlaps partial or complete with the perimeter of some natural protected areas. The natural protected area IV-2554 Cotul Bran on the Prut River, located near Podu Jijiei village, has protection status on local level from 1994 [16] and on national level from 2000 [17]. This territory is part of two Natura 2000 sites: ROSCI0123 Prut River [18, 19], respectively ROSPA0163 Prut River [20, 21].

The sector Cotul Bran on the Prut River is a meander of the Prut River (Figure 1) and represents a significant reproduction territory for 20 fish species, and shelters also other protected animal species [19].

At the same time, the Valley of the Prut River is part of a significant flyway for the birds' migration in the eastern part of Europe. On the territory of Golăiești commune, the Prut River presents some unfrozen sectors during winter, sheltering population of waterfowls in this part of Romania [9, 10, 20, 21].

2. PERIOD AND METHODS OF STUDY

We have done our field study through monthly visits during 2014 – 2015, following the monitoring of bird fauna diversity. We tried to assess the present status of the bird populations and identify the main threatening factors for the bird fauna and biodiversity on the territory of Golăiești commune.

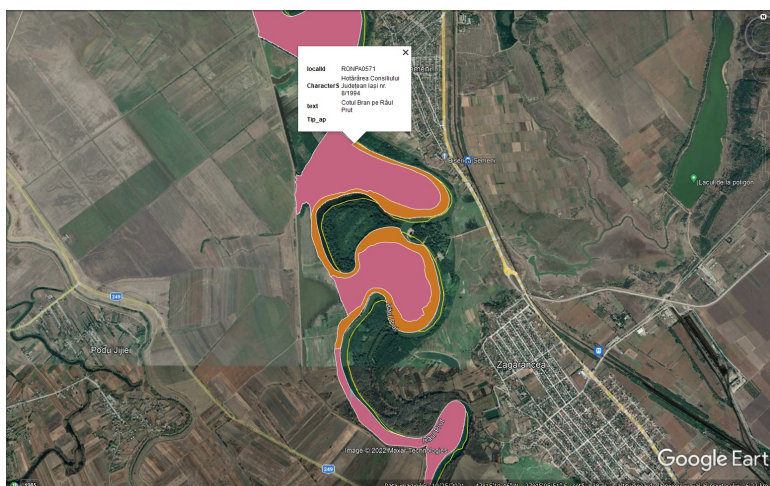


Figure 1. Natural protected area Cotul Bran on the Prut River, part of the Natura 2000 Network in Romania (source: Iași County Environment Protection Agency, Romania)

The monitoring of birds was done using the methods of transect and fixed points, using also the males' calling activity. We established some transects following the communal roads and protective dykes of the two watercourses Jijia and Prut, crossing all types of habitats in the investigated territory. The total length was about 22 km and we used pedestrian walking and a car during our monitoring activity. Stationary in fixed points allowed us to identify and estimate the bird diversity and populations in the area. We used the males' calling activity to identify and estimate the populations of passerines in the reed beds and woodlands, respectively, the hidden life bird species inside compact vegetation, the crepuscular and nocturne ones.

We identify the birds through direct observation by binoculars Pentax 10x42 DCF HRC and telescope HAKUBA 35x70. In the analysis of our results, we are using SIBLEY & AHLQUIST taxonomic system (1995) with subsequent additions and modifications [22, 23].

3. RESULT AND DISCUSSIONS

During our field monitoring activity, we identified 117 bird species, as we present in the table 1. The mentioned values for the bird population represent the minimum, respectively, the maximum number of counted birds or estimated population during one-day visit in the whole territory in the migration and wintering time; we estimated the breeding bird populations using the visual and auditory recordings.

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Taxonomical, the passerines (Passeriformes) are dominants, with 72 species, followed by the diurnal raptors – Accipitriformes, with 7 species and the woodpeckers (Piciformes) with 6 species. The other orders have two – five species present in the investigated territory and two orders (Cuculiformes and Bucerotiformes) have one representing species in the area, and in Romania, too.

We recorded the highest diversity of bird fauna inside the ecosystem of forest (68 species) and we met 55 bird species in the perimeter of open areas, covered by grasslands and agricultural lands, with shrubs and bushes, representing the largest habitat in the investigated territory. The low number of the characteristic aquatic and semiaquatic birds (25 species), recorded in the area, reflects the poor quality of typical habitats of wetlands in the study area. Inside the villages we observed 24 bird species.

The breeding bird fauna represent a significant parameter for the assessment of the quality of suitable habitats from one territory because the bird species have strict nesting site requirements. We identified 77 regular breeding bird species, other six species being at least irregular breeding birds in the perimeter of Golăiești commune. On the territory of our country the breeding season of bird species covers a period of seven months, beginning in February for some sedentary species as the corvids (*Corvus corax*, *Corvus frugilegus*) that start to build or consolidate the nests in the middle February. The other sedentary bird species begin the territorial songs in the late February or early March. Some bird species have fledging chicken from the second, third or even fourth broods in August (for example, *Hirundo rustica*, *Streptopelia decaocto*).

During the first decade of March, we observed the territorial song activity (delimitation, occupation, marking and defence of breeding territory) of passerine species that build their nests in the open lands as dry grasslands and cultivated lands (*Alauda arvensis* or *Galerida cristata*). Other species as *Anthus campestris*, *Motacilla flava* and *Motacilla alba* arrive during March and in the first part of April, occupying breeding territories and building their nests as large cups woven from grasses among the herbs on the ground, as well as inside the shrubs or tall and thick grasses (for example, *Emberiza calandra*). In the same area we met the wheatear (*Oenanthe oenanthe*).

Starting from April, the warblers (*Curruca curruca* and *Curruca communis*), the shrikes (*Lanius collurio* and *Lanius minor*), as well as the winchat (*Saxicola rubetra*) and the European stonechat (*Saxicola rubicola*) occupy the shrubs and bushes area, building their nests inside it and using as survey points to search and find the potential preys by flying to the ground and catching it. Most of them have the brood complete in the late April or even in the early May.

Table 1. Bird fauna recorded in the sector Golăiești - Cotul Bran (Iași), during the period 2014 – 2015

No.	Species	Breeding (pairs)	Migration (individuals)	Wintering (individuals)	Suitable habitats				Birds' Directive	Romanian Red Books
					Forest	Wetlands	Open lands	Villages		
1.	<i>Phasianus colchicus</i>	8 - 12	x	x	-	-	+	-	A2	-
2.	<i>Perdix perdix</i>	7 - 8	x	x	-	-	+	-	A2	-
3.	<i>Coturnix coturnix</i>	4 - 5	x	-	-	-	+	-	-	-
4.	<i>Cygnus olor</i>	-	1 - 5	2 - 6	-	+	-	-	A2	-
5.	<i>Anas platyrhynchos</i>	1 - 2	18 - 58	14 - 72	-	+	-	-	A2	-
6.	<i>Anas crecca</i>	-	2 - 10	0 - 4	-	+	-	-	A2	-
7.	<i>Nycticorax nycticorax</i>	-	0 - 2	-	-	+	-	-	A1	V
8.	<i>Ardea alba</i>	-	0 - 3	-	-	+	-	-	A1	E
9.	<i>Ardea cinerea</i>	-	2 - 7	0 - 1	-	+	-	-	-	-
10.	<i>Platalea leucorodia</i>	-	0 - 4	-	-	+	-	-	A1	E
11.	<i>Ciconia ciconia</i>	4 - 7	35 - 145	-	-	+	+	+	A1	V
12.	<i>Ciconia nigra</i>	-	6 - 12	-	-	+	-	-	A1	V
13.	<i>Buteo buteo</i>	-	4 - 13	5 - 7	+	-	+	-	-	-
14.	<i>Buteo lagopus</i>	-	1 - 5	2 - 4	+	-	+	-	-	-
15.	<i>Pernis apivorus</i>	-	3 - 7	-	+	-	+	-	A1	V
16.	<i>Accipiter gentilis</i>	-	2 - 4	1 - 2	+	-	+	+	-	-
17.	<i>Milvus milvus</i>	-	0 - 1	-	+	-	+	-	A1	V
18.	<i>Milvus migrans</i>	-	0 - 2	-	+	-	+	-	A1	CE
19.	<i>Circus aeruginosus</i>	0 - 1?	1 - 3	-	+	-	+	-	A1	-
20.	<i>Falco columbarius</i>	-	-	1 - 2	+	-	+	-	A1	-
21.	<i>Falco subbuteo</i>	1 - 2	3 - 7	-	+	-	+	-	-	-
22.	<i>Falco tinnunculus</i>	1 - 2	5 - 7	0 - 1	+	-	+	-	-	-
23.	<i>Fulica atra</i>	1 - 2?	6 - 13	-	-	+	-	-	A2	-
24.	<i>Gallinula chloropus</i>	2 - 3	4 - 7	-	-	+	-	-	A2	-
25.	<i>Vanellus vanellus</i>	-	11 - 17	-	-	+	-	-	A2	-

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					Forest	Wetlands	Open lands	Villages		
26.	<i>Larus cachinnans</i>	-	2 - 4	-	-	+	-	-	A2	-
27.	<i>Chroicocephalus ridibundus</i>	-	4 - 11	-	-	+	-	-	A2	-
28.	<i>Chlidonias hybrida</i>	-	2 - 4	-	-	+	-	-	A1	-
29.	<i>Sterna hirundo</i>	-	1 - 3	-	-	+	-	-	A1	-
30.	<i>Columba palumbus</i>	3 - 5	30 - 42	2 - 4	+	-	-	-	A2	-
31.	<i>Streptopelia turtur</i>	9 - 11	7 - 26	-	+	-	+	-	A2	V
32.	<i>Streptopelia decaocto</i>	18 - 21	-	22 - 32	-	-	+	+	A2	-
33.	<i>Cuculus canorus</i>	5 - 8	x	-	+	+	+	-	-	-
34.	<i>Athene noctua</i>	3 - 4	-	x	-	-	+	+	-	-
35.	<i>Asio otus</i>	1 - 2	x	x	+	-	-	-	-	-
36.	<i>Strix aluco</i>	1 - 2	x	x	+	-	-	-	-	-
37.	<i>Alcedo atthis</i>	2 - 3	1 - 3	-	-	+	-	-	A1	-
38.	<i>Merops apiaster</i>	8 - 12	18 - 34	-	-	-	+	-	-	-
39.	<i>Upupa epops</i>	6 - 8	4 - 11	-	+	-	+	-	-	V
40.	<i>Picus viridis</i>	2 - 3	x	x	+	-	-	-	-	-
41.	<i>Dendrocopos major</i>	7 - 8	x	x	+	-	-	+	-	-
42.	<i>Dendrocopos syriacus</i>	5 - 7	x	x	+	-	+	+	A1	-
43.	<i>Dendrocoptes medius</i>	1 - 2	x	x	+	-	-	-	A1	-
44.	<i>Dryobates minor</i>	2 - 3	x	x	+	-	-	-	-	-
45.	<i>Jynx torquilla</i>	2 - 4	x	-	+	-	-	-	-	E
46.	<i>Oriolus oriolus</i>	9 - 11	x	-	+	-	+	+	-	-

No.	Species	Breeding (pairs)	Migration (individuals)	Wintering (individuals)	Suitable habitats				Birds' Directive	Romanian Red Books
					Forest	Wetlands	Open lands	Villages		
47.	<i>Lanius collurio</i>	26 - 28	13 - 21	-	-	-	+	-	A1	-
48.	<i>Lanius minor</i>	3 - 5	5 - 8	-	-	-	+	-	A1	-
49.	<i>Lanius excubitor</i>	-	8 - 10	6 - 10	-	-	+	-	-	-
50.	<i>Pica pica</i>	4 - 5	x	5 - 12	-	-	+	+	A2	-
51.	<i>Garrulus glandarius</i>	5 - 6	x	12 - 18	+	-	+	+	A2	-
52.	<i>Coloeus monedula</i>	12 - 14	x	3 - 8	-	-	+	+	A2	-
53.	<i>Corvus frugilegus</i>	70 - 84	x	48 - 112	-	-	+	+	A2	-
54.	<i>Corvus cornix</i>	7 - 9	x	8 - 11	-	-	+	+	A2	-
55.	<i>Corvus corax</i>	-	x	2 - 4	+	-	+	-	-	E
56.	<i>Poecile palustris</i>	8 - 11	x	x	+	-	-	-	-	-
57.	<i>Periparus ater</i>	-	x	3 - 5	+	-	-	-	-	-
58.	<i>Parus major</i>	27 - 35	x	x	+	-	-	+	-	-
59.	<i>Cyanistes coeruleus</i>	8 - 11	x	x	+	-	-	+	-	-
60.	<i>Remiz pendulinus</i>	3 - 5	x	-	-	+	-	-	-	-
61.	<i>Regulus regulus</i>	-	-	12 - 15	+	-	-	-	-	-
62.	<i>Lullula arborea</i>	3 - 5	x	-	+	-	-	-	A1	-
63.	<i>Alauda arvensis</i>	35 - 40	x	-	-	-	+	-	A2	-
64.	<i>Galerida cristatus</i>	10 - 13	x	21 - 27	-	-	+	+	-	-
65.	<i>Riparia riparia</i>	120 - 132	170 - 230	-	-	+	-	-	-	-
66.	<i>Hirundo rustica</i>	x	110 - 320	-	-	+	+	+	-	-
67.	<i>Delichon urbicum</i>	x	48 - 64	-	-	+	+	+	-	-

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					Forest	Wetlands	Open lands	Villages		
68.	<i>Phylloscopus collybita</i>	14 - 18	x	-	+	-	-	-	-	-
69.	<i>Phylloscopus trochillus</i>	-	x	-	+	-	-	-	-	-
70.	<i>Phylloscopus sibilatrix</i>	2 - 3?	x	-	+	-	-	-	-	-
71.	<i>Aegithalos caudatus</i>	-	x	11 - 15	+	-	-	-	-	-
72.	<i>Acrocephalus arundinaceus</i>	7 - 9	x	-	-	+	-	-	-	-
73.	<i>Acrocephalus scirpaceus</i>	1 - 3	x	-	-	+	-	-	-	-
74.	<i>Hippolais icterina</i>	5 - 7	x	-	+	-	-	-	-	-
75.	<i>Sylvia atricapilla</i>	10 - 12	x	-	+	-	-	-	-	-
76.	<i>Sylvia borin</i>	8 - 10	x	-	+	-	-	-	-	-
77.	<i>Curruca curruca</i>	11 - 14	x	-	+	-	+	-	-	-
78.	<i>Curruca communis</i>	12 - 15	x	-	-	-	+	-	-	-
79.	<i>Sitta europaea</i>	7 - 10	x	x	+	-	-	-	-	-
80.	<i>Certhia familiaris</i>	0 - 1?	x	5 - 7	+	-	-	-	-	-
81.	<i>Troglodytes troglodytes</i>	1 - 2?	x	7 - 10	+	-	-	-	-	-
82.	<i>Ficedula hypoleuca</i>	-	3 - 5	-	+	-	+	-	-	-
83.	<i>Ficedula albicollis</i>	0 - 1?	4 - 8	-	+	-	-	-	A1	-
84.	<i>Ficedula parva</i>	2 - 3	3 - 5	-	+	-	+	-	A1	-
85.	<i>Muscicapa striata</i>	5 - 7	8 - 11	-	+	-	+	-	-	-
86.	<i>Oenanthe oenanthe</i>	5 - 6	7 - 11	-	-	-	+	-	-	-
87.	<i>Saxicola rubetra</i>	4 - 3	6 - 9	-	-	-	+	-	-	-
88.	<i>Saxicola rubicola</i>	2 - 4	4 - 6	-	-	-	+	-	-	-

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					Forest	Wetlands	Open lands	Villages		
89.	<i>Phoenicurus phoenicurus</i>	6 - 7	x	-	+	-	+	-	-	-
90.	<i>Phoenicurus ochruros</i>	8 - 10	x	-	+	-	+	+	-	-
91.	<i>Erithacus rubecula</i>	6 - 9	x	-	+	-	-	-	-	-
92.	<i>Luscinia luscinia</i>	5 - 6	x	-	+	-	-	-	-	-
93.	<i>Luscinia megarhynchos</i>	9 - 11	x	-	+	-	-	-	-	-
94.	<i>Turdus merula</i>	12 - 13	x	x	+	-	-	-	A2	-
95.	<i>Turdus philomelos</i>	8 - 12	x	-	+	-	-	-	A2	-
96.	<i>Turdus iliacus</i>	-	18 - 42	-	+	-	+	-	A2	-
97.	<i>Turdus viscivorus</i>	-	52 - 170	-	+	-	+	-	A2	-
98.	<i>Turdus pilaris</i>	-	22 - 72	35 - 54	+	-	+	-	A2	-
99.	<i>Sturnus vulgaris</i>	x	280 - 1050	0 - 26	+	-	-	+	A2	-
100.	<i>Passer domesticus</i>	x	x	x	-	-	-	+	-	-
101.	<i>Passer montanus</i>	x	x	-	-	-	-	+	-	-
102.	<i>Anthus trivialis</i>	2 - 4	x	-	+	-	-	-	-	-
103.	<i>Anthus campestris</i>	5 - 6	x	-	-	-	+	-	A1	-
104.	<i>Motacilla alba</i>	4 - 5	10 - 11	-	-	-	+	-	-	-
105.	<i>Motacilla flava</i>	9 - 11	14 - 17	-	-	-	+	-	-	-
106.	<i>Fringilla coelebs</i>	18 - 23	x	x	+	-	-	+	-	-
107.	<i>Fringilla montifringilla</i>	-	-	12 - 78	+	-	+	-	-	-
108.	<i>Pyrrhula pyrrhula</i>	-	x	8 - 24	+	-	-	-	-	-

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					Forest	Wetlands	Open lands	Villages		
109.	<i>Coccothraustes coccothrauste</i>	4 - 6	x	x	+	-	-	-	-	-
110.	<i>Chloris chloris</i>	10 - 13	x	-	+	-	-	+	-	-
111.	<i>Spinus spinus</i>	-	14 - 32	10 - 25	+	-	+	-	-	-
112.	<i>Carduelis carduelis</i>	11 - 14	x	27 - 142	+	-	-	+	-	-
113.	<i>Acanthis flammea</i>	-	x	2 - 7	+	-	+	-	-	-
114.	<i>Linaria cannabina</i>	1 - 3	7 - 9	-	+	-	-	-	-	-
115.	<i>Emberiza calandra</i>	11 - 13	x	0 - 2	-	-	+	-	-	-
116.	<i>Emberiza schoeniclus</i>	1 - 3	x	0 - 5	-	+	-	-	-	-
117.	<i>Emberiza citrinella</i>	6 - 8	x	3 - 16	+	-	-	-	-	-

Legend: Fenology: 1? – Probable breeding species, x – non-estimated population; Birds' Directive: A1 – bird species from Annex 1, A2 – bird species from Annex 2; Romanian Red Books of Vertebrates: V – vulnerable species, E – endangered bird species, CE – critically endangered bird species.

In the perimeter of agricultural lands, in the areas with shrubs and bushes and at the edge of forests we observed three-gamefowl species (*Perdix perdix*, *Coturnix coturnix* and *Phasianus colchicus*) present in the investigated zone. They are polygamous birds, living hidden inside the thicket of vegetation, so their census is difficult; we estimated the breeding population using the males calling activity during the first part of breeding season and the sporadic observation of the birds along the study transects.

We identified nests of the riparian bird species in various sites: the former exploitation loam areas and vertical cracks formed by landslides on the slopes (*Merops apiaster* and *Riparia riparia*) or the high clay bank of the Prut River, especially in the sector Cotul Bran (*Alcedo atthis* and *Riparia riparia*). The sparrows (*Passer montanus* and *Passer domesticus*) occupy often the old nests of sand martins (*Riparia riparia*), especially in the former exploitation loam areas located in vicinity of villages.

We recorded the highest diversity of breeding bird species typical for the aquatic ecosystems inside the meadow forest. The bird species that require reed beds to build their nest and take care of their broods present a low diversity and small populations. We observed these species on the old meanders of the Jijia River, presenting the aspects of puddles with swamp vegetation, and the marshy surfaces are missing in the investigated territory. The regularised sectors of the Jijia River appear as a concrete channel, without suitable breeding habitats from the typical wetlands and aquatic bird species, so the birds use it as resting and feeding territory.

Inside the villages of Golăiești commune, the bird species are building their nests on the walls or roofs of the houses and on the trees along the roads or in the orchards. Some species search their food at long distances from the village area, in the open cultivated lands and grasslands or even in the perimeter of the aquatic ecosystems (*Ciconia ciconia*, *Hirundo rustica* and *Delichon urbicum* or the two species of *Passer*). Other bird species are not leaving the edge of villages, finding food inside it (*Streptopelia decaocto*, *Athene noctua* or *Dendrocopos syriacus*).

We met the highest breeding bird species diversity inside and at the edge of the woodlands from the investigated area. We caught some of these bird species far from the edge of the forest, using the shrubs and the clumps of trees less often for nesting but as survey points inside the feeding or hunting territories. The woodpeckers and doves present significant breeding populations but are not leaving the forest to search and find their food; the migratory dove species (*Columba palumbus* or *Streptopelia turtur*) appear searching for food on the cultivated lands area during the month of August. The woodlands passerines present a various trophic regime, but use to feed their chickens with eggs, larvae and adults of insects.

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Between the diurnal raptors, two falcon species (*Falco tinnunculus* and *Falco subbuteo*) are breeding, using old nests of crows in clumps of trees. We cannot exclude the possibility of existence of one breeding pair of marsh harrier (*Circus aeruginosus*) in the area. We observed adult and flying juvenile birds during the whole breeding season; probably, they have the nest inside the compact reed beds from one of the meanders of the Old Jijia River.

Two nocturnal raptor species (*Asio otus* and *Strix aluco*) are breeding in the meadow forest from the sector Cotul Bran on the Prut River, but also inside the oak forest from Petrești – Medeleni. We could not identify their nests, but in June – July we heard the calling sounds of chickens begging the attention of the adult birds who bring food to the nest.

We notice the highest bird diversity during the period of seasonal migration, in spring and autumn, when we counted the biggest bird populations, too; we recorded some bird species in the area only during the migration time, especially in autumn. During the spring migration (March – first decade of May), the birds are going quickly to the breeding areas, the first arrivals occupying the best suitable sites for a high rate of fledging survival. We observed some bird species crossing the area by flight or in short sequences of feeding. In the autumn migration (August – first decade of November), the birds use to stop-over in the suitable feeding and resting areas, preparing themselves for the long way towards the wintering zones. Some migratory bird species can stay even two weeks in the perimeter of Golăiești commune, using the rich and various food resources and sleeping shelters from the area.

During the late July, the typical forest passerines form larger or smaller flocks, reuniting adult and juvenile birds, flying between the edge of forest and the open lands, arriving to the limits of the villages in search of more abundant and accessible food resources. As example, we can mention species as the warblers – *Sylvia* sp. and *Curruca* sp., flycatchers – *Ficedula* sp., redstarts – *Phoenicurus* sp., finches – *Fringilla coelebs*, *Chloris chloris* and *Carduelis carduelis*. In the late August, we met flocks of hundreds and thousands starlings (*Sturnus vulgaris*) flying towards the south direction or searching for fruits in the area.

This time represents a period of increased mobility even for the sedentary bird species, all the birds searching for food to accumulate fat reserves necessary to survive during the wintering time or to cope with the effort of migration flight. The birds present long daily flights between the forests and shrubs perimeter, used as resting and sleeping shelter sites, respectively the open lands that offer them various types of food resources.

We noticed the passage of the storks (*Ciconia ciconia* and *Ciconia nigra*), sometime in mixed flocks, but the black storks presented significant smaller effectives than the white ones. The two duck species (*Anas platyrhynchos* and *Anas crecca*) appeared on the watercourse of the Prut River, especially in the sector from the neighbourhood of the natural protected area Cotul Bran on the Prut River and in the sector Petrești – Medeleni.

During the wintering time, the populations of waterfowls are small, the birds crowding on the wide meanders of the Prut River with smooth water flow and no ice-bed covering. The constant presence of a high number of diurnal raptors represents the most characteristic element for the wintering bird fauna on the territory of Golăiești commune, including the natural protected area Cotul Bran on the Prut River. The two buzzard species (*Buteo buteo* and *Buteo lagopus*) occupy the hunting territories in the open lands located between the villages and the edge of meadow forests, using solitary trees or shrubs as survey points. We met the merlin (*Falco columbarius*) especially in the trees from the edge of the meadow forest and grasslands.

Two Natura 2000 sites, ROSCI0123 Prut River, respectively ROSPA0163 Prut River present sectors located on the administrative territory of Golăiești commune. Their designation is due to the recorded presence of plant species and animal species included in Annex 2 of the Habitats' Directive [24], respectively, presence of bird species that appear in Annex 1 of the Birds' Directive [25, 26]. These species and habitats need special conservation measures concerning their habitats in order to ensure their survival and the reproduction in their distribution range.

During our monitoring field activity along the common meadow of the Jijia and Prut Rivers on the territory of Golăiești commune, as well as in the area Cotul Bran on the Prut River we identified 21 bird species included in Annex 1 of the Birds' Directive. On the territory of the European Union, these bird species present extinction risk, being vulnerable to the changes of the suitable habitats or becoming rare species due to the diminution of their populations. Most of these recorded species in the investigated area appear with small populations during the migration time as constant presences: *Nycticorax nycticorax*, *Ardea alba*, *Platalea leucorodia*, *Ciconia nigra*, *Pernis apivorus*, *Milvus migrans*, *Milvus milvus*, *Sterna hirundo* and *Chlidonias hybrid*. One bird species is wintering visitor in this perimeter: *Falco columbarius*. The other 11 bird species are present during the breeding season, two being probably breeding species in the area: *Circus aeruginosus* and *Ficedula albicollis*.

We mention also the presence of 25 bird species included in Annex 2 of the Birds' Directive as gamefowl species; their hunting is regulate through the national laws, but their extraction from ecosystems must keep the species out of the risk of extinction.

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In the list of bird fauna recorded in the sector Golăiești – Cotul Bran on the Prut River, we notice 12 bird species that appears in the Red Book of Vertebrates from Romania [27]. From these, the black kite (*Milvus migrans*) is a critically endangered species in our country, presenting high risk of extinction in the near future. We observed two individuals hunting at the southern edge of the natural protected area Cotul Bran on the Prut River in August 2015. Other four species have the status of endangered bird species; between these, only the wryneck (*Jynx torquilla*) is breeding in the investigated perimeter. We met two species (*Ardea alba* and *Platalea leucorodia*) during the migration time and the raven (*Covurs corax*) is present during the wintering time. We identified seven vulnerable bird species: *Ciconia ciconia*, *Nycticorax nycticorax*, *Ciconia nigra*, *Pernis apivorus*, *Milvus milvus*, *Streptopelia turtur* and *Upupa epops*. Only three of these species are breeding birds in the area: the white stork (*Ciconia ciconia*), the turtle dove (*Streptopelia turtur*) and the hoopoe (*Upupa epops*).

There are some vertebrate species mentioned in the standard forms of Natura 2000 site ROSCI0123 Prut River [24] that appear also in the Red Book of Vertebrates from Romania [27]. These present status of vulnerable species (fishes: *Gymnocephalus schraetser* and *Zingel zingel*; amphibians - *Hyla orientalis*; reptiles - *Emys orbicularis*; mammals: *Lutra lutra* and *Spermophilus citellus*) or endangered species (*Zingel streber* – from the fishes, respectively, *Myotis myotis* – from the mammals).

The main activities of local community from Golăiești commune are agriculture and breeding of sheep, cattle and goats. The present level of anthropogenic activities is low. We did not met herds of domestic animals inside the forests, but we noticed the intensive extraction – and, probably, illegal - of the wood materials in the forests from the neighbourhood of villages. The owner of the oak forest from the sector Medeleni – Petrești protects this woodland body by digging a peripheral ditch enough deep and wide to prevent the easy access of vehicles inside the forest.

The fishing along the watercourse of the Prut River is possible only with a special document that allows the access in the border area (it is the eastern border of the European Union). The service of Border Police takes a rigorous control of this document, so we noticed the low presence of the sport anglers in the study area. The high and steep bank of the watercourse along the sector of the natural protected areas Cotul Bran on the Prut River is unsuitable for the sport fishing activities.

Between the identified threatening factors in the area, we mention the climate changes and the development of road infrastructure. The prolonged severe drought and the still active classic approach to the flood risk management (concreted banks, dams and drainage) have led to the disappearance of significant wetlands surfaces in the common meadow

of the Jijia and Prut Rivers from this region. The still existent wetlands are subject of disappearance in the near future. The local community faces the lowering of the aquifers' level and water shortage due to the evolution of the aquatic ecosystem in the area.

A significant project of road infrastructure is developing in the area of Golăiești commune, in the neighbourhood of the natural protected area Cotul Bran on the Prut River, aiming to build a new road connection between Romania and the Republic of Moldova. The project includes a bridge over the Prut River and road sectors that will connect the highway Târgu Neamț – Iași – Ungheni and the national road M14 Criva – Briceni – Chișinău – Tiraspol. On the territory of the Republic of Moldova, this road infrastructure project has no impact on a natural protected area. On the Romanian side, one sector of the connection road endangers the natural protected area Cotul Bran on the Prut River, one of the last reproduction refuge for the fish species from the watercourse of the Prut River on the Iași County territory. The first presented environmental impact study has not identified an alternative technical solution to eliminate this risk and has not assessed the collision risk for the fauna present on the territory of protected areas in this perimeter.

4. CONCLUSIONS

During two years of monitoring, we identified 117 bird species in the sector Golăiești – Cotul Bran, located in the common meadow area of the Jijia and Prut Rivers, part of the territory of two Natura 2000 sites: ROSCI0123 Prut River, respectively ROSPA0163 Prut River, including the natural protected area Cotul Bran on the Prut River. We recorded the highest diversity of bird fauna inside the woodlands despite the small surfaces covered by forests in the investigated area.

The typical bird species for wetlands and aquatic ecosystems present low specific diversity and small populations, appearing especially during the autumn migration time. Their suitable habitats are present in the perimeter of the former meanders of the Old Jijia River that remained after the hydrotechnic regularisation of the Jijia River, mostly located inside the villages.

In our list of bird fauna, 77 bird species form the regular breeding bird fauna and other six bird species are probably or at least irregular breeding species on the territory of Golăiești commune, including the perimeter of the natural protected area Cotul Bran on the Prut River.

Between the recorded bird species, 21 species appear in Annex 1 of the Birds' Directive as species that need special conservation measures to prevent their extinction on the European Union territory.

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During our field activity we met 12 bird species included in the Red Book of Vertebrates from Romania as critically endangered species (one), endangered species (four) or vulnerable species (seven). Other vertebrate species included in this national red list are present on this territory: three fish species, one amphibian species, one reptile species and three mammal species.

The anthropogenic risk factors correlated with the activity of local community present low level of impact for the bird fauna and biodiversity from the region. The climate changes and the projects of infrastructure in the area (highway, roads and bridges) represent the main factors of risk identified for the biodiversity as a whole in the sector Golăiești – Cotul Bran. A correct assessment of the risks is important to find the best technic solutions and to minimize the development impact of this type of projects in this sensitive area.

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(Tofănescu Diana-Roxana) ROMANIAN ORNITHOLOGICAL SOCIETY (SOR/BIRDLIFE ROMANIA) - IAȘI
BRANCH

(Gache Carmen) FACULTY OF BIOLOGY, UNIVERSITY “AL. I. CUZA” FROM IAȘI, ROMANIA