

## ASPECTS ON THE BREEDING SEASON OF BIRD FAUNA IN THE ROSPA0063 RESERVOIRS BUHUŞI-BACĂU-BEREŞTI (ROMANIA)

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**Abstract.** Our ornithological study ran from May 2011 until August 2016 in the perimeter of the five lakes that form the territory of ROSPA0063 Reservoirs Buhuș - Bacău - Berești (Lilieci, Bacău, Galbeni, Răcăciuni and Berești) and on the Gârlești reservoir from the vicinity of the Nature 2000 site. In the present note, we focus on the diversity of breeding bird species in the area. The list of breeding bird fauna include 102 regular breeding species, other five being irregular breeding species (*Anser anser*, *Recurvirostra avosetta*, *Himantopus himantopus*, *Haematopus ostralegus* and *Podiceps nigricollis*), while one could probably breeds in the vicinity of this territory using it like feeding area (*Haliaeetus albicilla*). The suitable habitats cover large, but different surfaces, on the territory of all six investigated reservoirs. Despite this, the breeding effectives of bird species present low values due to large and frequent oscillations of water level, sometimes with huge flooding phenomena in the area and high anthropogenic pressure (especially fishing poaching).

**Keywords:** bird fauna, breeding, Nature 2000, climate, anthropogenic impact.

**Rezumat. Aspecte ale sezonului de cuibărit al ornitofaunei în ROSPA0063 Lacurile de acumulare Buhuș-Bacău-Berești (România).** Studiul nostru ornitologic s-a desfășurat începând din mai 2011 până în august 2016, în perimetru celor cinci lacuri de acumulare ce formează teritoriul ROSPA0063 Lacurile de acumulare Buhuș - Bacău - Berești (Lilieci, Bacău, Galbeni, Răcăciuni și Berești) și a acumulării Gârlești, din vecinătatea sitului Natura 2000. În această notă, urmărим diversitatea speciilor de păsări clocitoare în acest teritoriu. Lista avifaunei reunește 102 specii clocitoare constante în acest teritoriu, alte cinci specii fiind clocitoare neregulate (*Anser anser*, *Recurvirostra avosetta*, *Himantopus himantopus*, *Haematopus ostralegus* și *Podiceps nigricollis*), în timp ce o specie ar putea cuibări în vecinătatea acestui teritoriu folosit ca zonă de hrănire (*Haliaeetus albicilla*). Habitatele favorabile acoperă suprafețe largi, dar diferite, pe suprafața celor șase lacuri luate în studiu. În ciuda acestui aspect, efectivele păsărilor clocitoare sunt mici ca urmare a oscilațiilor ample și frecvente ale nivelului apei, asociate uneori cu viituri majore în acest perimetru și cu presiunea antropică ridicată (în special, braconajul piscicol).

**Cuvinte cheie:** avifaună, cuibărit, rețea Natura 2000, climat, impact antropic.

### INTRODUCTION

Part as the Nature 2000 network (HG no. 1284/2007), the ROSPA0063 Reservoirs Buhuș - Bacău - Berești present the geographic coordinates  $46^{\circ}14'50''$  northern latitude and  $27^{\circ}7'12''$  eastern longitude. The site covers a surface about 5575.5 hectares and includes five reservoirs: Lilieci, Bacău, Galbeni, Răcăciuni and Berești, all of them situated around the confluence of Bistrița and Siret Rivers. These lakes receive the waters of some tributaries from middle sector of Siret River basin: Răcatău, Marvila, Rogoaza and Racova.

The Lilieci reservoir is located in the minor bed of the Bistrița River, has a length of about 4 kilometres and a surface of about 338.8 hectares. The left bank of this lake is high and steep, with the northern middle part covered by some trees and bushes. The edge of the lake appears like one mosaic of vegetation comprising grasslands with bushes, open waters and canals, large compact reed beds with sedges (*Carex* sp.), rushes (*Schoenoplectus lacustris* and *Juncus* sp.) and osiers (*Salix* sp.). In the same area, is present one large island covered by a meadow forest formed by willows (*Salix* sp.) and poplars (*Populus alba*), surrounded by shrubs and red beds. There are some stumps of trees and mounds of pebble near reed beds, surrounded by open waters. This lake shelters one high diversity and large groups of bird species during the whole year.

The Bacău reservoir is located in the minor bed of Bistrița River too, inside the north-eastern part of Bacău city. It has a length of about 2.3 kilometres, covering a surface of about 216.9 hectares. The suitable habitats for birds are present in the edge of lake, but also on the north-eastern and north-western banks. There exist one island covered by a meadow forest with old willow and poplar trees, large compact reed beds with sedges and rushes, grassland with shrubs, open waters and canals.

The Galbeni reservoir, situated in the area of confluence between Bistrița and Siret Rivers, is the third lake in size from the Nature 2000 site: 6.3 kilometres in length and a surface of about 1063.8 hectares. The north-eastern part represents the former natural reserve Balta Albastră. The suitable habitats for birds cover about half of the whole surface: open waters and canals, large compact reed beds with sedges, rushes, willows and osiers (*Salix* sp.), small islands formed by pebble.

The Răcăciuni reservoir is located in minor bed of Siret River, covering a surface of about 1702.4 hectares, with a length of about 13 kilometres. In the northern middle part of the lake, the eastern (left) bank is very high and partially steep. This section of lake is silted and covered with large compact reed beds with osiers, while in the southern limit of it, there exists some islands of pebble and clay. A large deciduous forest, with trees of different ages, is present in the north-eastern side of this lake.

The Berești reservoir is located in minor bed of Siret River, too, being the largest from the site with a length of about 15 kilometres and a surface of about 2253.7 hectares, but only the northern third part of the lake has

ornithological interest, where the left bank is also high and near steep, covered by grasslands and shrubs. This section is like one huge mosaic of compact reed beds, canals and open waters, with some islands with grasslands and willows. In the edge of the lake, there are present canals and compact reed beds areas, large but narrow islands formed by pebble, sand and clay, respectively, some islands with high clay banks and covered by willows and different shrubs. The lake is under a very high risk of silting phenomenon.

One small reservoir, Gârleni Lake, is not part of the Nature 2000 site, but has ornithological importance in the area. Situated in the minor bed of the Bistrița River and about 4.5 kilometres distance from the Lilieci reservoir, this lake cover about 200 hectares and is subject to a strong silting phenomenon. In front of the dam is present one large open water area, the rest pf perimeter being a mosaic of canals, compact reed beds and one meadow forest with willows and some poplars, shrubs and grasslands.

The climate is temperate-continental, winter is long and very cold, while summers are hot and dry. The average annual temperature is 9 °C and the average annual rainfalls are about 500 - 550 millimetres. The dominant winds from the south-eastern, north-western and north-eastern directions. The flooding risk is very high in early summer (especially in June).

Ornithological data in this area are available starting from the early '70s (RANG, 2002), while a focused study of the aquatic bird fauna from the reservoir was performed in the late '90s (FENERU, 2002), data about the ornithological importance of the area being included in some synthesis works (MUNTEANU, 2004 and PAPP & FÂNTÂNĂ, 2008). MÜLLER et al. (2005) and GACHE (2012) did more recent evaluations on the status of bird' fauna from this area.

The Nature 2000 site has a management plan and one custodian who implements this plan – the Regional Centre of Ecology Bacău (CRE Bacău). All the field investigation work was carried out with the large logistical support of the custodian, like component of bird species' monitoring activities in the management plan.

## METHODS AND PERIOD OF STUDY

Our field investigations on the birds' fauna from the ROSPA0063 Reservoirs Buhuși – Bacău - Berești began in May 2011 in the perimeter of Bacău, Galbeni and Răcăciuni lakes, but starting from January 2012, we included the whole territory of the Nature 2000 site in our study. Beginning with January 2015, we included also the reservoir Gârleni in our field investigation.

In this paper we present the results of one focused monitoring on the breeding season of bird fauna developed during the period 2011 – 2014 and in 2016, the area being visited twice per month. The monitoring of birds was done using the methods of transect and fixed points, following the western and northern bank for the Lilieci, Bacău, Galbeni, Răcăciuni and Berești reservoirs, respectively, the eastern bank for the Bacău reservoir, while for the Gârleni reservoir, our transect followed the northern and eastern banks. In year 2014 and 2016, we included the observation by boat trips that allowed us to obtain a better image on the breeding season of bird species inside the perimeter of these large reservoirs.

We identify the birds (BRUUN et al., 1999) through direct observation by binoculars (Pentax 10x42 DCF HRc and Olympus 8-16x40) and telescope (HAKUBA 40x70). We aimed estimating the bird populations, too, by counting each bird from the small groups and used quantitative evaluation in band for the groups or flocks larger than 200 individuals. We used calling activity in order to identify and estimate the populations of passerines from the reed beds, the crepuscular and nocturne bird species. In the analysis of our results, we are using SIBLEY & AHLQUIST taxonomic system (1995) with subsequent additions and modifications (<http://avibase.bsc-eoc.org/>).

## RESULTS AND DISCUSSIONS

As it results from the official presentation of the Nature 2000 site ROSPA0063 Reservoirs Buhuși – Bacău – Berești, this territory offers suitable habitats and rich feeding territories for the birds, especially in migration and wintering period, through the richness and diversity of vegetation and fauna. During the migration time, the Nature 2000 site shelters groups of more than 20,000 aquatic bird species, while during winter, thousands of waterfowls were found in the area (GACHE, 2012). The first data on the breeding season of bird species in the perimeter of these six reservoirs appeared in the late 90s and small breeding populations are noticed, along with some interesting breeding presences like that of the tufted duck (*Aythya fuligula* Linnaeus 1758), previously mentioned just as a passage or wintering presence in Romania (FENERU, 2002).

The principal aims of our monitoring study were to evaluate the specific diversity and to estimate the breeding population of bird fauna, but also to identify the reason of the mentioned small breeding birds' population despite the large surfaces covered by suitable habitats on the territory of the Nature 2000 site.

During the period of study, we recorded 121 bird species (Table 1) that find suitable habitats during the breeding season in the area, but we must notice that not all these bird species are breeding in the area. Some of them are unusual presence in the area – for example, the appearance of one adult Dalmatian pelican (*Pelecanus crispus* Bruch 1832), flying from the south-eastern direction to the north on the 8<sup>th</sup> June 2016. We mention also the constant summer presence of adult red kites (*Milvus milvus* Linnaeus 1758) in the north-eastern part of Lilieci reservoir despite the absence of breeding suitable habitat there or in the nearest of this area.

Table 1. List of bird species in the perimeter of dam lakes around the confluence of Bistrița and Siret Rivers in the breeding season.

No.	Species	Breeding (pairs)	Presence (individuals)																
1.	<i>Perdix perdix</i>	-	-	8-11	6-8	-	-	3-4	3-5	4-7	3-7	2-4	3-5	-	-	-	-	-	-
2.	<i>Coturnix coturnix</i>	-	-	4-6	2-6	-	-	1-2	1-3	3-4	3-5	2-3	1-3	-	-	-	-	-	-
3.	<i>Phasianus colchicus</i>	3-4	3-5	3-5	2-9	1-2	2-7	2-3	2-5	2-3	2-8	4-7	4-11	-	-	-	-	-	-
4.	<i>Cygnus olor</i>	0-1?	8-64	-	48-352	1-2	4-156	5-6	78-345	-	28-42	7-8	8-156	-	-	-	-	-	-
5.	<i>Anser anser</i>	-	0-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6.	<i>Anas platyrhynchos</i>	6-7	24-62	7-11	18-318	5-9	12-72	15-18	14-92	8-10	56-96	6-12	36-114	-	-	-	-	-	-
7.	<i>Anas strepera</i>	3-5	14-28	6-8	5-56	1-2	5-17	6-8	6-18	3-6	7-21	7-8	8-18	-	-	-	-	-	-
8.	<i>Anas querquedula</i>	2-4	16-42	4-7	6-22	1-2	3-8	7-9	10-25	5-6	-	6-8	8-12	-	-	-	-	-	-
9.	<i>Anas clypeata</i>	-	0-14	-	0-8	-	-	-	0-4	-	0-14	-	-	-	-	-	-	-	-
10.	<i>Aythya ferina</i>	4-5	7-56	5-8	14-65	1-2	6-11	10-13	24-56	4-5	7-82	3-5	8-22	*	*	*	*	*	*
11.	<i>Aythya nyroca</i>	1-2	6-12	1-2	3-12	-	-	2-3	6-19	1-2?	3-10	3-5	7-18	-	-	-	-	-	-
12.	<i>Aythya fuligula</i>	-	0-14	-	0-36	-	-	0-10	-	-	-	-	-	-	-	-	-	-	-
13.	<i>Phalacrocorax carbo</i>	1-2?	5-38	2-3	2-48	-	0-5	0-35	12-62	-	2-48	1-3	7-16	-	-	-	-	-	*
14.	<i>Microcarbo pygmaeus</i>	-	-	-	0-2	-	-	-	-	-	-	-	-	-	-	-	-	-	*
15.	<i>Pelecanus crispus</i>	-	-	-	-	-	-	0-1	-	-	-	-	-	-	-	-	-	-	*
16.	<i>Bonasa umbellus</i>	1-2	1-3	0-1?	0-2	1-2	2-4	2-3	2-4	0-1?	0-1	3-5	2-4	*	*	*	*	*	*
17.	<i>Ardeola ralloides</i>	-	-	0-1?	0-2	0-1?	0-1	1-2?	1-3	0-1?	0-2?	0-3	*	*	*	*	*	*	*
18.	<i>Ixobrychus minutus</i>	2-3	3-7	4-7	2-8	2-3	3-12	5-6	4-11	4-5	3-6	8-12	5-13	*	*	*	*	*	*
19.	<i>Nycticorax nycticorax</i>	-	1-2	1-2	2-7	4-5	6-11	1-2	1-8	-	-	1-2	3-10	*	*	*	*	*	*
20.	<i>Fregata gullifera</i>	3-4?	2-22	-	5-12	0-2?	5-7	4-5	13-54	-	2-11	2-3	3-32	*	*	*	*	*	*
21.	<i>Ardea alba</i>	5-6?	4-32	-	3-32	0-1?	1-3	-	4-8	-	2-6	-	2-11	*	*	*	*	*	*
22.	<i>Ardea cinerea</i>	4-5?	3-17	-	4-7	0-1?	2-5	2-3	3-14	-	1-6	1-2	3-13	-	-	-	-	-	*
23.	<i>Ardea purpurea</i>	1-2?	3-7	-	1-3	1-2	3-5	1-2	2-7	1-2?	2-5	1-3	2-7	*	*	*	*	*	*
24.	<i>Platalea leucorodia</i>	-	-	-	-	-	-	-	-	0-52	-	-	-	-	-	-	-	-	*
25.	<i>Ciconia ciconia</i>	-	-	-	-	-	-	-	156-307	-	0-149	-	2-162	*	*	*	*	*	*
26.	<i>Haliaeetus albicilla</i>	-	-	-	-	-	-	0-1?	0-1	-	-	-	-	-	-	-	-	*	
27.	<i>Buteo buteo</i>	-	-	-	-	0-2	-	1-2	1-3	-	-	1-2	1-2	*	*	*	*	*	*
28.	<i>Milvus milvus</i>	-	-	0-1	-	-	-	-	-	-	-	-	-	*	*	*	*	*	*
29.	<i>Milvus migrans</i>	-	-	0-1	-	-	-	-	-	-	-	-	-	*	*	*	*	*	*
30.	<i>Circus aeruginosus</i>	0-1	0-2	0-1	0-3	2	2-4	2-3	2-5	1-2	1-3	1-2	2-4	*	*	*	*	*	*
31.	<i>Circus pygargus</i>	-	-	-	-	0-1?	1-2	1-2	1-3	-	-	-	0-1	*	*	*	*	*	*
32.	<i>Falco subbuteo</i>	-	-	0-1?	1-3	-	-	1-2	1-4	1-15	-	-	-	-	-	-	-	-	*
33.	<i>Falco tinnunculus</i>	-	-	2-5	3-10	3-4	3-11	8-10	6-31	7-8	1-2	10-11	4-23	-	-	-	-	-	*
34.	<i>Gallinula chloropus</i>	4-5	3-12	2-6	26-186	8-11	16-72	18-20	12-138	8-10	9-56	12-18	22-132	-	-	-	-	-	*
35.	<i>Fulica atra</i>	6-8	8-38	8-11	-	-	-	12-14	24-88	11-12	16-136	20-22	23-72	-	-	-	-	-	*
36.	<i>Panellus vanellus</i>	-	-	-	-	-	-	-	-	-	0-9	-	0-8	-	-	-	-	-	*
37.	<i>Haematopus ostralegus</i>	-	-	-	-	-	-	-	-	0-14	-	0-6	*	*	*	*	*	*	*
38.	<i>Charadrius dubius</i>	-	-	-	-	1-2	2-5	3-7	4-12	2-3?	-	2-4	2-6	-	-	-	-	-	*
39.	<i>Limicola falcinellus</i>	-	-	-	-	-	-	-	-	0-12	-	-	-	-	-	-	-	-	*
40.	<i>Tringa ochropus</i>	-	0-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*
41.	<i>Tringa glareola</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*
42.	<i>Tringa nebularia</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*
43.	<i>Tringa stagnatilis</i>	-	-	-	-	-	-	-	-	-	0-6	-	-	-	-	-	-	-	*
44.	<i>Recurvirostra avosetta</i>	-	-	-	-	-	-	-	-	0-1?	0-2	-	0-3?	4-8	*	*	*	*	*
45.	<i>Himantopus himantopus</i>	-	-	-	-	-	-	0-2?	0-6	-	-	-	-	-	-	-	-	-	*

46.	<i>Larus cachinnans</i>	-	7-18	8-10	8-18	2-4	5-26	12-18	8-71	8-10	6-67	8-12	8-34	-
47.	<i>Chroicocephalus ridibundus</i>	-	16-52	12-28	24-52	75-80	56-162	33-35	26-286	12-14	8-278	16-22	12-92	-
48.	<i>Chlidonias hybrida</i>	-	12-28	14-16	14-34	46-65	32-108	28-37	16-46	13-14	16-42	8-18	18-44	*
49.	<i>Chlidonias niger</i>	-	0-32	-	0-82	-	-	0-5?	2-26	0-3?	0-24	0-5?	-	*
50.	<i>Sterna hirundo</i>	-	12-32	13-19	22-38	5-10	10-17	32-49	32-76	14-15	18-26	15-56	18-32	*
51.	<i>Podiceps cristatus</i>	2-3	4-12	7-8	12-32	6-8	11-15	5-6	10-28	5-8	3-16	5-7	7-19	-
52.	<i>Podiceps grisegena</i>	0-1	1-3	-	-	-	-	-	-	0-1?	0-2	-	-	-
53.	<i>Podiceps nigricollis</i>	-	-	-	-	-	-	1-2?	0-22	2-4?	0-9	-	-	-
54.	<i>Tachybaptus ruficollis</i>	0-1	1-4	-	-	0-1?	1-2	0-2?	0-5	1-2?	0-3	0-3?	0-4	-
55.	<i>Columba palumbus</i>	1-2	3-17	3-4	4-18	2-3	2-5	3-5	4-21	6-7	4-36	2-4	1-18	-
56.	<i>Streptopelia turtur</i>	-	2-3	3-7	1-2	2-3	2-3	3-8	12-14	10-32	1-2	2-7	-	-
57.	<i>Streptopelia decaocto</i>	2-3	4-11	8-10	9-32	4-5	4-11	8-10	6-28	6-7	5-16	5-6	6-21	-
58.	<i>Cuculus canorus</i>	3-4	6-7	8-12	10-13	6-7	5-8	13-17	15-18	18-20	8-19	18-20	18-22	-
59.	<i>Alcedo atthis</i>	1-2	1-3	-	-	-	-	-	-	-	1-2	2-3	*	-
60.	<i>Merops apiaster</i>	-	-	15-18	16-42	-	-	-	2-16	19-23	21-45	-	12-35	-
61.	<i>Coracias garrulus</i>	-	-	-	-	-	-	-	-	-	-	0-22?	0-3	*
62.	<i>Upupa epops</i>	1-2	1-4	1-2	1-3	-	-	1-2	1-5	3-5	2-6	1-2	0-4	-
63.	<i>Dendrocopos major</i>	-	2	2-3	1-2	3-5	2-3	4-5	3-6	12-14	8-15	0-1	1-2	-
64.	<i>Dendrocopos syriacus</i>	1-2	1-4	2-3	3-5	3-5	3-5	3-4	2-5	3-5	3-6	1-2	2-3	*
65.	<i>Oriolus oriolus</i>	2-3	3-6	3-5	4-7	3-5	4-11	5-7	6-13	14-15	12-28	3-5	5-8	-
66.	<i>Lanius collurio</i>	3-4	3-14	4-5	4-17	1-2	2-7	2-3	3-11	7-8	5-26	2-3	3-14	*
67.	<i>Lanius minor</i>	1-2	1-4	2-3	3-7	-	0-2	1-2	2-10	4-5	5-12	-	0-3	*
68.	<i>Pica pica</i>	-	2-11	28-30	32-46	4-5	8-18	7-8	8-17	4-5	7-17	3-4	4-15	-
69.	<i>Corvus glandarius</i>	-	-	1-2	2-7	1?	2-4	2-3	1-6	5-6	3-21	-	-	-
70.	<i>Corvus monedula</i>	-	2-5	4-17	2-3	2-7	5-7	4-18	8-9	6-32	1-2	0-6	-	-
71.	<i>Corvus frugilegus</i>	-	3-36	-	13-28	-	2-12	-	8-87	-	2-32	-	3-43	-
72.	<i>Corvus cornix</i>	-	1-7	-	7-11	-	0-6	2-3	3-9	3-5	5-11	1-2	2-5	-
73.	<i>Corvus corax</i>	-	-	-	0-2	-	-	-	-	1-2	1-4	-	-	-
74.	<i>Calerida cristata</i>	2-3	4-7	5-6	6-9	1-2	1-5	4-5	2-12	8-12	7-15	7-10	5-13	-
75.	<i>Alauda arvensis</i>	8-11	10-14	16-18	17-24	2-3	1-7	12-14	13-21	14-16	11-23	12-13	14-23	-
76.	<i>Hirundo rustica</i>	-	42-78	-	32-68	-	22-56	-	32-118	-	58-92	-	21-86	-
77.	<i>Delichon urbicum</i>	-	12-38	-	12-26	-	12-32	-	9-34	-	12-45	-	5-34	-
78.	<i>Riparia riparia</i>	62-125	126-320	92-234	180-530	85-152	170-380	98-420	100-360	92-230	120-675	132-340	270-840	-
79.	<i>Phylloscopus collybita</i>	3-4	4-6	4-5	6-11	3-4	5-11	7-8	10-18	18-20	16-24	2-3	3-5	-
80.	<i>Phylloscopus sibilatrix</i>	1-2	2-3	1-2	0-3	1-2	1-3	4-5	3-9	4-6	2-11	1-2	0-3	-
81.	<i>Locustella naevia</i>	6-8	5-11	5-6	6-11	7-9	10-11	12-16	6-8	6-12	10-12	11-22	-	-
82.	<i>Acrocephalus scirpaceus</i>	32-35	33-48	28-32	30-42	15-16	18-34	58-60	65-87	30-35	32-45	60-80	53-82	-
83.	<i>Acrocephalus arundinaceus</i>	23-25	24-37	18-25	20-32	18-20	18-26	50-52	54-65	28-32	30-42	50-60	45-78	-
84.	<i>Acrocephalus schoenobaenus</i>	12-14	9-18	10-14	9-18	8-10	9-22	22-26	24-34	18-20	20-26	32-35	28-35	-
85.	<i>Hippolais icterina</i>	-	-	1-2	1-4	1-2	1-3	2-3	2-5	5-7	4-8	1-2	1-4	-
86.	<i>Sylvia curruca</i>	1-2	2-4	1-2	1-3	2-3	2-6	5-6	4-11	7-8	8-15	2-3	3-9	-
87.	<i>Sylvia atricapilla</i>	1-2	2-7	1-3	2-9	1-2	1-5	4-5	6-11	6-8	9-13	1-2	1-4	-
88.	<i>Sylvia borin</i>	2-3	3-7	2-3	2-9	1-2	1-6	5-7	7-13	7-9	10-18	3-5	6-11	-
89.	<i>Sylvia communis</i>	3-4	5-11	4-5	7-13	3-5	2-6	7-9	9-15	9-12	8-19	4-5	6-12	-
90.	<i>Fanurus biarmicus</i>	14-16	18-48	13-15	20-52	16-18	-	32-35	28-72	18-20	32-76	24-30	-	-
91.	<i>Muscicapa striata</i>	-	2-3	3-8	1	0-4	2-3	1-8	3-5	2-8	1-2	0-5	-	-
92.	<i>Ficedula albicollis</i>	-	-	-	-	-	-	-	-	2-3	1-6	-	*	-
93.	<i>Oenanthe oenanthe</i>	1-2	3-7	2-3	3-8	-	-	2-3	1-9	2-3	4-11	4-5	3-14	-
94.	<i>Saxicola rubetra</i>	2-3	3-11	2-4	3-9	1-2	1-6	3-4	3-11	5-6	4-13	1-2	2-7	-

95. <i>Saxicola torquata</i>	1-2	1-5	1-2	1-4	1?	0-3	1-2	0-5	3-4	2-7	0-1	0-3	-
96. <i>Phoenicurus phoenicurus</i>	-	-	1-2	1-5	1	1-4	1-3	2-7	4-5	4-12	0-1	0-5	-
97. <i>Phoenicurus ochruros</i>	-	-	2-4	1-7	2-3	1-7	4-6	3-11	5-7	4-14	1-2	1-7	-
98. <i>Erythacus rubecula</i>	2-3	3-7	5-6	3-11	1-2	1-4	2-3	3-5	8-12	3-18	1-2	1-8	-
99. <i>Luscinia luscinia</i>	3-5	3-4	3-5	2-3	2-5	5-8	5-9	14-16	15-17	3-5	4-6	-	-
100. <i>Turdus merula</i>	3-4	6-13	3-4	5-19	2-3	4-7	4-5	7-21	8-12	10-26	2-4	2-9	-
101. <i>Turdus philomelos</i>	5-6	7-22	8-10	9-24	4-5	6-14	8-10	9-35	14-18	15-32	5-6	5-17	-
102. <i>Sturnus vulgaris</i>	15-18	32-520	21-23	38-470	22-24	32-280	32-35	42-318	32-40	54-1320	22-25	46-630	-
103. <i>Sitta europaea</i>	2-3	3-7	3-5	5-11	2-3	3-6	5-7	11-22	10-13	14-34	2-3	3-9	-
104. <i>Troglodytes troglodytes</i>	-	-	3-5	2-5	-	-	1-2	0-3	4-6	3-7	-	-	-
105. <i>Parus major</i>	4-5	7-19	5-6	5-15	6-8	7-18	12-14	15-28	28-32	32-38	3-4	5-13	-
106. <i>Oenanthes coeruleus</i>	1-3	2-5	2-3	3-7	1-2	2-5	3-4	4-7	10-12	8-15	1-2	0-5	-
107. <i>Remiz pendulinus</i>	5-6	6-18	3-5	4-11	2-3	3-9	4-6	5-8	2-3	2-7	3-5	5-9	-
108. <i>Fassier domesticus</i>	8-10	16-94	25-30	32-198	50-60	78-173	80-100	92-178	65-70	87-156	30-35	56-118	-
109. <i>Fassier montanus</i>	12-13	18-56	13-15	21-42	10-12	14-38	32-38	28-36	42-45	38-79	14-16	18-42	-
110. <i>Anthus campestris</i>	5-6	7-18	4-6	3-16	1-2	2-6	2-4	3-16	5-7	4-17	3-5	4-22	*
111. <i>Motacilla flava</i>	6-8	9-32	5-6	5-28	2	3-7	6-8	11-21	3-4	5-21	5-8	12-32	-
112. <i>Motacilla alba</i>	3-4	6-21	3-5	7-31	2	4-9	3-5	7-23	7-8	7-23	5-7	8-35	-
113. <i>Fringilla coelebs</i>	2-4	4-11	7-8	8-26	8-9	9-21	11-13	15-48	24-26	25-42	-	-	-
114. <i>Coccothraustes</i>	1-2	2-6	2-3	3-5	1-2	2-5	2-3	3-7	8-10	9-13	-	-	-
115. <i>Serinus serinus</i>	-	-	1-2	1-3	-	-	1-2	1-8	4-6	3-9	-	-	-
116. <i>Chloris chloris</i>	3-4	6-11	4-6	5-19	4-5	5-17	7-11	10-14	12-15	13-18	3-4	4-9	-
117. <i>Carduelis carduelis</i>	5-6	12-38	5-7	11-42	3-4	8-26	5-6	8-52	14-18	15-78	-	-	-
118. <i>Carduelis cannabina</i>	-	-	1-2	2-5	-	-	2-3	1-7	3-5	2-11	-	-	-
119. <i>Emberiza calandra</i>	4-6	8-25	4-5	6-17	2-3	3-5	6-8	10-18	10-12	11-21	5-8	7-15	-
120. <i>Emberiza schoeniclus</i>	6-7	11-34	6-8	7-24	3-5	4-11	18-20	21-25	12-15	12-28	14-18	17-22	-
121. <i>Emberiza citrinella</i>	0-1	1-3	3-4	5-13	2-3	2-6	4-5	5-11	8-10	10-15	3-4	2-7	-

The breeding effectives mentioned in the Table 1 represent the result of direct observation of the pairs on the nest or in mating display, of the pairs or females with offspring. We not exclude the possibility of underestimated effectives for the bird species that are living hidden and discrete inside the compact reed beds or shrubs. We notice also the large variation from one year to other of the breeding pairs' success in the area due the climate conditions (for example in 2016 breeding season) and to the high and constant human activity (especially in the perimeter of Galbeni, Răcăciuni and Berești reservoirs). The irregular breeding presences are marked by "?" in the table. Regarding the present effectives presented in this table, we give the minimum and maximum-recorded values for one daily field observation. The big effectives for some species are not related to the breeding activity, but with the migration time (in late April – early May, respectively, in late July – early August), when the birds use the area of the Nature 2000 site as a stopover territory to rest and feed.

Starting from the first year of field monitoring we noticed that the diversity of suitable habitats for the breeding birds is similar on the all lakes, but the surfaces covered by them are different from one reservoir to other, still appropriate for birds' breeding activity on the all of them. The water level presents very large oscillations from one lake to other and even from one month to the next, being correlated with the rainfall level. Last but not least, the level of anthropogenic pressure is a decisive factor in modelling the breeding bird fauna's diversity and effectives on the each of investigated reservoirs.

From the recorded 121 bird species on the territory of ROSPA0063 Reservoirs Buhuși – Bacău – Berești, the breeding bird fauna includes 102 regular breeding species using a high variety of suitable nesting habitats (reed beds, humid and dry grasslands, steep clay banks, trees, hollows and shrubs in the meadow forests). Other five bird species are irregular breeding species:

- the greylag goose (*Anser anser* Linnaeus 1758) was met just during the autumn migration, but we met one adult displaying territorial behaviour in the vicinity of the compact reed beds from the Gârleni reservoir, during one boat trip on the 23<sup>rd</sup> May 2016, the bird retreated into the reed bed just on the approach of our boat;

- the pied avocet (*Recurvirostra avosetta* Linnaeus 1758) appears as a breeding species in the basic report of Nature 2000 site's management plan. We met it with groups about 16 – 22 individuals during the emptying of the Bacău lake in the summer of 2011 for some hydrotechnic works. In the April 2016, we recorded one pair in mating display in the perimeter of one strip of pebble on the surface of the Răcăciuni reservoir;

- the black-winged stilt (*Himantopus himantopus* Linnaeus 1758) was recorded as a breeding species on the territory of Galbeni (one – two pairs) and Berești (three pairs) reservoirs during the breeding season in 2012 and 2013, respectively, two pairs on the sector of Siret River downstream of the dam of Răcăciuni reservoir;

- the oystercatcher (*Haematopus ostralegus* Linnaeus 1758) was observed first in May 2013, on the perimeter of the Galbeni reservoir, respectively, on the 21<sup>st</sup> June 2014, we met one pair displaying mimics of injury behaviour on one strip of pebble on the territory of Berești reservoir, one pair being recorded in the same area in early June 2016;

- the black-necked grebe (*Podiceps nigricollis* Brehm 1831) could try to breed in 2016 in the perimeter of Galbeni and Răcăciuni reservoirs.

In 2016, we must mention the constant summer presence, from May to July, of adult white tailed-eagles (*Haliaeetus albicilla* Linnaeus 1758) in the perimeter of forest from the eastern bank of the Răcăciuni reservoir, where we met adult and juveniles birds too, in the August 2016, but we did not find the nest in the area. Previously, we met this species just during the wintering time in the area – in the perimeter of Răcăciuni and Bacău reservoirs.

From the group of waterfowls, the mute swan (*Cygnus olor* Linnaeus 1758) present a good breeding population on the Nature 2000 site's territory, missing just on the Liliieci reservoir, despite the fact that here we met the largest summer non-breeding presence of this species – 352 individuals in 2016. Probably, these immature birds use the perimeter like feeding territory, avoiding the presence of the territorial breeding pairs of swans. We notice the increase of breeding effectives of mute swans from 2 pairs in 2011 to six pairs in 2016 on the territory of Galbeni reservoir, but also the presence of one pair that had nine offspring in 2014 and twelve offspring in 2016 in the perimeter of Berești reservoir. Between the duck species, we mention the slow increase of breeding effectives for *Anas strepera* Linnaeus 1758 and the breeding presence of *Aythya nyroca* Güldenstädt 1770, a globally threatened species, presenting the biggest breeding effectives in the perimeter of Berești reservoir. We cannot reconfirm the breeding presence of *Aythya fuligula*, mentioned before here (FENERU 2002).

The great cormorant (*Phalacrocorax carbo* Linnaeus 1758) was a constant presence during summer, but they did not breed in the area until 2013, coming here just to feed. In the breeding season of the year 2013, we met a breeding colony with about 35 nests built in the osiers from the southern part of Galbeni reservoir. The colony was present with just 27 nests in 2014 (probably, abandoned the eggs or even the offspring due the high level of fishing activity in the area) and disappeared in 2016, when we found small breeding effectives of great cormorants on the territory of Liliieci and Berești reservoirs.

The egret and herons group presents a good diversity, but small breeding effectives in the area and we found just one monospecific colony formed by five pairs of night herons (*Nycticorax nycticorax* Linnaeus 1758) in the spring of year 2016, on the northern side of island from the Bacău reservoir. We assume that one mixed colony including at least the species *Egretta garzetta* Linnaeus 1758, *Ardea alba* Linnaeus 1758 and *A. cinerea* Linnaeus 1758 could exist in the meadow forest from the territory of Gârleni Lake, where we met adult and juvenile birds but we could not reach this area by boat due the low level of waters. For the spoonbills (*Platalea leucorodia* Linnaeus 1758), we have just one

summer presence – on the 25<sup>th</sup> August 2011, we met a group of 52 individuals, including juvenile birds, feeding in the edge of Răcăciuni reservoir.

Among wader species, only two are constant breeding species in the area: *Vanellus vanellus* Linnaeus 1758 and *Charadrius dubius* Scopoli 1786. The gulls and terns (*Larus cachinnans* Pallas 1811, *Chroicocephalus ridibundus* Linnaeus 1766, *Sterna hirundo* Linnaeus 1758, *Chlidonias hybrida* Pallas 1811 and *C. niger* Linnaeus 1758) form breeding colonies of about tens of pairs on the all five lakes from the Nature 2000 site. The substrate on which they are building their nests is different from one reservoir to other: stumps of trees and mound of pebble on the Lilieci lake, strips of pebble, sand and clay on the lakes Galbeni, Răcăciuni and Berești, respectively, osiers and floating plants (*Scoenoplectus lacustris*) on the Bacău reservoir.

In the grebes group, we mention the breeding presence of *Podiceps grisegena* Boddaert 1783 in the perimeter of Gârleni Lake, where we met one pair with two offspring in late July 2016, but we cannot exclude the breeding in the perimeter of Răcăciuni Lake, too.

From the riparian bird species that dig nest-tunnels, we mention the breeding presence of kingfisher (*Alcedo atthis* Linnaeus 1758), bee-eaters (*Merops apiaster* Linnaeus 1758) and roller (*Coracias garrulus* Linnaeus 1758). The last one is a very rare breeding species in this part of Romania, two pairs being present in one mixed colony with 15 pairs of *Merops apiaster* and some tens pairs of *Riparia riparia* Linnaeus 1758 in the clay bank from the north-western part of Berești reservoir. The last species present a breeding population about 1300 pairs overall investigated territory, the largest colonies being recorded in the area of Lilieci, Galbeni, Răcăciuni and Berești reservoirs, but also in the sectors of Bistrița River (before the entry in Lilieci lake) and Siret River (around the confluence with Bistrița River).

Some breeding raptor species (Accipitriformes and Falconiformes) are also present, most of them with small effectives in the area due the high level of human pressure especially. As an exception, we mention the marsh harrier (*Circus aeruginosus* Linnaeus 1758) that presents a positive trend in the territory including by the appearance of two pairs in the northern part of Bacău reservoir, but also the common kestrel (*Falco tinnunculus* Linnaeus 1758). The last one forms a breeding colony in the sector that looks like a rocky cliff in the middle sector of the Răcăciuni reservoir, on the left high and steep bank. In 2014, we recorded the biggest number of pairs – 15, mostly having two offspring, but there were three nests with three offspring, one with four offspring and one with five offspring. In 2016, there were just 11 pairs, mostly of them having two offspring, just two having three offspring and one with four offspring, but also one with just one chick.

The passerines present a big specific diversity and breed in very different habitats: compact reed beds (warblers – *Acrocephalus* sp., *Panurus biarmicus* Linnaeus 1758 or *Emberiza schoeniclus* Linnaeus 1758), willows (*Remiz pendulinus* Linnaeus 1758), surrounding dry and humid grasslands (*Motacilla alba* Linnaeus 1758, *M. flava* Linnaeus 1758, *Anthus campestris* Linnaeus 1758, *Alauda arvensis* Linnaeus 1758), shrubs (*Lanius collurio* Linnaeus 1758 or *L. minor* Gmelin 1788). The greatest diversity of this group is present inside the meadow forest and in the deciduous forest from the north-eastern side of Răcăciuni reservoir.

The oscillations of the water level are the most important natural factor of risks for the breeding bird species on the territory of the Nature 2000 site ROSPA0063 Reservoirs Buhuși – Bacău – Berești. For example, during the breeding season of the year 2014, at the 21<sup>st</sup> June, we met the gulls and terns building new nests in order to lay the second clutch (double-clutching behaviour) on the territory of the Lilieci reservoir, first being removed by waters during the flooding phenomenon from the middle June in the area.

During the breeding season of the year 2016, this phenomenon disturbed the efforts of adult breeding birds twice, and some species losing the breeding season completely (riparian ones, like *Alcedo atthis* and *Riparia riparia* that lost their nests when the flood has broken the banks along large sectors of rivers and lakes). All the birds that use to build their nest on the ground (reed beds, floating vegetation, beaches and strips of pebble, different stumps of trees in the water), but also on young osier lost their nests and even their twice due the flooding phenomenon from the 25<sup>th</sup> – 26<sup>th</sup> May 2016, respectively, 20<sup>th</sup> – 21<sup>st</sup> June 2016.

For example, the grebes (*Podiceps* sp.) and the rails (*Fulica atra* Linnaeus 1758 and *Gallinula chloropus* Linnaeus 1758) lost the offspring recorded on the 23<sup>rd</sup> May, because they were too little in order to swim in high flood conditions. The same waters removed the nests of gull, terns and waders, washing completely the floating nests and the strips of pebble from the all investigated reservoirs. In the early June, we found the terns and gulls rebuilding their nests on the stumps of trees in Lilieci Lake perimeter, respectively, on the osier and rushes (*Scoenoplectus lacustris*) in the area of Bacău Lake. In the perimeter with osier from the western side of the last lake, we observed individuals of *Chroicocephalus ridibundus* stealing plants of *Scoenoplectus lacustris* from the nests of *Chlidonias hybrida*, trying to build more solid nests. However, the birds lost once again the nests and clutches during the second flooding phenomenon. The gulls and the common tern (*Sterna hirundo*) abandoned completely the breeding activity on the Lilieci reservoir, while the whiskered tern (*Chlidonias hybrida*) moved on the western side of this lake, building new nest on the floating plants and forming a mixed breeding colony with grebes (*Podiceps cristatus* Linnaeus 1758). Nor on the Bacău reservoir, the situation was better – the birds began to build the third nests, but the breeding effectives decrease to the third part of recorded values in middle May.

From the riparian bird species, just the bee-eaters (*Merops apiaster*) succeeded in breeding and just the pairs that organised their colonies in the high and more solid eastern banks of Lilieci and Răcăciuni reservoirs. All the other colonies were lost due to the complete break and collapse of banks on a width of 1 – 1.5 metres.

Regarding the wader species, just those that built their nests at some distance from the banks of lakes succeeded in breeding: *Vanellus vanellus* and *Himantopus himantopus*.

Starting from the late spring of 2014, the level of human pressure increased obviously, especially in the southern part of the Nature 2000 site, with strong impact on the breeding bird fauna from this territory. The most important risk factors generated by the local community in the area are the fishing activity, the extraction of osiers and the grazing activity.

Sport fishing, but also fishing poaching can reach very high values, especially in the perimeter of the Galbeni, Răcăciuni and Berești reservoirs. For example, on the 22<sup>nd</sup> June 2014, we estimated a presence of at least 420 sport anglers and at least 60 boats sailing on the surfaces of these three lakes. Even more, we took out from the waters kilometres of fishing nets in the same area, the biggest one being more than 2000 metres long, stretched as a zigzag mesh in the perimeter of the former breeding colony of cormorants (*Phalacrocorax carbo*) from the perimeter of Galbeni reservoir. The fish poaching activity disturbs the waterfowls feeding in the area and places the diving ducks (like *Aythya sp.*) at risk of death by swimming to exhaustion and drowning, being caught in the abandoned immersed nets. Also, fish poachers and sport anglers have laid out large corridors inside the compact reed beds in order to facilitate their access in the areas where they cannot be observed easily by the mixed patrols formed by the gendarmerie and custodians of the Nature 2000 site. This situation is present in all the reservoirs, Lilieci, Galbeni, Răcăciuni and Berești, disturbing the breeding birds in the area, but also causing a fragmentation of suitable habitats.

The extraction of osiers in order to manufacture and market different gardening props, especially from the territory of Galbeni and Răcăciuni reservoirs, disturbs the breeding birds present in the area, but also makes this important habitat completely unsuitable for the nests' building.

The herds of sheep and goats are a constant presence in the proximity of the Lilieci and Bacău lakes, sometimes using the grasslands, the rushes and the sedges areas from the edge of the lakes disturbing the birds that can breed in these habitats. We also mention the abandon of domestic animal carcasses (especially, cattle, horse and pigs) in the waters of lakes, mostly seen in the area of Galbeni Lake.

From our list of bird fauna, 30 bird species appear in Annex 1 of Birds Directive (2009/147/EC), being species that need special conservation measures concerning their habitats in order to ensure their survival and the reproduction in their distribution range. From these, 23 are breeding species on of the Nature 2000 site ROSPA0063 Reservoirs Buhuși – Bacău – Berești a, mostly with small number of pairs.

Finally, we mention the breeding presence of some bird species included in the Red Book of Vertebrates from Romania (BOTNARIUC & TATOLE, 2005) with three different threatening statuses: one critically threatened species (*Haliaeetus albicilla*), 7 threatened species (*Egretta garzetta*, *Ardea alba*, *A. purpurea* Linnaeus 1766, *Haematopus ostralegus*, *Recurvirostra avosetta*, *Himantopus himantopus* and *Corvus corax* Linnaeus 1758), respectively, 5 vulnerable species (*Aythya nyroca*, *Ardeola ralloides* Scopoli 1769, *Nycticorax nycticorax*, *Streptopelia turtur* Linnaeus 1758 and *Upupa epops* Linnaeus 1758).

## CONCLUSIONS

During our study, we recorded 121 bird species with summer presence on the territory of the Nature 2000 site ROSPA0063 Reservoirs Buhuși – Bacău – Berești.

The breeding bird fauna includes 102 regular breeding species, other 5 being probably or irregular breeding species, mostly of them with small breeding effectives in the area despite the large surfaces covered by suitable habitats.

In our list of bird fauna, we mention 30 bird species that appear in Annex 1 of Birds Directive, respectively, 13 bird species that are included in the Red Book of Vertebrates from Romania with three different threatening statuses: one critically threatened species, 7 threatened species and 5 vulnerable species.

The most important risk factors for birds are the frequent oscillations of water level, including the flooding phenomenon, fishing activities, osier extraction and grazing activity.

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