

THE CURRENT STATUS OF THE DIVERSITY OF BIRD FAUNA ON THE GÂRLeni RESERVOIR (ROMANIA) AS POTENTIAL PART OF NATURA 2000 NETWORK

GACHE Carmen

Abstract. This ornithological study presents data on the diversity of bird species recorded on the territory of Gârleleni Reservoir, on the lower sector of Bistrița River, starting from the winter of 2014-2015 until the winter of 2021-2022. We identified 151 bird species, part of them being vagrant species with only one or two observations in the area during our study. We also present quantitative data for the observed bird species. The typical forest species and passerines are dominant by diversity but the aquatic birds present significant populations all time during the year. We notice the relevance of this territory as a breeding site, a migration stopover point and a wintering area for the bird fauna in the lower sector of the Bistrița River, emphasizing the importance of connecting it with the neighbouring ROSPA0063 Buhuși – Bacău – Berești Reservoirs. We identified 30 bird species that appear in Annex 1 to the Birds Directive, respectively, 18 bird species included in the Romanian Red Book of Vertebrates during our monitoring activity in the investigated perimeter. Our study supports the importance of including this perimeter in the Natura 2000 Romanian Network, as an individual site or as a part of the ROSPA0063 Buhuși – Bacău – Berești Reservoirs.

Keywords: bird fauna, Gârleleni reservoir, Natura 2000 network, Bistrița River.

Rezumat. Starea actuală a diversității ornitofaunei pe lacul de acumulare Gârleleni (România), ca posibilă parte componentă a rețelei Natura 2000. Acest studiu ornitologic prezintă informații privind diversitatea avifaunei inventariate pe teritoriul lacului de acumulare Gârleleni în perioada de timp cuprinsă între iarna anului 2015-2016 și cea a anului 2021-2022. Am identificat 151 de specii de păsări, unele fiind specii accidentale, cu doar una sau două semnalări în acest teritoriu de-a lungul perioadei de studiu. Am înregistrat prezența a 62 de specii de păsări clocitoare, alte 11 fiind specii care cuibăresc neregulat sau sunt probabil clocitoare în acest teritoriu. De asemenea, prezentăm și date cantitative pentru speciile de păsări inventariate. Ca diversitate, speciile tipice pentru ecosistemul forestier și paseriformele sunt dominante, dar păsările acvatice prezintă efective importante de-a lungul anului. Subliniem importanța acestui perimetru ca teritoriu de cuibărit, loc de popas pe durata migrației și cartier de iernare pentru păsări în sectorul inferior al Bistriței, având legături strânse cu situl ROSPA0063 Lacurile de acumulare Buhuși – Bacău – Berești, din apropiere. De-a lungul activității noastre de monitorizare în acest teritoriu, am identificat 30 de specii incluse în Anexa 1 a Directivei Păsări, respectiv 18 de specii de păsări incluse în Cartea Roșie a Vertebratelor din România. Studiul nostru susține importanța includerii acestui perimetru în Rețeaua Natura 2000 din România ca sit individual sau ca parte a sitului ROSPA0063 Lacurile de acumulare Buhuși – Bacău – Berești.

Cuvinte cheie: avifaună, lacul de acumulare Gârleleni, rețea Natura 2000, Bistrița.

INTRODUCTION

Developed as hydro-technical arrangements along the lower sector of the Bistrița River during the period 1959 – 1965, downstream of Buhuși-Racova, the Gârleleni reservoir is located in the neighbourhood of the northern limit of the ROSPA0063 Reservoirs Buhuși – Bacău – Berești at about 4.5 kilometres (km) to the north-west of the Lilieci Reservoir (Fig. 1). This reservoir presents the geographic coordinates 46°67'82'' northern latitude and 26°77'63'' eastern longitude, and is part of the code area 10kmE559N276 in the projection system Lambert Azimuthal Equal Area (10x10 km ETRS89 LAEA) – Fig. 1.

From Bacău, the access to the reservoir's area is done on the national road DN 15 towards Buhuși, following the county road DJ159 to Racova village, respectively DJ207 towards the Gura Văii village and a communal road along the supply canal to the dam.

The climate is temperate-continental, with eastern and Arctic influences. Winters are generally long and very cold while summers are hot and dry, but in the last decade - in the context of the global climate change - the winters became strong in middle January, while the snow and ice-bed disappear only in the middle or even in the last decade of March. The average annual temperature is 9 °C; the average annual rainfalls are about 500 - 550 millimetres. The dominant winds come from the south-eastern, north-western and north-eastern directions. We notice the high incidence of the flooding phenomenon in early summer, especially in May-June and the severe drought starting from late July until middle October.

The Gârleleni reservoir covers about 233.5 hectares (ha) and it appears as a plain lake, despite the altitude of about 199 metres (m). Some natural meadow forests with willows and osiers (*Salix* sp.), poplars (*Populus alba*), and alders (*Alnus* sp.) here and there cover the central and north-western of the reservoir (Fig. 2). The compact reed beds with sedges (*Carex* sp.), rushes (*Schoenoplectus lacustris* and *Juncus* sp.) represent another significant habitat in the area, while the submerged vegetation (*Potamogeton* sp., *Myriophyllum* sp., *Elodea* sp.) may become abundant (MITITELU & BARABAȘ, 1982). The grasslands with shrubs and bushes (*Sambucus nigra*, *Prunus spinosus*, *Rosa canina*, *Hippophae rhamnoides* etc.) appear in the north-western side, respectively, south-western side of reservoir, and the open waters are present in its eastern part.



Figure 1. Gârleni Reservoir and Lilieci Reservoir, the northern limit of the ROSPA0063 Buhuși – Bacău – Berești (Sources: Satellite image, March 2022, Google Earth).

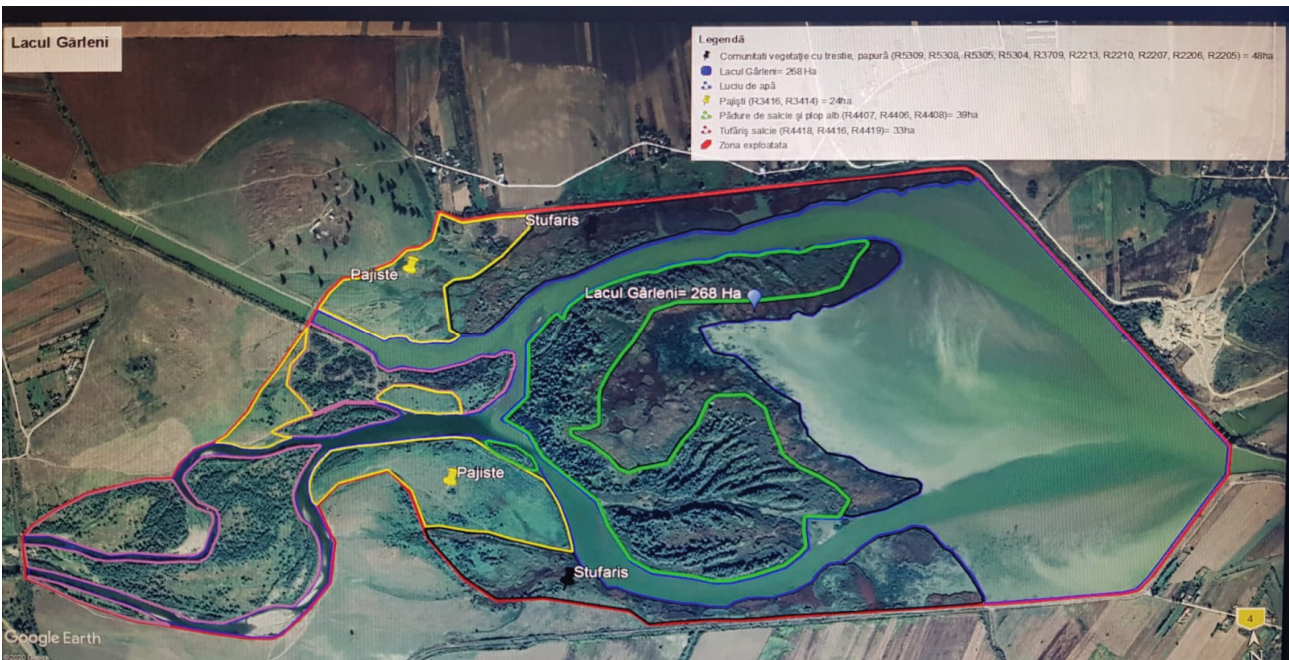


Figure 2. The Gârleni reservoir, as a potential part of Romanian Nature 2000 Network: red line – the proposed limits of the site; blue line – the perimeter of reservoir; black thumbtack – reed beds; green line – meadow forest; yellow line – grasslands; purple line – shrubs and osiers (Sources: Gabriel Grițcu, Regional Centre of Ecology Bacău - using satellite image 2020, Google Earth).

The aquatic fauna is rich, represented by invertebrates such as worms, crustaceans, molluscs, and various insect's larvae, but also vertebrates such as fish species (*Carassius gibelio*, *Alburnus alburnus*, *Alburnoides bipunctatus*, *Scardinius erythrophthalmus*, *Barbus meridionalis*, *Rhodeus amarus*, *Cobitis taenia*, *Perca fluviatilis*, *Sander lucioperca*, *Esox lucius*, *Silurus glanis* etc.). The herpetofauna comprises amphibians (*Pelophylax kl. esculentus*, *Triturus cristatus*, *Lissotriton vulgaris*) and reptile species (*Emys orbicularis*, *Lacerta agilis*, *L. viridis*, *Natrix natrix*, *N. tessellata*). From among mammals, we notice the presence of medium size and small carnivores (*Lutra lutra*, *Mustela nivalis*, *M. erminea*), and rodents (*Spermophilus citellus*, *Arvicola terrestris*, *Ondatra zibethica*, *Apodemus agrarius*, *Microtus arvalis* etc.). Part of these species appear in the Annex 2 of the Directive 92/43/EEC (Habitats Directive) as community interest species that require special conservation measures. The expansion of the zebra mussel (*Dreissena*

polymorpha) has resulted in an increase in the diversity and numbers of diving ducks (*Bucephala clangula* and *Aythya* sp.) (FENERU, 2002).

Ornithological qualitative data related to the valleys of the Bistrița and Siret Rivers around their confluence are available starting from the '60s (RANG, 1968, 1971, 2002). One comprehensive ornithological study focused on the aquatic and wetlands related bird fauna recorded on the territory of all reservoirs around the confluence of the Bistrița and Siret Rivers, performed starting from 1995 until early 2002, presenting the first quantitative analyses for the most important aquatic and semi-aquatic bird species for this area (FENERU, 2002). The ornithological importance of the area is mentioned in some synthesis works (MUNTEANU et al., 2002; MUNTEANU, 2004; MÜLLER et al., 2005; PAPP & FÂNTÂNĂ, 2008). We also mention the results of the recent monitoring activity of the bird fauna from this territory performed by GACHE (2012, 2017, 2018, 2019, 2021).

The initial proposal for the designation of the perimeter of the Buhuși – Bacău – Berești reservoirs as part of the Natura 2000 Romanian Network included two other reservoirs from the Bistrița River, Buhuși and Gârleni. The final decision removed them both, following the decommissioning of the Buhuși reservoir, despite the relevance of the Gârleni reservoir for the bird fauna in this region. In November 2020, the non-governmental organisation Regional Centre of Ecology Bacău (CRE Bacău) and a group of biologist researchers initiated an official proposal to include the perimeter of Gârleni reservoir in the Natura 2000 Romanian Network as an individual site or through the extension of the ROSPA0063 Reservoirs Buhuși – Bacău – Berești. The proposal remained under analysis at the relevant ministry department.

METHODS AND PERIOD OF STUDY

Our on-going field investigations on the bird fauna from the confluence area of the Bistrița and Siret Rivers began during May 2011 in the perimeter of the Bacău, Galbeni and Răcăciuni lakes, but starting from January 2012, we included the Lilieci and Berești lakes in our study. Beginning with January 2015, we also included the Gârleni reservoir in our field investigation. We visited the area once per month during the wintering time of bird species, respectively twice per month during the migration and breeding season.

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 whole perimeter along the banks. In 2014 and 2016, we included 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. Our monitoring study included the presence of birds on the sectors of rivers between the reservoirs, too. These are not part of the Natura 2000 site's perimeter, but the birds swing between these sectors used as feeding territories and the reservoirs' area, used as a resting territory.

We identify the birds (BRUUN et al., 1999; SVENSSON et al., 2017) through direct observation by binoculars (Olympus 8-16x40 and Nikon Akulon 8 – 24x) and telescope (HAKUBA 40x70, Swarovski 20 – 60x). We used the males' calling activity to identify and estimate the populations of passerines from the reed beds and woodlands, respectively, the hidden life bird species inside compact vegetation, the crepuscular and nocturne ones. We aimed at estimating the bird populations, too, by counting each bird from the small groups and used a quantitative evaluation in band for the groups or flocks larger than 200 individuals. In the analysis of our results, we are using the SIBLEY & AHLQUIST taxonomic system (1995) with subsequent additions and modifications (<http://avibase.bsc-eoc.org/>).

RESULTS AND DISCUSSIONS

The valley of the Bistrița River was the subject of an impressive programme of hydro-technical arrangements implemented from the upper mountain area to the confluence with the Siret River, starting from 1950 until 1965. As a result, ten reservoirs appeared in the area, following the energy production and the control of flooding risk along this valley. The development of these large reservoirs has modified the values of the water flow, and the topographic and climate parameters. At the same time, the volume of solid suspensions in water increased, reducing the transparency and intensifying the transport of alluvium. All these reservoirs are subject to a high risk of silting and present a very high dynamic of the habitats, while the water evolves from oligotrophic status to eutrophic ones (COJOC, 2016). Moreover, we recorded at least three major floods in this area during the last decade, aggravating the clogging phenomenon of the investigated reservoirs.

Initially, these reservoirs were large open water surfaces without suitable vegetation for birds, but the situation changed definitely in time. The appearance of the ten reservoirs along the Bistrița River changed the species' diversity and the dynamic of the bird fauna in the area (MUNTEANU & MĂTIEȘ, 1983). Over time, the birds' diversity increased in the perimeter of these large aquatic surfaces that became wintering shelters for significant numbers of waterfowls, new presences in this region (MUNTEANU, 2000). Numerous bird species related to the aquatic and wetlands' habitats – as *Cygnus olor*, *Spathula clypeata*, *Mareca penelope*, *M. strepera*, *Locustella luscinioides*, *Acrocephalus* sp. or *Emberiza schoeniclus* – were not present in this region before or immediately after the appearance of these reservoirs (RANG, 1968 and 1971) while they present important populations nowadays. Other two common species today presenting flocks of hundreds of individuals during the migration or wintering on the territory of the site,

the coot (*Fulica atra*) and tufted duck (*Aythya fuligula*), were present only for the perimeter of the Bacău reservoir during the period 1963 – 1970 (RANG, 1971).

In the perimeter of the Gârleni reservoir, the compact reed beds covered about 10 ha two decades ago (FENERU, 2002). The northern Buhuși-Racova Reservoir was emptied and disused in 2011 due to the intensive clogging phenomenon. From that moment on, the Gârleni reservoir recorded an annual rate of silting higher than 2%, so the estimated degree of clogging was about 54.9% inside the perimeter of the reservoir in 2016 (COJOC, 2016). Nowadays, the surfaces of compact reed beds cover 48 ha, and the meadow forest is present with 39 ha.

The Gârleni reservoir presents ornithological significance during the breeding season, in the migration and wintering period, sheltering small breeding effectives, but hundreds to thousands of waterfowls and tens waders on its territory (FENERU, 2002; GACHE, 2017). During the period of our study, we recorded 151 bird species (Table 1) on the investigated territory. The mentioned values for the birds' population represent the minimum, respectively, the maximum number of counted birds or estimated population during a one-day visit in the whole territory of the reservoir.

Table 1. Diversity of the bird fauna on the territory of the Gârleni Reservoir (Bacău County, Romania), during our monitoring activity 2015 - 2022.

No.	Species	Breeding season		Migration time (individuals)	Wintering time (individuals)	Birds Directive	Romanian Red Book of Vertebrates
		Nesting (pairs)	Presence (individuals)				
1.	<i>Phasianus colchicus</i> Linnaeus 1758	3 - 4	3 - 5	1 - 5	2 - 3	Annex 2	-
2.	<i>Cygnus olor</i> Linnaeus 1758	0 - 1?	8 - 64	65 - 128	77 - 411	Annex 2	-
3.	<i>Cygnus cygnus</i> Linnaeus 1758	-	-	21 - 71	52 - 247	Annex 1	-
4.	<i>Anser anser</i> Linnaeus 1758	1?	0 - 1	22 - 36	9 - 15	Annex 2	-
5.	<i>Anser albifrons</i> Scopoli 1769	-	-	5 - 21	0 - 5	Annex 2	-
6.	<i>Anas platyrhynchos</i> Linnaeus 1758	6 - 7	24 - 62	128 - 632	172 - 2480	Annex 2	-
7.	<i>Anas acuta</i> Linnaeus 1758	-	-	0 - 14	4 - 11	Annex 2	-
8.	<i>Anas crecca</i> Linnaeus 1758	-	-	123 - 370	56 - 252	Annex 2	-
9.	<i>Spathula querquedula</i> Linnaeus 1758	2 - 4	16 - 42	42 - 128	-	Annex 2	-
10.	<i>Spathula clypeata</i> Linnaeus 1758	-	0 - 14	4 - 18	0 - 4	Annex 2	-
11.	<i>Mareca strepera</i> Linnaeus 1758	3 - 5	14 - 28	32 - 92	0 - 6	Annex 2	-
12.	<i>Mareca penelope</i> Linnaeus 1758	-	-	18 - 138	11 - 16	Annex 2	-
13.	<i>Tadorna tadorna</i> Pallas 1764	-	-	0 - 4	0 - 34	-	V
14.	<i>Netta rufina</i> Pallas 1773	-	-	0 - 1	-	Annex 2	E
15.	<i>Aythya marila</i> Linnaeus 1761	-	-	0 - 12	-	Annex 2	-
16.	<i>Aythya fuligula</i> Linnaeus 1758	-	0 - 14	35 - 213	78 - 128	Annex 2	-
17.	<i>Aythya ferina</i> Gldenstdt 1770	4 - 5	7 - 56	42 - 178	2 - 61	Annex 2	-
18.	<i>Aythya nyroca</i> Linnaeus 1758	1 - 2	6 - 12	16 - 113	-	Annex 1	V
19.	<i>Melanitta fusca</i> Linnaeus 1758	-	-	-	0 - 2	Annex 2	-
20.	<i>Clangula hyemalis</i> Linnaeus 1758	-	-	-	-	Annex 2	-
21.	<i>Bucephala clangula</i> Linnaeus 1758	-	-	12 - 82	40 - 109	Annex 2	V
22.	<i>Mergus merganser</i> Linnaeus 1758	-	-	0 - 4	0 - 16	Annex 2	-
23.	<i>Mergus serrator</i> Linnaeus 1758	-	-	-	-	Annex 2	-
24.	<i>Mergellus albellus</i> Linnaeus 1758	-	-	-	2 - 8	Annex 1	V
25.	<i>Phalacrocorax carbo</i> Linnaeus 1758	1 - 2?	5 - 38	9 - 72	1 - 52	-	-
26.	<i>Microcarbo pygmeus</i> Pallas 1773	-	-	0 - 5	-	Annex 1	V
27.	<i>Botaurus stellaris</i> Linnaeus 1758	1 - 2	1 - 3	0 - 2	-	Annex 1	-
28.	<i>Ixobrychus minutus</i> Linnaeus 1766	3 - 7	2 - 8	3 - 11	-	Annex 1	-
29.	<i>Nycticorax nycticorax</i> Linnaeus 1758	-	-	2 - 10	-	Annex 1	V
30.	<i>Egretta garzetta</i> Linnaeus 1766	3 - 4?	2 - 22	12 - 37	-	Annex 1	E
31.	<i>Ardea alba</i> Linnaeus 1758	5 - 6?	4 - 32	17 - 51	1 - 5	Annex 1	E
32.	<i>Ardea cinerea</i> Linnaeus 1758	4 - 5?	3 - 17	14 - 45	2 - 3	-	-
33.	<i>Ardea purpurea</i> Linnaeus 1766	1 - 2?	3 - 7	3 - 8	-	Annex 1	E
34.	<i>Ciconia ciconia</i> Linnaeus 1758	-	1 - 3	152 - 1412	-	Annex 1	V
35.	<i>Ciconia nigra</i> Linnaeus 1758	-	-	0 - 5	-	Annex 1	V
36.	<i>Haliaeetus albicilla</i> Linnaeus 1758	-	-	0 - 1	0 - 1	Annex 1	CE
37.	<i>Buteo buteo</i> Linnaeus 1758	-	0 - 1	0 - 5	0 - 3	-	-
38.	<i>Buteo lagopus</i> Pontoppidan 1763	-	-	0 - 2	0 - 1	-	-
39.	<i>Pernis apivorus</i> Linnaeus 1758	-	-	0 - 7	-	Annex 1	V
40.	<i>Accipiter gentilis</i> Linnaeus 1758	-	0 - 1	0 - 3	0 - 1	-	-
41.	<i>Accipiter nisus</i> Linnaeus 1758	-	0 - 1	0 - 2	-	-	-
42.	<i>Circus aeruginosus</i> Linnaeus 1758	0 - 1	0 - 2	2 - 5	-	Annex 1	-
43.	<i>Circus pygargus</i> Linnaeus 1758	-	-	0 - 2	-	Annex 1	E
44.	<i>Circus cyaneus</i> Linnaeus 1766	-	-	0 - 1	0 - 1	Annex 1	-
45.	<i>Falco subbuteo</i> Linnaeus 1758	-	0 - 2	1 - 3	-	-	-
46.	<i>Falco tinnunculus</i> Linnaeus 1758	0 - 1?	1 - 2	1 - 3	-	-	-

47.	<i>Rallus aquaticus</i> Linnaeus 1758	0 – 1?	0 – 2	x	-	Annex 2	-
48.	<i>Porzana porzana</i> Linnaeus 1766	0 – 1?	0 – 1	x	-	Annex 1	-
49.	<i>Gallinula chloropus</i> Linnaeus 1758	4 – 5	3 – 12	5 – 12	-	Annex 2	-
50.	<i>Fulica atra</i> Linnaeus 1758	6 – 8	8 – 38	72 – 278	12 – 386	Annex 2	-
51.	<i>Vanellus vanellus</i> Linnaeus 1758	-	0 – 8	14 – 54	-	Annex 2	-
52.	<i>Charadrius dubius</i> Scopoli 1786	-	-	5 – 18	-	-	-
53.	<i>Calidris pugnax</i> Linnaeus 1758	-	-	5 – 72	-	Annex 1, Annex 2	-
54.	<i>Calidris alpina</i> Linnaeus 1758	-	-	0 – 28	-	-	-
55.	<i>Calidris alba</i> Pallas 1764	-	-	0 – 12	-	-	-
56.	<i>Calidris temminckii</i> Leisler 1812	-	-	0 – 32	-	-	-
57.	<i>Gallinago gallinago</i> Linnaeus 1758	-	-	0 – 5	-	Annex 2	-
58.	<i>Numenius arquata</i> Linnaeus 1758	-	-	0 – 13	-	Annex 2	-
59.	<i>Limosa limosa</i> Linnaeus 1758	-	-	32 – 72	-	Annex 2	-
60.	<i>Actitis hypoleucos</i> Linnaeus 1758	-	-	2 – 10	-	-	-
61.	<i>Tringa ochropus</i> Linnaeus 1758	-	0 – 1	2 – 13	-	-	-
62.	<i>Tringa glareola</i> Linnaeus 1758	-	-	1 – 21	-	Annex 1	-
63.	<i>Tringa nebularia</i> Gunnerus 1767	-	-	5 – 57	-	Annex 2	-
64.	<i>Tringa stagnatilis</i> Bechstein 1803	-	-	7 – 21	-	-	-
65.	<i>Tringa totanus</i> Linnaeus 1758	-	-	6 – 72	-	Annex 2	-
66.	<i>Tringa erythropus</i> Pallas 1764	-	-	4 – 51	-	Annex 2	-
67.	<i>Larus fuscus</i> Linnaeus 1758	-	-	0 – 3	-	Annex 2	-
68.	<i>Larus cachinnans</i> Pallas 1811	-	7 – 18	72 – 128	14 – 21	Annex 2	-
69.	<i>Larus canus</i> Linnaeus 1758	-	-	0 – 2	-	Annex 2	-
70.	<i>Chroicocephalus ridibundus</i> Linnaeus 1766	-	16 – 52	98 – 176	7 – 15	Annex 2	-
71.	<i>Hydrocoleus minutus</i> Pallas 1766	-	-	0 – 6	-	Annex 1	-
72.	<i>Chlidonias hybrida</i> Pallas 1811	-	12 – 28	16 – 45	-	Annex 1	-
73.	<i>Chlidonias niger</i> Linnaeus 1758	-	0 – 32	5 – 12	-	Annex 1	-
74.	<i>Chlidonias leucopterus</i> Temminck 1815	-	-	4 – 18	-	-	-
75.	<i>Sterna hirundo</i> Linnaeus 1758	-	12 – 32	13 – 24	-	Annex 1	-
76.	<i>Podiceps cristatus</i> Linnaeus 1758	2 – 3	4 – 12	13 – 19	0 – 2	-	-
77.	<i>Podiceps griseigena</i> Boddaert 1783	0 – 1	1 – 3	0 – 4	-	-	-
78.	<i>Podiceps nigricollis</i> Brehm 1758	-	-	0 – 8	-	-	-
79.	<i>Tachybaptus ruficollis</i> Pallas 1764	1 – 2	1 – 4	2 – 12	0 – 4	-	-
80.	<i>Columba oenas</i> Linnaeus 1758	0 – 1	0 – 2	4 – 12	-	Annex 2	-
81.	<i>Columba palumbus</i> Linnaeus 1758	1 – 2	3 – 17	6 – 28	-	Annex 2	-
82.	<i>Streptopelia turtur</i> Linnaeus 1758	1 – 2	1 – 3	4 – 13	-	Annex 2	V
83.	<i>Streptopelia decaocto</i> Frivaldszky 1838	2 – 3	4 – 11	4 – 16	3 – 8	Annex 2	-
84.	<i>Cuculus canorus</i> Linnaeus 1758	3 – 4	6 – 7	4 – 12	-	-	-
85.	<i>Alcedo atthis</i> Linnaeus 1758	1 – 2	1 – 3	2 – 4	-	Annex 1	-
86.	<i>Merops apiaster</i> Linnaeus 1758	-	1 – 5	12 – 27	-	-	-
87.	<i>Upupa epops</i> Linnaeus 1758	1 – 2	1 – 4	1 – 4	-	-	V
88.	<i>Picus viridis</i> Linnaeus 1758	0 – 1	1 – 2	x	-	-	-
89.	<i>Dendrocopos major</i> Linnaeus 1758	0 – 1	1 – 2	x	-	-	-
90.	<i>Dendrocopos syriacus</i> Hemprich & Ehrenberg 1833	1 – 2	1 – 4	x	-	Annex 1	-
91.	<i>Oriolus oriolus</i> Linnaeus 1758	2 – 3	3 – 6	x	-	-	-
92.	<i>Lanius collurio</i> Linnaeus 1758	3 – 4	3 – 14	5 – 13	-	Annex 1	-
93.	<i>Lanius minor</i> Gmelin 1788	1 – 2	1 – 4	3 – 7	-	Annex 1	-
94.	<i>Lanius excubitor</i> Linnaeus 1758	-	-	0 – 4	1 – 3	-	-
95.	<i>Pica pica</i> Linnaeus 1758	-	2 – 11	5 – 17	2 – 12	Annex 2	-
96.	<i>Coloeus monedula</i> Linnaeus 1758	-	-	4 – 12	-	Annex 2	-
97.	<i>Corvus frugilegus</i> Linnaeus 1758	-	3 – 36	15 – 52	5 – 18	Annex 2	-
98.	<i>Corvus cornix</i> Linnaeus 1758	-	1 – 7	3 – 13	1 – 5	-	-
99.	<i>Corvus corax</i> Linnaeus 1758	-	0 – 2	2 – 7	1 – 5	-	E
100.	<i>Parus major</i> Linnaeus 1758	4 – 5	7 – 19	x	2 – 5	-	-
101.	<i>Cyanistes caeruleus</i> Linnaeus 1758	1 – 3	2 – 5	x	1 – 3	-	-
102.	<i>Remiz pendulinus</i> Linnaeus 1758	5 – 6	6 – 18	x	-	-	-
103.	<i>Panurus biarmicus</i> Linnaeus 1758	14 – 16	18 – 48	18 – 47	-	-	-
104.	<i>Galerida cristata</i> Linnaeus 1758	2 – 3	4 – 7	5 – 13	2 – 5	-	-
105.	<i>Alauda arvensis</i> Linnaeus 1758	8 – 11	10 – 14	7 – 18	-	Annex 2	-
106.	<i>Hirundo rustica</i> Linnaeus 1758	-	42 – 78	52 – 168	-	-	-
107.	<i>Delichon urbicum</i> Linnaeus 1758	-	12 – 38	26 – 94	-	-	-
108.	<i>Riparia riparia</i> Linnaeus 1758	42 – 45	26 – 112	36 – 192	-	-	-
109.	<i>Phylloscopus collybita</i> Vieillot 1817	3 – 4	4 – 6	x	-	-	-

110.	<i>Phylloscopus trochilus</i> Linnaeus 1758	-	-	x	-	-	-
111.	<i>Phylloscopus sibilatrix</i> Bechstein 1793	1 - 2	2 - 3	x	-	-	-
112.	<i>Locustella luscinioides</i> Savi 1824	6 - 8	5 - 11	x	-	-	-
113.	<i>Acrocephalus scirpaceus</i> Hermann 1804	32 - 35	33 - 48	x	-	-	-
114.	<i>Acrocephalus palustris</i> Bechstein 1798	1 - 3?	3 - 6	x	-	-	-
115.	<i>Acrocephalus arundinaceus</i> Linnaeus 1758	23 - 25	24 - 37	x	-	-	-
116.	<i>Acrocephalus schoenobaenus</i> Linnaeus 1758	12 - 14	9 - 18	x	-	-	-
117.	<i>Hippolais icterina</i> Vieillot 1817	0 - 1	0 - 3	2 - 4	-	-	-
118.	<i>Sylvia atricapilla</i> Linnaeus 1758	1 - 2	2 - 7	3 - 8	-	-	-
119.	<i>Sylvia borin</i> Boddaert 1783	2 - 3	3 - 7	3 - 5	-	-	-
120.	<i>Curruca curruca</i> Linnaeus 1758	1 - 2	2 - 4	2 - 6	-	-	-
121.	<i>Curruca communis</i> Latham 1787	3 - 4	5 - 11	3 - 9	-	-	-
122.	<i>Sitta europaea</i> Linnaeus 1758	2 - 3	3 - 7	x	0 - 3	-	-
123.	<i>Troglodytes troglodytes</i> Linnaeus 1758	-	-	x	1 - 4	-	-
124.	<i>Muscicapa striata</i> Pallas 1764	0 - 1	1 - 2	2 - 5	-	-	-
125.	<i>Ficedula albicollis</i> Temminck 1815	-	-	0 - 3	-	Annex 1	-
126.	<i>Oenanthe oenanthe</i> Linnaeus 1758	1 - 2	3 - 7	4 - 12	-	-	-
127.	<i>Saxicola rubetra</i> Linnaeus 1758	2 - 3	3 - 11	3 - 11	-	-	-
128.	<i>Saxicola rubicola</i> Linnaeus 1766	1 - 2	1 - 5	2 - 7	-	-	-
129.	<i>Phoenicurus phoenicurus</i> Linnaeus 1758	0 - 1	1 - 2	x	-	-	-
130.	<i>Phoenicurus ochruros</i> Gmelin 1774	-	-	x	-	-	-
131.	<i>Erithacus rubecula</i> Linnaeus 1758	2 - 3	3 - 7	x	-	-	-
132.	<i>Luscinia luscinia</i> Linnaeus 1758	2 - 3	3 - 5	x	-	-	-
133.	<i>Turdus merula</i> Linnaeus 1758	3 - 4	6 - 13	x	0 - 2	Annex 2	-
134.	<i>Turdus philomelos</i> Brehm 1831	5 - 6	7 - 22	5 - 31	-	Annex 2	-
135.	<i>Turdus iliacus</i> Linnaeus 1766	-	-	7 - 28	-	Annex 2	-
136.	<i>Turdus pilaris</i> Linnaeus 1758	-	-	6 - 42	7 - 138	Annex 2	-
137.	<i>Sturnus vulgaris</i> Linnaeus 1758	15 - 18	32 - 520	320 - 1300	0 - 32	Annex 2	-
138.	<i>Passer domesticus</i> Linnaeus 1758	8 - 10	16 - 94	x	16 - 34	-	-
139.	<i>Passer montanus</i> Linnaeus 1758	12 - 13	18 - 56	x	12 - 25	-	-
140.	<i>Anthus campestris</i> Linnaeus 1758	5 - 6	7 - 18	5 - 11	-	Annex 1	-
141.	<i>Motacilla flava</i> Linnaeus 1758	6 - 8	9 - 32	8 - 28	-	-	-
142.	<i>Motacilla alba</i> Linnaeus 1758	3 - 4	6 - 21	6 - 14	-	-	-
143.	<i>Fringilla coelebs</i> Linnaeus 1758	2 - 4	4 - 11	x	1 - 11	-	-
144.	<i>Fringilla montifringilla</i> Linnaeus 1758	-	-	18 - 178	12 - 182	-	-
145.	<i>Pyrrhula pyrrhula</i> Linnaeus 1758	-	-	x	0 - 34	-	-
146.	<i>Coccothraustes coccothraustes</i> Linnaeus 1758	1 - 2	2 - 6	x	1 - 3	-	-
147.	<i>Spinus spinus</i> Linnaeus 1758	-	-	12 - 18	8 - 14	-	-
148.	<i>Chloris chloris</i> Linnaeus 1758	3 - 4	6 - 11	6 - 11	0 - 2	-	-
149.	<i>Carduelis carduelis</i> Linnaeus 1758	5 - 6	12 - 38	18 - 113	18 - 74	-	-
150.	<i>Linaria cannabina</i> Linnaeus 1758	0 - 1	0 - 2	8 - 42	0 - 3	-	-
151.	<i>Emberiza calandra</i> Linnaeus 1758	4 - 6	8 - 25	5 - 16	0 - 2	-	-
152.	<i>Emberiza schoeniclus</i> Linnaeus 1758	6 - 7	11 - 34	x	0 - 6	-	-
153.	<i>Emberiza citrinella</i> Linnaeus 1758	0 - 1	1 - 3	x	3 - 12	-	-

Legend: bolded name species – recorded species by Feneru during the period 1995 - 2002; x – non-estimated population; *Romanian Red Book of Vertebrates*: CE – critically endangered species, E – endangered species, V – vulnerable species.

Previous studies include valued qualitative ornithological data related to the reservoirs around the confluence of the Bistrița and Siret Rivers, but with no mention on the specific location (RANG, 1968, 1971, 2002). We found quantitative data about the bird population allowing us to assess the dynamic of birds' fauna in the area only in FENERU, 2002, focusing on the bird species related to the aquatic ecosystems. This last study is relevant also because it presents the latest data about the bird fauna in the perimeter of the Racova Reservoir, in 2002, being affected by the silting phenomenon on 90% of its surface and closed in 2011. Moreover, the author anticipates the dynamic evolution downstream of the Gârleni reservoir, mentioning the presence of 69 bird species related to the aquatic and wetland habitats in the area (table 1 - bolded name species). Of these species, only two – *Clangula hyemalis* and *Mergus serrator* – were not present in the perimeter of the Gârleni reservoir during our study, but we met the long-tailed duck (*C. hyemalis*) in the southern part of the ROSPA0063 Reservoirs Buhuși – Bacău – Berești, during the winter. The red-breasted merganser (*M. serrator*) appears very rare in the north-eastern part of Romania. The both species are vagrant presences in the area as the velvet scoter (*Melanitta fusca*) with one observation during our monitoring activity: one pair, 19th January 2017, on the territory of Gârleni reservoir. We notice a slight increase in the diversity of the bird fauna related to the aquatic ecosystems, but also an increase in the bird populations present during the annual biologic cycle in the perimeter of the Gârleni reservoir. Probably, the evolution was similar for the bird species related to the

forest ecosystems and open lands with shrubs and bushes, but we cannot compare our field-recorded results with previous studies in this area.

As we can see in table 1, the bird species typical or related to the woodland present high diversity on the territory of the Gârleni reservoir (38.56% from the recorded bird fauna) due to the large surfaces covered by meadow forests inside the area. Only a few of these bird species are not leaving the forest's perimeter while most of them search for food around the shrubs and bushes, grasslands and cultivated lands. In the present analysis, we focus on the bird species characteristic for the investigated reservoir as key-species to designate this area as an individual site or part of a Natura 2000 site. The passerines represent 41.17% from the recorded bird species in the investigated perimeter. Most of them are woodland species, followed by the passerines related to the open lands with shrubs, and only ten species are typical for the aquatic ecosystems.

During the breeding season, 62 bird species are regular breeding, while other 11 bird species could be at least irregular or probably breeding species in the perimeter of this reservoir. The breeding bird populations could be slightly larger than we estimated because we counted the individuals feeding in the large open waters outside of compact reed beds. We assess that the central part of reservoir – covered by suitable habitats for the bird fauna – represents the principal shelter for the breeding species. The access by boat inside the areas covered by compact reed beds with open water holes and meadow forest is impossible due to the silting phenomenon and low level of waters. We observed males of mute swan (*Cygnus olor*) and greylag goose (*Anser anser*) with an aggressive territorial display at the edge of reed beds during our monitoring activities by boat in May 2016.

We observed various adults with breeding plumage during the breeding period, and we believe that a mixed breeding colony could exist inside the central forest meadow and compact reed beds. During late May and early June, we noticed the appearance of juvenile cormorants (*Phalacrocorax carbo*), egrets (*Egretta garzetta*, *Ardea alba*) and herons (*Ardea cinerea*, *A. purpurea*) feeding on the perimeter of the floodplain situated on the south-western edge of the central part of Gârleni reservoir. As more discrete species, we identified the breeding presence of the great bittern (*Botaurus stellaris*), water rail (*Rallus aquaticus*) and spotted crake (*Porzana porzana*) using the mating calling activity of the males while, for the little bittern (*Ixobrychus minutus*), we observed adult and juvenile individuals flying between the sectors of reed beds. Among the grebe species, we assess that the red-necked grebe (*Podiceps grisegena*) and the little grebe (*Tachybaptus ruficollis*) could breed on the territory of the ROSPA0063 Reservoirs Buhuși - Bacău – Berești, but we recorded pairs with chicks only in the perimeter of Gârleni reservoir (July 2016 and 2019). The red-necked grebe (*P. grisegena*) is a new presence and breeding species in the area of this lake (FENERU, 2002). As breeding passerine species, we notice the presence of the tawny pipit (*Anthus campestris*) and shrikes (*Lanius collurio*, *L. minor*), building their nests on the dry grasslands with shrubs from the western side of this reservoir.

The oscillations of the water level and the flooding phenomenon are the most important natural risk factor for the bird breeding species on the territory of the Gârleni reservoir. Both risk factors present high amplitude in this area in the global climate change context. During our monitoring activity in 2016, we recorded two high flooding phenomena: on the 25th – 26th May, respectively, 20th – 21st June. During the May flooding, the Bistrița River's water removed the nests built on the ground (reed beds, floating vegetation, beaches and strips of pebble, different stumps of trees or young osiers in the water), washing completely the floating nests. The high level and water debit of the June flooding damaged these nests twice and broke the banks, collapsing on a width of 1 to 1.5 metres, along large sectors of river and reservoir, compromising the breeding efforts of the riparian species (*Alcedo atthis*, *Riparia riparia*) too. The severe drought seen during the last years has reduced the flow of water and water-covered surfaces, causing the disappearance of floodplains and swamps, respectively the expansion of reed beds. The last one represents a favourable element for accelerating the clogging phenomenon in the perimeter of the Gârleni reservoir.

Our recorded data during the migration time (March – first decade of May for spring migration, respectively, middle August – middle November for autumn migration) proves the overlaps of important flyways for the migration of bird species in Eastern Romania with the territory around the confluence of Bistrița and Siret Rivers. During the seasonal migration of the birds, we met 149 bird species inside the perimeter of the Gârleni reservoir.

During one day of monitoring in this territory during the migration time, we counted thousands of individuals for the aquatic and semi-aquatic bird species population – up to 4500 individuals.

For the semi-aquatic 25 bird species such as the egrets, herons, storks and waders, we recorded passage populations of ten individuals, the only exception being the white stork (*Ciconia ciconia*), present with flocks of hundred individuals. We assess that thousands of white storks cross the territory during the last decade of August because we recorded many flocks of hundred birds coming from the north-western direction, flying and soaring over the perimeter of Liliéci Reservoir, on the 20th August 2013. During that day, we could catch the peak of the autumn migration of the white storks, counting about 13430 individuals soaring over the ROSPA0063 Reservoirs Buhuși – Bacău – Berești (GACHE, 2021). The suitable habitats for the waders like the swampy areas, shallow waters or the islands and stripes of pebble, sand and clay appear temporary, covering small surfaces in this area, which explains the small flocks of waders recorded in the perimeter of the Gârleni reservoir. This situation is similar to the other five reservoirs situated around the confluences of Bistrița and Siret Rivers, which form the ROSPA0063 Reservoirs Buhuși - Bacău – Berești.

The typical aquatic bird species present a high diversity during the migration period (44 bird species) and appear with flocks of tens or hundreds of individuals in the investigated reservoir's perimeter. The anseriforms are

dominant in terms of diversity (23 species) and populations - we recorded up to 2600 individuals of swans, geese and ducks during one day of monitoring in the territory of the Gârleni reservoir. For the geese species (*Anser anser* and *A. albifrons*), we recorded tens of individuals as passage presences, while in the Prut River basin, these species appear with thousands of individuals in the spring migration period, respectively more than 19000 individuals during the autumn migration time (GACHE, 2002). From among the duck species, the dabbling ones present larger populations than the diving species during the passage time. Regarding the gull species, only the Caspian gull (*Larus cachinnans*) and the black-headed gull (*Chroicocephalus ridibundus*) present significant passage population in the area, the other species appearing as vagrant species there, while we recorded tens of individuals of tern species (*Sterna hirundo* and *Chlidonias* sp.) as constant presence during the migration period.

The first winter visitors appear in the area starting from the second decade of November. We observed 58 bird species on the perimeter of the Gârleni reservoir during the wintering time. Between these, we notice the mid-winter presence of some bird species that are summer visitors in Romania. If the great egret (*Ardea alba*) and grey heron (*A. cinerea*) were present with at least one or two individuals every winter, the gadwall (*Mareca strepera*) became a constant wintering presence in this area during the last three years. We notice also the presence of 34 common shelducks (*Tadorna tadorna*) on the 17th of January 2021, when we observed another group of 78 common shelducks in the perimeter of Răcăciuni reservoir, representing the highest population of this species recorded in the area of confluence between Bistrița and Siret Rivers. The common shelduck is a summer visitor, with a rare presence during winter in Romania. In the same period, we recorded the frequent to the regular appearance of four raptor species, using the open grasslands with shrubs and bushes existing on the western part of reservoir as hunting territory. Usual, the winter visitors leave this region in the last decade of February and the beginning of March. We caught a retro-migration phenomenon during the March and April 2018 on this perimeter. After a mild late February and early March, starting from the 20th of March 2018, the temperatures had negative values (10 – 12 degrees below 0 °C), and heavy snow fell during one week in the region. Some winter visitors in the area that left this perimeter during late February or early March going towards their breeding territories from the mountain or northern areas came back. We observed flocks of tens of bullfinches (*Pyrrhula pyrrhula*) and hundreds of fieldfares (*Turdus pilaris*) or bramblings (*Fringilla montifringilla*) searching for shelter and food inside the shrubs and in the clumps of trees around the area. We notice also the unusual late presence of goosander (*Mergus merganser*), one female being present on the 6th of April 2019 inside one group of common pochards (*Aythya nyroca*).

The Gârleni reservoir shelters a significant wintering population of waterfowls (we recorded up to 4500 individuals during the mid-winter National Census of Waterfowls) despite the smaller surface compared to the other five existing reservoirs around the confluence of Bistrița and Siret Rivers. Winters are usually harsh in this region and the ice bed covers the surface of these lakes during January and melts in the middle of February, but the escape canals and the sectors of Bistrița River between the lakes never froze during the period of our study in the area. The larger unfrozen surface in the perimeter of the Lilieci and Gârleni reservoirs remained every winter during our studies, sheltering the highest diversity and the largest groups of waterfowls in the area. The Gârleni reservoir was 100% frozen only in the middle of January 2017, when we found the waterfowls concentrated along the escape canal from the former Racova reservoir and along the Bistrița River. For example, during the second decade of January 2020, the ice covered only 2% of the aquatic surface of the Gârleni reservoir, respectively 40% inside the perimeter of Galbeni reservoir, reaching 70% in the tail area of this lake. The Galbeni reservoir has a surface of 1063.8 ha, so an area four times larger than the Gârleni reservoir. We recorded 15 waterfowl species on the territory of Gârleni reservoir, respectively 13 species in the perimeter of Galbeni reservoir, during our field activity on the 19th of January 2020. We counted similar populations for most of the waterfowl species present on these two reservoirs despite their different size, but we met some significant differences: 247 whooper swans (*Cygnus cygnus*) in the perimeter of Gârleni reservoir and no one in the area of Galbeni reservoir, 2480 mallards (*Anas platyrhynchos*) on the first lake versus 1300 individuals on the second ones. We recorded higher populations in the perimeter of the Galbeni reservoir just for three aquatic bird species: coot (*Fulica atra*), Caspian gull (*Larus cachinnans*) and black-headed gull (*Chroicocephalus ridibundus*).

In the list of bird fauna identified during our monitoring activity on the territory of the Gârleni reservoir, 30 bird species appear in Annex 1 to the 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. Some of them are rare species in the area; for example, we met the black stork (*Ciconia nigra*) or Montagu's harrier (*Circus pygargus*) as solitary birds during the autumn migration period, while the hen harrier (*C. cyaneus*) appeared in the migration and wintering period. The perimeter of this reservoir represents an important wintering shelter for species as the whooper swan (*Cygnus cygnus*) and the smew (*Mergellus albellus*). For example, we recorded 119 whooper swans in the perimeter of Gârleni reservoir in the middle January 2022. During the same day of wintering census, we observed 115 individuals of *C. cygnus* on the territory of the Răcăciuni reservoir, only 6 whooper swans on the Galbeni reservoir and none for Bacău and Berești reservoirs, while the larger group (544 individuals) was present in the area of the Lilieci reservoir. In terms of surface, the Gârleni reservoir is similar to the Bacău and Lilieci reservoirs, the other three reservoirs that form the Natura 2000 site ROSPA0063 Reservoirs Buhuși – Bacău – Berești being four to six times larger.

The certain and probably breeding bird species in the area use suitable habitats aquatic (*Aythya nyroca*, *Botaurus stellaris*, *Ixobrychus minutus*, *Egretta garzetta*, *Ardea alba*, *A. purpurea*, *Circus aeruginosus*, *Porzana porzana* or *Alcedo atthis*), the meadow forest (*Dendrocopos syriacus*) or the open lands with shrubs and bushes (the shrikes - *Lanius collurio* or *L. minor* and tawny pipit - *Anthus campestris*). The breeding populations are small but comparable with those recorded for the each of the five reservoirs included in the ROSPA0063 Reservoirs Buhuși – Bacău – Berești.

During our field research activity, we also met 48 bird species included in Annex 2 of Birds Directive (2009/147/EC) as hunting species under the national laws without jeopardising conservation efforts in their distribution area. Most of them represent waterfowl species (Anseriformes), wader species (Charadriiformes), passerines (Passeriformes) and doves (Columbiformes).

For the territory of the Gârleni reservoir, we notice the presence of 18 bird species included in the Red Book of Vertebrates from Romania (BOTNARIUC & TATOLE, 2005). One of them is critically endangered bird species – the white-tailed eagle (*Haliaeetus albicilla*) uses the perimeter of this reservoir as feeding area during the migration and wintering time. Other six are endangered species. Among these, two appear as passage bird species: the red-crested pochard (*Netta rufina*) and Montagu's harrier (*Circus pygargus*). The raven (*Corvus corax*) is a sedentary bird in the region, using the investigated perimeter as feeding territory. The other three (*Egretta garzetta*, *Ardea alba* and *A. purpurea*) are irregular or at least probably breeding species in the area, most of them recorded with larger populations during the migration period. Eleven represent the group of vulnerable species, with four of them recorded only during the migration time in this perimeter (*Microcarbo pygmeus*, *Nycticorax nycticorax*, *Ciconia nigra*, and *Pernis apivorus*). Other four species are summer visitors, breeding bird species on the territory of Gârleni reservoir (*Aythya nyroca*, *Ciconia ciconia*, *Streptopelia turtur* and *Upupa epops*). The other three species – *Tadorna tadorna*, *Bucephala clangula* and *Mergellus albellus* – are winter visitors and passage species in this area.

During our monitoring activities, we did not record anthropogenic activities with significant impact on the bird fauna from the territory of the Gârleni reservoir. The silting phenomenon inside the reservoir's perimeter represents the principal risk factor for this area. It is more efficient and less expensive to implement measures to limit erosion through afforestation in the entire catchment basin of one reservoir, to control the entry of alluvium, and sustainable extraction of pebble and sand than unclogging the reservoir's basin (COJOC, 2016).

CONCLUSIONS

The location of the Gârleni reservoir is in the neighbourhood of the Natura 2000 site ROSPA0063 Reservoirs Buhuși – Bacău – Berești, at about 4.5 kilometres (km) distance on the north-western side of Liliaci Reservoir – the northern limit of the site. During our study, we recorded 151 bird species on the territory of the Gârleni reservoir, most of them present also on the territory of mentioned ROSPA0063 that proves the valuable connection of the all-existent six lakes created around the confluence of Bistrița and Siret Rivers. Compared to the data from previous ornithological studies in the area, the diversity of bird fauna and the bird populations present positive trends in this territory, supporting the inclusion of this perimeter as part of the Natura 2000 Romanian Network.

A mosaic of various suitable habitats for different bird species covers the territory of this reservoir and its neighbourhood, representing a shelter for 62 bird species as regular breeding, other 11 could be irregular or at least probably breeding species there. The breeding populations are small, but present a positive trend compared to two decades ago due to the habitats' evolution and the absence of anthropogenic impact in this perimeter. We assume that one mixed colony of cormorants, egrets and heron species could exist in the meadow forest and compact reed beds covering the central part of the Gârleni reservoir. Three grebe species (*Podiceps cristatus*, *P. griseogen* and *Tachybaptus ruficollis*) are certain breeding species in this area, while the sensitive greylag goose (*Anser anser*) could breed there at least in the breeding season of the year 2016.

The territory of six reservoirs created around the confluence of Bistrița and Siret Rivers (Gârleni and those that form the ROSPA0063 Reservoirs Buhuși – Bacău – Berești) overlaps with significant birds' flyways in Eastern Romania. We recorded the highest diversity of bird fauna (149 bird species) during the seasonal migration period in the investigated territory. We counted up to 4500 individuals representing the aquatic and semi-aquatic bird species in the area during the migration time, most of these species presenting significant increases in the passage population compared with two decades ago as natural dynamics. The silting phenomenon, the water quality evolution from oligotrophic status to eutrophic ones, and the periodic severe flooding phenomenon are the main responsible factors for this dynamic of the bird fauna inside the perimeter of the Gârleni reservoir. Between the typical bird species for the wetlands and aquatic ecosystems, we cannot confirm a significant passage of geese (*Anser anser* and *A. albifrons*) in the perimeter of this area as it appears in the standard forms of mentioned Natura 2000 site.

The territory of the Gârleni reservoir represents a significant wintering area for the aquatic birds presented with 23 bird species in this region. The diversity of waterfowl varies from 10 to 18 species, being higher during the mild winters. During the harshest winters, a large surface of this reservoir, the escape canals and neighbourhood sectors of Bistrița River remain unfrozen, sheltering up to 4500 waterfowls. This represents a wintering population twice or even three times larger than those recorded on the territory of the Bacău, Galbeni or Berești reservoirs included in the ROSPA0063 Reservoirs Buhuși – Bacău – Berești.

From November 2020, there is an official proposal to include the perimeter of the Gârleni reservoir in the Natura 2000 Romanian Network as an individual site or through the extension of the ROSPA0063 Reservoirs Buhuși – Bacău – Berești. This request is still under analyses in the relevant ministry department. We identified 30 bird species mentioned in Annex 1 to the Birds' Directive; most of them represent breeding bird species in the area, with a significant population in the migration or wintering period. We observed 48 bird species included in Annex 2 of the same directive. We noticed the absence of hunting games activity in this perimeter during our field trips in the area, a completely different situation than we met inside the territory of the neighbourhood ROSPA0063 Reservoirs Buhuși – Bacău – Berești.

The biologist researchers who initiated this proposal also mention the presence of other animal species of community interest whose conservation requires the designation of special areas of conservation, listed in the Annex 2 of the Habitats Directive. These species are invertebrates (*Lucanus cervus* and *Lycaena dispar*) or vertebrates as fishes (*Barbus meridionalis*, *Rhodeus amarus* and *Cobitis taenia*), reptiles (*Emys orbicularis*) and mammals (*Lutra lutra*). Two of these species – Eurasian otter (*L. lutra*) and European pond turtle (*Emys orbicularis*) – appear as vulnerable species in the Red Book of Vertebrates from Romania. Moreover, the implementation of a monitoring program focused on the biological diversity of this area could improve the list of protected or community interest species. There are no data regarding the presence of bat species in this region and we have only old data regarding the amphibians and reptiles.

We recorded one critically endangered species, six endangered bird species and eleven vulnerable bird species included in the Red Book of Vertebrates from Romania inside the perimeter of the Gârleni reservoir that represents the feeding, breeding, stopover point during the migration period or wintering area for them. We notice that 12 of these species appear in the Annex 1 of Birds' Directive, too.

The main risk factors for the bird fauna in the perimeter of the Gârleni reservoir are the silting and severe drought phenomenon, the oscillations of water levels and the flooding phenomenon. The impact of the first two phenomena is indirect, as the habitats' evolution increases or disturbs the presence and specific structure of bird populations in the area. The two second phenomena have a significant direct impact on the existing habitats by reshaping them suddenly and on the breeding season of the birds that can lose their nests and chicks on the territory of the reservoir and in the neighbourhood.

We assess that a regular long-term monitoring activity focused on the bird fauna inside the perimeter of Gârleni reservoir could increase the accuracy of data regarding the birds' diversity and their population, especially during the migration time. The aim is to reach a level comparable to the collected data related to the neighbourhood ROSPA0063 Reservoirs Buhuși – Bacău – Berești, during one decade (2011 – 2020), creating a real image of the bird fauna presence in the area.

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Gache Carmen

“Al. I. Cuza” University of Iasi, Carol I Av., 11A, 700505, Romania.
E-mail: cgache@uaic.ro

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