THE BIRDS OF THE PECINEAGU DAM BASIN (ARGEȘ COUNTY, ROMANIA)

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Abstract. The bird fauna of the Pecineagu Reservoir from the upper hydrographical basin of the Dâmbovița River, observed during October 2023 – September 2024, is typical for the mountain dam basins from the Făgăraș Massif, although its fauna of waterbirds is comparatively poorer, despite of the proximity of the Rucăr-Bran Pass, known as way used by the migratory birds to cross the Southern Carpathians. 6 of the 67 identified species are waterbirds, noticeable being the breeding of *Anas platyrhynchos*, at 1.117 m a.s.l., one of the highest elevations from the country, and the reconfirmed breeding of *Mergus merganser*, both to the end of the reservoir. As a result, while no waterbird species belongs to the Annex I of the Birds Directive, but 14 other species (plus 1, found here with other occasion) and the total number of species was lower than the expected one, we consider the area deserves a special regime of protection.

Keywords: birds, mountain dam basin, breeding, migration, protection.

Rezumat. Păsările lacului de acumulare Pecineagu (județul Argeș, România). Avifauna lacului de acumulare Pecineagu din bazinul superior al râului Dâmbovița, observată în perioada octombrie 2023 – septembrie 2024, este tipică pentru lacurile de acumulare montane din Masivul Făgăraș, chiar dacă fauna sa de păsări de apă este comparativ mai săracă, în ciuda vecinătății Culoarului Rucăr-Bran, cunoscut loc de trecere pentru păsările migratoare peste Carpații Meridionali. 6 dintre cele 67 specii identificate sunt de apă, de notat fiind cuibărirea raței *Anas platyrhynchos*, la cota 1,117 m, una dintre cele mai ridicate din țară, și reconfirmarea cuibăririi ferăstrașului *Mergus merganser*, ambele la coada lacului. Ca urmare, deși nicio specie de apă nu aparține Anexei I a Directivei Păsări, ci alte 14 specii (plus 1, găsită cu altă ocazie aici), iar numărul total de specii este mai mic decât cel preconizat, considerăm că zona merită un regim special de protecție.

Cuvinte cheie: păsări, lac de acumulare montan, cuibărire, migrație, protecție.

INTRODUCTION

The bird fauna of the Pecineagu mountain Reservoir was not regularly studied until now, since there are only a few published observations about the local breeding of *Mergus merganser* (MESTECĂNEANU, 2019; MESTECĂNEANU & MESTECĂNEANU, 2022), while other recordings of birds from the area appear on some public databases (https://rombird.ro/, https://openbirdmaps.ro/). As a consequence, the aim of the paper is to contour a tableau of assembly of the bird fauna of the lake, the researches starting from the conjecture that it is a hotspot for the waterbirds in their migration over the Southern Carpathians.

MATERIALS AND METHODS

The geographical setting. Located at 1,117 m a.s.l. (cf. Google Earth), the Pecineagu Reservoir is the highest reservoir of this type from the Făgăraș Mountains. It was built in the upper sector of the Dâmbovița River (Fig. 1), between the northern slopes of the Iezer-Păpușa Mountains (the Barbu Peak, 2,297 m – the maximum elevation) and the southern versants of the eastern extremity of the Făgăraș Mountains (the Luțele Peak, 2,176 m – the highest cote). The Piatra Craiului Mountains, delimitated by the Făgăraș Mountains through Curmătura Foii (1,367 m a.s.l., 7.3 km South-East of the dam), which represents the highest point of the branch that diverges to North from the Rucăr-Bran Corridor, named the Corridor of Tămaș, are in its proximity (https://muntii-nostri.ro/..., BARCO & NEDELCU, 1974). The lake bed was carved in the crystalline rocks of the Cumpăna gneiss (STRECKEISEN, 1935; BARCO & NEDELCU, 1974; MÂCIU & POSEA, 1982). Pârâul Hotarului, Pârâul cu Lespezi and Pârâul Larg flow into the reservoir from its right versants and Pârâul lui Aron, Pârâul Comisului, Pârâul cu Scară and Pârâul Mănăstirii, from its left versants (https://muntii-nostri.ro/...).

The hydropower facility was put into operation in 1983 to regularize the river debits, to supply with water the downstream consumers, to contribute to the irrigation of the agricultural terrains from downriver and to produce electricity. It is provided with a zone earth fill dam of 105 m height, equipped with a masque of ferroconcrete, and with a crown of 300 m length (NEGULESCU & PÂRVAN, 2010). In normal conditions, the 63 million m^3 of water retained in the reservoir, cover ca. 182 ha (cf. Atlasul cadastrului apelor din România, 1992). The maximum deep of the reservoir is 108 m (NEGULESCU & PÂRVAN, 2010).

The climate of the area shows sub-polar characteristics. The mean annual value of the air is -2°C on the crests, but the temperature of the area ranges from +20 to -38°C, by the season. The winds blow mainly from the West and Northwest, with speeds that reaches values of 25-30 m/sec. The number of cloudy days passes 200 on the highest crests, where, the annual average of precipitations exceeds 1,300 mm, and the rainfalls are more numerous in the early summers. The snow covers the ridges between November and April (https://www.carpathia.org/...final-report.pdf).

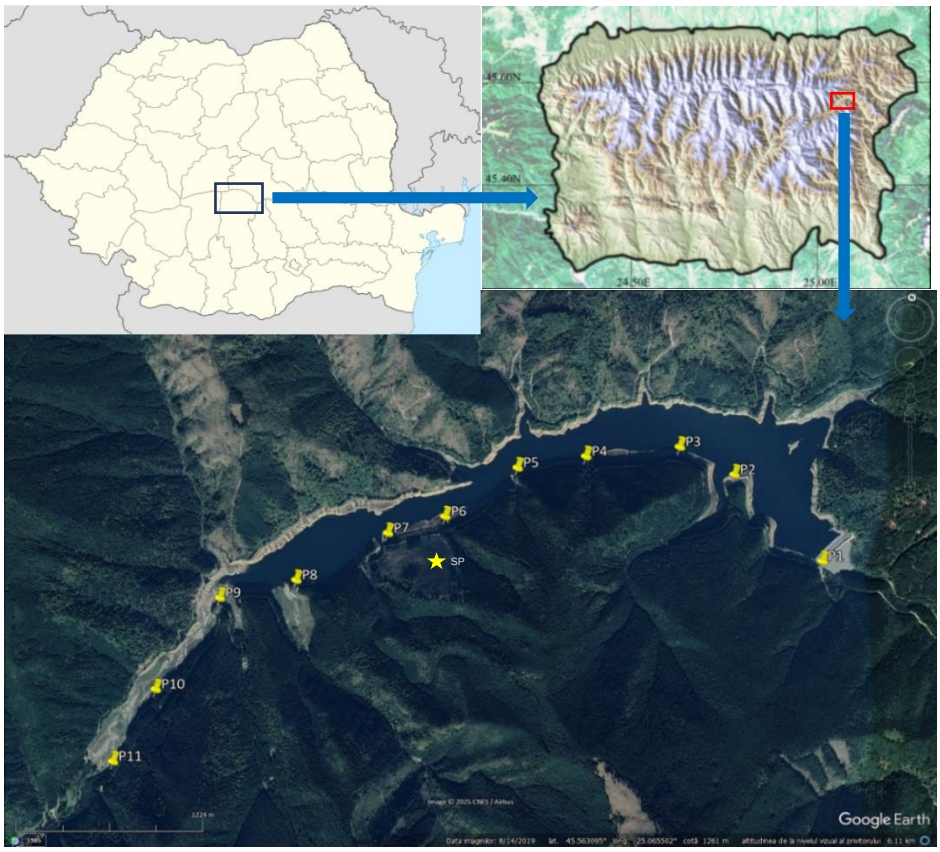

Figure 1. The satellite map of the Pecineagu Reservoir (in Google Earth view) and its setting in the Făgăraș Mountains and Romania (by https://upload.wikimedia.org/and https://ro.m.wikipedia.org/, modified; yellow marks – the places of observation).

Regarding the water temperature, it is 7°C in winter and 12-13°C in summer, while the water pH is 7 at the confluence Otic (Boarcășu)-Valea Vladului. The water transparency is maximal and the turbidity is very low. At the flow in the reservoir, the dissolved oxygen is optimum (ca. 8.5 mg/l), the coliform bacteria and the Enterococci are present in significant amount, the chemical oxygen consumption (CCO-Mn) is high (12.50 mg O_2/l), the nitrites (NO2-) are undetectable and the nitrate (NO3-) level is increased (https://www.carpathia.org/...final-report.pdf).

From the biogenic point of view, which expresses the water nutritional value for the fishes, the rivers from the area belong to the 7 class from 10, while, by the fish farming biotic index, the aquatic habitats from the upper basin of the Dâmbovița River have a good and a very good ecological condition (https://www.carpathia.org/...2015_2017).

The ichthyofauna of the reservoir is scarce: *Salmo trutta* Linnaeus, 1758 and *Cottus gobio* Linnaeus, 1758 were recently found upstream and downstream of the lake (https://www.carpathia.org/...2015_2017, https://www.carpathia.org/...final-report.pdf), while *Phoxinus phoxinus* (Linnaeus, 1758) and *Barbus petenyi* Heckel, 1847 are occurred below the dam (https://www.carpathia.org/...2018_final_web.pdf). Pecineagu (and also the Vidraru Lake, from the Făgăraș Mountains) hosted *Hucho hucho* (Linnaeus, 1758) until a few years ago and there is hope regarding its comeback in the near future (https://www.aquacrisius.ro/specii-de-pesti/, https://www.aquacrisius.ro/noutati-2023/). Regarding the amphibians, *Rana temporaria* Linnaeus, 1758, *R. dalmatina* Fitzinger in Bonaparte, 1839, *Bufo bufo* (Linnaeus, 1758), *Bufotes viridis* (Laurenti, 1768) and *Ichthyosaura alpestris* (Laurenti, 1768) were found at the end of the lake, while *Gerris* sp. Fabricius, 1794, *Rhyacophila* sp. Pictet, 1834, *Anitella lateroproducta* Botoșăneanu, 1952, *Agapetus* sp. Curtis, 1834, *Limnephilus* sp. Leach in Brewster, 1815, *Potamophylax* sp. Wallengren, 1891, and *Allogamus* sp. Schmid, 1955 were found here among the aquatic insects (https://www.carpathia.org/...final-report.pdf).

The phytoplankton composition of the reservoir is low, with only 35 species, from 5 groups: Ochrophyta – *Gomphonema constrictum* Ehrenberg, 1844, *Melosira ambigua* (Grunow) O. Müller, 1903, *Synedra ulna* (Nitzsch) Ehrenberg, 1832 etc., Euglenophyta – *Euglena intermedia* (Klebs) F.Schmitz 1884, Chlorophyta – *Pediastrum duplex* Meyen 1829, *Ulothrix zonata* (F. Weber & Mohr) Kützing 1833, etc., Cyanophyta – *Microcystis aeruginosa* Kützing, 1846, *Oscillatoria tenuis* C. Agardh ex Gomont 1892, etc., Dinophyta – *Ceratium hirundinella* (O. F.Müller) Dujardin, 1841, *Cryptomonas ovata* Ehrenberg, 1832 (DOBRESCU & SOARE, 2011). In some years, the flourishing algal is registered, but, generally, the waters are oligotroph and close to the category II of quality. Instead, the zooplankton is well represented (VLAICU, 2007).

The reservoir is surrounded by mixed forests of *Fagus sylvatica* L., *Picea abies* (L.) H. Karst., *Betula pendula* Roth, *Acer pseudoplatanus* L., *Larix decidua* Mill. etc., with the predominance of the broad leaf forests, in the downstream, and

of the coniferous forests, in the upstream. Shrubs of *Sambucus racemosa* L., *Rubus idaeus* L. and *R. hirtus* Waldst. & Kit. grow in the clearances. Herbaceous flora is rich: *Anemone nemorosa* L., *Festuca altissima* All., *Agrostis tenuis* Sibth., *Impatiens noli-tangere* L., *Gentiana asclepiadea* L. etc. Three aquatic habitats were identified on the banks of the lake: R5421 Southeast Carpathian communities of springs and streams with *Chrysosplenium alternifolium* L. and *Cardamine amara* L., R5422 Southeast Carpathian communities of springs and streams with *Glyceria nemoralis* (R.Uechtr.) R. Uechtr. & Koern. and R6112 Southeast Carpathian pioneer mountain communities of mobile or semi-fixed grunting with *Thymus comosus* Heuff. ex Griseb. & Schenk, *Galium album* Mill. and *Teucrium montanum* L. (https://www.carpathia.org/...final-report.pdf). The macrophyte vegetation has low development. The variability of the water level, with effect on the fish reproduction, influences the installation of the belt of wetland vegetation (VLAICU, 2007). Among the trees adapted to the damp soils, *Alnus incana* (L.) Moench and *Salix capraea* L. are locally frequent on the shore, as *Corylus avelana* L., in the open woods. The forest connectivity is high in the upper basin of the Dâmbovița River and has low fragmentation, predominantly in the dominant forest layer, excepts for Berevoiu – Valea Colților and Mânăstire – Valea Comisului, the latter one from the left versants of the Pecineagu Lake (NICOLAE & NIȚĂ, 2024).

The method of work. The study covered a cycle of a year, from October 2023 to November 2024. A survey a month (on October 18, November 9, and December 10, 2023, and January 6, February 9, March 17, April 6, May 16, June 9, July 9, August 8 and September 6, 2024) was performed from 11 permanent points of observations (P1-P11) with wide view, placed on the right bank of the reservoir, so the surface of the resrervoir was virtually 100% covered (Fig. 1). 10 minutes were allocated to every point for observations. Also, a supplementary point (SP) was chosen into a deforested area, close to the right shore, chiefly to survey the flights of the birds of prey, where at least 2 hours were spent, every time. Occasional observations were recorded on October 7 and November 17, 2023 and September 6, 2024, in the last case from a point of observation situated on the harder accessible left shore. The field activity was done generally between 9:00 and 18:00, depending on the daylight, and a 67X scope, binoculars and a photo camera were used. The waterbirds were especially envisaged, but all individuals, regardless the species, were registered. The weather conditions during the monitoring were favorable, which mean wind intensity bellow 3 on the Beaufort Scale and good visibility. The snow cover was present only in December (5 cm thick) and January (up to 20 cm thick) and the ice sheet, in February (ca. 80% of the reservoir area), while it was negligibly in January (1% of the area). The water level of the lake significantly fluctuated, from the minimum of November, and generally from the winter, to the maximum of May and June, resulted from the snow melting and rains.

The data were worked by standard methods (MUNTEANU, 2000; GACHE, 2002; ZAMFIRESCU & ZAMFIRESCU, 2008; GOMOIU & SKOLKA, 2001). The similarities between the species were computed using BioDiversity Pro Software, while the systematics and denomination of the species are conformed to the HBW/BirdLife Taxonomic Checklist (v9.1) (https://datazone.birdlife.org/).

RESULTS AND DISCUSSIONS

During a year of regular study, 67 species of birds, belonging to 14 orders, were observed in the area (Table 1). Another species can be added – *Circus cyaneus* (Linnaeus, 1766), 1 individual found in migration, on November 17, 2023, a day of occasional observations – and we expect, the list will increase, particularly with species in passage, enlarging the period of observations, respectively the frequency of the field trips. The richest in number of species was Passeriformes (42 species, 62.69% of all). It was followed, at a huge gap, by Accipitriformes (7 species, 10.45% of all) and Piciformes (5 species, 7.46% of all). While the reservoir seems lifeless at the first glance, 6 species (8.96% of all) of waterbirds were identified during the period, they pertaining to 5 orders (35.71% of all), Anseriformes, with 2 species (33.33% of all), and Ciconiiformes, Pelecaniformes, Suliformes and Charadriiformes, with 1 species (16.67% of all, each). Other 4 species are dependent on wetlands: *Cinclus cinclus* and *Motacilla cinerea*, observed on the lakeshore, and *Circus aeruginosus* and *Haliaeetus albicilla*, viewed on the wing, at great height.

According to the Birds Directive (Directive 2009/147/CE), *Tetrastes bonasia*, *Ciconia nigra*, *Pernis apivorus*, *Circaetus gallicus*, *Circus aeruginosus*, *Haliaeetus albicilla*, *Picus canus*, *Dryocopus martius*, *Picoides tridactylus*, *Dendrocopos leucotos*, *Falco peregrinus*, *Lanius collurio*, *Ficedula parva* and *F. albicollis* (14 species, 20.90% of all, plus *Circus cyaneus*, observed with other occasion) are mentioned in the Annex I, being the most important from the conservation point of view; no waterbird species was present among them.

It is difficult to say to what phenological category belong every species. Considering the appurtenance of the most of their individuals, 20 species (29.85% of all) were residents in the area, 12 species (17.91% of all) were summer visitors, 5 species (7.46% of all) were partial migrants, while 30 (44.78% of all) were species of passage. On the other hand, considering the phenology of all observed individuals, 34 species (50.75% of all) were in passage through the area, 22 species (32.84% of all) were residents, 19 species (28.36% of all) were summer visitors, 5 species (7.466% of all) were partial migrants and 1 species (1.49% of all) was winter visitor. To note, both situations, the prevalence of the species of passage: for them, the area was improper, although some stopped here for a while, while others only overflew it. They were followed by the residents, specialized species, adapted to live here all year round, which found food mainly in the mixed forests. The summer visitors occupied the third position, they adding to the residents in the warm period, while the partial migrant species ranked on the fourth place, these completely leaving the area only in the harsh winter. The almost complete absence of the winter visitors shows the difficulty of the life condition in the cold time. To specify that a field trip a month was insufficient to determine the real status of some species. Thus, *Strix aluco* was considered resident species, although it was heard only in March and April,

Accipiter gentilis was considered a species of passage, although it was, probably, rather erratic, *Picus canus, Picoides tridactylus, Dendrocopos leucotos, Nucifraga caryocatactes, Lophophanes cristatus, Poecile palustris, Pyrrhula pyrrhula, Loxia curvirostra* were considered resident species, although they were rare or very rare in observations, *Falco tinnunculus* was considered a passage species, although it is common in the summer on the mountain ridges, *Lanius collurio* was considered an exclusively passage species, although the deforested habitats near the reservoir could sustain it in the breeding season, *Anas platyrhynchos, Troglodytes troglodytes Turdus viscivorus, T. merula, Regulus regulus* were considered partial migrant species, supposing that some individuals could be in the area all year round, *Ficedula parva* and *F. albicollis*, were considered only species of passage, although rare individuals should be summer visitors, etc. Also, the prevalence of the individuals from a phenological category against the individuals from the other categories can be questionable. In the case of the waterbirds, the passage species were the most (4 species, *Ciconia nigra, Ardea cinerea, Phalacrocorax carbo, Actitis hypoleucos*, 66.67% of all). 1 species (*Mergus merganser*, 16.67% of all) was summer visitor and 1 species (*Anas platyrhynchos*, 16.67% of all) was partial migrant, but the dynamics for them suggest the existence of some individuals of passage, too (Table 1, Fig. 2). If the preponderance of the species of passage in the case of all species is not surprising, because the reservoir is a few kilometres away from the Rucăr-Bran Corridor, used in migration by many species of birds, it is surprising the low number of waterbird species of passage (5.97% of all registered species), although, finally, the other two are migratory species, too. Even in the case of all species, the number of the species of passage would have been expected to be higher, as their total number. To compare, 66 species (14 among them, 21.21%, waterbird species) were found on the Vidraru Reservoir, ca. 40 km away, from the Făgăraș Mountains, during a year of study (April 2022 – March 2023); 25.76% were passage species, considering all species, and 57.14%, considering only the waterbird species (MESTECĂNEANU, 2023b). On the Râușoru Reservoir, ca. 20 km away, from the Iezer-Păpușa Mountains, 69 species of birds were identified during almost two years of study (October 2005 – July 2007), 8 of them (11.59%) being waterbird species; 12 species (17.39% of all) were considered of passage, while 5 species (62.50%) were of passage at the level of the waterbirds (MESTECĂNEANU, 2008). *Anser albifrons* (Scopoli, 1769), *Tadorna tadorna* (Linnaeus, 1758), *Aythya ferina* (Linnaeus, 1758), *Spatula clypeata* (Linnaeus, 1758), *Mareca penelope* (Linnaeus, 1758), *Tachybaptus ruficollis* (Pallas, 1764), *Podiceps cristatus* (Linnaeus, 1758), *Actitis hypoleucos* (Linnaeus, 1758), *Tringa ochropus* Linnaeus, 1758, *Larus cachinnans* Pallas, 1811/*L. michahellis* Naumann, 1840 (MESTECĂNEANU, 2023a, b) were observed in addition on the Vidraru Reservoir, but other precedent researches showed the presence in the area of: *Eudromias morinellus* (Linnaeus, 1758) (WEBER, 1970), *Ciconia ciconia* (Linnaeus, 1758) (MĂTIEȘ, 1971), *Anser anser* (Linnaeus, 1758) (?), *Aythya nyroca* (Güldenstädt, 1770), *Spatula querquedula* (Linnaeus, 1758), *Anas acuta* Linnaeus, 1758, *A. crecca* Linnaeus, 1758, *Gallinula chloropus* (Linnaeus, 1758), *Fulica atra* Linnaeus, 1758, *Gavia arctica* (Linnaeus, 1758) (MĂTIEȘ, 1974), *Ardea alba* Linnaeus, 1758, *Larus ridibundus* Linnaeus, 1766 (PETRESCU, 2005). The same, *Tachybaptus ruficollis* (Pallas, 1764), *Podiceps cristatus* (Linnaeus, 1758), *S. querquedula* and *Bucephala clangula* (Linnaeus, 1758) were observed in addition on the Râușoru Reservoir (ALEXIU & MESTECĂNEANU, 2008, MESTECĂNEANU, 2008, 2011) and, theoretically, all of these species (and others) can occasionally appear on the Pecineagu Reservoir. Its higher quote (1,117 m, versus 830 m, respectively 850 m a.s.l.), the area larger than the one of Râușoru (160 ha), but lower than the one of Vidraru (870 ha), the different meteorological conditions from the time of observations, influenced by the global warming, the lower number of the field trips from this case, all reflected in some extent on the results. However, the most probably, generally, the birds chose to pass over the mountains with minimal effort, in this case using the Rucăr-Bran Corridor. At least 16 birds of prey overflown it, by a recent study performed at the Mateiaș area (MESTECĂNEANU & MESTECĂNEANU, 2021), while the migration through it is known for Anseriformes, Ciconiiformes and other waterbirds for decades RUDESCU (1958). Also, OLARU (1972), MĂTIEȘ (1969, 1971, 1986), DOROȘENCU (2011), PÂRÂU (2011), MESTECĂNEANU (2011, 2019), MESTECĂNEANU & MESTECĂNEANU, 2010, 2011a, b, MESTECĂNEANU et al. (2018a, b), etc. mentioned the migration over this mountain pass.

About the breeding, 33 species (49.25% of all) were probable breeders in the area, 14 species (20.90% of all) were certain breeders, while 20 species (29.85% of all) were non-breeders (Table 1). A special attention was not accorded to the active search of nests and juveniles and, consequently, the number of the probably or certainly breeding species can be higher. Among the waterbirds, it must be said that both species of Anseriformes (33.33% of all) were certain breeders, while the other 4 species (66.67% of all) were non-breeders. A female of *Mergus merganser* with 5 small chicks was found at the end of the reservoir on May 16, 2024 (Photo 1) and 2 females of *Anas platyrhynchos* (one with 9 small chicks and another with 4 medium-sized juveniles, together with other adult ducks) were found in the same place on July 9, 2024 (Photo 2), where the riverbed gets larger and more plate and where the dump vegetation is more developed. The food proved to be enough for these species to rise the offspring and the occurrence of *Lutra lutra* (Linnaeus, 1758), on September 6, 2024, at the end of the basin underlines this statement. The density was 0.55 pairs/100 ha, for *Mergus merganser*, and 1.10 pairs/100 ha, for *Anas platyrhynchos*. The breeding of *Mergus merganser* on the Pecineagu Reservoir confirms previous observations (MESTECĂNEANU, 2019), the breeding of 1-2 pairs being supposed here, after what 5 juveniles well fledged were found on August 29, 2020 and a pair was viewed on May 9, 2021 (MESTECĂNEANU & MESTECĂNEANU, 2022). Concerning *Anas platyrhynchos*, it is worth highlighting that, rarely, it lives in the mountain areas up to 1.200 m a.s.l. (MUNTEANU, 2012) and its breeding, in this circumstance, is one registered at the highest elevation in Romania. The ducklings and the other birds were targeted by predators: 1 individual of *Felis silvestris* (Schreber, 1777) was saw lurking them, on July 9, 2024, from the wetland vegetation; *Martes martes* (Linnaeus, 1758) was also viewed in the area (1 individual, on July 9, 2024) and *Lutra lutra* is also known as a bird predator (de la HEY, 2008).

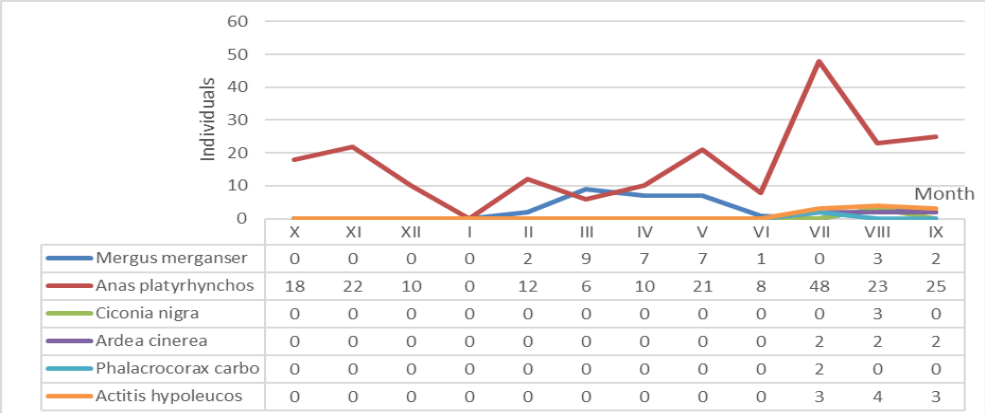

Figure 2. The dynamics of the waterbirds.

Table 1. The monthly occurrence and abundance of the species of birds, their total strengths, and the phenology.

No.	Species/Order	October	November	December	January	February	March	April	May	June	July	August	September	Total individuals	Phenology	Breeding	Remarks
I.	**Galliformes**																
1.	*Tetrastes bonasia* (Linnaeus, 1758)	a	a					a		a		a		5	R	PB	1 i., each
II.	**Anseriformes**																
2.	*Mergus merganser* Linnaeus, 1758*					a	a	a	a	a		a	a	31	SV	CB	
3.	*Anas platyrhynchos* Linnaeus, 1758*	b	b	b		b	a	b	b	a	b	b	b	203	PM	CB	
III.	**Columbiformes**																
4.	*Columba palumbus* Linnaeus, 1758	b					b	a	a	a	a	a		117	P, SV	CB	Max. 43 i., in October
IV.	**Cuculiformes**																
5.	*Cuculus canorus* Linnaeus, 1758								a	a				4	SV	PB	Max. 3 singing males, in May
V.	**Ciconiiformes**																
6.	*Ciconia nigra* (Linnaeus, 1758)*											a		3	P	NB	
VI.	**Pelecaniformes**																
7.	*Ardea cinerea* Linnaeus, 1758*										a	a	a	6	P	NB	1 i., each
VII.	**Suliformes**																
8.	*Phalacrocorax carbo* (Linnaeus, 1758)*										a			2	P	NB	
VIII.	**Charadriiformes**																
9.	*Actitis hypoleucos* (Linnaeus, 1758)*										a	a	a	10	P	NB	Max. 4 i., in August
IX.	**Strigiformes**																
10.	*Strix aluco* Linnaeus, 1758						a	a						2	R	PB	
X.	**Accipitriformes**																
11.	*Pernis apivorus* (Linnaeus, 1758)									a		a	a	5	P, SV	PB	2 i., in August and September
12.	*Circaetus gallicus* (Gmelin, 1788)											a		1	P	NB	
13.	*Circus aeruginosus* (Linnaeus, 1758)												a	1	P	NB	
14.	*Accipiter nisus* (Linnaeus, 1758)	a	a				a	a	a				a	12	P, SV	PB	Max. 4 i., in September
15.	*A. gentilis* (Linnaeus, 1758)											a		1	P	NB	
16.	*Haliaeetus albicilla* (Linnaeus, 1758)				a									1	P	NB	
17.	*Buteo buteo* (Linnaeus, 1758)	a	a				b	b	a	a	a	b	a	60	P, SV	CB	Max. 16 i., in March
XI.	**Coraciiformes**																
18.	*Merops apiaster* Linnaeus, 1758											b		85	P	NB	
XII.	**Piciformes**																
19.	*Picus canus* Gmelin, 1788	a					a	a						6	R	PB	Max. 3 i., in March
20.	*Dryocopus martius* (Linnaeus, 1758)		a			a	a	a	a	a			a	15	R	PB	Max. 4 i., in April
21.	*Picoides tridactylus* (Linnaeus, 1758)											a		2	R	CB	
22.	*Dendrocopos leucotos* (Bechstein, 1803)							a				a	a	3	R	PB	

23.	*D. major* (Linnaeus, 1758)	a	a				a	a					a	7	R	PB	
XIII.	**Falconiformes**																
24.	*Falco tinnunculus* Linnaeus, 1758											a		1	P	NB	
25.	*F. peregrinus* Linnaeus, 1758	a											a	3	P	NB	2 i., in September
XIV.	**Passeriformes**																
26.	*Lanius collurio* Linnaeus, 1758											a	a	2	P	NB	
27.	*Garrulus glandarius* (Linnaeus, 1758)	a	a	a				a	a	a		a	a	20	R	PB	Max. 4 i., in September
28.	*Nucifraga caryocatactes* (Linnaeus, 1758)	a	a									a		3	R	PB	
29.	*Corvus corax* Linnaeus, 1758	a	a	a	a	a	a	a	a	a		a	a	38	R	PB	Max 8 i., in October
30.	*Periparus ater* (Linnaeus, 1758)	a	a	a	a	a	a	a	a	a	b	b	a	63	R	CB	Max. 15 i., in August
31.	*Lophophanes cristatus* (Linnaeus, 1758)	a								a		a	a	12	R	PB	Max. 5 i., in September
32.	*Poecile palustris* (Linnaeus, 1758)						a							3	R	PB	
33.	*P. montanus* (Conrad von Baldenstein, 1827)	a	a	a	a	a	a	a	a	a	a	b	a	44	R, P	CB	Max. 10 i., in August
34.	*Cyanistes caeruleus* (Linnaeus, 1758)	a	a				b	b			a			56	P, R	PB	Max. 30 i., in April
35.	*Parus major* Linnaeus, 1758	a		a		a	c	b	a				a	142	P, R	PB	Max. 128 i., in March
36.	*Delichon urbicum* (Linnaeus, 1758)								b	b	b	c	c	1,395	P, SV	CB	Max. 955 i., in August
37.	*Phylloscopus trochilus* (Linnaeus, 1758)												a	3	P	NB	
38.	*P. collybita* (Vieillot, 1817)	a						b	b	b	b	b	b	102	SV	CB	Max. 20 i., in May
39.	*Aegithalos caudatus* (Linnaeus, 1758)	a	a	a			b	a						21	R, P	PB	Max. 13 i., in March
40.	*Sylvia atricapilla* (Linnaeus, 1758)								b	b	b	a		41	SV	PB	Max. 15 i., in July
41.	*Certhia familiaris* Linnaeus, 1758	a				a	a					a	a	11	R	PB	Max. 4 i., in September
42.	*Sitta europaea* Linnaeus, 1758							a				a		2	R	PB	
43.	*Troglodytes troglodytes* (Linnaeus, 1758)	a	a	a			a	a	a	a	a	a	a	37	PM	PB	Max. 7 i., in October and April
44.	*Cinclus cinclus* (Linnaeus, 1758)	a	a	a	a	a	a	a			a		a	18	R	PB	Max. 5 i., in October
45.	*Turdus viscivorus* Linnaeus, 1758		a				a	a	a		a			15	PM	PB	Max. 6 i., in April
46.	*T. philomelos* Brehm, 1831	a					a	b	a	a	a	a	a	30	SV	PB	Max. 12 i., in April
47.	*T. merula* Linnaeus, 1758	a	a	a			a	a	a	a	a	a	a	29	PM	PB	Max 5 i., in May, July
48.	*Muscicapa striata* (Pallas, 1764)											a		2	P	NB	
49.	*Erithacus rubecula* (Linnaeus, 1758)	a	a				a	b	a	a	a	a	a	50	SV	CB	Max. 13 i., in April
50.	*Ficedula parva* (Bechstein, 1792)											a		1	P	NB	
51.	*F. albicollis* (Temminck, 1815)											a		1	P	NB	
52.	*Phoenicurus ochruros* (Gmelin, 1774)	a					a	a		a				9	SV	PB	Max. 3 i., in June
53.	*P. phoenicurus* (Linnaeus, 1758)									a				1	SV	PB	
54.	*Regulus regulus* (Linnaeus, 1758)	a	a	a	a		b	a	a	a	a	a	a	54	PM, P	CB	Max. 18 i., in March
55.	*R. ignicapilla* (Temminck, 1820)	a						a	a	a			a	9	SV	PB	Max. 3 i., in May
56.	*Prunella modularis* (Linnaeus, 1758)	a					a	a	a	a			a	15	SV	PB	Max. 7 i., in April
57.	*Anthus trivialis* (Linnaeus, 1758)												a	1	P	NB	
58.	*A. spinoletta* (Linnaeus, 1758)							a						2	P	NB	
59.	*Motacilla cinerea* Tunstall, 1771	a					a	a	a	a	a	a	b	45	SV, P	CB	Max. 5 i., in May
60.	*M. alba* Linnaeus, 1758							a	a	a	a	a	a	21	SV	CB	Max. 6 i., in July
61.	*Fringilla coelebs* Linnaeus, 1758	b					a	b	b	b	b	a	a	120	P, SV	CB	Max. 28 i., in October
62.	*F. montifringilla* Linnaeus, 1758	a	a				a							7	P	NB	Max. 4 i., in October
63.	*Pyrrhula pyrrhula* (Linnaeus, 1758)	a			a						a	a	a	9	R	PB	Max. 4 i., in September
64.	*Chloris chloris* (Linnaeus, 1758)						a							1	P	NB	
65.	*Loxia curvirostra* Linnaeus, 1758		a											1	R	PB	
66.	*Carduelis carduelis* (Linnaeus, 1758)		a			a								7	P	PB	Max. 6 i., in November
67.	*Spinus spinus* (Linnaeus, 1758)	a	a	a		a		b			a			24	P, WV, SV	PB	Max. 15 i., in April

Legend: a – 1-9 individuals, b – 10-99 individuals, c – >= 100 individuals; P – species of passage, PM – partial migrant species, R – resident species, SV – summer visitor, WV – winter visitor; * – waterbirds; grey color – individuals observed in passage; NB – non-breeding species; PB – probably breeding species, CB – certainly breeding species; i. – individual(s).

3,053 individuals were counted, the most of them in August (38.88% of all), in the autumn passage, particularly because of the individuals of *Delichon urbicum*, and in September, when less than a half of strengths of the prior month were recorded. In March, during the spring passage, a low maximum raised, due to *Parus major* and *Columba palumbus*, while the numbers were the lowest between November and February (only 19 individuals in January, 0.62% of all), because of the lack of food, which obligated the birds to move to the inferior altitudes, but, also, to the lower vocal activity, which made them harder to find. In the same time, the number of species almost similarly fluctuated, with the highest peak in August (39 species, 58.21% of all) and the lowest minimum in January (7 species, 10.45% of all). 255 individuals (8.53% of all) were waterbirds. The most of them were registered in July (21.57% of all) and less in August and September, due to the individuals found in the autumn passage and, also, to the juveniles of *Anas platyrhynchos*. A low peak was registered in May, mainly because of the individuals of *A. platyrhynchos*, while no individuals were registered in January, because of the tough weather conditions. The number of species was the highest during July-September (maximum 83.33% of all, in August), while in January it was 0 (Table 2).

Negative and moderate correlations were found between the number of species and the snow depth, the percent of ice cover, and the water level (-0.55, -0.44, -0.44), respectively between the waterbirds and the snow depth and the water level (-0.46, -0.53), respectively between the number of species of waterbirds and the snow depth and the water level (-0.47, -0.57). Positive and moderate correlations were found in the case of the air temperature registered at 9:00: 0.56 for individuals, 0.61 for waterbirds, and 0.56 for all species. These mean that the number of species and individuals moderately depended on the considered parameters. in opposite sense for the negative correlations and in straight sense for the positive correlations. The only strong correlation (0.79) was got between the number of waterbird species and the air temperature, indicating that these species appeared in higher number with the warming of the weather and became fewer with the cooling of the weather, in a strong relation. In the rest of the situations, the correlations were weak or very weak. The strengths of *Anas platyrhynchos* and *Phalacrocorax carbo* positively and moderately correlated with the temperature of the air (0.50, 0.42), while the strength of *A. platyrhynchos* negatively and moderately correlated with the snow depth (-0.43). *Anas platyrhynchos*, *Ardea cinerea*, *Phalacrocorax carbo* and *Actitis hypoleucos* negatively and moderately correlated with the water level, while the correlations of *Mergus merganser* and *Ciconia nigra* with the considered parameters were week or very week. To note the positively and strongly correlations (0.74, respectively 0.72) between the strengths of *Ardea cinerea* and *Actitis hypoleucos* with the temperature of the air at 9:00; both are species of passage, arrived in the area in July, August and September, the three of the four months (including June) when the measured temperature of the air at 9:00 was more than 15°C.

Photo 1. Juveniles of *Anas platyrhynchos* (original).

Photo 2. Juveniles of *Mergus merganser* (original).

Table 2. The monthly variation of the individuals and of the species.

Period	**October**	**November**	**December**	**January**	**February**	**March**	**April**	**May**	**June**	**July**	**August**	**September**	**All year**
Number of individuals	170	83	33	19	32	297	237	197	143	208	1,187	447	3,053
Number of species	33	23	12	7	11	30	35	26	28	24	39	36	67
Number of waterbirds	18	22	10	0	14	15	17	28	9	55	35	32	255
Number of species of water	1	1	1	0	2	2	2	2	2	4	5	4	6

By ecological seasons, the averages of the number of individuals and species reveal maximums in the serotinal (less in the autumnal) seasons and minimums in the hiemal (less in the aestival) seasons, corresponding to the autumn passage, respectively, principally, to the winter seasons. In the prevernal seasons, during the spring migratory period, there were important values, too, while low values there were in the aestival season, in the breeding season. Generally,

the number of species of waterbirds was constant, 2 (*Mergus merganser* and *Anas platyrhynchos*), except for the serotinal season, when appeared the species of passage (*Ciconia nigra*, *Ardea cinerea*, *Phalacrocorax carbo*, *Actitis hypoleucos*), and the winter season, when only the Anseriformes remained (1 species/month, in average) (Table 3).

Table 3. The monthly average of the number of individuals and of the number of species per ecological seasons and per total.

Period	Prevernal	Vernal	Aestival	Serotinal	Autumnal	Hiemal	All year
Individuals/month	267	197	143	697.5	308.5	41.75	254.42
Species/month	32.5	26	28	31.5	34.5	13.25	25.33
Waterbirds/month	16	28	9	45	16	11.5	21.25
Species of waterbirds/month	2	2	2	4.5	2	1	2.17

According to the variation in strengths and in number of species, the monthly average density of the waterbirds, expressed in individuals/100 ha of water, respectively individuals/km of shoreline, shows the highest values in the serotinal season, while the lowest were in the aestival season. The maximums maintained in the serotinal season in the case of the monthly average density as number of species of waterbirds, while the minimums were, this time, in the hiemal season. (Table 4). *Mergus merganser* was found every season, its maximum densities being in the prevernal season, and its minimum ones, in the hiemal season. Also, *Anas platyrhynchos* was found every season, the highest values of the densities being registered in the searotinal season, while the lowest ones were in the prevernal and aestival seasons. *Ciconia nigra* and *Phalacrocorax carbo* appeared only in the serotinal season and attained low densities (with the mention that *C. nigra* was saw in flight, at high elevation over the reservoir). *Ardea cinerea* and *Actitis hypoleucos* were found in the serotinal and the autumnal seasons, the first with higher densities in the autumnal season and the last, in the serotinal season.

Table 4. The monthly average of the density of individuals, respectively species, in the case of the waterbirds.

Density at 100 ha water/ Density at 1 km shoreline	Prevernal	Vernal	Aestival	Serotinal	Autumnal	Hiemal	All year
Mergus merganser	4.40/0.62	3.85/0.54	0.55/0.08	0.82/0.12	0.55/0.08	0.27/0.04	1.42/0.20
Anas platyrhynchos	4.40/0.62	11.54/1.62	4.40/0.62	19.51/2.73	11.81/1.65	6.04/0.85	9.29/1.30
Ciconia nigra	0/0	0/0	0/0	0.82/0.12	0/0	0/0	0.14/0.02
Ardea cinerea	0/0	0/0	0/0	1.10/0.15	0.55/0.08	0/0	0.27/0.04
Phalacrocorax carbo	0/0	0/0	0/0	0.55/0.08	0/0	0/0	0.09/0.01
Actitis hypoleucos	0/0	0/0	0/0	1.92/0.27	0.82/0.12	0/0	0.46/0.06
Individuals	8.79/1.23	15.38/2.15	4.95/0.69	24.73/3.46	8.79/1.23	6.32/0.88	11.68/1.63
Species	1.10/0.15	1.10/0.15	1.10/0.15	2.47/0.35	1.10/0.15	0.55/0.08	1.19/0.17

Regarding the ecological indexes, the constancy and the Dzuba index of ecological significance were computed only for the hiemal and for all period, because of the limited field trips (Table 5). The occasional species (C1) predominated in the hiemal season and on the whole period, while the constant (C3) and the euconstant species (C4) were the least represented. Regarding the dominance, it is noticeable the prevalence of the subrecedent species (D1), except for the hiemal season, when the recedent species (D2) had the same weight as these. Generally, the dominant (D4) or the eudominant species (D5) were the fewest, except for the aestival season, when the recedent species (D2) had the lowest value. Regarding the Dzuba index of ecological significance, the subrecedent species (W1) were the most of them, while the recedent species (W2) were absent in the hiemal season. The subrecedent species (W1) prevailed and the dominant (W4) and the eudominant species (W5) had the lowest weight for all year. That means that a few species are common and abundant in the area, depending on the period, many others rarely arriving here and in low numbers.

Table 5. The distribution of the species on categories of constancy, dominance and Dzuba index of ecological significance.

Period	C1	C2	C3	C4	D1	D2	D3	D4	D5	W1	W2	W3	W4	W5
Prevernal	-	-	-	-	48.72	15.38	23.08	7.69	5.13	-	-	-	-	-
Vernal	-	-	-	-	38.46	11.54	30.77	7.69	11.54	-	-	-	-	-
Aestival	-	-	-	-	46.43	3.57	28.57	10.71	10.71	-	-	-	-	-
Autumnal	-	-	-	-	68.89	17.78	4.44	6.67	2.22	-	-	-	-	-
Hiemal	50.00	25.00	10.71	14.29	28.57	28.57	25.00	10.71	7.14	0.00	57.14	28.57	7.14	7.14
All year	47.76	23.88	17.91	10.45	74.63	13.43	8.96	1.49	1.49	50.75	29.85	16.42	1.49	1.49

39 species (58.21% of all) were occurred in the prevernal season, 26 species (38.81% of all) in the vernal season, 28 species (41.79% of all) in the aestival season, 44 species (65.67%) in the serotinal season, 45 species (67.16%) in the autumnal season and only 28 species (41,79% of all) in the hiemal season, in despite of the longer period of survey. *Corvus corax*, *Periparus ater*, *Poecile montanus*, *Cinclus cinclus* were the euconstant species in the hiemal season, while *Anas platyrhynchos*, *Corvus corax*, *Periparus ater*, *Poecile montanus*, *Troglodytes troglodytes*, *Turdus merula* and *Regulus regulus* were the ones at the level of the whole year; all of them are partial migrant or resident species. By dominance, *Columba palumbus* and *Parus major* had the highest ecological importance in the prevernal season, when their passage was

surprised, *Anas platyrhynchos*, *Delichon urbicum* and *Phylloscopus collybita*, in the vernal season, because of the passage of some individuals of *A. platyrhynchos* and of the arriving of breeding individuals of *D. urbicum* respectively *P. collybita*, and *D. urbicum*, *P. collybita* and *Fringilla coelebs* in the aestival season, all breeders in the area. Also, *Delichon urbicum* had the highest ecological importance in the serotinal and the autumnal seasons, because of the juveniles fledgling, respectively of the birds in passage, *Anas platyrhynchos* and *Corvus corax* in the hiemal season, on the background of the decreasing strengths of the other species, and *D. urbicum* for the whole year, due to the high number of juveniles resulted from the colony settled on the buildings from the dam and of the individuals observed in the autumn passage (Table 6). *Anas platyrhynchos* and *Corvus corax* were eudominant species by the Dzuba index of ecological significance at the level of the hiemal season and *Delichon urbicum* for the whole year.

Table 6. The synecological analyze of the species.

Species	All year			Prevernal	Vernal	Aestival	Serotinal	Autumnal	Hiemal		
	C	D	W	D	D	D	D	D	C	D	W
Tetrastes bonasia	C2	D1	W1	D1	-	D1	D1	D1	C1	D1	W2
Mergus merganser	C3	D1	W2	D3	D3	D1	D1	D1	C1	D2	W2
Anas platyrhynchos	C4	D4	W4	D3	D5	D4	D4	D4	C3	D5	W5
Columba palumbus	C3	D3	W3	D5	D3	D3	D1	D4	-	-	-
Cuculus canorus	C1	D1	W1	-	D2	D1	-	-	-	-	-
Ciconia nigra	C1	D1	W1	-	-	-	D1	-	-	-	-
Ardea cinerea	C1	D1	W1	-	-	-	D1	D1	-	-	-
Phalacrocorax carbo	C1	D1	W1	-	-	-	D1	-	-	-	-
Actitis hypoleucos	C1	D1	W1	-	-	-	D1	D1	-	-	-
Strix aluco	C1	D1	W1	D1	-	-	-	-	-	-	-
Pernis apivorus	C1	D1	W1	-	-	D1	D1	D1	-	-	-
Circaetus gallicus	C1	D1	W1	-	-	-	D1	-	-	-	-
Circus aeruginosus	C1	D1	W1	-	-	-	-	D1	-	-	-
Accipiter nisus	C2	D1	W2	D1	D1	-	-	D1	C1	D1	W2
Accipiter gentilis	C1	D1	W1	-	-	-	D1	-	-	-	-
Haliaeetus albicilla	C1	D1	W1	-	-	-	-	-	C1	D1	W2
Buteo buteo	C3	D2	W3	D4	D3	D3	D1	D1	C1	D2	W2
Merops apiaster	C1	D3	W2	-	-	-	D4	-	-	-	-
Picus canus	C1	D1	W1	D1	-	-	-	D1	-	-	-
Dryocopus martius	C3	D1	W2	D2	D1	D1	-	D1	C2	D3	W3
Picoides tridactylus	C1	D1	W1	-	-	-	D1	-	-	-	-
Dendrocopos leucotos	C1	D1	W1	D1	-	-	D1	D1	-	-	-
Dendrocopos major	C2	D1	W1	D1	-	-	-	D1	C1	D1	W2
Falco tinnunculus	C1	D1	W1	-	-	-	D1	-	-	-	-
Falco peregrinus	C1	D1	W1	-	-	-	-	D1	-	-	-
Lanius collurio	C1	D1	W1	-	-	-	D1	D1	-	-	-
Garrulus glandarius	C3	D1	W2	D1	D1	D1	D1	D1	C2	D3	W3
Nucifraga caryocatactes	C1	D1	W1	-	-	-	D1	D1	C1	D1	W2
Corvus corax	C4	D2	W3	D1	D1	D1	D1	D2	C4	D5	W5
Periparus ater	C4	D3	W3	D2	D2	D3	D2	D2	C4	D4	W4
Lophophanes cristatus	C2	D1	W2	-	-	D1	D1	D2	-	-	-
Poecile palustris	C1	D1	W1	D1	-	-	-	-	-	-	-
Poecile montanus	C4	D2	W3	D2	D1	D1	D1	D2	C4	D4	W4
Cyanistes caeruleus	C2	D2	W2	D4	-	-	D1	D1	C1	D2	W2
Parus major	C3	D3	W3	D5	D1	-	-	D1	C2	D2	W2
Delichon urbicum	C2	D5	W5	-	D5	D5	D5	D5	-	-	-
Phylloscopus trochilus	C1	D1	W1	-	-	-	-	D1	-	-	-
Phylloscopus collybita	C3	D3	W3	D3	D5	D5	D3	D3	-	-	-
Aegithalos caudatus	C2	D1	W2	D3	-	-	-	D1	C2	D3	W3
Sylvia atricapilla	C2	D2	W2	-	D4	D4	D2	-	-	-	-
Certhia familiaris	C2	D1	W2	D1	-	-	D1	D2	C1	D2	W2
Sitta europaea	C1	D1	W1	D1	-	-	D1	-	-	-	-
Troglodytes troglodytes	C4	D2	W3	D3	D1	D1	D1	D2	C2	D3	W3
Cinclus cinclus	C3	D1	W2	D1	-	-	D1	D1	C4	D3	W3
Turdus viscivorus	C2	D1	W2	D2	D3	-	D1	-	C1	D1	W2
Turdus philomelos	C3	D1	W2	D3	D3	D1	D1	D1	-	-	-
Turdus merula	C4	D1	W2	D2	D3	D3	D1	D1	C2	D2	W2
Muscicapa striata	C1	D1	W1	-	-	-	D1	-	-	-	-
Erithacus rubecula	C3	D2	W3	D3	D3	D4	D1	D2	C1	D2	W2

Ficedula parva	C1	D1	W1	-	-	-	D1	-	-	-	-
Ficedula albicollis	C1	D1	W1	-	-	-	D1	-	-	-	-
Phoenicurus ochruros	C2	D1	W1	D1	-	D3	-	D1	-	-	-
Phoenicurus phoenicurus	C1	D1	W1	-	-	D1	-	-	-	-	-
Regulus regulus	C4	D2	W3	D3	D1	D1	D1	D2	C3	D4	W3
Regulus ignicapilla	C2	D1	W2	D1	D2	D2	-	D1	-	-	-
Prunella modularis	C2	D1	W2	D2	D1	D3	-	D1	-	-	-
Anthus trivialis	C1	D1	W1	-	-	-	-	D1	-	-	-
Anthus spinoletta	C1	D1	W1	D1	-	-	-	-	-	-	-
Motacilla cinerea	C3	D2	W2	D1	D3	D3	D1	D3	-	-	-
Motacilla alba	C2	D1	W2	D1	D1	D3	D1	D1	-	-	-
Fringilla coelebs	C3	D3	W3	D4	D4	D5	D2	D4	-	-	-
Fringilla montifringilla	C1	D1	W1	D1	-	-	-	D1	C1	D2	W2
Pyrrhula pyrrhula	C2	D1	W2	-	-	-	D1	D1	C1	D1	W2
Chloris chloris	C1	D1	W1	D1	-	-	-	-	-	-	-
Loxia curvirostra	C1	D1	W1	-	-	-	-	-	C1	D1	W2
Carduelis carduelis	C1	D1	W1	-	-	-	-	-	C2	D3	W3
Spinus spinus	C2	D1	W2	D3	-	-	D1	D1	C3	D3	W3

Legend: C – constancy, C1 – occasional species, C2 – accessory species, C3 – constant species, C4 – euconstant species; D – dominance, W – Dzuba Index of ecological significance, D1, W1 – subrecedent species, D2, W2 – recedent species, D3, W3 – subdominant species, D4, W4 – dominant species, D5, W5 – eudominant species.

By the index of relation, it is interesting that the complementary orders predominate, because, generally, the Passeriformes summed the majority of the recorded individuals; it was the most important order in the avicoenose by the number of individuals, regardless the considered period, and, as a result, it was the only overdominant order. Anseriformes was the only dominant order in the hiemal season, because of the retreating of the most individuals of Passeriformes to warmer areas and of the maintaining of the strengths of *Anas platyrhynchos*. Consequently, Anseriformes was a dominant order per total, too (Table 7). Within the coenose of waterbirds, it can't be about a hierarchy of the orders for the prevernal, vernal, estival and the hiemal seasons, because Anseriformes was alone. Instead, Anseriformes was overdominant in the serotinal and the autumnal seasons, Ciconiiformes, Pelecaniformes, Suliformes and Charadriiformes were complementary in the serotinal season and Pelecaniformes and Charadriiformes, in the autumnal season. For the whole period, Anseriformes was overdominant, the other orders being complementary.

Table 7. The participation of the orders by the index of relation to the formation of the avicoenose.

Period	Prevernal	Vernal	Estival	Serotinal	Autumnal	Hiemal	All year
Galliformes	0.19	0.00	0.70	0.07	0.16	0.60	0.16
Anseriformes	5.99	14.21	6.29	5.30	7.29	27.54	7.66
Columbiformes	11.42	3.05	2.10	0.29	6.97	-	3.83
Cuculiformes	-	1.52	0.70	-	-	-	0.13
Ciconiiformes	-	-	-	0.22	-	-	0.10
Pelecaniformes	-	-	-	0.29	0.32	-	0.20
Suliformes	-	-	-	0.14	-	-	0.07
Charadriiformes	-	-	-	0.50	0.49	-	0.33
Strigiformes	0.37	-	-	-	-	-	0.07
Accipitriformes	6.37	4.06	2.80	1.22	2.11	2.99	2.65
Coraciiformes	-	-	-	6.09	-	-	2.78
Piciformes	3.00	1.02	0.70	0.22	0.97	2.99	1.08
Falconiformes	-	-	-	0.07	0.49	-	0.13
Passeriformes	72.66	76.14	86.71	85.59	81.20	65.87	80.81
Static axis	14.29	16.67	14.29	8.33	11.11	20.00	7.14
Dominance axis	28.57	33.33	28.57	16.67	22.22	40.00	14.29

Legend: - absence; yellow colour – complementary order, green colour – dominant order, blue colour – overdominant order.

Regarding the coenotic affinity between the waterbird species observed during a year of study, the highest values by the Bray-Curtis index, which considers both the number of samples and the number of individuals, was got between *Ardea cinerea* and *Actitis hypoleucos* (75%), which can be considered the characteristic association of species for the ecosystem. They appeared here in the same period and with relatively similar number of individuals each month. A medium similarity was got between *Phalacrocorax carbo* and *Ardea cinerea*, both passage species. *Mergus merganser* and *Anas platyrhynchos*, the most frequent and the most abundant species among the waterbirds, reached only 23.83% similarity, because they only partially overlapped as monthly occurrence and strengths (Table 8). The similarity between them was even lower in the hiemal period (8.70), because *Mergus merganser* was almost completely absent. The computation could not be achieved for the other seasons, because of the low number of proves.

Table 8. The coenotic affinity of the observed species during October 2023-September 2024, by the Bray-Curtis index.

Species	*Mergus merganser*	*Anas platyrhynchos*	*Ciconia nigra*	*Ardea cinerea*	*Phalacrocorax carbo*	*Actitis hypoleucos*
Mergus merganser	*	23.93	17.65	21.62	0.00	24.39
Anas platyrhynchos	*	*	2.91	5.74	1.95	9.39
Ciconia nigra	*	*	*	44.44	0.00	46.15
Ardea cinerea	*	*	*	*	50.00	75.00
Phalacrocorax carbo	*	*	*	*	*	33.33
Actitis hypoleucos	*	*	*	*	*	*

The diversity of the species gives the measure of the structural stability of the conenose, because as the ecological conditions become more uniform, the number of species grows, and the indexes of diversity help to estimate this stability. The Shannon-Wiener index tends to give a big importance to the rare species, while the Simpson index is more sensitive to the dominant species (PREDA et al., 2020). The relative diversity or equitability shows how much the real diversity distances from the maximal diversity (GOMOIU & SKOLKA, 2001). In the case of all species, it is observable that the highest equitability was recorded in the hiemal and the aestival seasons, when the most of the species occurred in the area had relatively close strengths. The lowest equitability was registered in the serotinal season, when there were present many species, whose strengths showed high discrepancies. Regarding the waterbirds, the higher equitability was registered in the prevernal season, when the two occurred species had equal strengths, and was minimum in the hiemal season, for Shannon-Wiener, respectively in the serotinal, for Simpson (Table 9). Large differences were registered in these cases between the strengths of the species.

Table 9. The diversity and the equitability of the species/ respectively of the species of waterbirds.

Period	Shannon-Wiener Index (H')	Equitability Shannon-Wiener	Simpson Index (1-D)	Equitability Simpson
All year	2.52/0.74	0.60/0.41	4.48/0.54	0.07/0.25
Hiemal	2.69/0.18	0.81/0.26	9.56/1.09	0.29/0.53
Prevernal	2.87/0.69	0.78/1.0	10.21/2.07	0.24/1.0
Vernal	2.55/0.56	0.78 /0.81	7.76/1.64	0.26/0.79
Aestival	2.67/0.35	0.80/0.50	10.31/1.29	0.30/0.56
Serotinal	1.35/0.84	0.36/0.47	1.86/1.59	0.04/0.25
Autumnal	2.37/0.56	0.62/0.40	4.20/1.35	0.09/0.32

CONCLUSIONS

The bird fauna of the Pecineagu Reservoir, observed during a year of study, in 2023-2024, was generally normal for the mixed forests, being comparable as number with the one from similar areas from the Făgăraș Massif. Passeriformes dominated the bird fauna and Anseriformes, the fauna of waterbirds, while only 6 species, among the total of 67, were waterbirds. The occurrence of other species, rare in the area, mainly in the passage time, is assumed.

14 species, 20.90% of all, are mentioned in the Annex I of the Birds Directive, being the most important ones from the conservation point of view, while no one was waterbird. Among them, *Tetrastes bonasia*, *Pernis apivorus*, *Picus canus*, *Dryocopus martius*, *Picoides tridactylus* and *Dendrocopos leucotos* bred in the area.

The species of passage prevailed, followed by the residents, summer visitors, and the partial migrants, reflecting the harsh conditions from the winter, but also the proximity of the Rucăr-Bran Corridor, a known way of migration through the Southern Carpathians. The species of passage were the most in the case of waterbirds, too, but their relatively low number is surprising, viewing the nearness of the corridor. The higher altitude of the reservoir, comparatively with the other two similar reservoirs from the Făgăraș Massif (Vidraru and Râușoru), had a major impact on the waterbirds, because of the limited food supply. As a result, the migratory individuals continued their route, without stopping here or, rather, preferred to cross over the low mountain saddles from the downstream and not to deviate on the reservoir.

All species of waterbirds were more or less migratory in the area and their number, higher in the autumn than in spring, should be put in relation with the presence in the northern vicinity of the Făgăraș Mountains of the great Olt River.

The dynamics of the species and individuals depended on the phenology of the species, and, also, by the weather conditions.

Anas platyrhynchos was the most common and abundant waterbird species in the area.

Ardea cinerea and *Actitis hypoleucos* formed the characteristic association of species of water for the ecosystem, from the coenotic affinity point of view. The reservoir assured for them favorable habitats for feeding and resting during the post-breeding passage.

While the reservoir was not a hotspot for the migratory waterbirds, as we initially supposed, especially its end (as well as the larger mouths of Pârâul Hotarului and Pârâul Mânăstirii), where wetland habitats are present, should became protected zones, because females with chicks of *Mergus merganser* and *Anas platyrhynchos*, rare breeders on the mountain reservoirs, were found here and also, individuals of the other species of waterbirds.

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