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ORNITHOFAUNA OF THE RAMSAR SITE „LOWER PRUT LAKES"

165.02-Zoology

Summary of the doctoral thesis in biological sciences

CHISINAU, 2024

The thesis was developed in the Laboratory of Terrestrial Vertebrates, Institute of Zoology Moldova State University, Doctoral School of Natural Sciences.

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The thesis defense will take place on 20th of September 2022 at 14:00, in the meeting of the Doctoral Commission within the Doctoral School of Natural Sciences, Moldova State University (http://www.usm.md), address: Chișinău, str. Kogălniceanu 65 A, room 332.

The doctoral thesis and the abstract can be consulted at the National Library of the Republic of Moldova, Central Library of Moldova State University (MD 2009, on ANACEC web page (http://www.cnaa.md), and on the USM web page (http://www.usm.md).

The summary was sent on 29 July 2024.

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CONTENT

LIST OF ABBREVIATIONS:

RSLPL - RAMSAR SITE „LOWER PRUT LAKES"
NRLP – NATURAL RESERVE „LOWER PRUT”

CONCEPTUAL HIGHLIGHTS OF RESEARCH

The topicality and importance of the research. Birds have the widest distribution among all living creatures on Earth. The development of human activities has led to significant degradation and alteration of the natural habitats where these birds live, harming their nesting areas, resting spots, feeding grounds, and, consequently, the bird populations themselves. Only some places remain where birds can find refuge and suitable living conditions, among which wetlands are notable.

The lower Prut sector is vital, encompassing large aquatic areas such as the Prut River, Lake Beleu, and the Manta Lake complex. These ecosystems represent some of the republic's most valuable and favorable sectors, maintaining a rich diversity of wild flora and fauna species. On April 23, 1991, the ,,Lower Prut" State Reserve was established based on Lake Beleu. In June 2000, the "Lower Prut Lakes" Ramsar Site was included in the List of Wetlands of International Importance, as a habitat for water birds. In 2018, the "Lower Prut" Biosphere Reserve was established, covering an area of 14,771.04 hectares, and it became part of UNESCO's World Network of Biosphere Reserves. Despite the transformations over time, the Lower Prut region remains a particularly interesting wetland from avifaunistic point of view, offering a critical habitat for both the Republic of Moldova and Romania due to its proximity to the Danube Delta. Additionally, it plays a vital role in southeastern Europe, as the Prut Valley is an important migration route for birds.

Description of the situation in the field of research and identification of research problems. Ornithological research in the Lower Prut sector has been conducted unevenly, with some species studied in greater detail while others have received little attention. Even the literature on the wetland ornithofauna is limited, with some publications having decades-long gaps.

In the last 50 years, the habitats of wild birds have degraded alarmingly, leading to significant changes in their populations. These transformations act as an early warning mechanism for the overall condition of the region, indicating where habitats are degraded, where climate change and anthropogenic activities are taking their toll, and where urgent conservation measures are needed. Birds need our help to survive their ongoing struggle with nature. Systematic monitoring provides accurate information on the ecological state of aquatic and adjacent habitats, allowing for a pertinent prognosis of their future development.

Currently, 246 bird species from the Republic of Moldova are present in the Ramsar Site ,,Lower Prut Lakes” serving as highly effective bioindicators of the quality of the aquatic biotopes they inhabit. More than half of these species use the wetland ecosystems for nesting, and 51 species, with varying degrees of vulnerability, are protected at national and international levels.

This work is highly relevant as it presents the results of research on the ornithofauna of the Ramsar Site ,,Lower Prut Lakes" (RSLPL), including its structure and diversity, some ecological aspects of aquatic and semi-aquatic species, and specifics regarding seasonal migration. It also explores the influence of environmental and anthropogenic factors on populations and the current state of rare species and highlights the importance of birds in nature and the national economy. Given that the Lower Prut sector is a wetland area, this work pays particular attention to aquatic and semi-aquatic bird species.

Scientific research methodology. The multiannual research on avifauna has covered all seasonal aspects: winter, early spring, spring, summer, late summer, and autumn. The methods used in field monitoring of birds included fixed-point observations, observations along predetermined transects, boat trips on the water surface, and recording data on numerical estimates, ecological aspects, habitat conditions, hydro-climatic conditions, anthropogenic activities, etc. [1-3]. The classification used and the taxonomic order of species in the thesis were based on the Bird World Database and BirdLife International.

Based on the outlined problem, the **goal of the research** is to determine the structure of the avifauna of the Ramsar Site ,,Lower Prut Lakes," to elucidate their reproductive and migratory characteristics, and to underscore the vital role of the Lower Prut Lakes in the conservation of bird species.

The following **objectives** were set: 1) Establishing the taxonomic composition and diversity of the avifauna of the Ramsar Site ,,Lower Prut Lakes"; 2) Highlighting behavioral characteristics during the reproductive period of some aquatic and semi-aquatic species; 3) Elucidating the migratory characteristics of aquatic and semi-aquatic bird species under the influence of environmental and anthropogenic factors; 4) Identifying species from different categories of vulnerability and developing the necessary measures to protect and conserve bird species and their habitats.

Scientific novelty and originality. A comprehensive research study was conducted in the Ramsar Wetland Area ,,Lower Prut Lakes" to analyze the avifauna and determine its structure. The study uncovered the reproductive and migratory characteristics of certain aquatic and semi-aquatic bird species. The significance of the Lower Prut Lakes in preserving bird species was emphasized.

The scientific problem solved. The composition of the ornithofauna and the changes that have occurred in recent years, largely due to the influence of environmental and anthropogenic factors, were determined. The research highlighted the reproductive and migratory particularities of some aquatic and semi-aquatic species and emphasized the importance of species protection.

Theoretical significance. For the first time, an inventory of bird species in the Ramsar Wetland Zone ,,Lower Prut Lakes" was conducted, and their list was compiled, highlighting the

importance of the Lower Prut wetland sector in the conservation of ornithofauna. Phenological groups, seasonal reproductive activities, migration, and passage were identified, contributing to the advancement of knowledge in the field of ornithology. The studies align with scientific research priorities and are integrated into national and international programs and strategies related to the protection and conservation of ornithofauna. This represents a significant contribution to fulfilling the commitments made by the Republic of Moldova through the international conventions it has adhered to.

The applicative value of the thesis. The Lower Prut wetland area importance in the conservation of bird species, especially rare ones, was highlighted. The obtained data will serve as a basis for initiating research within the ,,Lower Prut" Biosphere Reserve. Several recommendations regarding the conservation of birds and their habitats were formulated, emphasizing the importance of raising awareness and encouraging public participation in their protection.

Implementation of scientific results. For the first time, an illustrated guide of representative species from the Lower Prut fauna, describing 100 bird species, was developed. The obtained materials were also used to edit a chapter dedicated to ornithofauna in the monograph *Fauna of the ,,Lower Prut" Reserve, Terrestrial Vertebrates*. The paper is a starting point for future studies within the "Lower Prutul" Biosphere Reserve, a recently established protected area of international importance. The obtained results were implemented in the activities of the Moldsilva Agency, the "Prutul de Jos" Reserve, are integrated into the didactic process, in the elaboration of bachelor's and master's theses in educational institutions with a biological and ecological profile. Also, the data accumulated will be used for the next edition of the Red Book of the Republic of Moldova.

Approval of scientific results. The thesis materials were discussed, approved, and presented at about 22 national and international scientific events.

Publications on the thesis topic: The research results and conclusions were presented in 22 scientific papers (14 without co-authors), including one monograph, one methodological guide, and one illustrated guide.

Keywords: ornithofauna, wetland, species, diversity, phenology, ecology, dynamics, migration, conservation, importance.

THE CONTENT OF THE THESIS

In **Introduction** the characteristics of the work is presented: the importance and actuality of the topic addressed, the purpose and objectives of the research, the methodology used, the scientific novelty and originality, the significance and applied value of the results obtained, the approval of the scientific results, and a summary of the sections of the thesis are presented.

1. HISTORY OF AVIFAUNA RESEARCH IN THE PRUT RIVER BASIN

This chapter includes a synthesis of the bibliographic sources in ornithology and biology,

starting with the first works that mention wild bird species. The materials obtained as a result of research carried out on the territory of the republic from the second half of the 20th century and the main results of the studies carried out in the last two decades in the Lower Prut sector, both on the territory of the Republic of Moldova and Romania, are presented. Special attention is given to the data from the research conducted within the ,,Lower Prut" Nature Reserve.

2. MATERIALS AND RESEARCH METHODS

In this chapter, the physical-geographic description of the studied sectors was presented, emphasizing the ecosystems of the fish ponds in the village of Crihana-Veche; the Manta lake complex (localities: Pascani, Manta, Vadul-lui-Isac); the pond in Colibasi, the Brinza polder; the pond in the southern part of the town of Brinza, ,,Lower Prut" Nature Reserve, Slobozia Mare village, Valeni; the pond of the towns of Cislita-Prut and Giurgiulesti. Also here, information regarding the composition of the flora and vegetation and the faunal complex existing in the area was presented, highlighting the rare species and the new ones registered in recent years.

The data obtained personally, following the research carried out in the Ramsar Site ,,Lower Prut Lakes" in the period 2018-2023, as well as those certified within the NRLP in the period 2010-2023, were used in the elaboration of the thesis. Investigations in the territory covered the following periods: autumn migration, winter period, spring migration, and nesting period, using the following work methods: transect method, fixed point observations, and photographic method. The collected data were followed by a thorough analysis based on some software programs. Thus, an ecological analysis of the bird communities was carried out; it was possible to systematize and determine the effectiveness, established frequency, dominance, diversity, and spatial distribution [4].

3. STRUCTURE AND DIVERSITY OF THE AVIFAUNA IN THE RAMSAR SITE ,,LOWER PRUT LAKES"

According to the results, the wetland sector is visited by approximately 246 bird species, classified into 20 orders and 56 families, representing 91.7% of the avifauna of the republic. A comparison of the ornithofauna composition from the two periods shows that the most significant increase in the number of species is observed in the order Passeriformes, with 21 species [4-5]. Similarly, the increase in species belonging to the order Charadriiformes was significant, with 17 species, while the order Accipitriformes was supplemented by seven species (Table 3.1).

Regarding frequency, we inventoried 68 (28%) common species, 61 (25%) frequent species, 32 (14%) relatively rare species and 50 (20%) rare species, respectively 35 (14 %) very rare species (Fig. 3.2) [4-8].

Table 3.1. Taxonomic analysis of avifauna RSLPL

No.	Order	No. of species up to 2012	No. of species inventored in 2018-2023	Proportion in avifauna (%)	No. of famili-es	No. of species in Moldova	Share of RSLPL Bird fauna in Moldova bird fauna (%)
1.	Galliformes	3	3	1,2	1	3	100,0
2.	Anseriformes	25	26	10,6	1	28	92,8
3.	Gaviiformes	2	2	0,8	1	2	100,0
4.	Suliformes	2	2	0,8	1	2	100,0
5.	Pelecaniformes	13	13	5,3	3	13	100,0
6.	Ciconiiformes	2	2	0,8	1	2	100,0
7.	Accipitriformes	12	19	7,8	1	22	86,4
8.	Falconiformes	5	6	2,5	1	6	100,0
9.	Gruiformes	8	8	3,3	2	8	100,0
10.	Charadriiformes	29	46	18,4	8	50	90,0
11.	Podicipediformes	4	5	2,0	1	5	100,0
12.	Columbiformes	4	5	2,0	1	5	100,0
13.	Cuculiformes	1	1	0,4	1	1	100,0
14.	Apodiformes	1	1	0,4	1	1	100,0
15.	Caprimulgiformes	1	1	0,4	1	1	100,0
16.	Strigiformes	6	6	2,5	2	6	100,0
17.	Coraciiformes	3	3	1,2	3	3	100,0
18.	Bucerotiformes	1	1	0,4	1	1	100,0
19.	Piciformes	7	8	3,3	1	8	100,0
20.	Passeriformes	67	88	35,9	25	100	88,0
	Total	**196**	**246**	**100**	**56**	**267**	**91,7**

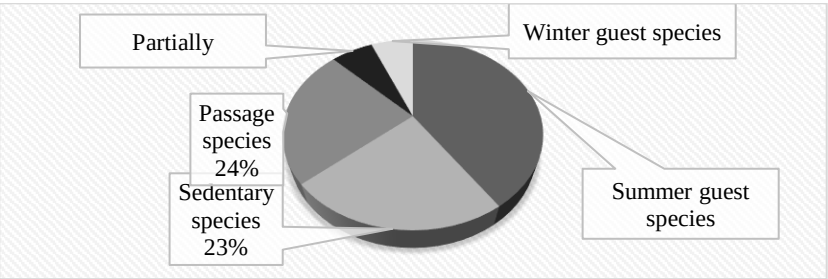

Figure 3.1. Phenological categories of bird species in RSLPL

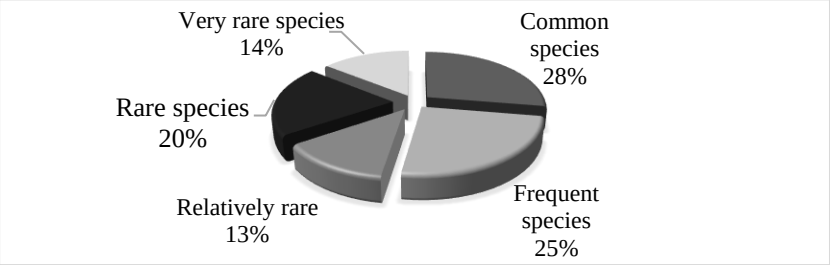

Figure 3.2. Frequency of bird species in RSLPL

The avifauna of the pre-vernal aspect includes 147 species, distributed in 17 systematic orders (Fig. 3.3). The most well-represented orders are Passeriformes (50%), Charadriiformes (23.8%), and Anseriformes (13.6%). They are followed by Accipitriformes (7.5%), Pelecaniformes (6.8%), and Piciformes (5.4%), while other orders have lower representation. A distinctive feature

of the pre-spring appearance is given by migratory species that pass through or stop in the area to rest and feed.

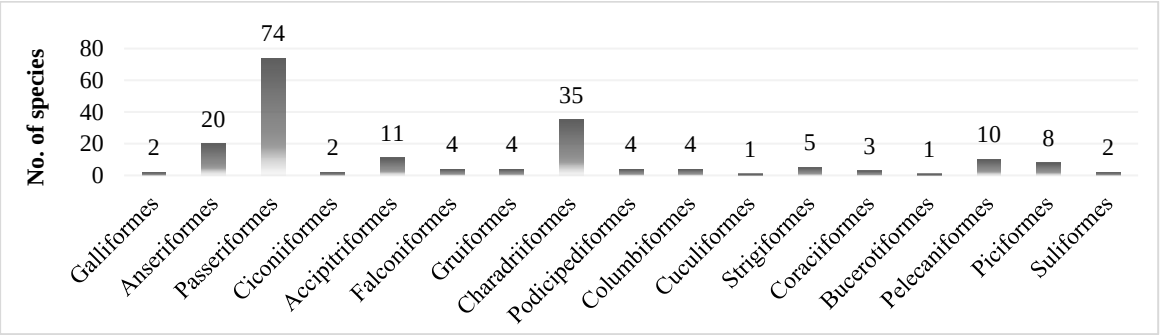

Figure 3.3. The share of systematic orders in the composition of the pre-vernal avifauna

The spring avifauna includes a spectrum of 181 species, divided into 18 systematic orders (Fig. 3.4). Systematically, the spring avifauna is dominated by the orders Passeriformes (43.1%), Charadriiformes (12.7%), Anseriformes (7.1%), Pelecaniformes (7.1%), Accipitriformes (5.0%), and Piciformes (4.4%). Other orders are less represented. A distinctive aspect of the spring period is the prenuptial behaviors, which precede pair formation and the species' nesting process.

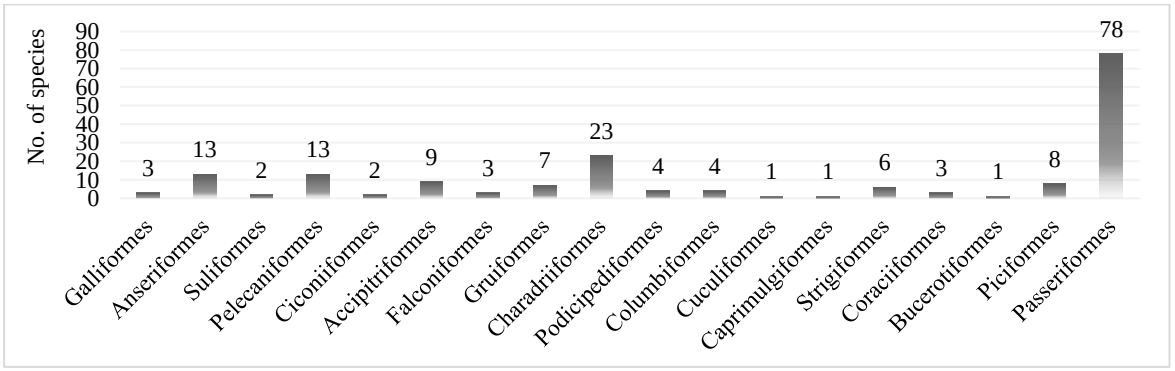

Figure 3.4. The share of systematic orders in the composition of the vernal avifauna

In contrast, the summer season is characterized by the predominance of summer visitors, including breeding species or those migrating seasonally for feeding, alongside sedentary and partially migratory species. The summer avifauna includes a total of 172 species distributed across 18 systematic orders (Fig. 3.5).

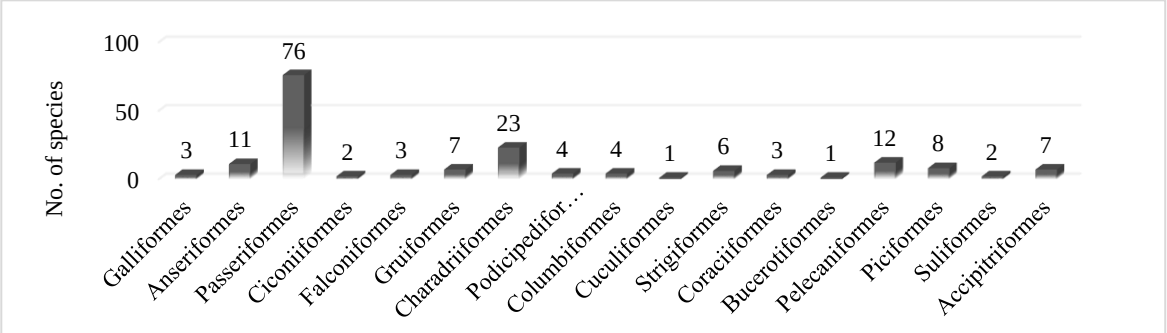

Figure 3.5. The share of systematic orders in the composition of the summer avifauna

In the summer avifauna, the dominant orders are Passeriformes (44.1%), Charadriiformes (13.3%), Pelecaniformes (7.0%), Anseriformes (6.3%), and Piciformes (4.6%). Other orders are

present in smaller proportions. Most of the birds observed during this time are engaged in nesting activities or caring for their young.

In the serotinal aspect, 213 species were recorded, divided into 20 systemic orders (Fig. 3.6). The orders Passeriformes (38.9%), Charadriiformes (19.7%), Anseriformes (6.1%), Pelecaniformes (6.1%), Accipitriformes (5.1%), Gruiformes (3, 7%) and Piciformes (3.7%). The other orders register a lower presence. Compared to the summer season, a significant increase is observed with 19 species in the order Charadriiformes, 7 species in the order Passeriformes and 4 species in the order Accipitriformes.

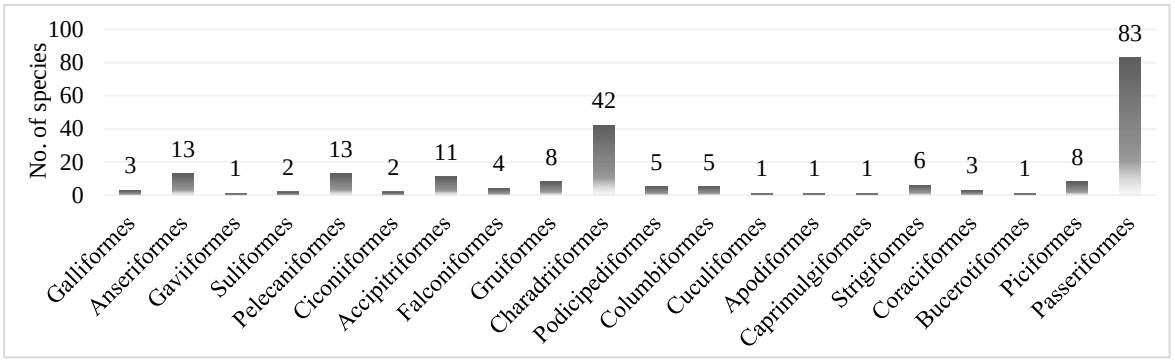

Figure 3.6. The share of systematic orders in the composition of the serotinal avifauna

In the autumn aspect, we witness the peak moment of migration, when species of transit and winter birds occupy the territories that the summer guests have left free. According to the studies, 155 species were identified, divided into 18 orders (Fig. 3.7).

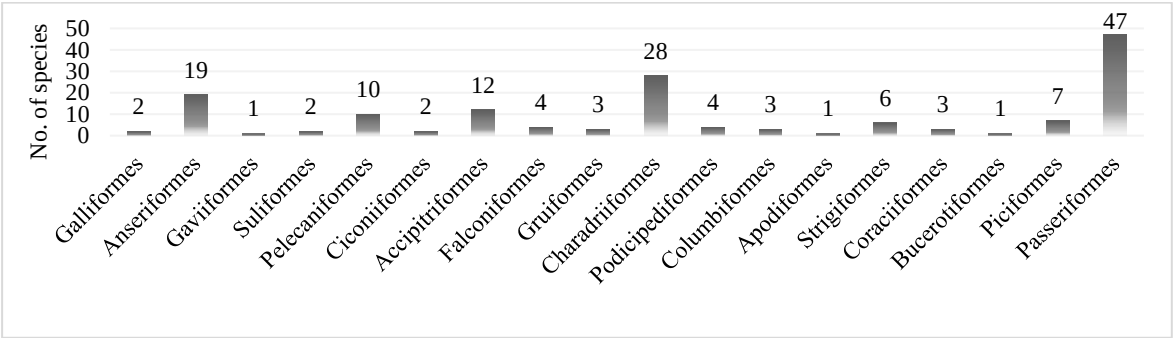

Figure 3.7. The share of systematic orders in the composition of autumn avifauna

After analyzing the data, we find a significant reduction of 36 species in the order Passeriformes, 14 species in the order Charadriiformes, 5 species in the order Gruiformes and 3 species in the order Pelecaniformes. The only order showing an increase is Anseriformes, with six additional species.

During the winter period, 132 species were recorded, divided into 16 orders. From the perspective of systemic analysis, we note that the best-represented orders are Passeriformes (32.5%), Anseriformes (19.7%), Charadriiformes (12.1%), Pelecaniformes (5.3%), Accipitriformes (5, 3%), Piciformes (5.3%) and Strigiformes (4.5%). The other orders are less involved. A decrease in the number of species was observed in the orders Charadriiformes (12 species), Accipitriformes (5

species), Passeriformes (4 species), Pelecaniformes (3 species). Only the order Anseriformes registers an increase with 7 species (Fig. 3.8).

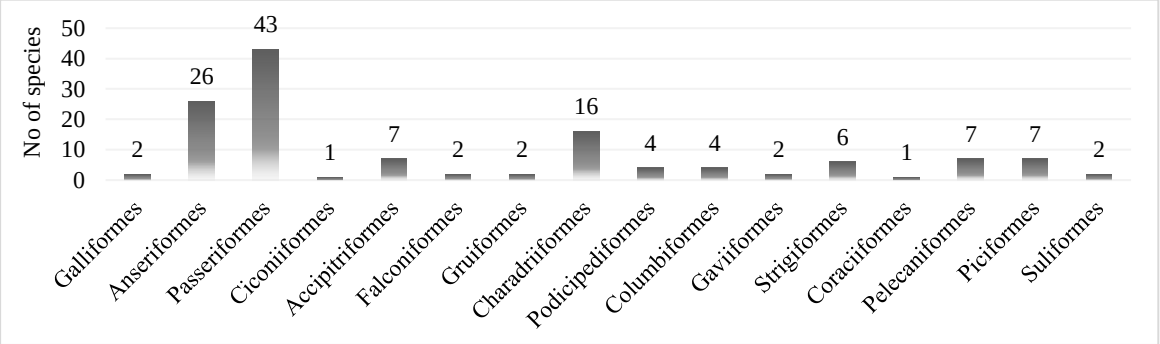

Figure 3.8. Proportion of systematic orders in the winter bird fauna

Analyzing the systematic diversity of species encountered in the six seasons, we observe that the highest number is recorded in the serotinal (213 species), vernal (181 species) and summer (172 species) aspects. With a smaller difference, they are followed by the autumnal (155 species) and prevernal (147 species) aspects. The lowest number of species is observed in the hiemal aspect (132 species).

Following the analysis of geographical distribution, it was found that the avifauna of the Ramsar Wetland is composed of faunistic elements belonging to 18 zoogeographical groups [9]. The most numerous are the Palearctic species – 94 (38.2%), followed by the Euro-Turkestan species – 28 (11.4%), Holarctic species – 24 (9.8%), European species – 22 (9.0%), and Arctic species – 20 (8.2%).

The analysis of the life modes of birds in the wetland shows that the forested habitats are preferred by 56 (23%) species; aquatic-adapted species number 49 (20%). On the riverbank, approximately 47 (19%) species are observed; in the floodplain – 44 (18%) species, and in the woodland edge – 35 (14%) species. In comparison, only 15 (6%) species are found in reedbeds and bulrush (Fig. 3.9).

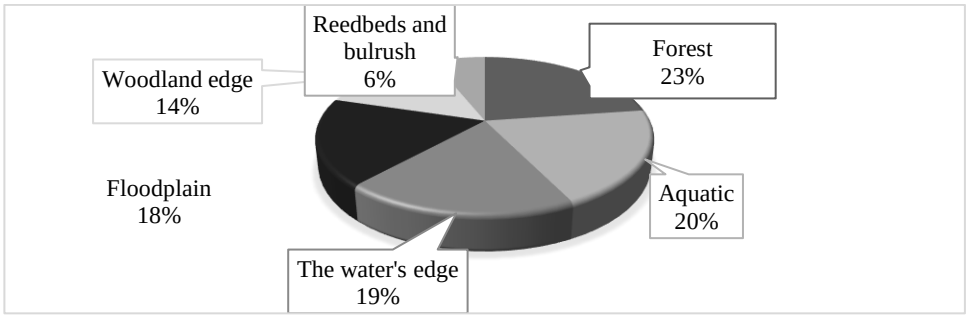

Figure 3.9. Distribution of bird species in main habitat types

The predilection of water birds for wooded surfaces or that of wet places can be explained by the fact that these habitats offer greater possibilities for obtaining food, building and placing nests in safe places.

The diversity of avifauna of the Manta Lake complex.

The aquatic habitats as well as the adjacent territories in the perimeter of the Manta Lake complex, represent a complex ecosystem, with extremely fluctuating environmental and trophic conditions for a wide variety of birds. Their group is represented by an ensemble made up of 244 species belonging to 20 orders and 56 families (Fig. 3.10) [9].

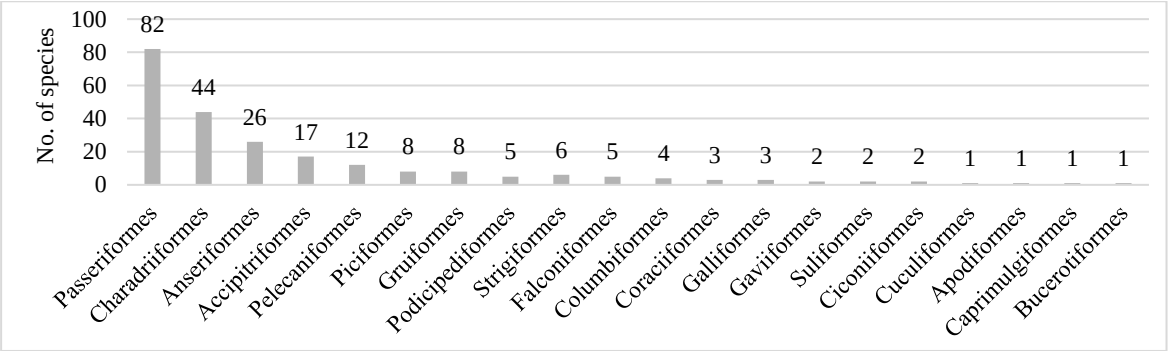

Figure 3.10. Taxonomic structure of bird species in the Manta Lake sector

In the ponds in Colibsi and Brinza, we identified about 132 species, classified into 17 orders (Fig. 3.11). As in most sectors, the most representative were passerines – 49 species, Caradriiformes – 24 species, and Pelecaniformes – 12 species; the other orders had an insignificant presence.

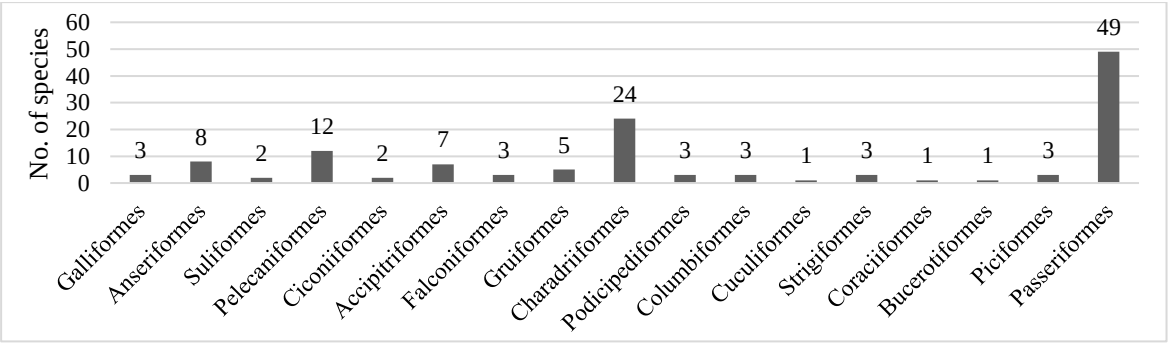

Figure 3.11. Taxonomic structure of bird species in the Colibasi wetland

Approximately 241 species can be observed within the **„Lower Prut" Nature Reserve**, categorized into 20 orders, representing 97.9% of the current avifauna of the Ramsar Wetland ,,Lower Prut Lakes". Figure 3.12 depicts the representativeness of these orders from 1995 to the present.

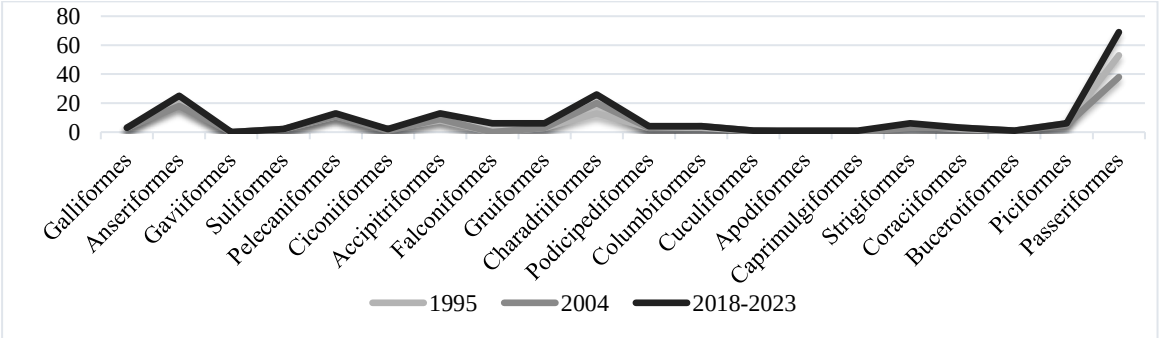

Figure 3.12. Taxonomic Structure of bird species in the NRLP, recorded from 1995 to 2023

The systematic list of bird species observed in the perimeter of the **Brinza** polder includes 106 species belonging to 17 orders. The orders Passeriformes – 48 species, Charadriiformes – 11 species, Pelecaniformes – 10 species, and Anseriformes – 8 species had the highest representation (Fig. 3.13).

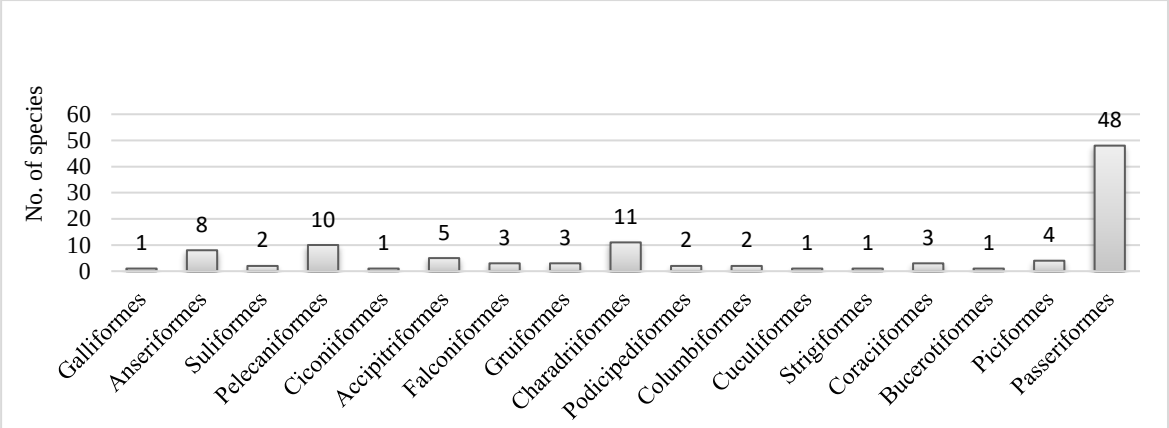

Figure 3.13. Taxonomic structure of bird species found in the Brinza polder area

The avifauna of the wetlands in **Cislita-Prut** and **Giurgiulesti** comprises approximately 91 species categorized into 17 orders. The most numerous orders are Passeriformes, with 23 species; Charadriiformes, with 15 species; and Accipitriformes, with ten species.

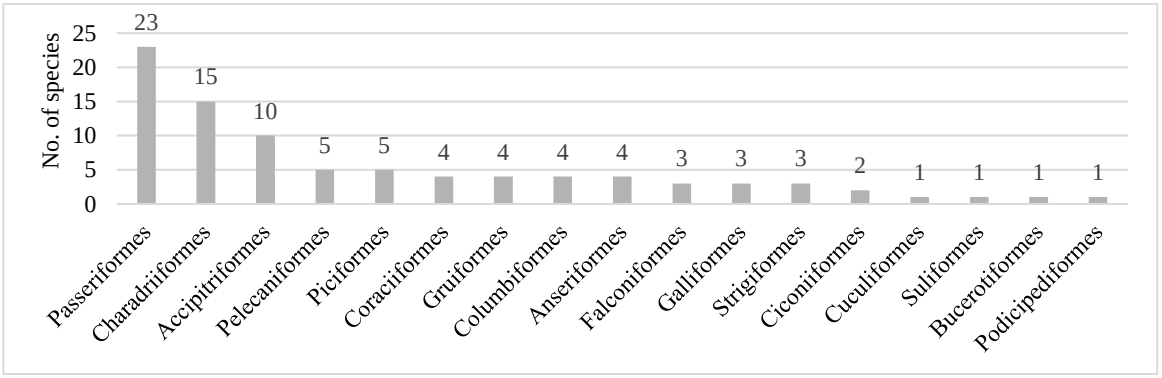

Figure 3.14. Taxonomic structure of bird species in the wetlands of Cislita-Prut and Giurgiulesti

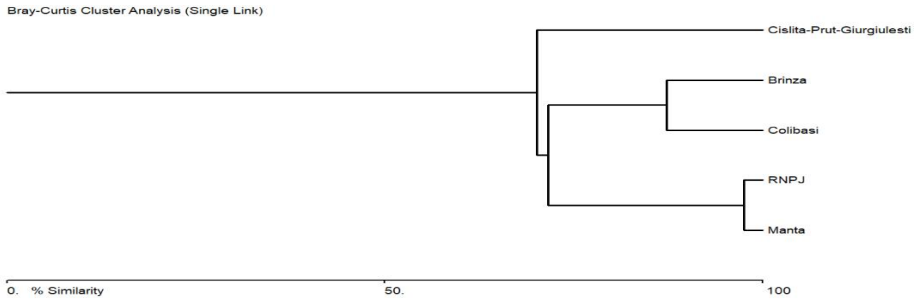

Figure 3.15. Similarity dendrogram of bird communities in the RSLPL habitats

Analyzing the ecological similarity between bird communities in the central wetland habitats of the described area, it was found that the highest similarity between habitats is between the Manta Lacustrine Complex and NRLP (97.4%); similarly close is the similarity between the wetlands of

Brînza and Colibași (87.2%), due to their large areas and relatively constant water surfaces that attract a large number of birds (Fig. 3.15). The lowest degree of similarity with other wetland habitats is observed in the wetland between the localities Cislita-Prut and Giurgiulesti, which presents some specific conditions.

4. ECOLOGICAL ASPECTS OF AQUATIC AND SEMI-AQUATIC BIRD FAUNA IN THE RAMSAR SITE „LOWER PRUT LAKES"

Aquatic and semi-aquatic birds in the RSLPL comprise a group of approximately 104 species, categorized into eight orders and 18 families, constituting 42.3% of the wetland area's avifauna. A comparative analysis of data obtained up to 2010 and data from the period 2018-2023 indicates an increase in their number: the Charadriiformes order has gained 20 species, the Anseriformes order has gained four species, the Gaviiformes order has gained two species, the Gruiformes order has gained two species, and the Podicipediformes order has gained one species (Table 4.1) [4-5,8,10].

Table 4.1. Taxonomic structure of the aquatic and semi-aquatic avifauna of RSLPL

No.	**Order**	**Family**	**No. of species up to 2010**	**No. of species reported in the 2012-2023**
1.	Anseriformes	Anatidae	22	26
2.	Gaviiformes	Gaviidae	-	2
3.	Suliformes	Phalacrocoracidae	2	2
4.	Pelecaniformes	Pelecanidae	2	2
		Ardeidae	9	9
		Treskiornithidae	2	2
5.	Ciconiiformes	Ciconiidae	2	2
6.	Gruiformes	Gruidae	1	1
		Rallidae	5	7
7.	Charadriiformes	Scolopacidae	14	22
		Charadriidae	3	6
		Haematopodidae	-	1
		Recurvirostridae	2	2
		Glareolidae	-	1
		Stercoraridae	-	1
		Laridae	7	13
8.	Podicipediformes	Podicipedidae	4	5
	Total	**18**	**75**	**104**

The **order Anseriformes** includes 26 species, which constitute 10.6% of the avifauna of the RSLPL. Phenologically, the anseriform species are categorized as follows: winter visitors – 13 species (48%), summer visitors – 8 species (30%), partial migrants – 3 species (11%), and passage migrants – 3 species (11%). Species such as *Tadorna tadorna*, *Anas crecca*, *A. clypeata*, *Aythya ferina*, and *A. nyroca* belong to multiple phenological categories.

The swan group includes *Cygnus olor*, *C. cygnus*, and *C. columbianus bewickii*. Except for *C. olor*, the other two species are found only during passage or in winter, from November to March, exclusively in Lake Beleu and the Manta lacustrine complex. *Cygnus olor* is a partial migrant, with

some individuals staying to winter in the NRLP, on Lake Manta and the Binza polder. In the studied sector, approximately 13 pairs of swans breed (Fig. 4.2).

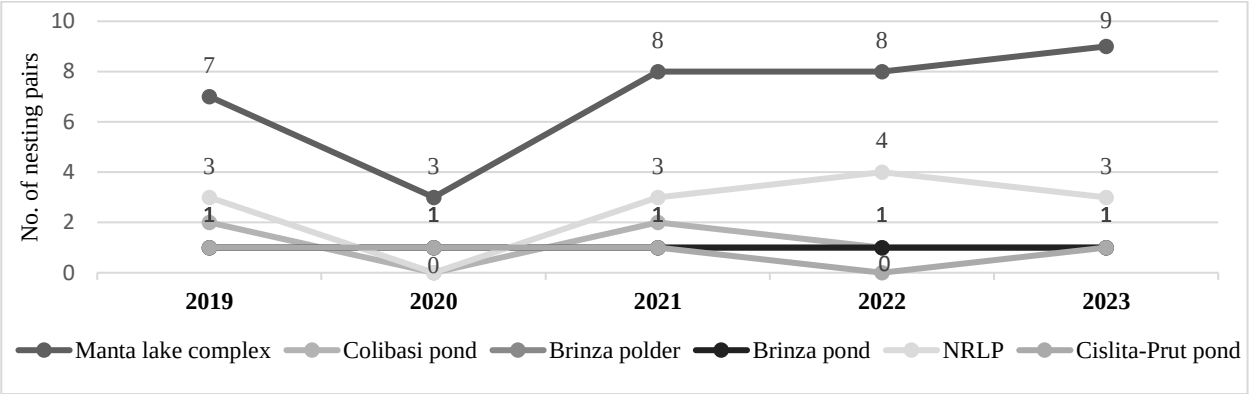

Figure 4.2. The number of nesting pairs of *Cygnus olor* recorded during the years 2019-2023

Out of the maximum number of 9 budgies encountered, a maximum of 6 reached maturity, and in most cases, only 4. Due to the lack of favorable conditions for nesting, the low water level, and the burning of the reeds, some pairs did not reproduce in 2020 in the NRLP and the Colibasi Pond and in 2022 in the Cislita-Prut Pond.

The group of geese consists of the species *Anser anser*, *A. fabalis*, *A. albifrons*, *A. erytropus*, and *Branta ruficollis*. *Anser anser* is a partially migratory species with a constant presence in the territory, the only species that hatch on the republic's territory. They nest in the humid sector, around 37 pairs. Among the species of ducks, *Anas platyrhynchos* is the most numerous and widespread; it is a regionally migratory breeding species. Around 95 pairs of nests are found in the entire region. In autumn, large flocks are encountered on both large bodies of water, some groups of which migrate and others remain to winter in the area. *Anas crecca* is a species found in relatively large numbers during the passage but also in winter. *Aythya ferina* is a partially migratory hatchery species. On the territory of wetland during the summer, around 36 nesting pairs were observed. Towards autumn, *A. ferina* prepares for migration in groups of up to 25-30 ex. *Aythya nyroca* is a summer guest and a passage species; specimens that choose to winter in wetland are rarely observed. The number of nesting pairs is insignificant due to the lack of favorable conditions

In addition to the species mentioned above, as nesting species, we can also mention *Spatula querquedula*, *S. clypeata*, *Tadorna tadorna*, *T. ferruginea*, *Mareca strepera*, the great majority of the flocks of which are registered in the passage. The only pair of *Netta rufina* was observed in the pools of Crihana Veche at the beginning of May 2022; other specimens were only in the passage in the number of a few specimens.

The three species of mergansers, *Mergus merganser*, *M. serrator*, and *M. albellus*, are found only in the winter aspect of the year, in the number of a few specimens.

The **order Suliformes** is represented by the species *Phalacrocorax carbo* and *Microcarbo pygmaeus*, which nest in mixed colonies within the NRLP and the Manta Lake complex. In the

ponds of the localities Cislita-Prut, Brinza, Colibasi, Vadul-lui-Isac, and Manta, *M. pygmaeus* nests in reed beds or dense groves.

The **order Charadriiformes** includes 46 species of wading birds (Fig. 4.3). The most numerous is the family Scolopacidae, which includes 22 species, accounting for 47.8% of the Charadriiformes species in RSLPL. With a significant difference, the following families are represented: Laridae - 13 species (28.2%), Charadriidae - 6 species (13.0%), Recurvirostridae - 2 species (4.2%). The families Haematopodidae, Glareolidae, and Stercoraridae are each represented by only one species (2.1% each).

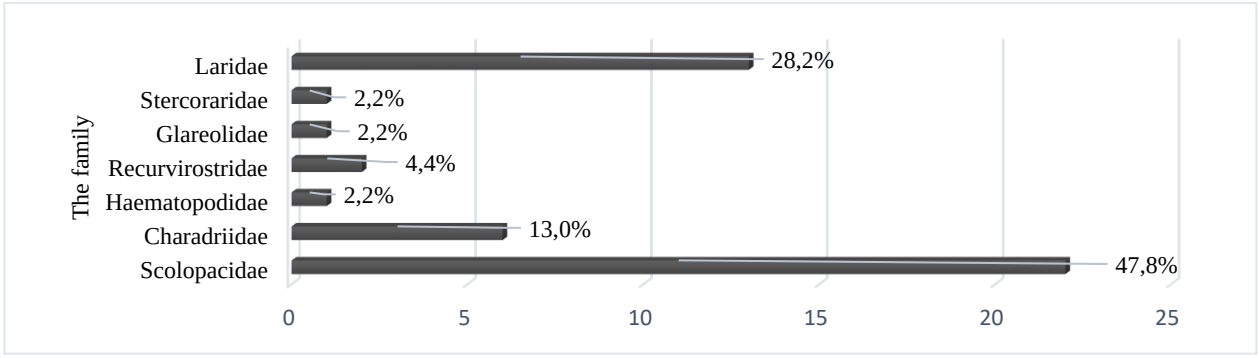

Figure 4.3. Proportion of species in the Charadriiformes families

Regarding the transition from winter to spring, during the prevernal period, wading birds migrating to their northern nesting grounds can be observed in the territory; those arriving in the territory are summer guests, and those leaving the territory after the winter period are winter guests (Fig. 4.4).

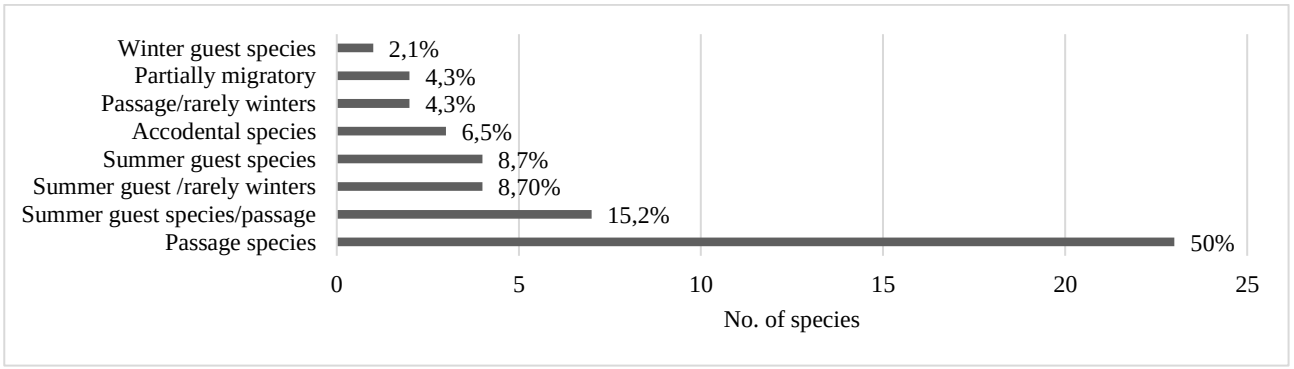

Figure 4.4. Phenological categories of Charadriiformes species

Vanellus vanellus is a frequently encountered species, with a constant presence both during nesting and migration periods. Its earliest appearance was on January 20, 2023. In the studied sector, over 55-68 pairs nest.

Recurvirostra avosetta is a summer guest of the territory, but many individuals remain late into autumn or to winter (over 1200 individuals on 11.20.2018; 238 individuals on 11.18.2021; 169 individuals on 12.22.2022, 695 on 11.16.2023). Around 23-28 pairs nest in the studied sector.

Himantopus himantopus is a species encountered during spring and autumn migration, as well as in the summer aspect of the year. The nesting population consists of 15-19 pairs.

Sternula albifrons appears accidentally. The only individual of *Hydroprogne caspia* was identified in a group of *Chroicocephalus ridibundus* on September 9, 2020. *Chlidonias hybrida* is a summer guest of the territory and a nesting species. Its monospecific colonies have been inventoried in various locations, comprising around 160 nesting pairs within the NRLP. Multiannual data on the number of nesting pairs within the NRLP are presented in Figure 4.5.

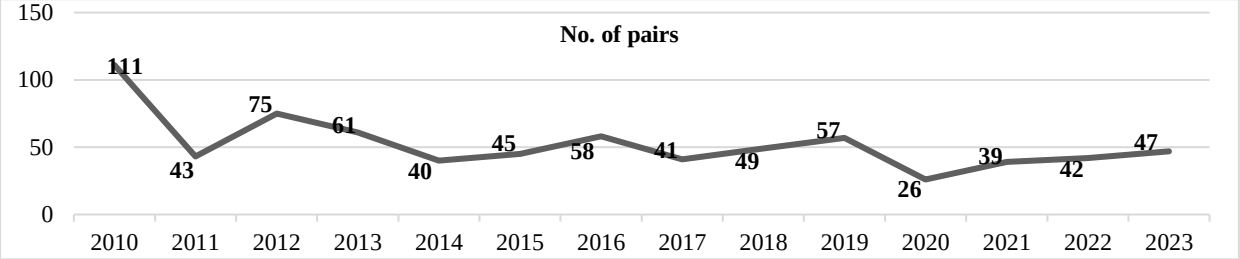

Figure 4.5. Multiannual data on the number of nesting pairs in NRLP

The birds from the family Laridae include a variety of gulls encountered during migration or the summer season. In the cold season, only certain species, such as *Larus fuscus*, *L. cachinnans*, and *Chroicocephalus ridibundus*, winters. The breeding season for nesting pairs begins in the last decade of March.

Order Pelecaniformes. *Pelecanus onocrotalus* and *Pelecanus crispus* are summer guests of the territory, but solitary individuals can also appear in wetlands during winter. Both species come to the Prut ponds only for feeding, with the largest concentrations on Lake Beleu and the Manta Lake complex.

Bubulcus ibis is very rarely observed. In our own observations, we had two encounters in 2021: two individuals in May and one individual in December. *Ixobrychus minutus* is a summer guest of the territory, with 19-26 nesting pairs.

Ardea alba is a summer guest of the territory, but up to 27 individuals also remain over winter in mild environmental conditions. It nests solitarily or in mixed colonies with pairs of *Nycticorax nycticorax, Egretta garzetta, Ardea cinerea, Ardeola ralloides, Platalea leucorodia, Phalacrocorax carbo* and *Microcarbo pygmaeus*. Two mixed colonies have been located in the studied area, one in each lake ecosystem. It nests solitarily in several locations in the region.

Ardea cinerea is a summer guest and a nesting species, but some prefer wintering in the Lower Prut ponds.

Nycticorax nycticorax is a summer guest, appearing at the beginning of April. Before the onset of reproduction, newly arrived groups wander for a few days in various area sectors. It nests in mixed colonies (on willows) and sometimes in monospecific colonies (occasionally in reed beds).

Egretta garzetta is a summer guest and a nesting species. The first individuals arrive at the end of March, with a mass appearance in April. Around 67 pairs nest.

Ardeola ralloides is a summer guest and a nesting species. Up to 43 pairs nest in mixed

colonies, in reed beds or on willows, not far from the water or ground surface.

Ardea purpurea is a summer guest. It prefers dense reed beds for nesting, but nesting pairs have also been observed in mixed colonies alongside other ardeidae. Around 36 pairs nest in the region.

Plegadis falcinellus and *Platalea leucorodia* are summer guests and nesting species. In some winters, 1-2 individuals remain to winter. They nest in monospecific or mixed colonies, in reed beds, willows, or willow trees, numbering 7-9 pairs. They form groups and feed intensively in autumn to sustain their migration flights.

Plegadis falcinellus associates with heron and spoonbill pairs for nesting in willows and groves, preferring the edge or upper tier. In autumn, they form groups, sometimes with E. garzetta individuals, to inspect the water edges for food. They leave the territory starting in September, sometimes in October

Order Ciconiiformes includes two species: *Ciconia nigra* and *Ciconia ciconia*. The first is a reclusive species, seen in spring starting from the last decade of March. It is presumed to nest in the Manta Lake complex sector, as up to 6 individuals have been observed in the summer months. Over 100 individuals can be observed during migration, flying high across the area. Up to 20 individuals stop for a few days in various parts of wetlands to feed and rest. On September 19, 2021, a young ringed bird was found weakened and unable to fly. It was one of 3 chicks in the nest at the time of ringing (July 1, 2021) in Jitomirskaia oblosti, Ukraine. After being intensively fed for three days, the bird was released into the wild along with other storks.

Ciconia ciconia is an anthropophilic species that nests in 8 out of 9 localities of wetlands (Fig. 4.6).

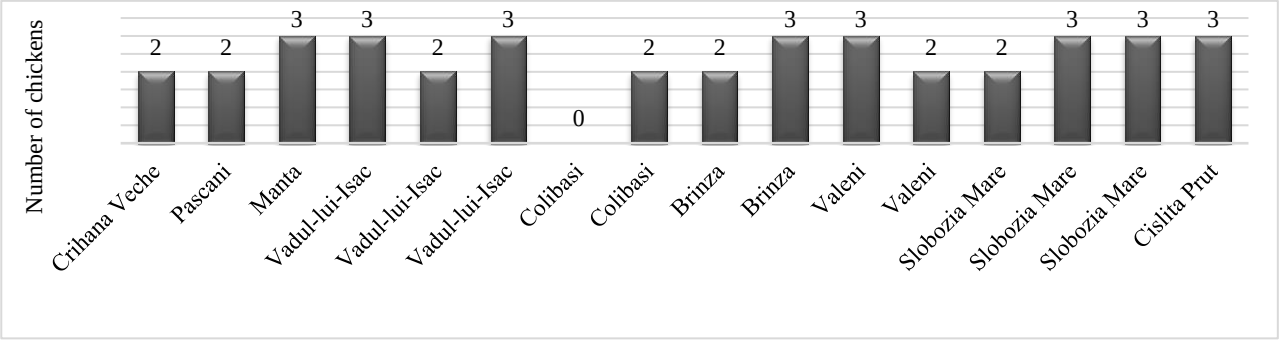

Figure 4.6. Number of *Ciconia ciconia* chicks raised in nests in 2023

Of the 17 nests inventoried, 16 were occupied in 2023. In dry years, in nests located further from the pond, birds raised only 1, at most two chicks. In 2023, the majority of pairs raised 2-3 chicks. In autumn, flocks of 50, rarely over 300-580 individuals, can be observed resting for 1-2 days before migrating.

Tracking the dynamics of aquatic and semi-aquatic bird species in wetlands throughout the year, we observed a continuous change in populations, with quantitative fluctuations from one

season to another (Fig. 4.7).

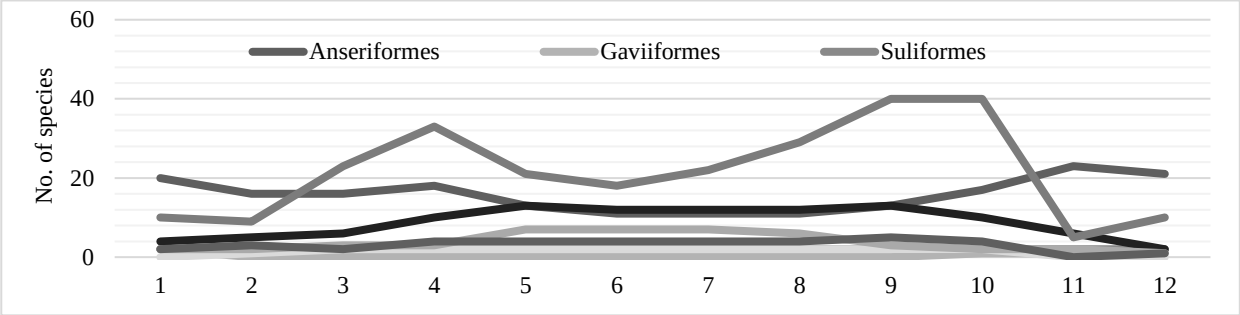

Figure 4.7. Proportion of systematic orders of aquatic and semi-aquatic species throughout the year

According to multi-year data based on seasonal movements, they belong to the following phenological categories: 42 (40%) summer guests; 10 (10%) sedentary species; 36 (34%) passage species; 9 (9%) winter guests; 3 (3%) partially migratory species; 4 species appear accidentally (Fig. 4.8).

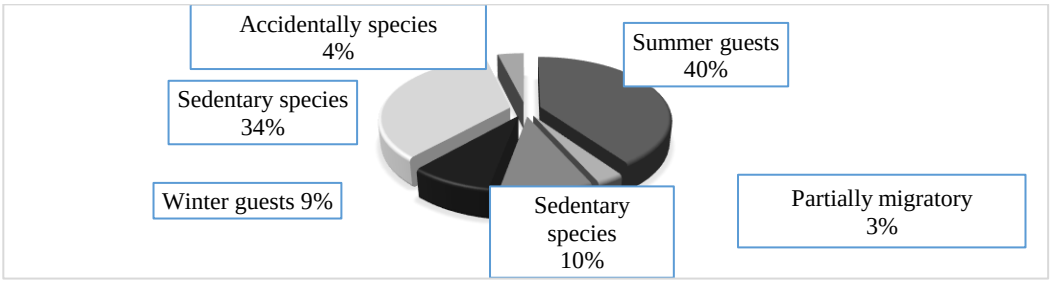

Figure 4.8. Phenological categories of aquatic and semi-aquatic bird species

In the winter aspect, 59 species were inventoried. The most represented orders were Anseriformes - 42.4%, Charadriiformes - 27.1%, and Pelecaniformes - 11.8%, followed by Podicipediformes – 6.8%, Gaviiformes - 3.4%, Suliformes - 3.4%, Gruiformes - 3.4%, and Ciconiiformes - 1.7% (Fig.4.9).

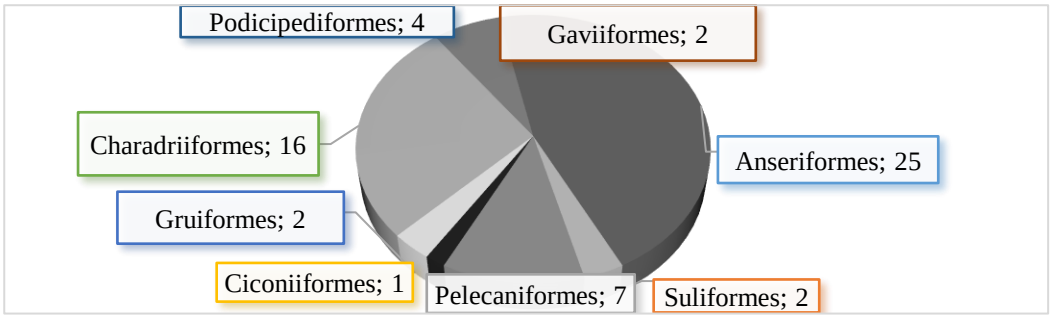

Figure 4.9. Representation of systematic orders of aquatic and semi-aquatic bird species in the hiemal aspect

From a phenological perspective, this aspect is dominated by species such as *Cygnus olor*, *Mareca strepera*, *Aythya nyroca*, *Spatula clypeata*, *S. querquedula*, *Tadorna ferruginea*, *Ardea alba*, *A. cinerea*, and *Podiceps cristatus*.

In the prevernal aspect, 78 species classified into seven orders can be observed (Fig. 4.10). The prevernal aquatic and semi-aquatic avifauna is primarily represented by the orders

Charadriiformes - 46.2%, Anseriformes – 24.3%, and Pelecaniformes - 12.8%. The other orders have lower representation: Gruiformes – 6.4%, Podicipediformes - 5.1%, Suliformes - 2.6%, and Ciconiiformes - 2.6%.

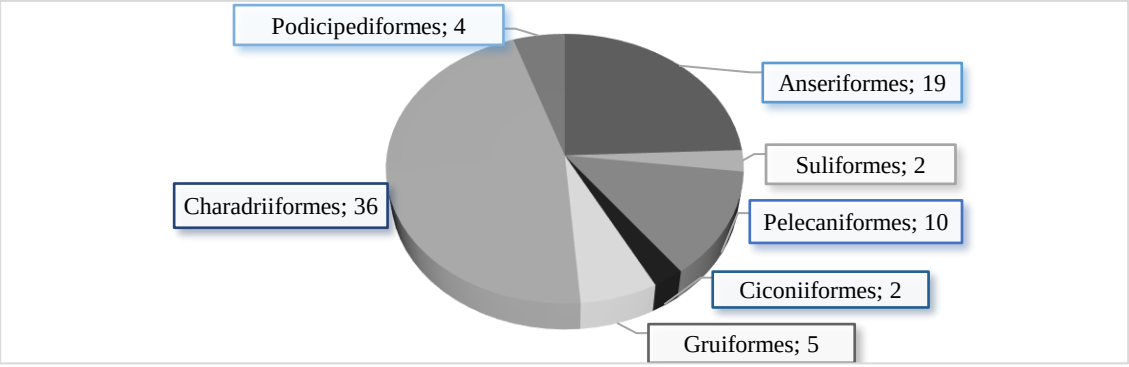

Figure 4.10. Representation of systematic orders of aquatic and semi-aquatic bird species in the prevernal aspect

Of the 25 shorebird species analyzed within the wetland, we have the following distribution: 12 succedent species (less than 1.1%) (*Haematopus ostralegus*, *Recurvirostra avosetta*, *Himantopus himantopus*, *Charadrius dubius*, *C. hiaticula*, *Calidris minuta*, *C. temminckii*, *C. ferruginea*, *C. falcinellus*, *Lymnocryptes minimus*, *Chlidonias niger*, *Larus ichthyaetus*); 4 recedent species (1.2-2%) (*Gallinago gallinago*, *Chlidonias leucopterus*, *C. hybridus*, *Sterna hirundo*); 1 subdominant species (2.1-5%) (*Numenius arquata*); 4 dominant species (5.1-10%) (*Vanellus vanellus*, *Tringa erythropus*, *T. totanus*, *T. ochropus*); and four eudominant species (more than 10.1%) (*Philomachus pugnax*, *Limosa limosa*, *Tringa nebularia*, *T. glareola*) (Fig. 4.11).

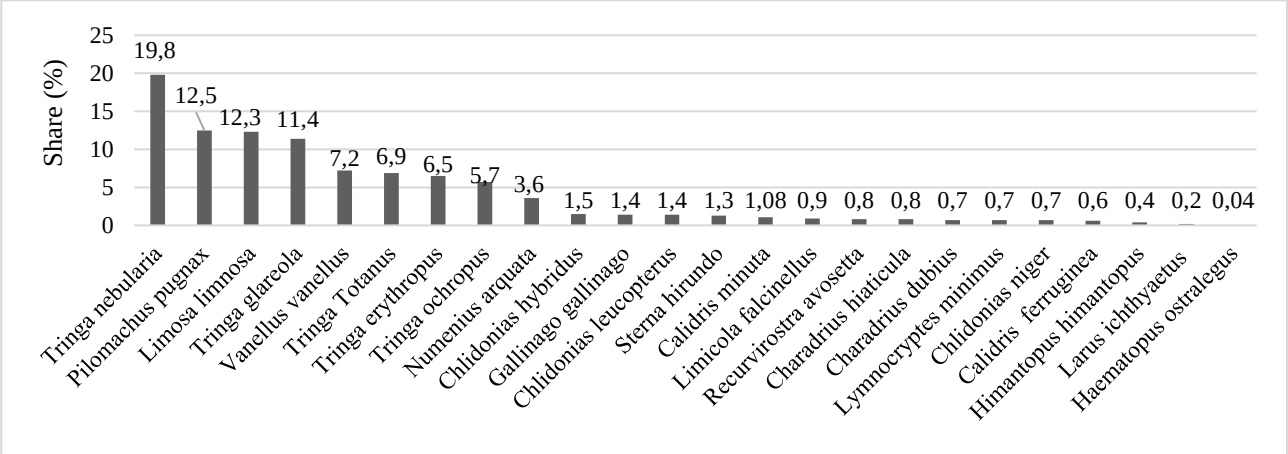

Figure 4.11. Dominance of Charadriiformes species during spring passage from 2018-2023

Among the anatids in the prevernal aspect, we have two dominant species: *Anas platyrhynchos* and *A. crecca*, a situation specific to most years (Fig. 4.12). In April, the representation of summer guest species, which reproduce in the wetland sector, becomes increasingly significant.

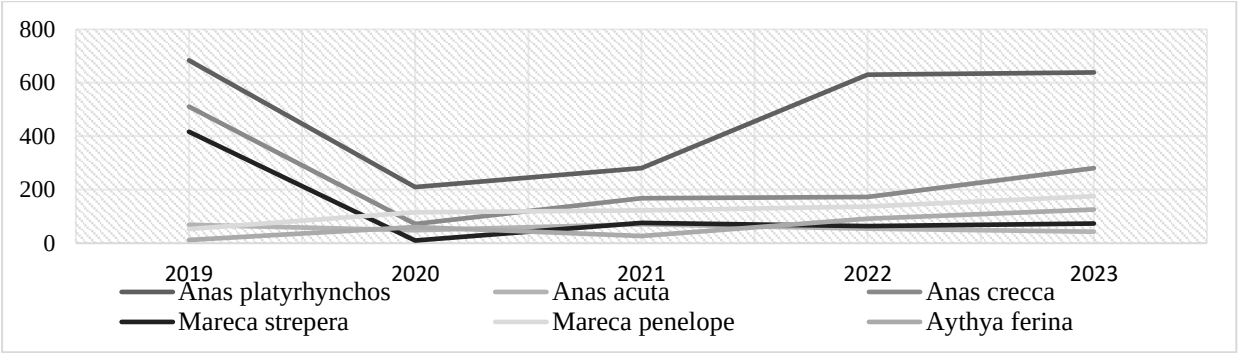

Figure 4.12. Dynamics of some aquatic species in the prevernal aspect, 2019-2023

The **vernal aspect** is characterized by the arrival of summer guests and the continued migration of shorebirds to northern breeding grounds. This period marks the beginning of the breeding season for most summer guests, sedentary and partially migratory species. The spectrum of vernal avifauna includes 62 species distributed across seven orders (Fig. 4.13).

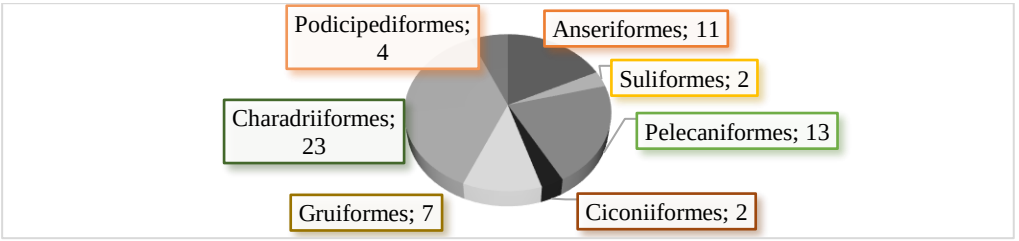

Figure 4.13. Representation of systematic orders of aquatic and semi-aquatic birds in vernal aspect

Systematically, in the vernal aquatic and semi-aquatic avifauna, the most represented orders are Charadriiformes – 37.1%, Anseriformes – 17.7%, and Pelecaniformes – 21.0%. The other orders have a minor component: Gruiformes – 11.3%, Podicipediformes – 6.5%, Suliformes – 3.2%, and Ciconiiformes – 3.2%.

Highlighting the main points within RSLPL where aquatic surfaces are temporarily or permanently present, we analyzed the values of the leading indices of diversity and dominance of aquatic and semi-aquatic bird species present in May and June. Most aquatic and semi-aquatic species have a significant biotopic preference for the Manta Lake ecosystem and NRLP, especially anatids (Fig. 4.14).

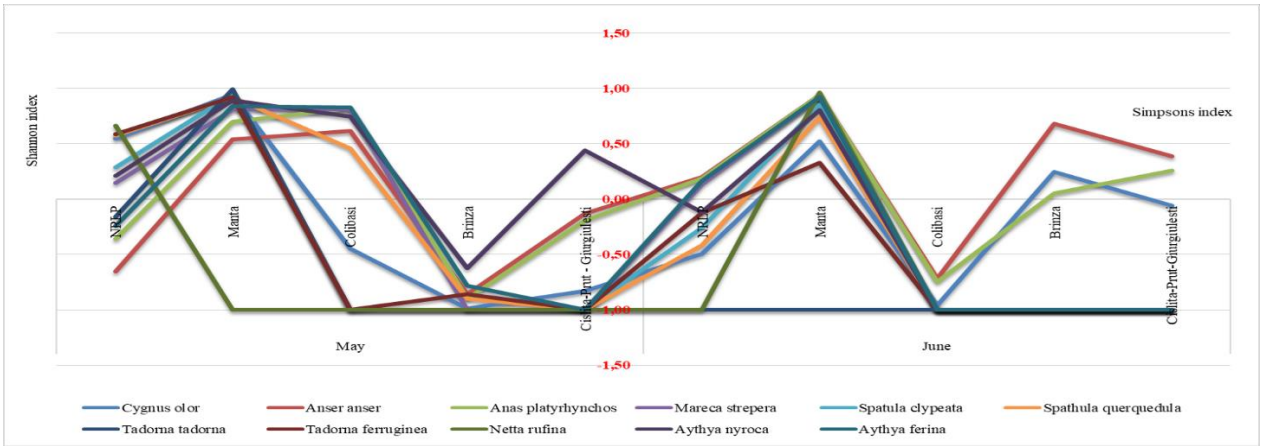

Figure 4.14. Biotopic preference index values of anatid species in May-June

Analyzing the Shannon diversity index and Simpson dominance index, it was found that the highest diversity in May-June was in ecosystems with large water surfaces – Beleu and Manta, while the ponds in other localities had lower indices. The dominance index was highest in Colibasi and Brinza, which were dominated by only 3-4 species with over 30 individuals each. Meanwhile, in the Manta and Beleu ecosystems, the number of individuals per species was more evenly distributed (Fig. 4.15).

The higher diversity of the RSLPL ecosystem and Manta Lake complex can be explained by the large number of aquatic and semi-aquatic bird species present and by a more significant population balance for the bird communities that reproduce in these places.

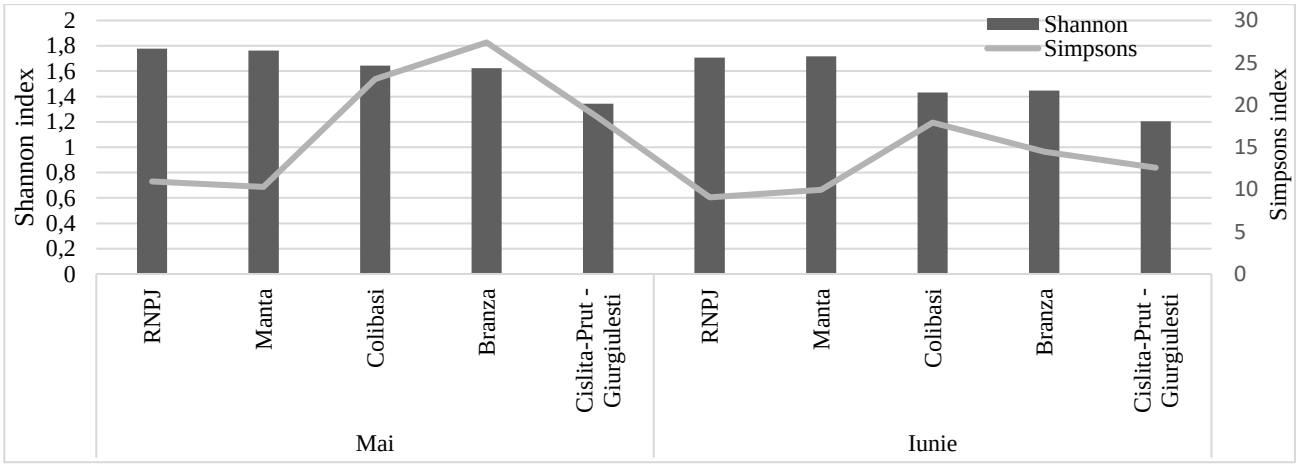

Figure 4.15. Representation of diversity indices of aquatic and semi-aquatic bird fauna in RSLPL in May and June

The ratio between the dominance and diversity indices of Anseriformes, Pelecaniformes, and Charadriiformes bird species in RSLPL in May and June are shown in Figures 4.16-4.23.

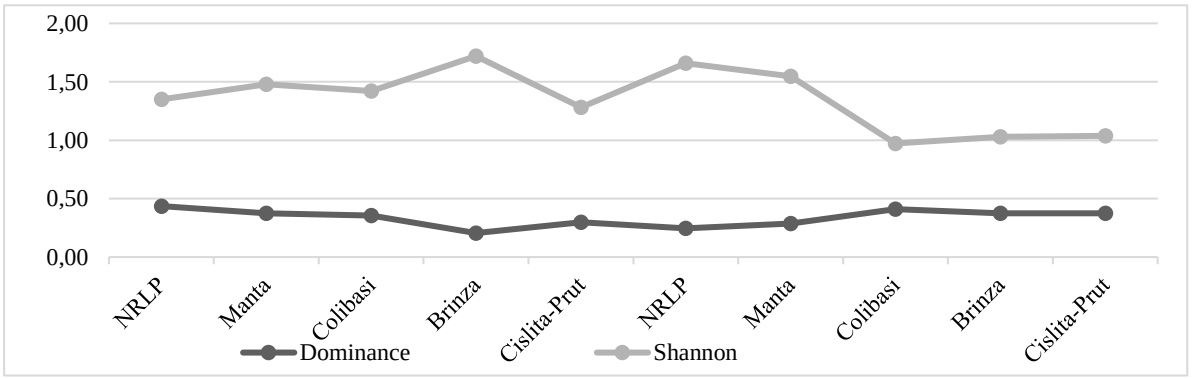

Figure 4.16. Ratio between dominance and diversity indices of Anseriformes bird species in RSLPL in May and June

Analyzing the ratio between the dominance index and the diversity of Anseriformes bird species in the RSLPL area in May and June, it is observed that in NRLP, dominance and diversity are balanced, with moderate initial values; in the Manta Lake complex ecosystem, there is a significant increase in diversity, with a slight decrease in dominance; in the pond at Colibasi,

diversity remains high, and dominance decreases slightly; in the ponds at Brinza, diversity remains high, but dominance reaches the lowest value; in the pond between Cislita-Prut and Giurgiulesti, dominance begins to increase, and diversity decreases significantly.

Thus, significant variations in the structure of Anseriformes bird communities were highlighted, showing an inverse relationship between species dominance and diversity in the region.

Examining the relationship between dominance index and species diversity of Pelecaniformes in the RSLPL area during May and June, in May, in NRLP, the index values are moderate, indicating a relative balance between dominance and diversity; in the Manta Lake complex, diversity increases significantly, while dominance decreases slightly; in Colibasi pond, diversity peaks, and dominance continues to decrease; in Brinza ponds, diversity remains high, but dominance drops to the lowest value; in the pond between Cislita-Prut and Giurgiulesti, dominance begins to rise, and diversity decreases significantly. For June, the situation is as follows: in NRLP, the index values remain balanced; in the Manta Lake complex, dominance and diversity show a balance similar to that in May; in Colibasi pond, diversity remains high, and dominance is reduced; in Brinza ponds, diversity remains constant, and dominance is at its lowest level; in the Cislita-Prut - Giurgiulesti pond, dominance increases significantly, and diversity decreases.

Figure 4.17 illustrates variations in the structure of Pelecaniformes bird communities in the RSLPL area during May and June, highlighting a dynamic balance between diversity and dominance. Higher diversity values are associated with lower dominance, and higher dominance values correspond to lower diversity, reflecting the complexity and dynamics of wetland ecosystems in this area.

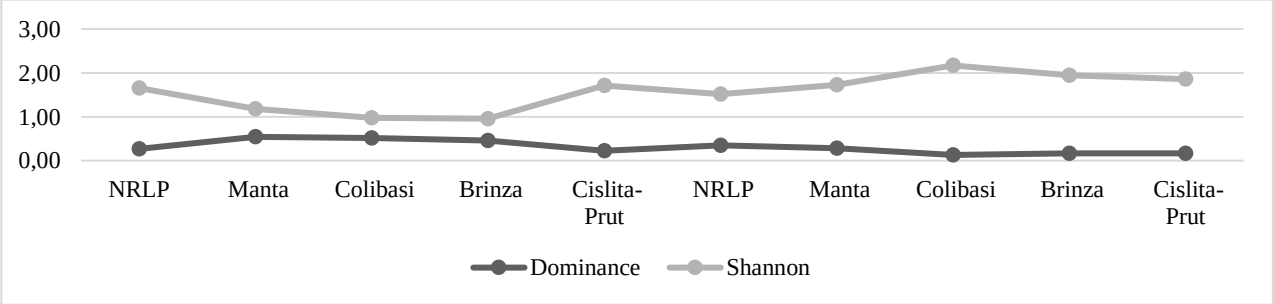

Figure 4.17. Ratio between dominance and diversity indices of Pelecaniformes bird species in RSLPL in May and June

Analyzing the relationship between the dominance index and diversity of Charadriiformes bird species in the RSLPL area during May and June, we can conclude an inverse relationship between species dominance and diversity. In locations with higher diversity (Manta, Colibasi, Brinza), dominance is lower, suggesting a more balanced species distribution.

At Cislita-Prut, dominance increases, and diversity decrease, indicating a more significant presence of a dominant species. Data from Figure 4.18 illustrate variations in the structure of

Charadriiformes bird communities in the RSLPL area during May and June. High diversity values coincide with low dominance values and vice versa. This relationship underscores the dynamics and complexity of wetland ecosystems in this area, reflecting seasonal and local changes in bird community structure.

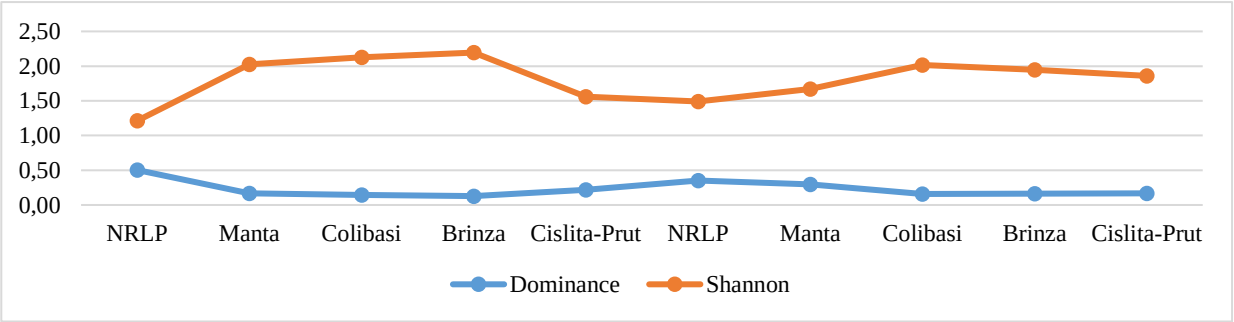

Figure 4.18. The ratio between dominance and diversity indices of Charadriiformes bird species in RSLPL in May and June

Regression analysis between reproductive activity (number of breeding birds) and the hydrological level of Lake Beleu in May showed a significant positive correlation ($r=0.944$, $p \leq 0.01$). This demonstrates that the number of breeding pairs and reproductive success of anatids are closely related to the water level in aquatic basins (Fig. 4.19).

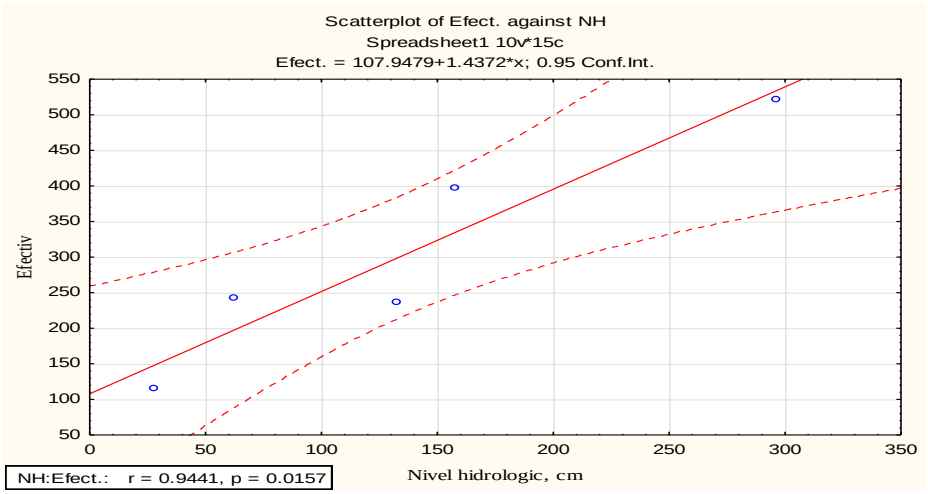

Figure 4.19. Regression analysis between reproductive activity and hydrological level of Lake Beleu in May

A characteristic of this ecological spectrum is the wide variety among aquatic and semi-aquatic species, with significant changes in their populations' composition and numerical density during the same vernal period and in successive years (Fig. 4.20).

In the **estival aspect**, aquatic and semi-aquatic avifauna comprises 64 species, distributed across seven systematic orders, led by summer guest species and sedentary and partially migratory species (Fig. 4.21). Systematically, in the estival aquatic and semi-aquatic avifauna, the most represented orders are Charadriiformes – 45.3%, Pelecaniformes – 17.2%, Anseriformes – 14.1%; other orders have a smaller representation: Gruiformes - 11.0%, Podicipediformes - 6.2%,

Suliformes - 3.1%, and Ciconiiformes - 3.1%.

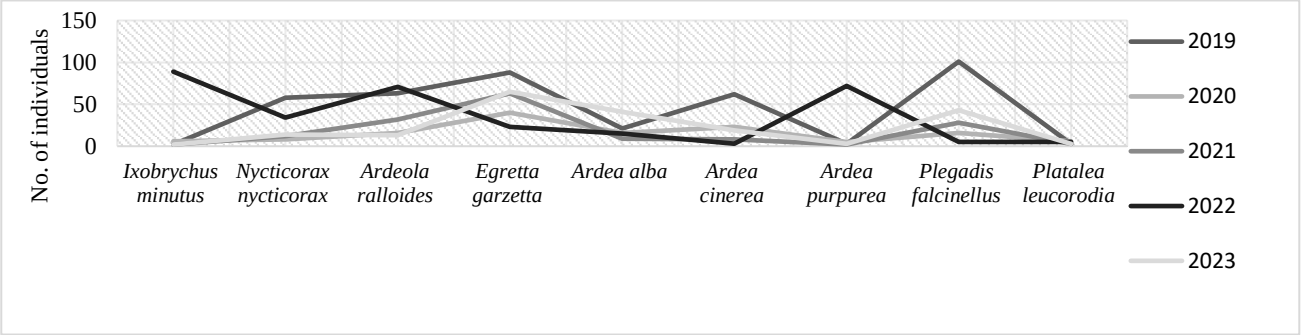

Figure 4.20. Dynamics of some Pelecaniformes species, in the vernal aspect (2019-2023)

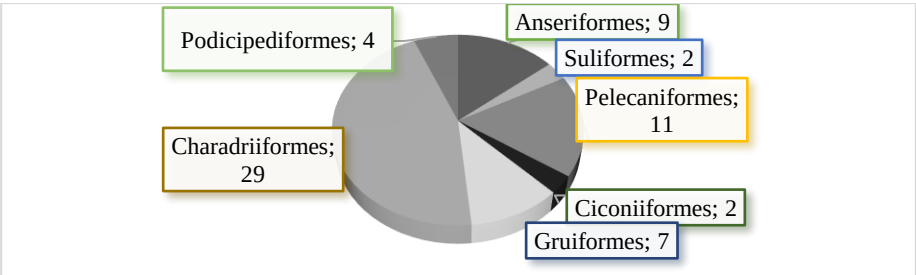

Figure 4.21. Representation of systematic orders of aquatic and semi-aquatic bird species in estival aspect

Also, we witness increased breeding populations in the estival spectrum due to chicks hatching. As with other ecological aspects, environmental conditions play an essential role. This can also be demonstrated by analyzing the multiannual dynamics of pelican species in the estival aspect of the last five years (2019-2023) (Fig. 4.22). Following the figure below, a significant decrease in their numbers is observed in the estival aspect of 2020, when, after periods with critically low levels until May, there were large floods that prevented pelicans from obtaining food.

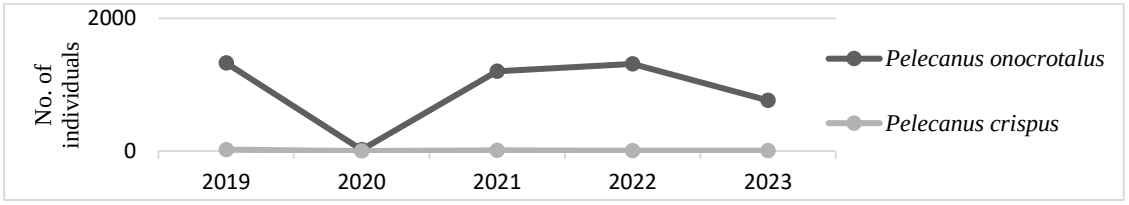

Figure 4.22. Dynamics of *Pelecanus onocrotalus* and *P. crispus* species, in estival aspect (2019-2023)

The **serotinal aspect** aligns with the beginning of autumn migration, marking the initial departures of summer guests and the arrival of the first passage species. In this context, 67 species of aquatic and semi-aquatic birds were recorded, distributed across seven systematic orders (Fig. 4.23).

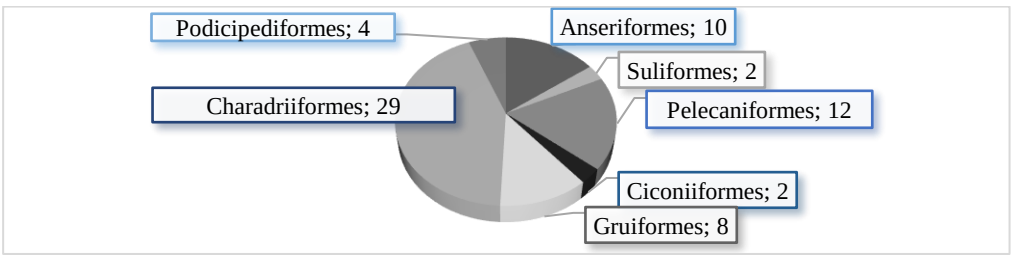

Figure 4.23. Representation of systematic orders in the serotinal aspect

The largest share was held by the orders Charadriiformes – 43.3%, Pelecaniformes – 18.0%, and Anseriformes – 14.9%; other orders had a smaller representation: Gruiformes – 11.8%, Podicipediformes - 6.0%, Suliformes - 3.0%, and Ciconiiformes - 3.0% (Fig. 4.24).

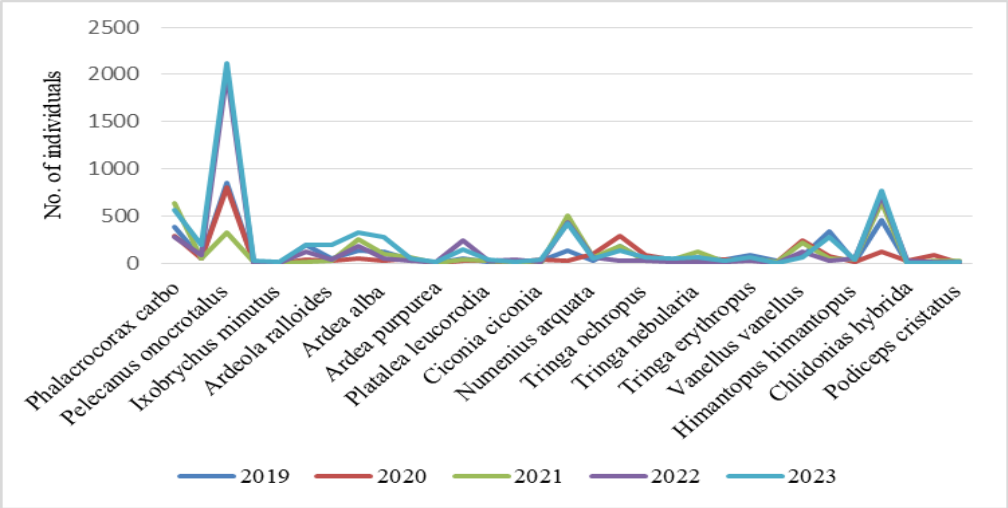

Figure 4.24. Dynamics of some aquatic and semi-aquatic species in the serotinal aspect of 2019-2023

The autumnal aspect represents the peak of autumn migration when the ornithofauna numbers around 84 species classified into eight orders. Systematically, the most represented orders are Charadriiformes – 47.6%, Anseriformes – 21.4%, and Pelecaniformes – 14.3%. Other orders have a smaller representation: Gruiformes – 4.7%, Podicipediformes – 6.0%, Suliformes, Ciconiiformes – each 2.4%, Gaviiformes – 1.2% (Fig. 4.25).

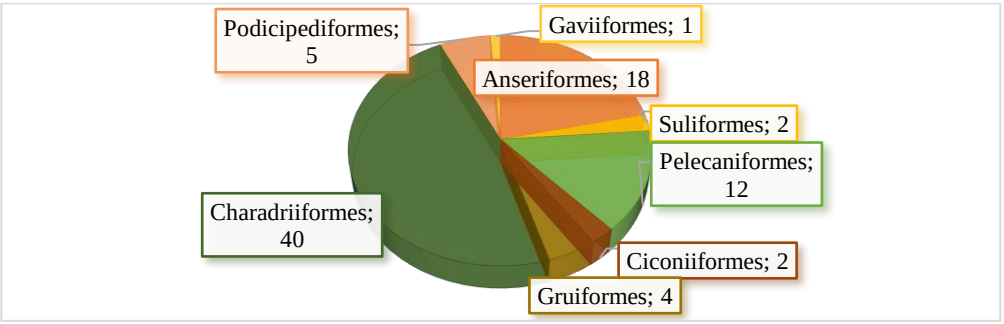

Figure 4.25. Representation of systematic orders in the autumnal aspect

Analyzing the bird population in the RSLPL area, it was noted that there are changes in its composition from year to year and season to season, mainly driven by perturbing factors, both environmental and anthropogenic, such as fires, extraction of oil and natural gas deposits, hunting, fishing, overgrazing, agriculture, noise, unorganized tourism activities, population recreation, illegal logging, waste disposal, water regime modification, drought, floods, heavy precipitation, predation, and avian flu.

According to the degree of vulnerability, 51 species are found in the researched area, which represents 82.2% of the total of rare species in the republic. The degree of rarity internationally is shown in Figure 4.26.

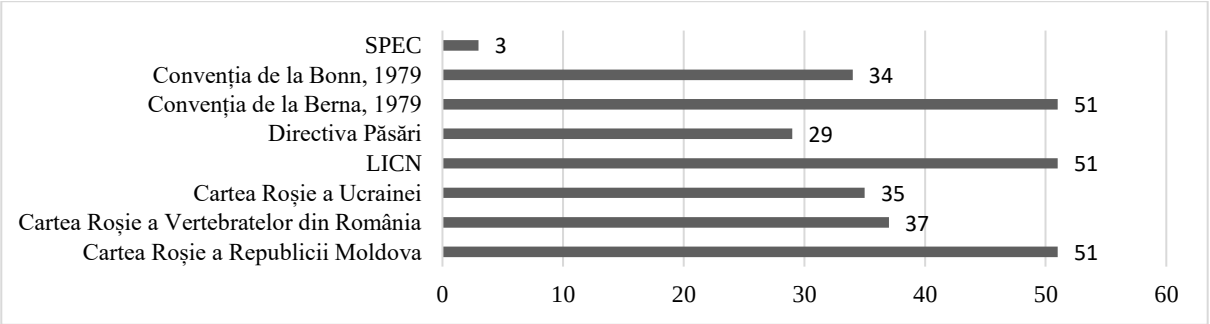

Figure 4. 26. Rarity degree of bird species at international level

GENERAL CONCLUSIONS

1. The Ramsar Site "Lower Prut Lakes" hosts 246 bird species, belonging to 20 orders and 56 families, representing 91.7% of the total species recorded in the Republic of Moldova. The Passeriformes order is the most represented with 88 species, followed by the orders Charadriiformes with 46 species, Anseriformes with 26 species, Accipitriformes with 19 species, Pelecaniformes with 13 species, Piciformes (8 species), Gruiformes (8 species), Falconiformes (6 species), and Strigiformes (6 species).

2. The highest increase in the number of species was recorded in the orders Passeriformes - 21 species, Charadriiformes - 17 species, and Accipitriformes - 7 species. Some of the 50 new species included in the list are regularly present, and others arrive accidentally or sporadically. Among these are: *Cygnus columbianus bewickii*, *Periparius ater*, *Arenaria interpres*, *Hydroprogne caspia*, *Glareola pratincola*, *Ichthyaetus ichthyaetus*, *Phylloscopus collybita tristis*, *Bubulcus ibis*, *Glareola pratincola*, *Pastor rosseus*, *Turdus iliacus*, *Aegypius monachus*, *Limosa lapponica*, *Stercorarius parasiticus*, *Sternula albifrons*, *Podiceps auritus*, etc. Changes in the configuration and microclimate of the wetland generally determined the diversification and increase in the number of species.

3. Approximately 56 species prefer forested areas as their habitat, followed by 49 species that choose the aquatic environment, while about 47 species opt for the shoreline. Forty-four species visit the floodplain, and the forest edge hosts 35 species. Only 15 species are found in reed and bulrush beds.

4. The majority are summer guests - 39.4%, followed by passage species - 23.2%, and sedentary species - 22.8%. The remaining categories have a lower proportion, with 5.7% being partially migratory species and 5.6% winter guests. The predominance of a significant number of bird species throughout the year indicates that the wetland is on the migration route of many birds.

5. Aquatic and semi-aquatic birds are represented by 104 species, most of which were recorded in the autumnal aspect (84 species), serotinal (79 species), and prevernal (77 species), while the fewest were inventoried in the estival aspect (61 species). Of the total, 45 species are nesting: *Cygnus olor*, *Aythya nyroca*, *Microcarbo pygmaeus*, *Recurvirostra avosetta*, *Himantopus himantopus*, *Ciconia*

ciconia, Ardea alba, A. purpurea, Ardeola ralloides, Plegadis falcinellus, Platalea leucorodia, etc. Their number is considerably lower compared to that recorded in the 1960s.

6. Due to climate change characterized by mild winters, solitary specimens or groups of: *Netta rufina, Anas strepera, Ardea alba, A. cinerea, Microcarbo pygmaeus, Pelecanus crispus, P. onocrotalus, Platalea leucorodia, Circus aeruginosus, Tadorna ferruginea, Tringa nebularia, T. ochropus, Recurvirostra avosetta, Numenius arquata, Himantopus himantopus, Vanellus vanellus* have been identified.

7. By analyzing the ecological similarity between bird communities in the respective habitats, it was observed that the highest similarity appears between the Manta Lake complex and the ,,Lower Prut" Nature Reserve (97.4%). A high similarity was established between the wet habitats of Brinza and Colibasi (87.2%), with large areas occupied by relatively constant waters that attract a significant number of birds.

8. During spring migration, the following distribution of wader species was observed: subresidents (below 1.1%) – 12 species; residents (1.2 – 2%) – 4 species; subdominants (2.1 – 5%) – 1 species; dominants (5.1 -10%) – 4 species; eudominants (over 10.1%) – 4 species. Among the Anatidae species, two species are dominant: *Anas platyrhynchos* and *A. crecca*, a situation characteristic of most of the studied years.

9. Examining the status and level of protection of birds in the wetland area, it can be noted that 51 species are included in the Red Book of the Republic of Moldova, of which 24 are considered vulnerable, 19 are critically endangered, and eight are endangered. These species benefit from international protection, which is included in the IUCN Red List and the Bern Convention. Only 34 species are covered by the Bonn Convention, while 29 are protected under the Birds Directive. Additionally, 35 species are included in the Red Book of Romania and the Red Book of Ukraine.

10. In the Lower Prut ecosystems, various natural and anthropogenic factors directly or indirectly influence the composition and number of bird species. Drought, fishing, and fires have significant impacts on bird life and the wetland.

PRACTICAL RECOMMENDATIONS

1. It is recommended that birds be monitored in the wetland on a long-term basis. Data collection will facilitate the identification of appropriate solutions for the conservation of ecosystems as a whole and bird species in particular. Special emphasis will be placed on bird species that travel long distances during migration and nesting species. Simultaneously, these data will complement international databases of global significance.

2. It is proposed to finalize the establishment of the Biosphere Reserve and begin implementing institutional competencies. The zoning should be reviewed to place signs and informative panels in the field to prevent anthropogenic activities that negatively impact the environment and bird

species.

3. Promoting and conducting controlled ecological tourism on well-established and arranged routes, with minimal disturbance to birds, promoting birdwatching.

4. It is recommended to create a Regional Information and Ecological Education Center within the reserve, which should include a center for children, pupils, and students; a bird rehabilitation center; a nature museum, developing national and international projects for the training of reserve staff, as well as conducting experience exchanges. Increasing awareness among pupils and locals from the nine localities, as well as the general public, by conducting ecological lessons in the field, organizing various events to promote bird species, making reports on radio and TV shows, and highlighting the role of birds in nature and human life.

5. Prohibiting any disruptive activities (fishing, oil extraction) near colonies and nesting sites, restoring characteristic wetland habitats, maintaining a minimum water level, and analyzing the current situation of Beleu and Manta lakes to identify solutions and specific actions to contribute to their safeguarding.

6. Reviewing the management of fish ponds in the locality of Crihana Veche to protect habitats preferred by aquatic and semi-aquatic bird species, some of which are nesting.

7. Respecting and applying the provisions of national legislation.

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ADNOTARE

PALADI Viorica, ”Ornitofauna zonei umede Ramsar „Lacurile Prutului de Jos”, teză de doctor în științe biologice, Chișinău, 2024.

Teza constă din: introducere, 4 capitole, concluzii generale și recomandări, bibliografie din 201 titluri, 121 pagini de text de bază, 56 figuri, 5 tabele. Rezultatele obținute au fost publicate în 21 lucrări științifice.

Cuvinte cheie: ornitofaună, zonă umedă, specie, diversitate, fenologie, ecologie, dinamică, migrație, conservare, importanță.

Denumirea studiului: 165.02 - Zoologie

Scopul cercetării: Determinarea structurii ornitofaunei, elucidarea particularităților privind reproducerea și migrația acestora, precum și evidențierea importanței sectorului studiat pentru conservarea speciilor de păsări.

Obiectivele: Stabilirea componenței taxonomice și diversității ornitofaunei; Evidențierea particularităților comportamentale în perioada de reproducere la unele specii acvatice și semiacvatice; Elucidarea particularităților de migrație a speciilor de păsări acvatice și semiacvatice sub influența factorilor de mediu și antropici; Identificarea speciilor aflate în diferite categorii de vulnerabilitate și elaborarea măsurilor necesare de protecție și conservare a speciilor de păsări și a habitatelor acestora.

Problema științifică soluționată: S-a determinat componența ornitofaunei și schimbările care s-au produs în ultimii ani sub influența factorilor de mediu și antropici; s-au evidențiat particularitățile de repreducere și migrare ale unor specii acvatice și semiacvatice; s-a accentuat importanța protecției speciilor rare.

Semnificația teoretică: Pentru prima data a fost efectuată inventarierea speciilor de păsări și elaborată lista acestora. Au fost evidențiate grupurile fenologice, activitatea sezonieră de reproducere, migrație și pasaj, care contribuie la completarea cunoștințelor în domeniul ornitologiei. Studiile desfășurate se aliniază cu prioritățile în cercetarea științifică, integrate în programele și strategiile naționale și internaționale referitoare la protejarea și conservarea ornitofaunei. Aceasta reprezintă o contribuție semnificativă la îndeplinirea angajamentelor asumate prin convențiile internaționale la care a aderat Republica Moldova.

Valoarea aplicativă a lucrării. A fost evidențiată importanța zonei umede în conservarea speciilor de păsări, în special a celor rare. Datele obținute vor servi ca bază de inițiere a cercetărilor în cadrul Rezervației Biosferei „Prutul de Jos”. Au fost formulate mai multe recomandări în ceea ce privește conservarea păsărilor și a mediilor lor de trai, subliniată importanța sensibilizării și participării publicului larg în ceea ce privește protejarea acestora.

Importanța rezultatelor științifice. Materialele obținute au fost utilizate la elaborarea monografiei Fauna Rezervației „Prutul de Jos”. Rezultatele obținute au fost implementate în Analele Naturii ale Rezervației „Prutul de Jos”, inclusiv la promovarea tusismului ecologic în zona Prutulu Inferior. Materialele studiului pot fi integrate în procesul didactic și pot servi ca puncte de reper la elaborarea tezelor de licență și de masterat în instituțiile de învățământ cu profil biologic și ecologic. Datele acumulate vor servi pentru elaborarea ediției a IV-a a Cărții Roșii a Republicii Moldova.

ANNOTATION

Paladi Viorica „ Ornithofauna of the Ramsar Site „Lower Prut Lakes", PhD thesis in biological sciences, Chișinău, 2024.

The thesis consists of: introduction, 4 chapters, general conclusions and recommendations, bibliography of 201 titles, 121 pages of basic text, 56 figures and 5 tables. The results were published in 21 scientific papers.

Keywords: Ornithofauna, wetland area, species, diversity, phenology, ecology, dinamics, migration, conservation, importance.

Field of study: 165.02 – Zoology.

The aim of this paper: Determining the structure of ornithofauna, elucidating the particularities regarding their reproduction and migration, as well as highlighting the importance of the studied sector for the conservation of bird species

Objectives: Establishing the taxonomic composition and diversity of ornithofauna; Highlighting the behavioral peculiarities during the reproduction period in some aquatic and semi-aquatic species; Elucidation of the migration characteristics of aquatic and semi-aquatic bird species under the influence of environmental and anthropogenic factors; Identification of species in different categories of vulnerability and development of the necessary measures for protection and conservation of the breeding sites and their habitats.

The solved scientific problem: The composition of ornithofauna and the changes that occurred in recent years under the influence of environmental and anthropogenic factors were determined; the particularities of reproduction and migration of some aquatic and semi-aquatic species were highlighted; has been emphasized the importance of protection of rare species.

Theoretical significance: For the first time, the inventory of the bird fauna was carried out and the list of species was developed. Were highlighted the phenological groups, the seasonal activity of reproduction, migration and passage, which contribute to the completion of knowledge in the field of ornithology. The studies carried out align with the priorities in scientific research, integrated in national and international programs and strategies related to the protection and conservation of biodiversity. This represents a significant contribution to the fulfillment of the commitments assumed through the international conventions to which the Republic of Moldova has joined.

The applicative value of the paper: It was highlighted the importance of RSLPL in the conservation of bird species, especially rare ones. The data obtained will serve as a basis for initiating research within the "Prutul de Jos" Biosphere Reserve. As a result of the studies, several recommendations were made regarding the conservation of birds and their habitats, emphasizing the importance of awareness and participation of the general public in protecting them.

The importance of scientific results: The obtained materials were used in the elaboration of monograph on the Fauna of the ,,Prutul de Jos" Reserve, in which a separate chapter is dedicated to the ornithofauna. The obtained results were implemented in the Annals of Nature of the "Prutul de Jos" Reserve, including the promotion of ecological tourism in the Lower Prutulu area.The study materials can be integrated into the didactic process and can serve as reference points for the development of bachelor's and master's theses in educational institutions with a biological and ecological profile. The accumulated data will be used to update the next edition of the Red Book of the Republic of Moldova

АННОТАЦИЯ

Палади Виорика «Орнитофауна водно-болотных угодий Рамсар «Lacurile Prutului de Jos», диссертация на соискание учёной степени доктора биологических наук, Кишинёв, 2024.

Структура диссертации состоит из: введения, 4 глав, общих выводов и рекомендаций, библиографии из 201 наименований, 121 страницы основного текста, 45 рисунков, 5 таблиц. Результаты опубликованы в 21 научной работе.

Ключевые слова: орнитофауна, водно-болотные угодья, вид, разнообразие, фенология, экология, динамика, миграция, сохранение, важность.

Область исследования: 165. 02-Зоология.

Цель исследования: Определение структуры фауны птиц, выяснение особенностей их размножения и миграции, а также подчеркруть значение изучаемого сектора для сохранения видов птиц.

Задачи: Установление таксономического состава и разнообразия фауны птиц; Выявление особенностей поведения в период размножения у некоторых водных и околоводных видов; Выявление особенностей миграций водных и околоводных видов птиц под влиянием экологических и антропогенных факторов; Выявление категорий уязвимости для различных видов птиц и разработка необходимых мер по охране и сохранению их мест размножения и среды обитания.

Разрешённая научная задача: Был определен состав фауны птиц и изменения, произошедшие в ней за последние годы под влиянием экологических и антропогенных факторов; освещены особенности размножения и миграции некоторых водных и околоводных видов; подчеркнута важность водно-болотных угодий для охраны редких видов.

Теоретическое значение. Впервые проведена инвентаризация и составлен список видов птиц. Выделены фенологические группы, изучена сезонная активность размножения, миграции и перелёта, которые способствуют пополнению знаний в области орнитологии. Проведенные исследования соответствуют приоритетам научных исследований, интегрированных в национальные и международные программы и стратегии, связанные с защитой и сохранением биоразнообразия. Это представляет собой значительный вклад в выполнение обязательств, взятых ~~на себя~~ в рамках международных конвенций, к которым присоединилась Республика Молдова.

Практическая значимость исследований. Была подчёркнута важность сохранении видов птиц, особенно редких. Полученные данные послужат основой для начала исследований в биосферном заповеднике «Prutul de Jos». Было дано несколько рекомендаций относительно сохранения птиц и среды их обитания, подчеркнув важность осведомленности и участия широкой общественности в их защите.

Внедрение научных результатов. Полученные материалы были использованы при разработки монографии «Fauna Rezervației «Prutul de Jos»», отдельная глава которой посвящена фауне птиц. Полученные результаты были внедрены в Летописи природы заповедника «Prutul de Jos», в том числе в продвижении экологического туризма в районе Нижнего Прута. Материалы могут быть использованы в дидактическом процессе и служить основой при разработке дипломных работ, диссертаций бакалавра и магистратуры в образовательных учреждениях биологического и экологического профиля. Накопленные данные будут использованы в четвертом издании Красной Книги Республики Молдова.

PALADI VIORICA

ORNITHOFAUNA OF THE RAMSAR SITE „LOWER PRUT LAKES”

165.02-Zoology

ABSTRACT

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