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RARE SPECIES OF BIRDS AND THEIR BIOTOPE DISTRIBUTION IN THE UNREGULATED PART OF THE LOWER TRANSBOUNDARY RIVER DESNA (KYIV, UKRAINE)

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Key words: rare species, birds, Desna River, biotopes, Bern conventions.

Abstract

This study examines avian diversity on a 15,000 hectare section of the 3,382,000 hectare Desna River floodplains over four years, revealing 48 species with significant conservation status across 24 identified biotopes, including 14, biotopes listed under Resolution 4 of the Bern Convention. Of these species, 40 are included under Resolution 6 of the Bern Convention, and 19 are listed in the Red Book of Ukraine. Additionally, there are 22 nesting species, 9 of which are in the Red Book of Ukraine, and 8 are recognized by the IUCN and the European Red List as near-threatened and vulnerable. The findings highlight the critical need for biotopes conservation and propose the establishment of "Podesinnia" National Park as part of a broader ecological strategy aligned with the NATURA 2000 objectives, underscoring the importance of international collaboration in biodiversity preservation efforts.

Introduction

The war has been ongoing in Ukraine for two years now. In the initial months of the full-scale invasion by the Russian Federation, hostilities took place around Kyiv and affected the only unregulated river in Ukraine, the Desna. To complicate the advancement of the occupying army towards the capital, bridges over this river were blown up, but the Russian army deployed pontoon crossings and forced the river. After the Russian army withdrew from the outskirts of Kyiv in the summer of 2022, the Desna riverbed was cleared of sunken military equipment. In the river's floodplain, sappers are still finding remnants of aviation munitions and artil-

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lery shells that did not explode. Moreover, the airspace over this floodplain continues to be used during mass missile strikes on Ukraine's capital. Therefore, there are currently no opportunities to conduct research in this area to update data on biodiversity.

The Desna River, the longest tributary of the Dnipro River, is distinguished by its swift current and marshy relief of adjacent territories, making it a unique hydrological object within Ukraine, unaffected by Soviet industrialization. In contrast, most Ukrainian rivers have undergone flow regulation, loss of forest masses in floodplains, marsh drainage, and intensification of agricultural use of meadow lands. As a result, the 591 km of the Desna River and 3,382,000 hectares of its valley and floodplains remain important for ecosystem conservation within the "Eastern Plains" ecoregion. The untouched natural mosaic of landscapes in the floodplain territories of this transboundary water artery supports populations of both locally and globally rare fauna species, especially birds. The Desna River, unlike many other tributaries of the Dnipro located in the Kyiv region, features optimal conditions for the existence and reproduction of various ecological groups of macrobenthos and ichthyofauna (SYTNIK 2012), which are part of the food chain impacting the number of nesting pairs of waterfowl (VASYLYUK et al. 2010). The ecological corridor along this river spans a considerable length and includes various biotopes (DUBROVSKY et al. 2008), which serve as sites for forming a number of ecological niches (FULLER, 2019). Such areas, being "hot spots," play a leading role in the conservation of global biodiversity (HU 2015, VAN DEN BERGH 2000, CANTONATI 2020). The identification of similar refugia in Ukraine is important in the context of expanding the NATURA ecological network (VASYLYUK et al. 2019). It is worth noting that the modern loss of agricultural lands, especially in the south of Ukraine, poses a risk of transforming natural meadow ecosystems in the Kyiv region into agricultural fields. This prospect raises concerns among ecologists and scientists, as the floodplain area of the Desna River serves as a biotopes for a number of nesting bird species, particularly those rare in Ukraine and the European Union. In light of the above, there is a current need to publish the results of monitoring studies in international scientific journals to highlight the ecological significance of the lower course of the Desna River. Additionally, this information may prove useful in assessing ecological losses and contribute to the development of strategies for restoring natural biotopes affected by military actions caused by the Russian Federation.

Methodology

From the 3,382,000 hectares of the unregulated valley of the Desna River, we have studied 15,000 hectares along the floodplain. Various biotopes within this area were subject to study. The classification of biotopes was carried out according to the categories listed in CHYTRY et al. (2020), DAVIES et al. (2004), ONYSHCHENKO (2016).

The study of the ornithofauna was conducted using the point-count method from 2018 to 2021. For travel between counting points, we used a car, and local movements were made on foot. At selected points, durations of stay ranged from 20 minutes to 1 hour (HUTTO et al. 1986, BIBBY 1998). The greatest focus was on the nesting period (observations were conducted once a week from the second week of April to the second week of July). During other periods (March, the first half of April, August, September, October, November), observations were done biweekly. Data from winter period observations (December-February) were also considered. The status of the birds was characterized according to the methodology presented by FESENKO and BOKOTEY (2002, 2007). The research subjects were rare bird species listed in the Red Book of Ukraine, IUCN, and the European Red List, as well as species included in the lists requiring conservation and special measures for the preservation of their biotopes, including migratory species – according to Resolution 6 of the Bern Convention (1996) (Convention on the Conservation… 2024, Revised Annex I of Resolution 6… 1998). The authenticity of nesting was determined using criteria recommended by the Committee of the European Ornithological Atlas – EOAC (Breeding Bird Atlas of Europe 1992). The taxonomy and nomenclature of birds in this article follow FESENKO (2022). This research is notable for its focus on recording species within their natural habitats for feeding and breeding, which is crucial for the conservation and restoration of populations in specific biotopes. Research stations and their coordinates are depicted in Table 1 and Figure 1–3.

Table 1

Geographical location of stations where research was conducted

№	Station	Latitude	Longitude
1	2	3	4
1	Desna river, Muromets Island	50.552217	30.544875
2	Desna river, Pogrebinska oxbow lakes	50.553579	30.598764
3	Desna river, v. Pogreby	50.572909	30.606280
4	Desna river, v. Zazimye	50.591977	30.659718
5	Desna river, v. Novosilky	50.611507	30.628081
6	Desna river, v. Pukhivka	50.613656	30.704848

cont. Table 1

1	2	3	4
7	Desna river, v. Nizhnya Dubechnya	50.642639	30.673422
8	Desna river, v. Verkhnya Dubechnya	50.728195	30.689576
9	Desna river, v.Voropaev	50.767244	30.689685
10	Desna river, Europe Island	50.827280	30.760660
11	Desna river, Europe Island	50.824312	30.750931
12	Desna river, v. Zhukin	50.798258	30.722507
13	Desna river, v. Rozhni	50.658432	30.712974
14	Desna river, Lyubichiv island	50.783733	30.719339

Explanations: numbers *1–14* – see Figure 1

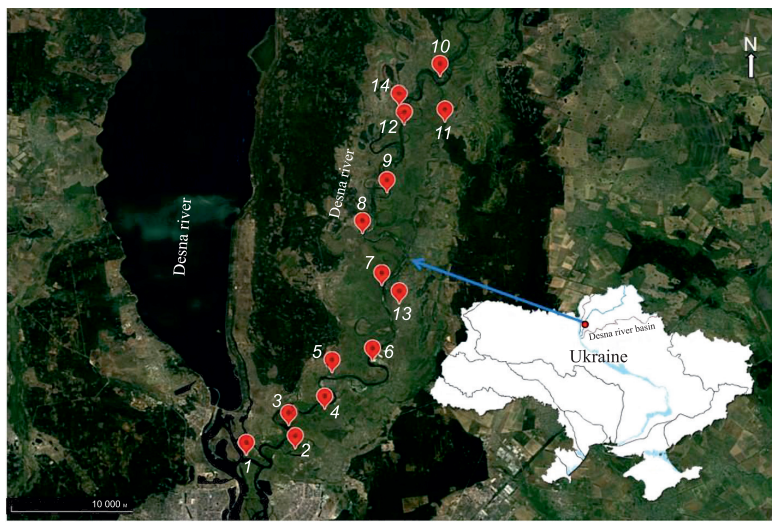


Fig. 1. Map of study areas

Explanations: numbers *1–14* – see Table 1

Source: Figure 1 is composed of a Google map and an Atlas of rivers of Ukraine (https://river.land.kiev.ua/atlas-rivers.html) as well as added author's elements (Yu. Kovalenko)

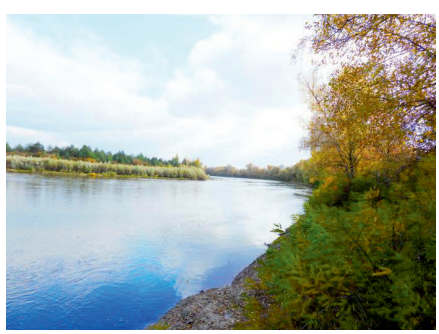


Fig 2. The Desna river (fragment a natural winding area near the village of Novosilka

Source: photo by M. Prychepa

Fig. 3. Swampy floodplain of the Desna river near the village Pogreby

Source: photo by M. Prychepa

Results

As a result of the biotope study in the Desna floodplain, 14 biotopes were identified that are listed under Resolution 4 of the Bern Convention. Additionally, there are 9 other biotopes currently not under protection (Table 2).

Table 2

Existing biotopes in the studied territory of the Desna River valley

Biotopes under Resolution 4	Other availables
C1.222. Hydrocharis morsus-ranae groupings (Floating Hydrocharis morsus-ranae rafts)	C3.1. Species-rich helophyte beds
C1.223. Stratiotes aloides groupings (Floating Stratiotes aloides rafts)	C3.2. Littoral groupings of tall helophytes (Water-fringing reedbeds and tall helophytes other than canes)
C1.225. Salvinia natans groupings (*Floating Salvinia natans mats*)	C3.6. Banks formed by soft and mobile deposits, with sparse vegetation or none (Unvegetated or sparsely vegetated shores with soft or mobile sediments)
C1.32. Free-floating vegetation of eutrophic waterbodies, groupings of the Lemnetea class in eutrophic conditions, includes vegetation dominated by the same species as the free-floating vegetation of mesotrophic waterbodies C1.22, but in eutrophic waterbodies	D5.1. High grass marshes (Reedbeds normally without free-standing water). Non-saline marsh groupings of *Phragmites australis, Phalaroides arundinacea, Scirpus lacustris, Typha* spp.
C1.67. Groupings at the bottom of dried-up waterbodies (Turlough and lake-bottom meadows). Groupings at the bottom of periodically, typically annually, dried-up standing waterbodies. At other times, this same area belongs to other settlements of groups C1 or C3	C3.6. Banks formed by soft and mobile deposits, with sparse vegetation or none (Unvegetated or sparsely vegetated shores with soft or mobile sediments)
C2.33. Vegetation of slow-flowing rivers with mesotrophic water	D5.1. High grass marshes (Reedbeds normally without free-standing water). Non-saline marsh groupings of *Phragmites australis, Phalaroides arundinacea, Scirpus lacustris*, *Typha* sp.
C2.34. Vegetation of slow-flowing rivers with eutrophic water	E1.D. Unmanaged xeric grasslands
C3.4. Species-poor beds of low-growing water-fringing or amphibious vegetation	E1.E. Trampled xeric grasslands with annuals
D5.2. Marshes dominated by large sedges (Beds of large sedges normally without free-standing water)	E2.7. Unmanaged mesic grasslands
E2.2. Low and medium altitude hay meadows	F9.2. Salix carr and fen scrub
E3.4. Moist and wet eutrophic and mesotrophic grasslands	–
F9.1. Riverine scrub	–
G1.11. Riverine Salix woodland	–
G1.3. Mediterranean riparian woodland	–

When these data are summarized according to the 2016 Biotope Catalog, six main biotope types emerge: continental water bodies (rivers, old riverbeds, lakes), meadows (dry and wet), shrubs, marshes, and floodplain forests (Figure 4–6). The distribution of these biotopes by area shows that moist meadows predominate in the studied territory, while the proportion of floodplain forests is represented by smler areas (Figure 7).

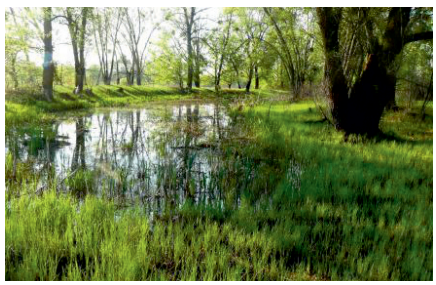


Fig 4. Floodplain forest on Myromets island
Source: photo by M. Prychepa

Fig 5. Swamps near v. Pogreby
Source: photo by M. Prychepa

Fig 6. Floodplain water body – old riverbed (fragment of Pogrebinska oxbow lakes.
Source: photo by M. Prychepa

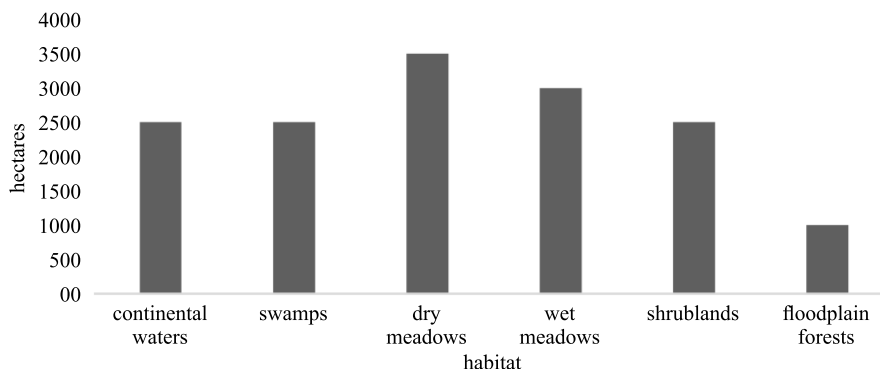


Fig 7. Distribution of areas in the studied part of the Desna River valley by types of biotopes, in hectares

The importance of this biotope distribution is highlighted in ornithological studies, which show the presence of 47 bird species belonging to 16 families, of which 3 species are included in the European Red List, 40 species are listed under Resolution 6 of the Bern Convention, and 20 species are included in the Red Book of Ukraine.

An analysis of the species richness of birds (Figure 8), according to the type of biotope, helps to understand the ecological interactions in the floodplain of the Desna River. It has been found that the largest number, 20 species, were registered in continental water bodies, which include rivers, old riverbeds, and lakes, and occupy approximately 15% of the studied area of the Desna River floodplain.

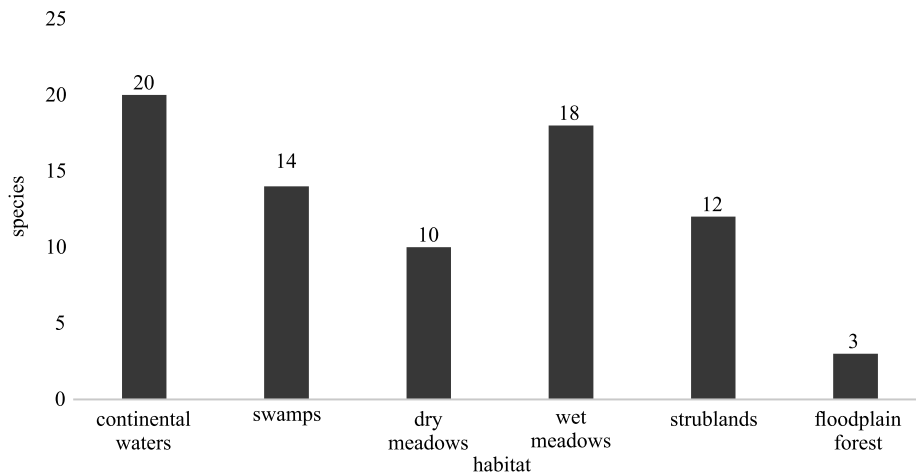


Fig. 8. Species richness of birds in the studied biotopes

In moist meadows, which cover 20% of the area, 17 bird species were found, including rare species such as Corn Crake *(Crex crex)*, which is also found in marshes and dry meadows. Additionally, these areas are regularly used for hunting by several birds of prey: Black Kite *(Milvus migrans)* (Figure 9), Short-toed Snake Eagle *(Circaetus gallicus)* (Figure 10), Western Marsh Harrier (*Circus aeruginosus),* Hen Harrier (*C. cyaneus).*

Marshes (sedge, reed, and bulrush) cover 15% of the biotope and host 14 bird species. This type of biotope is important for the conservation of nesting populations of Montagu's Harrier (*Circus pygargus*). Other rare species present include Purple Heron (*Ardea purpurea*), Eurasian Bittern (*Botaurus stellaris*), Little Bittern (*Ixobrychus minutus*), Eurasian Curlew (*Numenius arquata*), and European Honey Buzzard (*Pernis apivorus*).

Shrubs, occupying 15% of the territory, support the existence of 12 bird species and provide nesting for Great Grey Shrike (*Lanius excubitor*),

Lesser Grey Shrike (*Lanius minor*), Red-backed Shrike (*Lanius collurio*), European Nightjar (*Caprimulgus europaeus*), Wood Lark (*Lullula arborea*), and Barred Warbler (*Sylvia nisoria*).

Dry meadows cover 30% of the territory and are home to 9 bird species. This environment is used by species that prefer open spaces.

Floodplain forests occupy the smallest area (up to 5%). It is in this type of biotope that nesting populations of Black Kite *(Milvus migrans)* have been found.

Fig 9. Black Kite (*Milvus migrans*), representative of alluvial forest (included in the Red Book of Ukraine and Resolution 6 of the Bern Convention)
Source: photo by M. Prychepa

Fig. 10. Short-toed Snake Eagle
(*Circaetus gallicus*), representative of dry meadows and wet meadows (included in the Red Book of Ukraine and Resolution 6 of the Bern Convention)
Source: photo by M. Prychepa

The presence of various feeding grounds and trophic niches supports the presence of 48 bird species (Table 3) on the Desna River floodplain. The greatest species richness was observed during the spring-summer activity period, from May to July. In the winter period, Great Grey Shrike (*Lanius excubitor*) and Hen Harrier (*Circus cyaneus*) are present. Additionally, it is important to note the significant congregations of Common Goldeneye (*Bucephala clangula*) at the river's mouth, which is used by waterfowl during wintering.

Table 3

Bird species and their registration periods and biotope distribution in the floodplain areas of the lower Desna

№	Species	Registration periods	Biotopes					
			continental waters	swamps	dry meadows	wet meadows	shrubs-lands	alluvial forests
1	2	3	4	5	6	7	8	9
1	*Bucephala clangula* (Linnaeus, 1758)	October–March	+	–	–	–	–	–
2	*Mergus serrator* Linnaeus, 1758	October–November	+	–	–	–	–	–
3	*Caprimulgus europaeus* (Linnaeus, 1758)	May–July	–	–	–	–	+	–
4	*Crex crex* (Linnaeus, 1758)	May–July	–	+	–	+	–	–
5	*Zapornia parva* (Scopoli,1776)	May–June	–	+	–	+	–	–
6	*Grus grus* (Linnaeus, 1758)	March–April, October–November	–	+	–	+	–	–
7	*Haematopus ostralegus* (Linnaeus, 1758	April–September	+	–	–	–	–	–
8	*Vanellus vanellus* (Linnaeus, 1758)	March–September	–	–	–	+	–	–
9	*Numenius arquata* (Linnaeus, 1758)	September	–	–	–	+	–	–
10	*Limosa limosa* (Linnaeus, 1758)	April–August	–	+	–	+	–	–
11	*Calidris pugnax* (Linnaeus, 1758)	March–April, August–September	–	–	–	+	–	–
12	*Gallinago media* (Lathman, 1787)	May, September	–	+	–	+	–	–
13	*Xenus cinereus* (Guldenstadt, 1775)	August	+	–	–	–	–	–

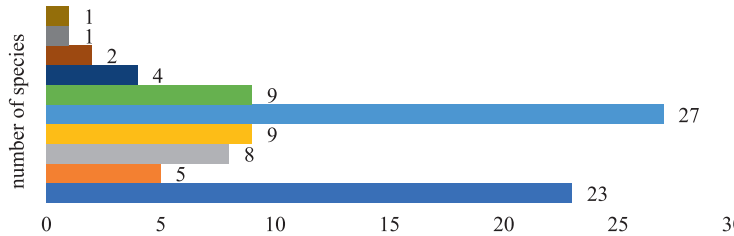
cont. Table 3

1	2	3	4	5	6	7	8	9
14	*Tringa glareola* (Linnaeus, 1758)	March–September	+	–	–	–	–	–
15	*Tringa totanus,* (Linnaeus, 1758)	April–August	–	–	+	+	–	–
16	*Sternula albifrons* (Pallas,1764)	May–July	+	–	–	–	–	–
17	*Sterna hirundo* (Linnaeus, 1758)	May–August	+	–	–	–	–	–
18	*Chlidonias hybrida* (Pallas,1811)	May	+	–	–	–	–	–
19	*Chlidonias leucopterus* (Temminck, 1815)	May–June	+	–	–	–	–	–
20	*Chlidonias niger* (Linnaeus, 1758)	May–July	+	–	–	–	–	–
21	*Gavia arctica* (Linnaeus, 1758)	October–November	+	–	–	–	–	–
22	*Ciconia nigra* (Linnaeus, 1758)	May–September	+	–	–	+	–	–
23	*Ciconia ciconia* (Linnaeus, 1758)	April	–	–	+	+	–	–
24	*Botaurus stellaris* (Linnaeus,1758)	April–May	+	+	–	–	–	–
25	*Ixobrychus minutus* (Linnaeus, 1766)	May–July	+	–	–	–	–	–
26	*Ardea purpurea* (Linnaeus, 1766)	June–August	+	+	–	–	–	–
27	*Ardea alba* (Linnaeus, 1758)	March–September	+	–	–	–	–	–
28	*Pandion haliaetus* (Linnaeus, 1758)	August–September, April	+	–	–	–	–	–
29	*Pernis apivorus* (Linnaeus, 1758)	June–September	–	–	–	–	+	+
30	*Circaetus gallicus* (Gmelin, JF, 1788)	April–September	–	–	+	+	–	–
31	*Clanga pomarina* (Brehm, CL, 1831)	April–September	–	+	+	+	+	+
32	*Clanga clanga* (Pallas, 1811)	March–October	–	+	+	–	–	–
33	*Hieraaetus pennatus* (Gmelin, JF, 1788)	July–August	–	–	+	+	+	–

cont. Table 3

1	2	3	4	5	6	7	8	9
34	*Aquila chrysaetos* (Linnaeus, 1758)	November	–	–	–	–	+	–
35	*Circus aeruginosus* (Linnaeus, 1758)	April–August	–	+	+	+	+	–
36	*Circus cyaneus* (Linnaeus, 1766)	March–April	–	–	+	+	–	–
37	*Circus pygargus* (Linnaeus, 1758)	May–September	–	+	+	+	–	–
38	*Milvus migrans* (Boddaert, 1783)	April–August	+	+	–	+	–	+
39	*Haliaeetus albicilla* (Linnaeus, 1758)	March–November	+	–	–	–	–	–
40	*Alcedo atthis* (Linnaeus, 1758)	April–November	+	–	–	–	–	–
41	*Falco vespertinus* (Linnaeus, 1766)	August–September	–	+	+	–	–	–
42	*Falco peregrinus* (Tunstall, 1771)	February–March	–	–	–	–	+	–
43	*Lanius collurio* (Linnaeus, 1758)	May–August	–	–	–	–	+	–
44	*Lanius minor* (Gmelin, JF, 1788)	May–August	–	–	–	–	+	–
45	*Lanius excubitor* (Linnaeus, 1758)	March–April	–	–	–	–	+	–
46	*Lullula arborea* (Linnaeus, 1758)	May–August	–	–	–	–	+	–
47	*Curruca curruca* (Linnaeus, 1758)	May–April	–	–	–	–	+	–
48	*Luscinia svecica* (Linnaeus, 1758)	April–August	–	+	–	–	–	–
Total			20	14	10	18	12	3

However, the graph (Figure 11) also illustrates the stark seasonal variations in species diversity, with the summer season supporting the greatest abundance of species. This influx likely reflects breeding activities and the availability of resources during this time. As the seasons transition from summer to autumn, there is a notable decrease in species count, which could be attributed to migration patterns and changes in the availability of trophic resources.



	1
spring – summer – – autumn – winter	1
autumn – winter – spring	1
spring – summer – autumn	2
winter	4
autumn	9
summer	27
spring	9
autumn – winter	8
summer – autumn	5
spring – summer	23

Fig. 11. Seasonal distribution of bird species on the desna river floodplain

In this context, the analysis of the ornithofauna by residency status allows for the determination of the species composition structure of birds in the floodplain of the river: nesting species constitute 58.3%, while migratory and wintering species account for 29.2% and 8.3% respectively (Figure 12).

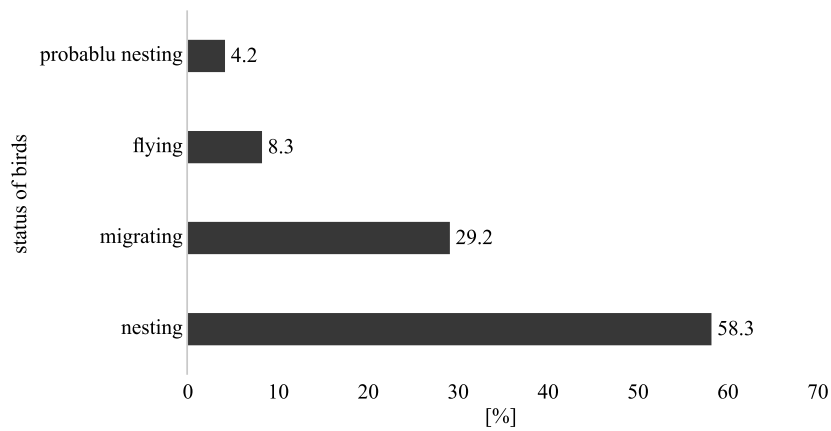


Fig. 12. Status of birds in the studied areas

Additional analysis, which shows the presence of birds from different ecological groups: limnophiles (55.2%), campophiles (20.0%), dendrophiles (23.0%), and petrophiles (2.1%), indicates favorable ecological conditions in the Desna River valley, particularly for the nesting of hydrophilic birds: Little Tern (*Sterna albifrons)* (10–40 pairs) and Eurasian Oystercatcher *(Haematopus ostralegus)* (3–4 pairs) – Table 4.

Table 4

Absolute numbers of individual representatives of the nesting fauna of rare birds (over a length of approximately 36.5 km)

№	Nesting	Number of pairs
1	Ciconia nigra	2–4
2	Milvus migrans	7–8
3	Circus pygargus	5–7
4	Circus aeruginosus	10–12
5	Circaetus gallicus	4–5
6	Aquilla pomarina	1–2
7	Haliaeetus albicilla	2
8	Crex crex	30–35
9	Limosa limosa	4–6
10	Vanellus vanellus	26
11	Tringa totanus	10
12	Pernis apivorus	2–4
13	Sterna albifrons	10–40
14	Sterna hirundo	4–8
15	Chlidonias leucopterus	4–8
16	Chlidonias niger	20–40
17	Haematopus ostralegus	3–4

The ecological value of the Desna Valley, reinforced by its comparison with biotopes included in Natura 2000, allows for considering the Desna River and its valley in a broader pan-European context (EU). Special attention is given to analyzing similarities between the floodplains of the Desna River and other rivers that already have conservation status in some neighboring and distant EU countries, as well as those sharing common features with the Desna River. Emphasis is placed on the similar area and number of bird species and biotopes that are protected in the European Union (Figure 13). The studied part of the Desna Valley in Ukraine covers 15,000 hectares and complies with the Birds Directive, as it provides a biotope for 42 species of birds listed under the Bern Conven-

tion and includes 14 protected biotopes. In neighboring countries, for instance, Ostoja Nidziańska in Poland covers 26,515.64 hectares with 26 bird species and 18 biotopes, while the Nida Valley includes 48 bird species over 19,956.08 hectares. The Danube meadows in Slovakia, spanning 16,511.58 hectares, contain 28 bird species and 12 biotopes. Pilis és Visegrádi-hegység in Hungary covers 30,145.74 hectares, protecting 41 bird species and 17 . In EU countries further from Ukraine, the German Vogelschutzgebiet "Unterer Niederrhein" covers 25,809 hectares and protects 60 bird species, the Dutch Rijntakken protects 37 bird species over 23,048 hectares, and the French River Seine nature reserve, the most diverse in terms of bird species, preserves 81 species over 18,592.61 hectares. All listed areas are protected under the Birds Directive, except for Ostoja Nidziańska (Poland) and Pilis és Visegrádi-hegység (Hungary) which are protected under the Directive.

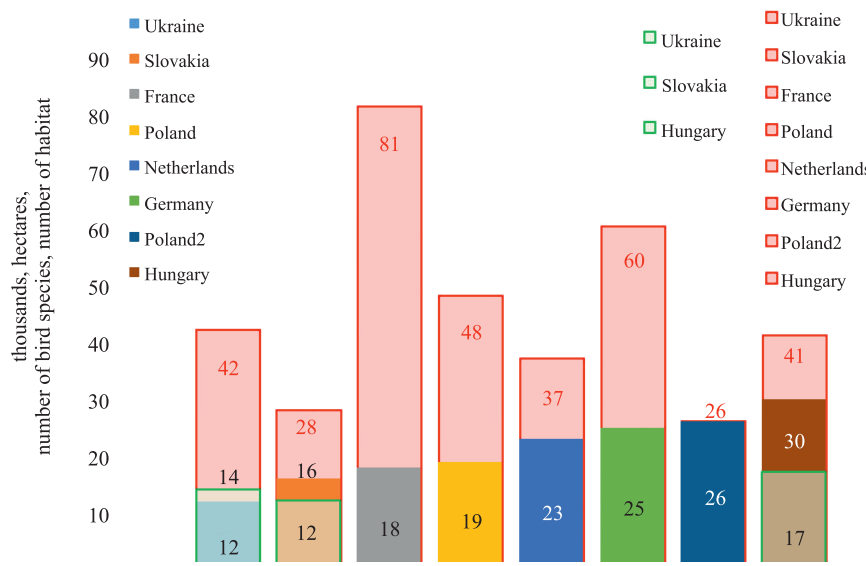


Fig. 13. The Desna floodplain compared to similar areas in neighboring and distant European Countries [in thousands of hectares in different countries]

Explanations: red represents bird species richness; green – the number of, and color-coded represents the area of protected territory

Discussion

Conducted by experts from the World Wildlife Fund (WWF), McGill University, and 30 international scientific institutions has shown that currently, out of the 246 longest rivers in the world, only 37% remain free-flow-

ing (GRILL et al. 2015, 2019, SCHAFER 2021) and only 10-30% of European floodplains remain in a natural state and have not lost their close connection with the river channel (TOCKNER et al. 2010, HEIN 2016, HERITAGE 2016, EEA 2019, TOCKNER et al. 2022). In Ukraine, such large rivers as the Dnipro, Siverskyi Donets, and Southern Bug, as well as their main tributaries, have been subjected to anthropogenic impact for a long time. From the 1930s to the 1980s, these rivers were regulated through the creation of hydraulic structures for intensive agricultural purposes (VISHNEVSKY 2000, KHILCHEVSKYI and GREBIN 2022). As a result, the ecological state of most rivers in the Dnipro basin was classified as "unsatisfactory" (YATSYK et al. 2007).

In the Kyiv region (central Ukraine), the expansion of agricultural lands leads to the plowing of meadows and the destruction of natural floodplain territories on the majority of small and medium-sized rivers. This has led to the formation of new agroecosystems, disrupting the typical biotopes of local campophilous birds: Tawny Pipit (*Anthus campestris*), Skylark (*Alauda arvensis*), Corn crake (*Crex crex*), Montagu's Harrier (*Circus pygargus*). It is worth noting that Montagu's Harrier – one of the most vulnerable species, the presence of nesting pairs of which indicates the conservation status of meadow-marsh biotopes, especially where there are associations of sedge (*Carex* sp.). A similar situation is observed in several EU countries. Currently, meadow biotopes both in Ukraine and in the European Union are becoming increasingly rare, leading to their protection (LISLEVAND et al. 2021). Thus, groups of dry and some types of moist meadows are protected under the Bern Convention and the EU Directive (Interpretive guide for settlements of Resolution No. 4 of the Berne Convention 2017, National biotope catalogue of Ukraine 2018). As floodplain landscapes are important for the conservation of wetland birds, the conservation level of the floodplain can be assessed by the number and species richness of birds (FERNANDEZ et al. 2005). In the Desna River valley, natural hydrology with typical floodplain complexes is preserved (VASYLYUK et al. 2010), which forms favorable conditions for nesting and reproduction of various bird species (AFANASYEV et al. 1992, DOMASHEVSKY 2005, GRISHCHENKO and YABLONOVSKA-GRISHCHENKO 2002, 2007, GRISHCHENKO et al. 1999, KOSTIUSHYN et al. 2020, MALYSHOK and KNYSH 2011, MOROZ 2015). Meanwhile, pan-European trends (BERG et al. 2002, MELTOFTE et al. 2018, LISLEVAND et al. 2021, ROODBERGEN and TEUNISSEN 2019), indicate a reduction in the population of nesting waders by approximately 40-50%, due to anthropogenic transformation of floodplain biotopes. In light of this, the International Union for Conservation of Nature has recognized the need to update the statuses for certain species

of waders from "LC" (Least Concern) to "NT" (Near Threatened) (BANIK 2016, SHYDLOVSKYY et al. 2017).

In response to the decline in populations of various bird species in Europe due to anthropogenic transformations in river basins, particularly the Seine and Danube, the EU has taken legislative steps to protect river valleys, including floodplain forests. In turn, the preserved diversity of landscapes and ecosystems in the Desna River valley supports the existence and reproduction of a large number of wetland birds, thereby ensuring genetic diversity. Regular spring floods further support these processes, preserving natural processes in the forest masses and meadows. Moreover, a reduction in agricultural impact in the vicinity of the studied area could further contribute to the restoration of natural plant groupings and increase the area for nesting of rare species (CHAMBERLAIN 2018). This is particularly relevant for meadow waders, whose population numbers depend on the groundwater level, which affects the height of meadow grasses in which they nest (RANNAP et al. 2016). At the same time, the decline in livestock farming across much of Ukraine affects the reduction of suitable environments for their reproduction (KOSTIUSHYN et al. 2020). Water level, water area, vegetation composition, and the size of wetland biotopes influence the biotope choice of wetland birds, particularly White-winged Tern (*Chlidonias leucopterus*), Black Tern (*Chlidonias niger*), Little Crake (*Porzana parva*), Great Snipe (*Gallinago media*). Bird species found in open biotopes where extensive agriculture is practiced, namely livestock farming (PUSTKOWIAK et al. 2021). However, intensive agriculture disrupts the integrity of the environment where the living space of Barred Warbler (*Sylvia nisoria)*, European Nightjar (*Caprimulgus europaeus)*, Red-backed Shrike (*Lanius collurio*) is concentrated (SALEK et al. 2022).

Measures have already been initiated to protect this area. Nature reserves such as the Dnipro-Desna Ornithological Reserve and the "Zhuravlyny" Ornithological Reserve have been established near the Desna River valley. Additionally, preparatory work is underway to create local reserves: "Ostrov Lyubychev", "Cherninsky", and "Urochyshe Rososchi". A crucial step for the conservation of wild flora and fauna along the Desna River is the creation of the "Podesinnya" National Park. This park will perform similar functions to other National Nature Parks in Ukraine. For example, the "Nizhnyosulsky" National Nature Park also plays a vital role in preserving natural floodplain areas: the mouth of the Sula River and part of the Dnipro water area. The "Pripyat-Stokhid" National Nature Park, which protects the riverbeds of the Pripyat and Stokhid rivers, has numerous branches that form labyrinths with marshy and sandy islands.

The "Kremenchug Plavni" Regional Landscape Park, located in the floodplain of the Middle Dnipro, includes the territory of the valuable Bilytskivskyi Plavni, preserving the natural appearance of the Dnipro floodplain as it was before the creation of the reservoir cascade. The park encompasses islands as well as the right and left bank floodplain areas.

Including significant floodplain areas around the city of Dnipro into the "Dniprovo-Orilsky" natural reserve exemplifies the importance of preserving river ecosystems in Ukraine. This helps to preserve key natural floodplains and islands on the left bank of the Dnipro. A similar strategy for protecting natural floodplain territories can be observed in Poland, where nature reserves such as "Cow Island" near Pulawy, "Vistula under Zawichost", and "Swiderskie Islands" in Warsaw, maintain the integrity of the natural floodplains of the Vistula River with its islands and spits. This underscores a pan-European approach to preserving river ecosystems, as in the case of the Lower Oder Valley located on the border between Poland and Germany, which is an example of river valley conservation in Central Europe.

Analyzing the importance of the Desna River floodplain for biodiversity conservation, particularly in terms of rare bird species, the need for protective measures becomes evident, especially during wartime. Although the Desna Valley is characterized by a high number of species with conservation status over a relatively small area, the lack of official conservation status exacerbates the threats to this natural heritage. Moreover, postwar population recovery requires significant efforts and often extends beyond a single country. For example, joint efforts by Germany, Portugal, and Gambia could contribute to the conservation of species whose populations are under threat, such as Limosa limosa (*Project LIFE19 IPE/DE/000004 Grass Bird* 2023). There are other examples of species conservation existing in the Desna River Valley. For instance, *Sterna albifrons* has become a conservation target in Croatia and other EU countries, where improvements to river biotopes, including sandy islands, help preserve the species (*Project Life14 NAT/HR/000115* 2024). Conservation efforts for *Ciconia nigra* in Croatia also include protecting wetlands important for the species' survival (*Project Life14 NAT/HR/000115* 2024). In Lower Saxony, restoration efforts are underway for meadows affected by drainage, intensification, plowing, and the removal of critically important environmental structures. Notably, this region is home to 19 males, approximately 20% of the entire *Crex crex* population. Over several years, the Lower Elbe has implemented a special conservation program that includes significant investments in land acquisition and improving meadow hydrology (*Project Life 97NAT-D-004233* 1997).

This comparison underscores the universality of efforts to protect natural floodplains and wetlands in the context of biodiversity and natural landscape conservation across different parts of Europe, which in turn demonstrates the need for broader international cooperation in conservation activities to preserve sensitive species and their breeding environments.

Conclusion

Investigation of avifaunal diversity conducted on a 15,000-hectare segment of the Desna River floodplains from 2018 to 2021 – an area representing a small fraction of the expansive 3,382,000 hectares – has unveiled a substantial assemblage of avian species. This survey revealed 48 species, of which 40 are listed in Resolution 6 of the Bern Convention, 7 are recognized on the European Red List, and 21 are inscribed in the Red Book of Ukraine, distributed across 6 studied biotopes. Within the lower Desna floodplain, there are a total of 24 biotopes, 14 of which are under the protection of Resolution 4 of the Bern Convention.

Meadow biotopes, both dry and moist, constitute the largest areas. Continental water bodies were found to be home to the highest species diversity, followed by wet meadows, while alluvial forests exhibited the lowest species variation. Seasonal observations indicated a peak in species richness during summer, with a notable decline towards autumn and a minimal presence in winter, highlighted by significant concentrations of the Common Goldeneye (*Bucephala clangula*). Among the nesting species, which represent a substantial 58.3% of the documented birds, three are registered with vulnerable categories on the European Red List: the Northern Lapwing (*Vanellus vanellus*) with 26 pairs, the Common Redshank (*Tringa totanus*) with 10 pairs, and the Black-tailed Godwit (*Limosa limosa*) with 4–6 pairs.

Given the Desna Valley's significant ecological value and resemblance to Natura 2000 biotopes, conservation measures are critical. The proposed "Podesinnia" National Park, alongside established and upcoming reserves, marks proactive steps for habitat protection. This initiative should be integrated into a wider strategy such as NATURA 2000. This research highlights the need for international cooperation in post-conflict restoration efforts, as seen in initiatives such as LIFE19 IPE/DE/000004 for habitat protection, and sets a precedent for future conservation strategies.

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