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Assessing the state of freshwater bottom Malacofauna (Mollusca: Bivalvia: Sphaeriidae) in the Prypiat sub-basin in the context of aquatic ecosystem sustainability

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ABSTRACT

The state of Sphaeriidae bivalve mollusc populations is examined in the context of their role in maintaining the sustainability of aquatic ecosystems in the Prypiat sub-basin. Notably, this sub-basin, as part of the Dnipro basin, has a transboundary nature. Based on the field research conducted between 2019 and 2024, this study analyzes the spatial distribution of 18 species in the family, which serve as vital filter feeders in watercourses of varying ranks. Species that are stably capable of forming monopopulations (*S. solidum, S. rivicola, S. nucleus*) have been identified, which indicates their key role in the functioning of ecosystems. It should be emphasized that 12 key identified areas where three to eight species coexist, contributing significantly to the functional stability of aquatic ecosystems. Patterns of species distribution in relation to watercourse size were revealed, with the highest occurrence frequency (60–100%) observed in large rivers. This distribution is attributed to the stability of hydrological regimes and the diversity of biotopes. The cluster analysis of the species composition similarity across water bodies allowed the authors to distinguish five main clusters, reflecting variations in the conditions of the family species existence compared to the Horyn reference river. The research suggests that anthropogenic impacts, including 179 cross structures in rivers, 20 significant point sources of pollution, and substantial changes in 75% of river channels, have led to the typical habitat transformations and potentially resulted in the elimination of certain species. These findings are essential for assessing the ecological status of water bodies, expanding the regional conservation network, and developing scientifically grounded measures to enhance aquatic ecosystem sustainability. Furthermore, the importance of the results is also underscored by the protected status of all species in European countries, contrasted with the lack of a protective strategy for these species in Ukraine.

Keywords: bivalve molluscs, Sphaeriidae, Prypiat sub-basin, ecosystem sustainability, filter species, spatial distribution of species, conservation areas, functional diversity.

INTRODUCTION

Under the current context of increasing anthropogenic impact and global climate changes, the practical application of biodiversity knowledge for managing and restoring natural systems is particularly relevant (Ricciardi, 1998, Folke et al., 2004). Understanding the mechanisms of ecosystem functioning and the role of biodiversity in maintaining their sustainability enables the development of effective strategies for natural resource management and conservation (Dudgeon et al., 2006, Cardinale et al., 2012).

Freshwater ecosystems cannot function effectively without the vital group of hydrobionts known as filter feeders, which serve as ecosystem engineers and form the water quality for the entire ecosystem (Carpenter, 2011, Vaughn, 2018).

These ecosystems depend on a complex biological filtration system supported by various groups of filter-feeding hydrobionts. These organisms are essential to maintaining water quality and aquatic ecosystems functioning through their ability to remove particulates, microorganisms, and organic compounds from water. Among the most significant filter feeders, a special place is held by representatives of the class Bivalvia. In Ukraine, Bivalve molluscs of the family Unionidae are represented by six native species (Shevchuk et al., 2019). These species are able to filter substantial volumes of water, with individual filtration rates reaching 20–40 liters per day. By forming natural biofiltration systems in aquatic ecosystems, these molluscs are most effective when the population density reach at least 10 individuals per square meter. The largest species within the family Sphaeriidae (Fig. 1) demonstrate equally high filtration efficiency, reaching maximum sizes up to 25 mm. In contrast, smaller species (up to 5 mm) exhibit lower filtration activity. However, their population densities, reported in the literature to reach several thousand individuals per square meter (Shevchuk and Bylyna, 2022), also exert a significant influence on water quality.

The complex interactions among different groups of filter organisms are essential for the effective functioning of biological self-purification mechanisms in water bodies. To understand the species composition and abundance of these organisms is critical for assessing the ecological status of aquatic ecosystems, developing restoration measures and managing water quality.

Figure 1. Molluscs of the family Sphaeriidae (authors' photo)

The conservation of natural filterers populations is an imperative objective of water management, as these organisms provide key ecosystem services, including water purification, regulation of trophic relationships, and maintenance of biodiversity in aquatic ecosystems. Their role becomes especially meaningful in the context of growing anthropogenic pressure on water bodies and the urgent need to support their ecological integrity (Palmer, 2010, Vaughn, 2018).

The Prypiat River sub-basin is characterized by a substantial anthropogenic load on surface water ecosystems (The Dnipro River Basin Management Plan, 2023). The primary factors contributing to this impact are: high population density (accounting for 14% of the total population within the Dnipro basin), a well-developed industrial sector (encompassing chemical, forestry, paper, food, construction, engineering, and energy industries), intensive agriculture with a high proportion of arable land (62.3%) and land reclamation measures.

The hydrological regime and river ecosystems are seriously affected by 179 cross structures on small and medium-sized rivers which alter hydrological dynamics and hinder the migration of aquatic organisms. The typology of water bodies in the Prypiat sub-basin is undergoing changes under the influence of climatic factors and anthropogenic activities. There is a tendency to decrease the area of natural wetlands and a corresponding increase in artificial water reservoirs, highlighting the need for further research and the development of adaptive water management strategies. These impacts disrupt the structure of hydrobiont communities, leading to the disappearance of certain freshwater species, including key filter feeders such as Unionidae bivalves. This underscores the importance of studying other critical filter-feeding groups, such as molluscs of the Sphaeriidae family, which, despite their small size, play a crucial role in maintaining the ecological balance of water bodies in the Prypiat sub-basin (Shevchuk et al., 2023). The analysis of key conservation issues for freshwater bivalves reveals essential knowledge gaps in their biology, ecology, and spatial distribution. The limited regional data coverage poses challenges for the development of effective conservation measures for this group of hydrobionts.

Currently, 33 objects of the Emerald Network are localized within the Prypiat River sub-basin, covering one third of its territory (Updated list of officially adopted Emerald Network sites (December 2019), 2019). This network encompasses diverse categories of environmental protection areas: one biosphere reserve, twelve national nature parks, four nature conservation areas, two regional landscape parks, and fourteen nature reserves. The implementation of the Water Framework Directive (2023) and basin management in the Prypiat sub-basin requires an expansion of nature conservation territories. In this context, it is necessary to identify the areas with the greatest species diversity, including important species such as bivalves, to determine potential protection zones and develop a comprehensive conservation strategy. Moreover, it is particularly important because freshwater bivalves are recognized as one of the most rapidly declining groups of hydrobionts. Thus, all the species found in the region of study have a protected status in Europe (Lopes-Lima et al., 2017, Lopes-Lima et al., 2018).

Oleksii Korniushyn emphasized the need to develop a conservation strategy for these species in Ukraine more than 20 years ago. Specifically, he proposed to provide an environmental protection status to *Pisidium lilljeborgi* as an endangered species, *P. pulchella* and *P. pseudosphaerium* as vulnerable species, and *P. moitessierianum, E. personata*, and *E. hibernica* as rare species. According to the author, the conservation status of *Sphaerium solidum* remains uncertain, while *Sphaerium nucleus*, *S. ovale* and *E. globularis* require further research. The scientist identified Polissia as the most significant region for their conservation, noting its highest species diversity of freshwater molluscs.

MATERIAL AND METHODS

To assess the status of freshwater bottom malacofauna (Mollusca: Bivalvia: Sphaeriidae) in the Prypiat basin, we conducted field research between 2019 and 2024, mainly in Zhytomyr and Volyn Polissia, covering 133 study sites. The hydrographic network of the study area consists of watercourses of various ranks: the main river (the Prypiat), its major tributaries (the Styr, the Horyn, the Ubort, the Uzh, the Turia, the Sluch, the Khomora), as well as 31 smaller rivers, 5 streams (up to 1 km long), and two channel ponds.

The material was collected at a depth of 50 cm using standard hydrobiological techniques, including manual collection and washing of sediments through a system of hydrobiological sieves. Taxonomic identification of the samples was performed in accordance with current European systematic approaches (Piechocki and Dyduch-Falniowska, 1993, MolluscaBase eds.). Statistical analysis of digital data was conducted using Microsoft Excel v. 9.0 and Statistics 9.0. The research resulted (Shevchuk and Bylyna, 2022) in the following habitats (Table 1) of 18 species of the family Sphaeriidae in this region: *Musculium lacustre* (Müller, 1774), *Sphaerium corneum* (Linnaeus 1758), *S. rivicola* (Lamarck, 1818), *S. nuscleus* (Studer, 1820), *S. solidum* (Normand, 1844), *Pisidium amnicum* (Muller, 1774), *P. supinum* Schmidt, 1851, *P. pseudosphaerium* Falve, 1927, *P. milium* Held, 1836, *P. subtruncatum* Malm, 1855, *P. tenuilineatum* Stelfox, 1918, *P. obtusale* (Lamarck, 1818), *P. nitidum* Jenyns, 1832, *P. casertanum* (Poli, 1791), *P. henslowanum* (Sheppard, 1823), *P. personatum* Malm, 1855, *P. moitessierianum* Paladilhe, 1866, *P. globulare* Clessin, 1873.

RESULTS AND DISCUSSION

The Prypiat sub-basin (The Dnipro River Basin Management Plan, 2023), which is part of the Dnipro basin, is located in the northern part of Ukraine. It covers approximately 114.3 thousand km² within the country. The hydrography of the Prypiat is characterized by calm, meandering channels, rivers, swamps, and water bodies. The sub-basin contains 50 water reservoirs and 2.130 ponds. This area accounts for 44% of all lakes in the Dnipro watershed, although they are relatively small, with the total lake coverage of the basin not exceeding 1%.

The river network of the sub-basin comprises watercourses of various sizes, ranging from small rivers to major tributaries of the Prypiat. In total, there are 4429 watercourses in the sub-basin and 4010 of them are less than 10 km in length. A considerable number of rivers measuring less than 10 km is a distinctive characteristic of this sub-basin.

Marsh ecosystems occupy large areas, especially in the northern part of the sub-basin. Mesotrophic and eutrophic bogs predominate in terms of nutrition, although oligotrophic complexes are also observed. There is a tendency to reduce the area of natural wetlands due to extensive melioration measures.

Table 1. Species habitats of the family Sphaeriidae

Species	Localities of habitation
M. lacustre	The Horyn River (Oleksandriia, Rivne region), the Sluch River (Nova Chortoriia, Zhytomyr region), the Stavy River (Shchekichyn, Rivne region), the Husak River (Levkivka, Khmelnytskyi region), the Khomora River (Polonne, Khmelnytskyi region).
S. corneum	The Sluch River (Sosnove, Rivne region), the Korchyk River (Vesniane, Rivne region; Ustia, Rivne region)
S. rivicola	The Sluch River (Zviahel, Zhytomyr region.; Liubar, Zhytomyr region; Baranivka, Zhytomyr region; Nova Chortoriia, Zhytomyr region), the Horyn River (Hoshcha, Rivne region; Oleksandriia, two detection sites, Rivne region; Tuchyn, Rivne region), the Smilka River (Zviahel, Zhytomyr region), the Korchyk River (Vesniane, Rivne region), the Khomora River (Poninky, two detection sites, Khmelnytskyi region; Polonne, Khmelnytskyi region), the Uzh River (Poliske, Zhytomyr region), the Noryn River (Hunychi, Zhytomyr region), the Kustynka River (Velykyi Zhytyn, Rivne region), the Styr River (Sokil, Volyn region.; Naviz, Volyn region; Borovychi, Volyn region).
S. nucleus	The Prypiat River (Hlukhy, Volyn region.; Ratne, Volyn region), the Kyzivka River (Nova Vyzhva, two detection sites, Volyn region), the Sluch River (Nova Chortoriia, Zhytomyr region), the Stavy River (Shchekichyn, Rivne region), the Korchyk River (Korets, Rivne region), the Khomora River (Poninky two detection sites, Khmelnytskyi region; Polonne, Khmelnytskyi region.), the Uzh River (Poliske, Zhytomyr region.; Korosten, two detection sites, Zhytomyr region), the Zherev River (Ihnatpil, Zhytomyr region), the Noryn River (Hunychi, Zhytomyr region; Ovruch, Zhytomyr region.), the Ubort River (Olevsk, Zhytomyr region); the Kustynka River (Zaborol, Rivne region).
S. solidum	The Prypiat River (Hlukhy, Volyn region; Ratne, Volyn region), the Kyzivka River (Nova Vyzhva, Volyn region), the Sluch River (Bilchaky, Rivne region; Sosnove, Rivne region; Kolky, Rivne region; Tynne, Rivne region; Berezne, Rivne region; Khotyn, Rivne region; Myropil, Zhytomyr region), the Smilka River (Zviahel, Zhytomyr region), the Tserem River(Pylypovychi, Zhytomyr region), the Korchyk River (Vesniane, Rivne region; Ustia, Rivne region), the Horyn River (Stepan, Rivne region; Remchytsi, Rivne region; Berestia, Rivne region), the Styr River (Sokil, Volyn region; Naviz, Volyn region; Borovychi, Volyn region).
P. amnicum	The Prypiat River (Hlukhy, Volyn region.; Ratne, Volyn region), the Kyzivka River (Nova Vyzhva, Volyn region), the Dyrazhka River (Dyrazhne, Rivne region), the Uzh River (Narodychi, Zhytomyr region; Korosten, Zhytomyr region), the Zherev River (Ihnatpil, Zhytomyr region.; Luhyny, Zhytomyr region), the Ubort River (Olevsk, Zhytomyr region), the Horyn River (Zlazne, Rivne region; Oleksandriia, Rivne region), the Kustynka River (Zaborol, Rivne region), the Styr River (Sokil, Volyn region).
P. supinum	The Horyn River (Velun, Rivne region).
P. pseudosphaerium	The Horyn River (Zlazne, Rivne region; Velun, Rivne region), the Uzh river (Korosten, Zhytomyr region), the Zherev river (Narodychi, Zhytomyr region), the Styr River (Rozhyshche, Volyn region), stream (Rozhyshche, Volyn region).
P. milium	The Prypiat River (Ratne, Volyn region), the Horyn River (Stepan, Rivne region).
P. subtruncatum	The Prypiat River (Ratne, Volyn region), the Kyzivka River (Nova Vyzhva, Volyn region), the Horyn River (Stepan, Rivne region).
P. tenuilineatum	The Prypiat River (Hlukhy, Volyn region.; Ratne, Volyn region), the Horyn River (Stepan, Rivne region)
P. obtusale	The Prypiat River (Ratne, Volyn region), the Vyzhivka River (Ratne, Volyn region).
P. nitidum	Stream (Oleksandriia, Rivne region; Hraddia, Volyn region).
P. casertanum	The Prypiat River (Hlukhy, Volyn region; Ratne, Volyn region), the Vyzhivka River (Ratne, Volyn region), the Horyn River (Yapolot, Rivne region.; Stepan, Rivne region; Zlazne, Rivne region; Dubrovytsia, Rivne region), the Dyrazhka River (Dyrazhne, Rivne region).
P. henslowanum	The Prypiat River (Hlukhy, Volyn region), the Uzh River (Poliske, Zhytomyr region), the Zherev River (Ihnatpil, Zhytomyr region).
P. perconatum	The Sluch River (Tynytsia, Rivne region), the Horyn River (Stepan, Rivne region).
P. moitesserianum	The Uzh River (Poliske, Zhytomyr region).
P. globulare	The Vyzhivka River (Ratne, Volyn region), the Kyzivka River (Nova Vyzhva, Volyn region), the Horyn River (Yapolot, Rivne region; Stepan, Rivne region; Velun, Rivne region), the Styr River (Rozhyshche, Volyn region), stream (Rozhyshche, Volyn region; Hradddia, Volyn region).

According to the river basin management plans, 1040 surface water bodies (SWBs) have been identified within the Prypiat subbasin (The Dnipro River Basin Management Plan, 2023). The assessment covered 418 rivers, with 491 SWBs identified in the rivers, 15 in the lakes, and 516 classified as heavily modified surface water bodies (HMSWB). A total of 49% of the subbasin consists of HMSWBs, with 304 attributed to channel straightening, 119 to water regulation, and 93 to both factors.

In the context of the environmental assessment of anthropogenic influence on the aquatic ecosystems of the sub-basin, the primary sources of organic compounds were identified as households lacking proper sewage system and the agricultural sector. The oxygen regime of the sub-basin's water bodies demonstrates strong degradation, which is correlated with the organic load. The major anthropogenic factors contributing to this situation are point-source pollution, including municipal and industrial wastewater. The analysis reveals that 74% of household wastewater is processed at municipal wastewater treatment plants, although the technical condition of these plants is largely unsatisfactory. Thus, sewage from housing and communal services poses a high risk to the ecological status of surface waters due to the heavy pollutant load. The eutrophication of water bodies in the sub-basin is caused by a complex of natural and anthropogenic factors. The hydromorphological features of the region, including wetlands, low river gradients, and artificial reservoirs with slow water exchange, increase the sensitivity of surface water bodies to the biogenic load. Anthropogenic pollution sources include point sources (insufficiently treated municipal, industrial, and livestock wastewater) and diffuse sources (atmospheric precipitation, surface and groundwater flow from urbanized and agricultural areas, and erosion processes). Quantitative indicators of diffuse pollution often exceed those of point sources, complicating the control and mitigation of biogenic load on aquatic ecosystems in the region. Diffuse phosphorus inputs are minimal. Localized areas with intensive pesticide application exceeding 3 kg/ha have been identified in the sub-basin, particularly in Teofipol of the Khmelnytskyi region and the Turiyiv region of Volyn. Potential risks to aquatic ecosystems are associated with excessive use, uncontrolled application, and violation of pesticide regulations within the sanitary protection zones of water bodies.

This list of anthropogenic impacts has led to a decrease in the number of aquatic species or their complete extinction from watercourses. The main reasons for this are the extinction of typical habitats and water contamination by pollutants (Shevchuk et al., 2020, Shevchuk et al., 2023).

The primary objective of the research was to identify the key natural areas where the highest number of species from the family Sphaeriidae occurs. The identification of such areas is a fundamental element in the development of the ecological network, as these regions ensure the conservation of the most valuable and representative elements of landscape and biological diversity. Core areas function as centers for the conservation of genetic, species, ecosystem and landscape diversity, ensuring the maintenance of the ecological balance of the territory. Furthermore, they act as "donors" for the restoration of biodiversity in the adjacent territories. Specifically, these areas form the backbone of the ecological network, shaping its spatial structure and determining the overall effectiveness of ecological connections. According to the researchers, the core areas for mollusc biodiversity within the Sphaeriidae family in the studied territory are those where three to eight species have been identified in a single locality (Table 2). The maximum number of species observed was eight.

The analysis of species diversity in large and medium-sized rivers demonstrated substantial

Table 2. Localities of the most species diversity

Locality	Identified species of the family Sphaeriidae and their quantity
The Prypiat River (Ratne, Volyn region)	Eight species – *S. nucleus*, *S. solidum*, *P. amnicum*, *P. milium*, *P. subtruncatum*, *P. tenuilineatum*, *P. obtusale*, *P. casertanum*
The Prypiat River (Hlukhy, Volyn region)	Six species – *S. nucleus*, *S. solidum*, *P. amnicum*, *P. tenuilineatum*, *P. henslowanum*, *P. casertanum*
The Horyn River (Stepan, Rivne region)	Six species – *P. milium*, *P. subtruncatum*, *P. tenuilineatum*, *P. casertanum*, *P. personatum*, *P. globulare*
The Kyzivka River (Nova Vyzhva, Volyn region)	Five species – *S. nucleus*, *S. solidum*, *P. amnicum*, *P. subtruncatum*, *P. globulare*
The Horyn River (Zlazne, Rivne region)	Four species– *P. amnicum*, *P. pseudosphaerium*, *P. obtusale*, *P. casertanum*
The Uzh River (Poliske, Zhytomyr region)	Four species – *S. rivicola*, *S. nucleus*, *P. henslowanum*, *P. moitessierianum*
The Korchyk River (Vesniane, Rivne region)	Three species – *S. rivicola*, *S. corneum*, *S. solidum*
The Khomora River (Polonne, Khmelnytskyi region)	Three species – *S. rivicola*, *S. nucleus*, *M. lacustre*
The Uzh River (Korosten, Zhytomyr region)	Three species – *S. nucleus*, *P. amnicum*, *P. pseudosphaerium*
The Zherev River (Ihnatpil, Zhytomyr region)	Three species – *S. nucleus*, *P. amnicum*, *P. henslowanum*
The Horyn River (Velun, Rivne region)	Three species –*P. supinum*, *P. pseudosphaerium*, *P. globulare*
The Styr River (Sokil, Volyn region)	Three species – *S. rivicola*, *S. solidum*, *P. amnicum*

differences in the number of species found. The highest diversity was observed in the Horyn River, which hosted 12 molluscs species. In the Prypiat River, 9 species were recorded, while the Uzh and Sluch Rivers each contained 6 species. The Khomora (3 species) and Ubort (2 species) rivers were much less diverse. No representatives of the family were detected in the Turia River. Moreover, none of the rivers studied contained the complete set of all 18 species known to occur in the region. In 28 locations, only a single species was identified. Specifically, *S. solidum* was found in 10 locations, *S. rivicola* in 6 cases, *S. nuscleus* was found in 4, *P. amnicum* was in 2, and *P. pseudosphaerium*, *P. obtusale*, *P. nitidum, P. casertanum, P. personatum*, and *M. lacustre* in one location each. The two species co-occurred in eighteen locations, though the species existed in different combinations (Fig. 2).

In conducting the cluster analysis, the similarity of the species composition of the water bodies was compared to the reference: the Horyn River, which contained 12 of the 18 identified mollusc species. The classification of the investigated water bodies, based on the similarity of the maximum mollusc species structure, revealed five clusters, as shown in Figure 3. This comparison facilitates the assessment of the differences in the conditions favorable for the existence of species within the family, relative to the selected reference, specifically the Horyn River.

The first cluster includes the Horyn River, which is distinguished by the highest number of species from the family Spaeriidae. By comparing the faunal lists with the Horyn River, the Prypiat River shows a similarity of 50%, the Horyn tributaries 50%, the Styr 33%, and the Vyzhivka tributaries 33%. Consequently, these four water bodies belong to the second cluster with a total similarity range of

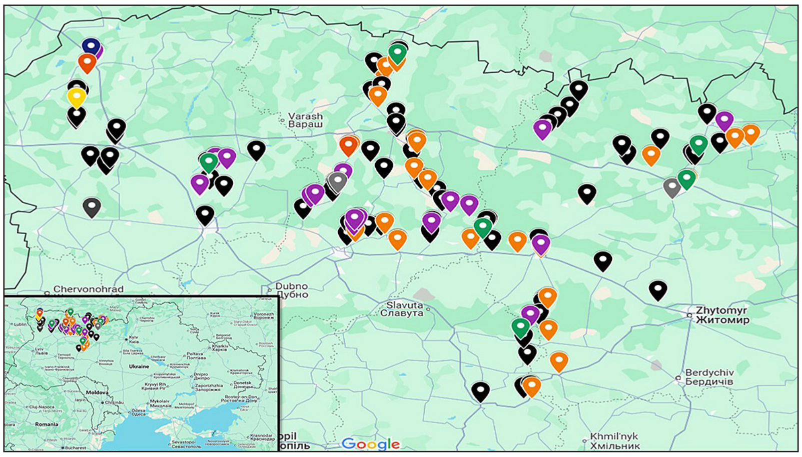

Figure 2. Species diversity of the studied localities: 8 species of the family Sphaeriidae – dark blue; 6 species – red; 5 species – yellow; 4 species – gray; 3 species – green; 2 species – purple; 1 species – orange; no species – black.

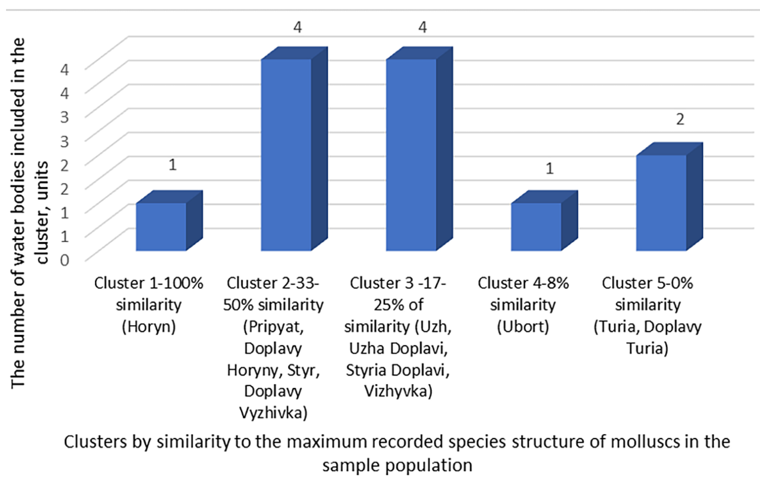

Figure 3. Clustering of the researched water bodies according to the similarity of the maximum species structure of molluscs

33–50%. The third cluster is characterized by an even lower degree of faunal similarity to the Horyn River, ranging from 17 % to 25%. The Uzh river and its tributaries demonstrate a faunal similarity of 25%, and the Styr and Vyzhivka tributaries have a 17% coincidence each with the species composition of the Horyn family Spaeriidae. The fourth cluster is defined by an even less similarity to the Horyn at 8%, and demonstrates a closer resemblance to the Ubort River. Finally, the fifth cluster shows no similarity to the species composition of the Horyn. This cluster includes the Turia River and its tributaries.

The analysis of the frequency occurrence of representatives within the family Sphaeriidae across different watercourses types revealed significant differences among the river systems in the region. In large and medium-sized rivers (over 100 km in length), the highest frequency of occurrence was recorded for the Prypiat River, with 100% of surveyed sites containing molluscs. For most other watercourses in this category, the frequency varied within 60%, including the Styr, the Horyn, the Sluch, the Khomora rivers. The lowest frequency of occurrence among large rivers was observed for the Ubort River, at just 20%. The exceptional case was noted in the Turia River and its tributaries, where no representatives of the family were detected, highlighting the need for further research.

In small rivers (n=60 survey sites), the average frequency of occurrence was about 30%, which is half as much as in large and medium-sized rivers (n=66 sites). However, some small rivers were characterized by the highest occurrence rates: the Smilka, the Tserem, the Gusak at 100%, the Kustynka and the Noryn at 67%.

The streams with a length of less than 1 km exhibited an intermediate occurrence rate (50%), which is higher than the average for small rivers but lower than that for larger watercourses.

This distribution may be attributed to the greater stability of the hydrological regimes in large rivers, the diversity of habitats they offer, and the presence of permanent mollusc populations that facilitate the recolonization of adjacent areas.

CONCLUSIONS

Based on the obtained results, the following conclusions can be drawn:

1. Eighteen species of bivalves from the family Sphaeriidae were identified in the Prypiat subbasin, underscoring the region's significant role in preserving the species diversity of freshwater filter feeders.
2. The uneven distribution of species in watercourses of different ranks was revealed. The richest in species composition is the Horyn River, with 12 species identified. This was followed by the Prypiat River with 9 species, and the Uzh and Sluch rivers with 6 species each. The Khomora River (3 species) and the Ubort River (2 species) demonstrated the lowest species diversity.
3. Twelve key areas of species diversity within the family conservation were identified, where three to eight species of molluscs coexist simultaneously. The highest number of species (8) was recorded in the Prypiat River near Ratne, in the Volyn Region.
4. The frequency of mollusc occurrence across different types of watercourses shows a clear pattern: the highest rates are observed in large rivers (60–100%), followed by small rivers with much lower rates (averaging 30%), and intermediate values are typical for streams (50%).
5. Revealed species capable of forming stable monopopulations include *S. solidum* (10 localities), *S. rivicola* (6 localities), *S. nucleus* (4 localities), suggesting their high ecological plasticity.

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