Ecological and faunal features of the streams of the Gizeldon River basin

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Abstract. The fauna of unnamed streams of the Gizeldon River basin was studied, the habitat conditions were determined, the structure of litoreophilic biocenoses was revealed, and the analysis of stream and river biotopes was conducted. As a result of the research, 48 species from 28 genera, 37 families, 12 orders, 6 classes and 4 types were identified for the Gizeldon River basin. The greatest diversity is found in the fauna of streams (30 species) – 35%, for the Gizeldon River, including the branches – 26 species (32 %) have been identified, in Genaldon-17 species (20%) and in the backwaters 11 species (13%) have been recorded

1 Introduction

Stream hydrobiocenoses, the most stable and at the same time quite fragile, are under the onslaught of anthropogenic impact. The Gizeldon River basin, like most of the rivers of North Ossetia, has repeatedly undergone powerful transformations, which were associated with natural phenomena, including the collapse of the Kolka glacier, which brought serious recreational changes for a whole decade [1,2].

The glacial disaster completely destroyed the fragile biocenoses of the streams-tributaries of the Gizeldon River (Fig.1) basin, and the river itself, and its larger tributaries (the Genaldon River), which were in the disaster zone. For many years, which amounted to 12 years, there was a slow recovery of the faunal complex of amphibious fauna and coastal vegetation cover [2].

Most of the tributary streams do not have their own names, so they are called in the vernacular Dzagaldon (lost stream), most of them are not studied either in faunal or hydrological aspects on the territory of the republic, so we decided to use the example of one of the main basins of the Terek – the Gizeldon River basin to study the faunal composition of unnamed streams, as well as their hydrological features [3].

Continuing the research of this truly unique basin, we identified the purpose and objectives of the study.

The aim is to study the faunal composition, structure and hydrological features of streams in the Giseldon basin. Tasks are to study the hydrological characteristics of streams; to collect hydrobionts of streams; to determine the species composition and

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structure of stream hydrobiocenoses; to compare the fauna of streams and the Giseldon River.

Fig. 1. The Gizeldon River

2 Materials and methods

Hydrobiological material was collected on the above-mentioned watercourses using the necessary tools. The period of field collection and cameral processing of materials covers 2018 (IX) - 2020 (V). We established stationary stations (2), where we took 41 samples – the total volume of samples was 1513 specimens of various stages of development of amphibious fauna (larvae, pupae, imago): including insects, oligochaetes, leeches, crustaceans, water mites, etc.). Basically, the research was conducted on an expedition basis. The collection of hydrobionts and other material was carried out according to the unified methods [4,5,6]

It should be noted that there have been significant positive changes in the composition of the Genaldon River zoobenthos. From 2002 to 2013, amphibiotic insects, with the exception of single specimens of the order Diptera, were not recorded in the Genaldon River [2].

We also recorded a mass flight of stoneflies of the family Chloroperlidae: *P. katherinae* (Balin., 1950); Nemouridae (*P. bifida* Mart., 1928, *P. triangulata* Mart., 1928); Perlidae: *Perla caucasica* Guer., 1838; Perlodidae: *Isoperla bithynica* (Kempny, 1908). Along with stoneflies, mayflies of the family Heptageniidae were often found: *Epeorus (C.) caucasicus* (Tsh., 1938); *E.(C.) znojkovi* (Tsh., 1938; Baetidae: *B.(B.) rhodani* Pictet, 1843; and caddisflies of the family Rhyacophilidae: *Rh. aliena* Mart., 1916; *Rh. nubila* Zett., 1840; Hydropsychidae: *H. acuta* Mart., 1909; *H. ornatula* McL., 1878. Diptera were represented by the family Simuliidae. A fairly high benthic density of 300 exp/m^2 was also noted. All this suggests that the hydrobiocenosis of the Genaldon River has almost recovered, but it took fifteen years to restore it. Recovery, in our opinion, is due to the migration of larvae from the tributary streams of the Genaldon River basin.

All the collected material is represented by 1513 specimens of zoobenthos-amphibiotic insects – 1451 specimens, including: 60 adults, 178 pupae, 1213 larvae; all other representatives of zoobenthos – 62 specimens (Amphipoda, Turbellaria, Mollusca, Amphibia and Pisces).

3 Results and discussion

As a result of the research, 48 species from 28 genera, 37 families, 12 orders, 6 classes and 4 types were identified for the Gizeldon River basin.

The greatest diversity is found in the fauna of streams (30 species) – 35%, for the Gizeldon River, including the branches – 26 species (32 %) have been identified, in Genaldon-17 species (20%) and in the backwaters 11 species (13%) have been recorded. The percentage of faunal diversity is shown in the diagram (Fig. 2).

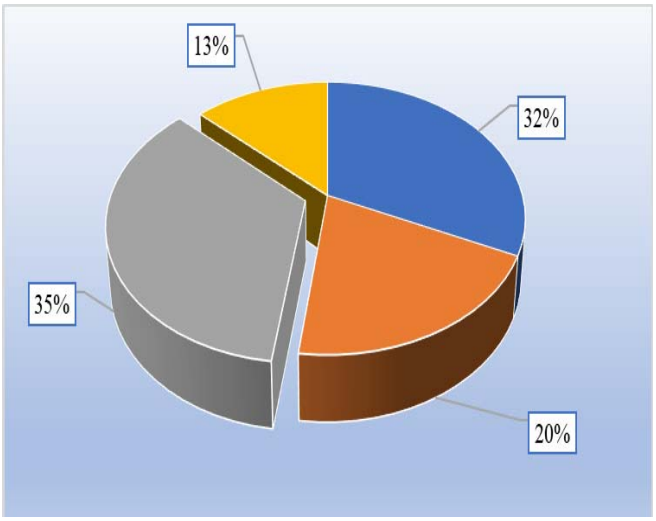

Fig. 2. The Biodiversity of hydrobiocenoses of the Gizeldon River basin

The taxonomic ratio of the orders in the composition of zoobenthos is as follows: Ephemeroptera, Plecoptera and Diptera – 15% each order, Trichoptera -33 %, Odonata - 6%, Heteroptera-4%, Coleoptera, Amphipoda, Mollusca, Turbellaria, Amphibia, Pisces-2% each order (Fig. 3).

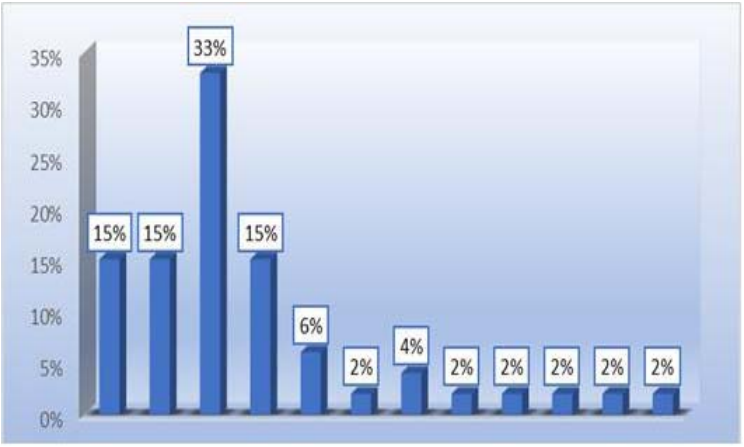

Fig. 3. Taxonomic composition of zoobenthos in the Gizeldon River basin

Consequently, representatives of the insect class-dominate in the composition of zoobenthos by the number of species (43 species) and make up 90% of all collections; the remaining orders account for 10% of the collected fauna. Besides insects in the composition

of the zoobenthos play an important role as representatives of groups Amphipoda, Tricladida, Pulmonata, which, including detachments of the Anura and the Salmoniformes comprise 10% of the fauna of the basin.

For a long time (over 8 years, starting in 2002) river Gizeldon carried meltwater of the glacier Kolka, so water contained a lot of mechanical impurities, and the temperature compared to other rivers was a bit lower.

The streams of the basin are a unique hydrological object (in terms of nutrition, they are underground springs that have a unique chemical composition that determines and forms the habitat of aquatic organisms: it should be noted that the biotope is stable, the temperatures (8-14^{0}C) are comfortable for the development of fauna (especially caddisflies), the flow rate is - 03, -0.7 m/s. Even leaf litter, brings the opportunity for the emergence of reliable shelters for a number of species (young larvae of mayflies - Baetidae, caddisflies of the families Hydropsychidae, Apataniidae; stoneflies - Taeniopterygidae).

4 Conclusions

In the course of the work, the taxonomic ratio of the orders in the composition of zoobenthos was revealed: Ephemeroptera, Plecoptera and Diptera – 15% each order, Trichoptera - 33 %, Odonata - 6%, Heteroptera - 4%, Coleoptera, Amphipoda, Mollusca, Turbellaria, Amphibia, Pisces - 2% each order.

The genera Apatania (45%) and Hydropsyche (22%) are the most numerous in the order of caddisflies, followed by Glossosoma (9%), Rhyacophila (6.7%), Limnephilus (5.7%) Potamophylax (5.5%), Kelgena (1.7%), Drusus (1.7%), Hydroptila (1.5%) and finally, Anabolia (1.2%).

In the order of mayflies, representatives of the genus Baetis (60 %), make the great majority, the rest of the genera were numerically distributed as follows: Epeorus (20%), Rhithrogena (11%), Ecdyonurus (5%), Heptagenia (3%). In the unit stoneflies dominated by members of the group Euholognatha (67%), Systellognatha (33%). For all key groups identified biotopical distribution, nearly all members of the benthos – litoreophilic – 70% psammophilic and phytoreophilic 12% each.

References

1. S.K. Cherchesova, *Amphibiotic insects (Trichoptera, Ephemeroptera, Plecoptera) of the rivers of North Ossetia* (Timiryazev Moscow State Agricultural Academy, Moscow, 2004)
2. S.K. Cherchesova, B.G. Koibaev, M.A. Mukagov, L.L. Tsibirova, *Biodiversity and problems of fauna protection - 3. Materials of the International Scientific Conference*, 54-58 (TASK, Yerevan, 2017)
3. A.K. Bekoev, V.I. Mamaev, Z.K. Tzagaeva, R.A. Dzestelova, *Actual Problems of Ecology and Nature Management. Proceedings of the XX International Scientific-Practical Conference,* **1**, 64-66 (RUDN, Moscow, 2019)
4. A.V. Yakimov, M. I. Shapovalov, et al., *Hydroentomology in Russia and neighboring countries: V All-Russian Symposium on amphibiotic and aquatic insects*, 247-250 (Filigran Publishing House, Yaroslavl, 2013)
5. *Determinant of freshwater invertebrates of Russia and adjacent territories. Vol. 5. Higher insects* (Nauka, St. Petersburg, 2001)
6. A.A. Sadovsky, Message. AN Gruz. SSR, **9(6)**, 365-368 (1948)