MONOGRAPH

Characteristics of macrozoobenthos lakes of the Barlinek-Gorzów Landscape Park (North-West Poland) on the basis of the European Union Water Framework Directive

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"... water is not a commercial product like any other, but rather a heritage which must be protected, defended and treated as such..."

(Preamble to the EU Water Framework Directive)

Fot. 1. Barlinek - Gorzów Landscape Park (*Barlinek Lake*)

Characteristics of macrozoobenthos lakes of the Barlinek-Gorzów Landscape Park (North-West Poland) on the basis of the European Union Water Framework Directive

Keywords: water; lake; macrozoobenthos; Barlineckie Lake; Suche Lake; Lubiszewko Lake; Przylęg Lake, Chłop Lake, Lubie Lake, Wielgie Lake; Barlinek-Gorzów Landscape Park; European Union Water Framework Directive

ABSTRACT

Contamination of lake waters is one of the factors affecting the qualitative and quantitative development of benthic organisms. Aside from contamination, the abundance of macrozoobenthos is determined by other conditions, i.e. predation pressure, phytoplankton biomass, detritus biomass, as well as the accessibility and quality of water reservoir bottom.

The Barlinek-Gorzów Landscape Park was established in October 1991. The Barlinek-Gorzów Landscape Park includes more than 55 000 ha of forests, lakes, fields, meadows, and is characterized by a great diversity of habitats and abundant life forms [46].

To protect the most valuable plant communities and animal habitats, five nature reserves were created within the boundaries of the Park:

1. “Skalisty Jar Libberta” includes Libbert’s Gorge, and the surrounding moraine hills and glacial erratics. It is the only site featuring lime stones and boulders in Western Pomerania and is surrounded by oak and beech forests [46].
2. “Dębina” forest conservation complex known as the Central European wet-ground forest, featuring stately oaks and beeches with some lime, hornbeam and old pine trees. In its clean environment, as many as 50 species of arboreal lichen have been preserved [46]. “Markowe Błota” – marshland, with its typical vegetation such as the *Sphagnopsida*, wild rosemary, ordinary cranberry, cottongrass. The site is visited quite often by white-tailed eagles [46].
3. The water reserve of the “River Przylęzek”. It includes a section of the River, the slopes of the riverbank and the surrounding beech stand with some tree specimens that are more than 100 years old. Seen as the watercourse resembles mountain streams, with its pure and cold water, it provides appropriate conditions for *Salmonidae* to live and spawn [46].
4. The forest reserve “Wilanów” aims to protect the natural mixed forest with vintage beech, oak and pine trees. Thanks to the varied topography, diverse rare types of forests have been preserved here [46].

The objective of the research conducted in the course of 2008 – 2012 was to determine the qualitative and quantitative structure of macrozoobenthos in the lakes of the Barlinek-Gorzów Landscape Park in the summer season.

The research enabled estimating how far the eutrophication processes have advanced in selected lakes of the Barlinek-Gorzów Landscape Park.

Qualitative and quantitative analyses of the macrozoobenthos structure in the lakes Barlinek-Gorzów Landscape Park were conducted in the summer seasons of 2008, 2010 and 2012.

By comparing the average density of benthic fauna of the lakes Barlinek-Gorzów Landscape Park with the lakes Western and Northern Polish you can see big changes in the density of taxa studied.

In comparison with other lakes Western and Northern Polish in the lakes Barlinek-Gorzów Landscape Park is a large number of taxa, however, as a result of the distribution of non-harmonic doesn't translate to the indicator value of biodiversity index PIE.

On the basis of the analysis of research in the Western and Northern Polish Lakes summer macrozoobenthos it can be concluded that in the lakes Barlinek-Gorzów Landscape Park very intensively develop Oligochaeta. While the larvae of Chironomidae subdominants status in the period under review amounting to water, developed in other lakes much more intensely, acting mostly the main ingredient of benthic fauna.

Reviewer

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1. INTRODUCTION

Water has always been the foundation of human existence. Once man's survival depended on access to water, however, along with the development of civilization, human reliance on water changed. Humans started treating water as a common good, assuming its resources to be limitless. This line of thought has resulted in degradation of waters constituting a reserve of drinking water for future generations.

These alarming changes gave an impetus to taking suitable legal actions for the protection of water resources. The European Union issued a series of regulations, the so-called "water directives", yet it recognized the need for introducing a coherent framework regulating the acts of law aimed at conservation of water resources in all EU member states. Directive 2000/60/EC, the so-called Water Framework Directive (WFD), which entered into force in December 2000, constitutes such an integrated act of law. The main objective of the WFD is providing access to good quality water to present and future generations as well as enabling the use of water by, inter alia, industry and agriculture, while simultaneously preserving and conserving the natural environment.

Contamination of lake waters is one of the factors affecting the qualitative and quantitative development of benthic organisms [1-5, 9-15]. Aside from contamination, the abundance of macrozoobenthos is determined by other conditions, i.e. predation pressure [31, 34-36, 47-52] phytoplankton biomass (Rasmussen and Kalff 1987), detritus biomass (Drake 1984), as well as the accessibility and quality of water reservoir bottom [34-36, 47-52, 56-59, 68-72]. Urbanization is the cause of many changes which are taking place in the environment, including those found in the catchment.

With this in mind, it is an important issue to properly protect water reservoirs and also take action to counter the adverse effects of human activities on the natural environment, including water bodies.

To address the increasing degradation of surface waters in the European Union, the approach to the evaluation and protection of water resources was changed. This approach was formulated in the European Union Water Framework Directive (2000/60/EC), which calls for the protection of water, as well as an environment-friendly and comprehensive approach to water assessment. The ecological status of surface waters and groundwater is assessed on the basis of the ecological potential of the biological and physico-chemical and hydromorphological indicators [10-30, 47-52].

The goal of the Water Framework Directive is to achieve good water status in all the Member States of the European Union.

Water has always been the foundation of human existence. Once man's survival depended on access to water, however, along with the development of civilization, human reliance on water changed [7-10, 17-19, 21-23, 25-27, 32-35].

Humans started treating water as a common good, assuming its resources to be limitless. This line of thought has resulted in degradation of waters constituting a reserve of drinking water for future generations [7-10, 21-23, 25-27, 32-35].

These alarming changes gave an impetus to taking suitable legal actions for the protection of water resources. The European Union issued a series of regulations, the so-called "water directives", yet it recognized the need for introducing a coherent framework regulating the acts of law aimed at conservation of water resources in all EU member states [1-6, 21-23, 36-40, 48-67].

Directive 2000/60/EC, the so-called Water Framework Directive (WFD), which entered into force in December 2000, constitutes such an integrated act of law [1-6, 9-17, 21-23, 36-40, 48-67]. The main objective of the WFD is providing access to good quality water to present and future generations as well as enabling the use of water by, inter alia, industry and agriculture, while simultaneously preserving and conserving the natural environment [73-87].

2. EXPERIMENTAL

A landscape park is established by a resolution of a regional parliament, after negotiations with a given city council. In a landscape park there is a the possibility of performing business activity with some restrictions, however, the construction of new buildings is not anticipated, except for the needs of the local residents. Landscape parks are meant to be tourism and education tools [46].

The following landscape parks are located within the Westpomeranian Region:

- a) The Lower Oder Valley Landscape Park (area: 60.09 km²),
- b) The Ińsko Landscape Park (area: 177.60 km²),
- c) The Drawsko Landscape Park (area: 414.30 km²),
- d) The Cedynia Landscape Park (area: 308.5 km²),
- e) The Barlinek-Gorzów Landscape Park (area: 239,83 km²),
- f) The Szczecin Landscape Park (area: 90.96 km²) [46].

The Barlinek-Gorzów Landscape Park was established in 1991. Forests, lakes, meandering rivers and numerous streams are its scenic and natural values. The area of the Park spread over the outwash plain, created by the waters running off from the melting glacier. The surface of the plain is not flat – it is crossed with glacial tunnels and depressions [46].

The vegetation in the Barlinek-Gorzów Landscape Park is luxuriant. It covers a total of 639 species of ferns and flower plants and 138 lichen species. Forty one of them are acknowledged in Poland as dying species.

Among 142 species of birds living in this region, as many as 105 nest within the park boundaries. One may encounter many rare bird species covered with species protection: white-tailed eagle, osprey, lesser spotted eagle, red and black kite, eagle-owl, crane, goldeneye, common kingfisher, woodpeckers and others.

The Barlinek-Gorzów Landscape Park is being succesively equipped with a proper tourist infrastructure which will allow people to visit the park for recreation and leisure purposes. Within the parks boundary and its buffer zone there are several walking, water and cycling tourist trails.

The nothern part of the Park is located within the Barlinek municipality. The spring part of the Płonia River is located there. It is an area which, in terms of landform features, is similar to the Beskid Niski mountain range. That is why it is called “Bieszczady Barlineckie”. The highest elevations are up to 114.2 m above sea level, and the lowest 24 m, by the bridge in Laskówek.

The valley slopes are cut by numerous ravines covered with beautiful fragments of wet-ground forests. The forests consist mainly of common hormbeam, English oak, Norway maple, small-leaved lime, and silver birch, with the addition of sycamore maple and beech. In the lakes and fishponds there is luxuriant water vegetation with large waterlily communities, with white and yellow waterlilies. Also the following monuments of material culture are an important part of the Barlinek-Gorzów Landscape Park and its buffer zone: palace and manor complexes, churches and cemeteries and also country and palace parks.

There are five natural reserves within the Barlinek-Gorzów Landscape Park boundaries:

- a) the “Dębina” natural reserve (area: 12,18 ha) – a reserve with partial protection status. Conservation of the central-Europe wet-ground forest for scientific and didactic purposes is the aim of the protection. One may encounter the following plants: oak forest with addition of beech, hornbeams, birches and old pines. Also 50 species of tree lichens have been found here, which means that the level of purity of the environment is exceptionally high here. The reserve is located on a slight elevation between a meadow and the picturesque Kłodawski Canal Valley [46].
- b) the “Przylężek River” natural reserve (area: 35,08 ha) – a reserve with partial protection status. Conservation for scientific and didactic purposes of a fragment of mixed forest of natural origin, with the addition of beech in the final position of the gregarious range with rich undergrowth is the aim of the protection. This is a fauna reserve. It was established on the basis of a fragment of the Przylężek River, in the forest landscape, rimmed with beech forest stands which are over 100 years old. The clean waters of the river, the fact that they are overshadowed by the beech forest on the slopes and low temperature, create the proper conditions for spawning grounds of salmonidae, which include brown trout and bullhead. The area of the forest stands in the reserve amounts to 93.7%. In the north-west part of the reserve there is a spring which starts from the cave washed away by the water [46].
- c) the “Wilanów” natural reserve (area: 67,16 ha) – a reserve with partial protection status. Conservation for scientific and didactic purposes of a fragment of mixed forest of natural origin with addition of beech at the final position of the gregarious range, with rich undergrowth is the aim of the protection. The reservation includes a fragment of natural beech and oak forest with the addition of pine and larch. Also individual beeches, oaks and pines which are 180-200 years old grow here, and they have natural monuments characteristics [46].
- d) the “Skalisty Jar Libberta” natural reserve (area: 33,21 ha) – A reserve with partial protection status. Conservation of geological and scenic values of the only lime stones, conglomerates and boulders site in Westpomerania, which is part of a composition of an oak and beech forest community, exceptionally rich vascular vegetation and numerous species of mosses and ferns, is the aim of the protection. The reserve is located within ravines and gorges with considerable ground delevelling. The elevations are as high as 115 m above sea level and are covered with trees. There are numerous huge glacial erratics covered with moss and lichens. The area is adorned with about fifty ponds in various stages of overgrowth. The main value of this area is the moraine hills that form the valley edges which are cut across by numerous ravines and gorges. “Skalisty Jar Libberta” is one of them. Only in Westpomerania are there lime and sand stones which reach the height of up to 4 m [46].
- e) the “Markowe Błota” natural reserve (area: 193,40 ha) – A reserve with partial protection status. Conservation for scientific, didactic and scenic purposes of the marshes with typical flora and fauna and also beech and mixed tree stands is the purpose of the protection. The protected complex is located in the Barlinek Forest. 30% of its area is covered with marshes surrounded by mixed and coniferous forests. One may observe 55 bird species here, including 42 breeding ones: white-tailed sea eagle, osprey, western marsh harrier and black stork. The marshes in the early spring and autumn period are an important stopping point on the bird-migration routes [46].

Fig. 1. Map Barlinek - Gorzów Landscape Park (Source: The Municipal Council in Barlinek)

In Table 1 presents data morphometric seven lakes Barlinek - Gorzów Landscape Park: Barlineckie, Suche, Lubiszewko, Przylęg, Chłop, Lubie, Wielgie.

Table 1. Morphometric and basin data of lakes of the Barlinek-Gorzów Landscape Park [46].

Indicators morphometric	Name of the lake						
	Barlineckie (Barlińskie)	Suche	Lubiszewko	Przylęg	Chłop	Lubie	Wielgie
Latitude N	52°58,9'	52°53,4'	52°53,4'	52°52,8'	52°52,7'	52°52,0'	52°56,7'
Longitude E	15°12,9'	15°16,8'	15°17,0'	15°21,8'	15°18,6'	15°18,1'	15°22,1'
Height above sea level n.p.m. [m]	57,0	63,3	63,3	60,9	59,1	59,5	69,8
Water surface area [ha]	259,1	21,5	31,1	43,6	64,3	79,4	81,9
Volume [10^3 m ³]	18579,8	838,5	1617,2	1090,0	4156,2	3588,3	2830,5
Maximal depth [m]	18,0	8,6	11,8	5,3	16,0	8,9	7,7
Average depth [m]	7,1	3,9	5,2	2,5	6,4	4,5	3,5
Maximal length [m]	3770	1180	2070	1090	1760	2450	1880
Maximal width [m]	2150	330	280	490	470	480	920
Coastline of lake's basin [m]	10450	3200	4600	3200	4100	5750	7500

Benthic material (sediments) along with benthic fauna was collected with Ekman-Brige grab sampler (surface of 225 cm²). Following that, the type of sediment and depth of the bottom were determined (tab. 2, 10, 18, 26, 34, 42, 50).

Benthic fauna Barlineckie Lake was collected during summer months from 6 sampling stations located in the littoral and profundal zone (altogether 12 samples).

Benthic fauna lakes - Suche, Lubiszewko, Przylęg, Chłop, Lubie, Wielgie was collected during two summer months from 4 sampling stations located in the littoral and profundal zone (altogether 8 samples).

The location of research stations resulted from tributary positions and water reservoir morphometry. At each station 2 sub-samples were collected.

The collected material was rinsed on a sieve with a mesh size of 0.5 mm and it was conserved in 4% formalin solution. Animals were segregated macroscopically and under a stereomicroscope (PZO make) into individual taxa, and their concentration was referenced to 1 m² of the surface of the lake bottom. Benthic fauna taxa collected from individual stations were weighted with an accuracy of 0.01 g after having been dried on filter paper. Fauna biomass was presented in grams of wet mass per 1 m² of the bottom [34,35,57,68,71,72].

Frequencies (F) were calculated from the following formula:

$$F = \frac{n}{N} \cdot 100\%$$

where: n – number of stations where a given taxon occurred,
N – number of research stations.

Dominance index (D) was calculated from the following formula:

$$D = \frac{S(a)}{S} \cdot 100\%$$

where $S(a)$ is a sum of individuals belonging to taxon „a”,

while S – is a total biomass of individuals of macrozoobenthos in all samples.

The dominance index and frequency values were interpreted in accordance with the criteria specified by Kasprzak and Niedbała (1981).

PIE biodiversity index was determined through the application of the following formula:

$$PIE = \frac{N}{N+1} (1 - \sum p_i^2) \quad p_i = \frac{n_i}{N}$$

where: N – total number of individuals;

p_i – share of i species in total number of individuals.

At work, particular attention has focused on a comparison of the two zones - littoral, profundal of the lakes Barlinek - Gorzów Landscape Park: Barlineckie, Suche, Lubiszewko, Przyłęg, Chłop, Lubie, Wielgie.

Places sampling water lakes assessed Barlinek - Gorzów Landscape Park is shown in Fig. 2 - 8.

Fig. 2. Location of the measuring point in Barlineckie Lake. *Source: Google maps 2012/develop your own*

Fig. 3. Location of the measuring point in Suche Lake. *Source: Google maps 2012/develop your own*

Fig. 4. Location of the measuring point in Lubiszewko Lake. *Source: Google maps 2012/develop your own*

Fig. 5. Location of the measuring point in Przylęg Lake. *Source: Google maps 2012/develop your own*

Fig. 6. Location of the measuring point in Chłop Lake. *Source: Google maps 2012/develop your own*

Fig. 7. Location of the measuring point in Lubie Lake. *Source: Google maps 2012/develop your own*

Fig. 8. Location of the measuring point in Wielgie Lake. *Source: Google maps 2012/develop your own*

3. RESULTS AND DISCUSSION

The objective of the research conducted in the course of 2008 – 2012 was to determine the qualitative and quantitative structure of macrozoobenthos in the lakes of the Barlinek-Gorzów Landscape Park in the summer season. The research enabled estimating how far the eutrophication processes have advanced in selected lakes of the Barlinek-Gorzów Landscape Park.

Qualitative and quantitative analyses of the macrozoobenthos structure in the lakes Barlinek-Gorzów Landscape Park were conducted in the summer seasons of 2008, 2010 and 2012.

The results of the lakes Barlinek - Gorzów Landscape Park: Barlineckie, Suche, Lubiszewko, Przylęg, Chłop, Lubie, Wielgie are presented in table 2 - 57.

Table 2. Type of bottom deposits, depth and pH of interstitial waters in measurement points Barlinek Lake (July 2008, 2010, 2012)

Sampling site no.	Type of bottom deposits	Depth [m]	pH of intersitial waters
1	Fine sand, autochthonous detritus, the remains of shells, leftover cane	1.5	7.45
2	Fine sand, autochthonous detritus, the remains of shells	1.8	7.19
3	Hamlets tanatocenzowy, seashell scrap (Dreissena), leftover cane	2.6	7.57
4	Hamlets tanatocenzowy, seashell scrap (Dreissena)	3.3	6.79
5	Hamlets tanatocenzowy, seashell scrap (Dreissena), silt, detritus, gravel	3.8	7.27
6	Black silt, detritus, gravel	4.9	7.04

Table 3. Qualitative amount bottom fauna in the Barlinek Lake in July of 2008

Lp.	Taxa	F [%]	Sampling sites					
			Litoral			Profundal		
			1	2	3	4	5	6
1.	Oligochaeta	100	+	+	+	+	+	+
2.	Hirudinea							
	<i>Piscicola</i> sp.	17	-	+	-	-	-	-
	<i>Helobdella stagnalis</i> L.	33	-	+	+	-	-	-
3.	Isopoda – <i>Asellus aquaticus</i> Racov.	17	+	-	-	-	-	-
4.	Ephemeroptera larvae							
	<i>Leptophlebia</i> sp.	17	-	+	-	-	-	-
	<i>Ephemera</i> sp.	17	-	+	-	-	-	-
	<i>Caenis macrura</i> (Stephens)	17	+	-	-	-	-	-
5.	Trichoptera larvae							
	Limnephilidae	17	-	-	+	-	-	-
	<i>Cyrtus</i> sp.	17	-	-	+	-	-	-
	Leptoceridae	17	-	-	+	-	-	-
6.	Diptera larvae							
	<i>Chironomus f.l. plumosus</i> L.	100	+	+	+	+	+	+
	<i>Chaoborus</i> sp.	33	-	-	-	+	-	+
	<i>Procladius</i> sp.	50	+	+	+	-	-	-
7.	Bivalvia – <i>Dreissena polymorpha</i> Pall.	17	-	-	+	-	-	-
8.	Megaloptera larvae – <i>Sialis lutaria</i> L.	33	-	+	+	-	-	-
Number of taxa			5	8	9	3	2	3

Explanation: F - Turnout

Table 4. Qualitative amount bottom fauna in the Barlinek Lake in July of 2010

Lp.	Taxa	F [%]	Sampling sites					
			Litoral			Profundal		
			1	2	3	4	5	6
1.	Oligochaeta	100	+	+	+	+	+	+
2.	Hirudinea							
	<i>Piscicola</i> sp.	17	-	+	-	-	-	-
	<i>Helobdella stagnalis</i> L.	33	+	+	-	-	-	-
3.	Isopoda – <i>Asellus aquaticus</i> Racov.	17	+	-	-	-	-	-
4.	Ephemeroptera larvae							
	<i>Leptophlebia</i> sp.	17	-	+	-	-	-	-
	<i>Ephemera</i> sp.	17	-	+	-	-	-	-
	<i>Caenis macrura</i> (Stephens)	17	+	-	-	-	-	-
5.	Trichoptera larvae							
	Limnephilidae	17	-	-	+	-	-	-
	<i>Cyrtus</i> sp.	17	-	-	+	-	-	-
	Leptoceridae	17	-	-	+	-	-	-
6.	Diptera larvae							
	<i>Chironomus f.l. plumosus</i> L.	100	+	+	+	+	+	+
	<i>Chaoborus</i> sp.	33	-	-	-	+	+	-
	<i>Procladius</i> sp.	50	+	+	+	-	-	-
7.	Bivalvia – <i>Dreissena polymorpha</i> Pall.	17	-	-	+	-	-	-
8.	Megaloptera larvae – <i>Sialis lutaria</i> L.	33	+	-	+	-	-	-
Number of taxa			7	7	8	3	3	2

Explanation: F - Turnout

Table 5. Qualitative amount bottom fauna in the Barlinek Lake in July of 2012

Lp.	Taxa	F [%]	Sampling sites					
			Litoral			Profundal		
			1	2	3	4	5	6
1.	Oligochaeta	100	+	+	+	+	+	+
2.	Hirudinea							
	<i>Piscicola</i> sp.	17	+	+	-	-	-	-
	<i>Helobdella stagnalis</i> L.	33	+	+	-	-	-	-
3.	Isopoda – <i>Asellus aquaticus</i> Racov.	17	+	-	-	-	-	-
4.	Ephemeroptera larvae							
	<i>Leptophlebia</i> sp.	17	-	+	-	-	-	-
	<i>Ephemer</i> sp.	17	-	+	-	-	-	-
	<i>Caenis macrura</i> (Stephens)	17	+	-	-	-	-	-
5.	Trichoptera larvae							
	Limnephilidae	17	-	-	+	-	-	-
	<i>Cyrnus</i> sp.	17	-	-	+	-	-	-
	Leptoceridae	17	-	-	+	-	-	-
6.	Diptera larvae							
	<i>Chironomus f.l. plumosus</i> L.	100	+	+	+	+	+	+
	<i>Chaoborus</i> sp.	33	-	-	-	+	+	-
	<i>Procladius</i> sp.	50	+	+	+	-	-	-
7.	Bivalvia – <i>Dreissena polymorpha</i> Pall.	17	-	-	+	-	-	-
8.	Megaloptera larvae – <i>Sialis lutaria</i> L.	33	+	-	+	-	-	-
Number of taxa			8	7	8	3	3	2

Explanation: F - Turnout

Table 6. Condensing of macrozoobenthos – C (10^2 individuals per m^{-2}) and wet mass M ($g_{mm} m^{-2}$) at examined measurement stations on Barlinek Lake (July of 2008)

Lp.	Taxa	Sampling sites											
		Litoral						Profundal					
		1		2		3		4		5		6	
		C	M	C	M	C	M	C	M	C	M	C	M
1.	Oligochaeta	4.6	1.9	8.5	3.1	11.8	4.6	8.6	3.4	11.7	5.7	7.2	3.2
2.	Hirudinea	0	0	5.5	2.7	1.3	0.4	0	0	0	0	0	0
	<i>Piscicola</i> sp.	0	0	0.8	0.3	0	0	0	0	0	0	0	0
	<i>Helobdella stagnalis</i> L.	0	0	4.7	2.4	1.3	0.4	0	0	0	0	0	0
3.	Isopoda – <i>Asellus aquaticus</i> Racov.	1.1	0.09	0	0	0	0	0	0	0	0	0	0
4.	Ephemeroptera larvae	0.9	0.3	0.4	0.14	0	0	0	0	0	0	0	0
	<i>Leptophlebia</i> sp.	0	0	0.2	0.06	0	0	0	0	0	0	0	0
	<i>Ephemera</i> sp.	0	0	0.2	0.08	0	0	0	0	0	0	0	0
	<i>Caenis macrura</i> (Stephens)	0.9	0.3	0	0	0	0	0	0	0	0	0	0
5.	Trichoptera larvae	0	0	0	0	0.8	1.1	0	0	0	0	0	0
	Limnephilidae	0	0	0	0	0.5	0.6	0	0	0	0	0	0
	<i>Cyrrus</i> sp.	0	0	0	0	0.2	0.3	0	0	0	0	0	0
	Leptoceridae	0	0	0	0	0.1	0.2	0	0	0	0	0	0
6.	Diptera larvae	1.1	0.4	0.7	0.8	2.2	2.5	3.6	4.7	3.8	7.3	3.2	9.3
	<i>Chironomus f.l.</i> <i>plumosus</i> L.	0.5	0.2	0.3	0.7	0.6	1.8	1.7	4.2	3.8	7.3	2.5	6.8
	<i>Chaoborus</i> sp.	0	0	0	0	0	0	1.9	0.5	0	0	0.7	2.5
	<i>Procladius</i> sp.	0.6	0.2	0.4	0.1	1.6	0.7	0	0	0	0	0	0
7.	Bivalvia – <i>Dreissena polymorpha</i> Pall.	0	0	0	0	0.6	1.9	0	0	0	0	0	0
8.	Megaloptera larvae – <i>Sialis lutaria</i> L.	0	0	0.8	2.1	0.7	1.8	0	0	0	0	0	0
Σ		7.7	2.7	15.1	8.9	17.4	12.3	12.2	8.1	15.5	13.0	10.4	12.5
Biodiversity index PIE		1,084		0.527		0.849		0.792		0.871		0.496	

Table 7. Condensing of macrozoobenthos – C (10^2 individuals per m^{-2}) and wet mass M ($g_{mm} m^{-2}$) at examined measurement stations on Barlinek Lake (July of 2010)

Lp.	Taxa	Sampling sites											
		Litoral						Profundal					
		1		2		3		4		5		6	
		C	M	C	M	C	M	C	M	C	M	C	M
1.	Oligochaeta	11.2	4.8	7.2	2.7	3.9	1.8	16.8	5.2	11.5	4.9	8.2	2.1
2.	Hirudinea	7.2	3.9	8.0	2.9	0	0	0	0	0	0	0	0
	<i>Piscicola</i> sp.	0	0	6.3	2.5	0	0	0	0	0	0	0	0
	<i>Helobdella stagnalis</i> L.	7.2	3.9	1.7	0.4	0	0	0	0	0	0	0	0
3.	Isopoda – <i>Asellus aquaticus</i> Racov.	0.4	0.06	0	0	0	0	0	0	0	0	0	0
4.	Ephemeroptera larvae	0.2	0.07	0.7	0.24	0	0	0	0	0	0	0	0
	<i>Leptophlebia</i> sp.	0	0	0.6	0.2	0	0	0	0	0	0	0	0
	<i>Ephemer</i> sp.	0	0	0.1	0.04	0	0	0	0	0	0	0	0
	<i>Caenis macrura</i> (Stephens)	0.2	0.07	0	0	0	0	0	0	0	0	0	0
5.	Trichoptera larvae	0	0	0	0	1.1	1.0	0	0	0	0	0	0
	Limnephilidae	0	0	0	0	0.2	0.1	0	0	0	0	0	0
	<i>Cyrrus</i> sp.	0	0	0	0	0.4	0.7	0	0	0	0	0	0
	Leptoceridae	0	0	0	0	0.5	0.2	0	0	0	0	0	0
6.	Diptera larvae	1.2	0.7	2.3	1.9	5.4	2.4	1.6	1.9	3.8	11.6	5.2	9.8
	<i>Chironomus f.l. plumosus</i> L.	0.7	0.4	0.5	0.8	0.6	0.9	0.8	1.5	2.5	7.9	5.2	9.8
	<i>Chaoborus</i> sp.	0	0	0	0	0	0	0.8	0.4	1.3	3.7	0	0
	<i>Procladius</i> sp.	0.5	0.3	1.8	1.1	4.8	1.5	0	0	0	0	0	0
7.	Bivalvia – <i>Dreissena polymorpha</i> Pall.	0	0	0	0	0.8	1.9	0	0	0	0	0	0
8.	Megaloptera larvae – <i>Sialis lutaria</i> L.	0	0	1.2	3.5	0.8	2.4	0	0	0	0	0	0
Σ		20.2	9.6	19.4	11.3	12.0	9.5	18.4	7.1	15.3	16.5	13.2	11.9
Biodiversity index PIE		1.257		0.739		0.836		0.528		0.947		0.391	

Table 8. Condensing of macrozoobenthos – C (10^2 individuals per m^{-2}) and wet mass M ($g_{mm} m^{-2}$) at examined measurement stations on Barlinek Lake (July of 2012)

Lp.	Taxa	Sampling sites											
		Litoral						Profundal					
		1		2		3		4		5		6	
		C	M	C	M	C	M	C	M	C	M	C	M
1.	Oligochaeta	8.6	2.4	6.1	2.0	2.7	0.8	9.8	2.4	8.5	1.9	6.7	1.0
2.	Hirudinea	4.7	1.6	7.3	2.7	0	0	0	0	0	0	0	0
	<i>Piscicola</i> sp.	0.8	0.3	6.3	2.5	0	0	0	0	0	0	0	0
	<i>Helobdella stagnalis</i> L.	3.9	1.3	1.0	0.2	0	0	0	0	0	0	0	0
3.	Isopoda – <i>Asellus aquaticus</i> Racov.	0.3	0.05	0	0	0	0	0	0	0	0	0	0
4.	Ephemeroptera larvae	0.1	0.04	0.6	0.18	0	0	0	0	0	0	0	0
	<i>Leptophlebia</i> sp.	0	0	0.4	0.1	0	0	0	0	0	0	0	0
	<i>Ephemer</i> sp.	0	0	0.2	0.08	0	0	0	0	0	0	0	0
	<i>Caenis macrura</i> (Stephens)	0.1	0.04	0	0	0	0	0	0	0	0	0	0
5.	Trichoptera larvae	0	0	0	0	1.0	1.0	0	0	0	0	0	0
	Limnephilidae	0	0	0	0	0.2	0.1	0	0	0	0	0	0
	<i>Cyrnus</i> sp.	0	0	0	0	0.2	0.7	0	0	0	0	0	0
	Leptoceridae	0	0	0	0	0.6	0.2	0	0	0	0	0	0
6.	Diptera larvae	1.2	0.5	2.2	1.7	4.9	2.3	1.5	1.4	4.2	6.9	6.1	7.9
	<i>Chironomus f.l. plumosus</i> L.	0.6	0.2	0.4	0.1	0.7	0.5	0.7	1.2	2.9	3.1	6.1	7.9
	<i>Chaoborus</i> sp.	0	0	0	0	0	0	0.8	0.2	1.3	3.8	0	0
	<i>Procladius</i> sp.	0.6	0.3	2.8	1.6	4.2	1.7	0	0	0	0	0	0
7.	Bivalvia – <i>Dreissena polymorpha</i> Pall.	0	0	0	0	0.6	1.2	0	0	0	0	0	0
8.	Megaloptera larvae – <i>Sialis lutaria</i> L.	0	0	1.2	2.6	1.2	3.0	0	0	0	0	0	0
Σ		14.9	4.6	17.5	15.9	10.4	8.3	11.3	3.8	12.7	8.8	12.8	8.9
Biodiversity index PIE		1.268		0.847		0.731		0.621		0.856		0.409	

Table 9. Macrozoobenthos condensing in summer of Barlinek Lake

Lp.	Taxa	Density of macrozoobenthos (indiv. · m ⁻²)			
		2008	2010	2012	Average
1.	Oligochaeta	745	803	529	692
2.	Hirudinea	101	220	163	161
3.	Isopoda – <i>Asellus aquaticus</i> Racov.	12	6	4	7
4.	Ephemeroptera larvae	18	12	10	13
5.	Trichoptera larvae	20	22	20	21
6.	Diptera larvae	396	479	408	428
7.	Bivalvia – <i>Dreissena polymorpha</i> Pall.	25	27	18	23
8.	Megaloptera larvae – <i>Sialis lutaria</i> L.	54	79	81	71
Σ		1371	1648	1233	1417
Numer of taxa		5	5	5	5
Biodiversity index PIE		0.767	0.783	0.789	0.780

Table 10. Type of bottom deposits, depth and pH of interstitial waters in measurement points
Suche Lake (July 2008, 2010, 2012)

Sampling site no.	Type of bottom deposits	Depth [m]	pH of intersitial waters
1	Fine sand, autochthonous detritus, the remains of shells, leftover cane	1.6	7.20
2	Fine sand, autochthonous detritus, the remains of shells	2.1	7.49
3	Hamlets tanatocenzowy, seashell scrap (<i>Dreissena</i>), leftover cane	3.2	7.18
4	Hamlets tanatocenzowy, seashell scrap (<i>Dreissena</i>), silt	4.3	7.39

Table 11. Qualitative amount bottom fauna in the Suche Lake in July of 2008

Lp.	Taxa	F [%]	Sampling sites			
			Litoral		Profundal	
			1	2	3	4
1.	Oligochaeta	100	+	+	+	+
2.	Hirudinea					
	<i>Piscicola</i> sp.	25	-	+	-	-
	<i>Helobdella stagnalis</i> L.	25	-	+	-	-
3.	Isopoda – <i>Asellus aquaticus</i> Racov.	25	+	-	-	-
4.	Ephemeroptera larvae					
	<i>Leptophlebia</i> sp.	25	-	+	-	-
	<i>Ephemera</i> sp.	25	-	+	-	-
	<i>Caenis macrura</i> (Stephens)	25	+	-	-	-
5.	Trichoptera larvae					
	Limnephilidae	25	-	+	-	-
	<i>Cyrnus</i> sp.	25	-	+	-	-
	Leptoceridae	25	-	+	-	-
6.	Diptera larvae					
	<i>Chironomus f.l. plumosus</i> L.	100	+	+	+	+
	<i>Chaoborus</i> sp.	50	-	-	+	+
	<i>Procladius</i> sp.	50	+	+	-	-
7.	Bivalvia – <i>Dreissena polymorpha</i> Pall.	25	-	+	-	-
8.	Megaloptera larvae – <i>Sialis lutaria</i> L.	25	-	+	-	-
Number of taxa			5	12	3	2

Explanation: F - Turnout

Table 12. Qualitative amount bottom fauna in the Suche Lake in July of 2010

Lp.	Taxa	F [%]	Sampling sites			
			Litoral		Profundal	
			1	2	3	4
1.	Oligochaeta	100	+	+	+	+
2.	Hirudinea					
	<i>Piscicola</i> sp.	25	-	+	-	-
	<i>Helobdella stagnalis</i> L.	50	+	-	+	-
3.	Isopoda – <i>Asellus aquaticus</i> Racov.	25	+	-	-	-
4.	Ephemeroptera larvae					
	<i>Leptophlebia</i> sp.	25	-	+	-	-
	<i>Ephemera</i> sp.	25	-	+	-	-
	<i>Caenis macrura</i> (Stephens)	25	+	-	-	-
5.	Trichoptera larvae					
	Limnephilidae	25	-	+	-	-
	<i>Cyrrus</i> sp.	25	-	+	-	-
	Leptoceridae	25	-	+	-	-
6.	Diptera larvae					
	<i>Chironomus f.l. plumosus</i> L.	100	+	+	+	+
	<i>Chaoborus</i> sp.	25	-	-	+	-
	<i>Procladius</i> sp.	50	+	+	-	-
7.	Bivalvia – <i>Dreissena polymorpha</i> Pall.	25	-	+	-	-
8.	Megaloptera larvae – <i>Sialis lutaria</i> L.	25	-	+	-	-
Number of taxa			6	11	4	2

Explanation: F - Turnout

Table 13. Qualitative amount bottom fauna in the Suche Lake in July of 2012

Lp.	Taxa	F [%]	Sampling sites			
			Litoral		Profundal	
			1	2	3	4
1.	Oligochaeta	100	+	+	+	+
2.	Hirudinea					
	<i>Piscicola</i> sp.	25	-	+	-	-
	<i>Helobdella stagnalis</i> L.	50	+	+	-	-
3.	Isopoda – <i>Asellus aquaticus</i> Racov.	25	+	-	-	-
4.	Ephemeroptera larvae					
	<i>Leptophlebia</i> sp.	25	-	+	-	-
	<i>Ephemera</i> sp.	25	-	+	-	-
	<i>Caenis macrura</i> (Stephens)	25	+	-	-	-
5.	Trichoptera larvae					
	Limnephilidae	25	-	+	-	-
	<i>Cyrrnus</i> sp.	25	-	+	-	-
	Leptoceridae	25	-	+	-	-
6.	Diptera larvae					
	<i>Chironomus f.l. plumosus</i> L.	100	+	+	+	+
	<i>Chaoborus</i> sp.	50	-	-	+	+
	<i>Procladius</i> sp.	50	+	+	-	-
7.	Bivalvia – <i>Dreissena polymorpha</i> Pall.	25	-	+	-	-
8.	Megaloptera larvae – <i>Sialis lutaria</i> L.	50	+	+	-	-
Number of taxa			7	12	3	3

Explanation: F - Turnout

Table 14. Condensing of macrozoobenthos – C (10^2 individuals per m^{-2}) and wet mass M ($g_{mm} m^{-2}$) at examined measurement stations on Suche Lake (July of 2008)

Lp.	Taxa	Sampling sites							
		Litoral				Profundal			
		1		2		3		4	
		C	M	C	M	C	M	C	M
1.	Oligochaeta	3.2	1.1	8.2	3.0	2.6	0.9	7.0	2.8
2.	Hirudinea	0	0	1.5	0.5	0	0	0	0
	<i>Piscicola</i> sp.	0	0	0.2	0.1	0	0	0	0
	<i>Helobdella stagnalis</i> L.	0	0	1.3	0.4	0	0	0	0
3.	Isopoda – <i>Asellus aquaticus</i> Racov.	1.7	0.2	0	0	0	0	0	0
4.	Ephemeroptera larvae	0.6	0.1	0	0	0	0	0	0
	<i>Leptophlebia</i> sp.	0	0	0	0	0	0	0	0
	<i>Ephemera</i> sp.	0	0	0	0	0	0	0	0
	<i>Caenis macrura</i> (Stephens)	0.6	0.1	0	0	0	0	0	0
5.	Trichoptera larvae	0	0	0.6	1.2	0	0	0	0
	Limnephilidae	0	0	0.4	0.7	0	0	0	0
	<i>Cyrnus</i> sp.	0	0	0.1	0.2	0	0	0	0
	Leptoceridae	0	0	0.1	0.3	0	0	0	0
6.	Diptera larvae	0.8	0.3	1.5	1.8	2.6	3.8	2.4	5.9
	<i>Chironomus f.l. plumosus</i> L.	0.2	0.1	0.3	1.6	1.2	3.1	2.0	4.9
	<i>Chaoborus</i> sp.	0	0	0	0	1.4	0.7	0.4	1.0
	<i>Procladius</i> sp.	0.6	0.2	1.2	0.2	0	0	0	0
7.	Bivalvia – <i>Dreissena polymorpha</i> Pall.	0	0	0.8	1.7	0	0	0	0
8.	Megaloptera larvae – <i>Sialis lutaria</i> L.	0	0	1.2	3.1	0	0	0	0
Σ		6.3	1.7	13.8	11.3	5.2	4.7	9.4	8.7
Biodiversity index PIE		1.107		0.917		0.659		0.564	

Table 15. Condensing of macrozoobenthos – C (10^2 individuals per m^{-2}) and wet mass M ($g_{mm} m^{-2}$) at examined measurement stations on Suche Lake (July of 2010)

Lp.	Taxa	Sampling sites							
		Litoral				Profundal			
		1		2		3		4	
		C	M	C	M	C	M	C	M
1.	Oligochaeta	6.9	2.1	2.8	1.1	7.3	2.9	6.7	2.0
2.	Hirudinea	5.3	1.7	4.0	1.9	0	0	0	0
	<i>Piscicola</i> sp.	0	0	4.0	1.9	0	0	0	0
	<i>Helobdella stagnalis</i> L.	5.3	1.7	0	0	0	0	0	0
3.	Isopoda – <i>Asellus aquaticus</i> Racov.	0.7	0.2	0	0	0	0	0	0
4.	Ephemeroptera larvae	0.7	0.2	0.5	0.16	0	0	0	0
	<i>Leptophlebia</i> sp.	0	0	0.3	0.1	0	0	0	0
	<i>Ephemera</i> sp.	0	0	0.2	0.06	0	0	0	0
	<i>Caenis macrura</i> (Stephens)	0.7	0.2	0	0	0	0	0	0
5.	Trichoptera larvae	0	0	1.8	1.2	0	0	0	0
	Limnephilidae	0	0	0.8	0.3	0	0	0	0
	<i>Cyrnus</i> sp.	0	0	0.2	0.6	0	0	0	0
	Leptoceridae	0	0	0.8	0.3	0	0	0	0
6.	Diptera larvae	1.6	0.9	4.0	2.7	1.2	2.4	6.1	10.6
	<i>Chironomus f.l. plumosus</i> L.	0.7	0.4	0.9	1.5	0.5	2.0	6.1	10.6
	<i>Chaoborus</i> sp.	0	0	0	0	0.7	0.4	0	0
	<i>Procladius</i> sp.	0.7	0.4	3.1	1.2	0	0	0	0
7.	Bivalvia – <i>Dreissena polymorpha</i> Pall.	0	0	0	0	0	0	0	0
8.	Megaloptera larvae – <i>Sialis lutaria</i> L.	0	0	0.6	2.0	0	0	0	0
Σ		15.1	5.1	15.0	11.8	8.5	5.3	12.8	12.6
Biodiversity index PIE		1.196		0.892		0.674		0.527	

Table 16. Condensing of macrozoobenthos – C (10^2 individuals per m^{-2}) and wet mass M ($g_{mm} m^{-2}$) at examined measurement stations on Suche Lake (July of 2012)

Lp.	Taxa	Sampling sites							
		Litoral				Profundal			
		1		2		3		4	
		C	M	C	M	C	M	C	M
1.	Oligochaeta	9.6	3.1	4.6	2.1	14.2	6.3	6.9	2.9
2.	Hirudinea	4.8	1.9	7.7	3.7	0	0	0	0
	<i>Piscicola</i> sp.	0	0	3.9	2.0	0	0	0	0
	<i>Helobdella stagnalis</i> L.	4.8	1.9	3.8	1.7	0	0	0	0
3.	Isopoda – <i>Asellus aquaticus</i> Racov.	1.2	0.4	0	0	0	0	0	0
4.	Ephemeroptera larvae	0.5	0.1	1.2	0.6	0	0	0	0
	<i>Leptophlebia</i> sp.	0	0	0.9	0.4	0	0	0	0
	<i>Ephemera</i> sp.	0	0	0.3	0.2	0	0	0	0
	<i>Caenis macrura</i> (Stephens)	0.5	0.1	0	0	0	0	0	0
5.	Trichoptera larvae	0	0	1.8	1.4	0	0	0	0
	Limnephilidae	0	0	0.6	0.3	0	0	0	0
	<i>Cyrtus</i> sp.	0	0	0.4	0.6	0	0	0	0
	Leptoceridae	0	0	0.8	0.5	0	0	0	0
6.	Diptera larvae	0.5	0.2	2.3	2.1	1.5	1.7	2.7	6.6
	<i>Chironomus f.l. plumosus</i> L.	0.3	0.1	0.2	0.5	0.9	1.2	2.8	4.6
	<i>Chaoborus</i> sp.	0	0	0	0	0.6	0.5	0.9	2.0
	<i>Procladius</i> sp.	0.2	0.1	2.1	1.6	0	0	0	0
7.	Bivalvia – <i>Dreissena polymorpha</i> Pall.	0	0	0.6	0.9	0	0	0	0
8.	Megaloptera larvae – <i>Sialis lutaria</i> L.	0	0	12	1.8	0	0	0	0
Σ		16.6	5.6	19.4	16.3	15.7	8.0	9.6	9.5
Biodiversity index PIE		0.982		1.109		0.516		0.451	

Table 17. Macrozoobenthos condensing in summer of Suche Lake

Lp.	Taxa	Density of macrozoobenthos (indiv. · m ⁻²)			
		2008	2010	2012	Average
1.	Oligochaeta	298	318	497	368
2.	Hirudinea	20	129	181	110
3.	Isopoda – <i>Asellus aquaticus</i> Racov.	19	9	16	15
4.	Ephemeroptera larvae	7	16	6	10
5.	Trichoptera larvae	18	30	32	27
6.	Diptera larvae	196	294	176	222
7.	Bivalvia – <i>Dreissena polymorpha</i> Pall.	25	40	15	27
8.	Megaloptera larvae – <i>Sialis lutaria</i> L.	43	26	30	33
Σ		616	864	953	811
Numer of taxa		6	6	6	6
Biodiversity index PIE		0.812	0.822	0.764	0.799

Table 18. Type of bottom deposits, depth and pH of interstitial waters in measurement points Lubiszewko Lake (July 2008, 2010, 2012)

Sampling site no.	Type of bottom deposits	Depth [m]	pH of intersitial waters
1	Fine sand, autochthonous detritus, the remains of shells, leftover cane	1.3	7.27
2	Fine sand, autochthonous detritus, the remains of shells	2.0	7.40
3	Hamlets tanatocenozowy, seashell scrap (<i>Dreissena</i>),	2.7	7.52
4	Hamlets tanatocenozowy, seashell scrap (<i>Dreissena</i>), detritus, gravel	3.8	7.29

Table 19. Qualitative amount bottom fauna in the Lubiszewko Lake in July of 2008

Lp.	Taxa	F [%]	Sampling sites			
			Litoral		Profundal	
			1	2	3	4
1.	Oligochaeta	100	+	+	+	+
2.	Hirudinea					
	<i>Piscicola</i> sp.	25	+	-	-	-
	<i>Helobdella stagnalis</i> L.	50	+	+	-	-
3.	Isopoda – <i>Asellus aquaticus</i> Racov.	25	+	-	-	-
4.	Ephemeroptera larvae					
	<i>Leptophlebia</i> sp.	25	-	+	-	-
	<i>Ephemera</i> sp.	25	-	+	-	-
	<i>Caenis macrura</i> (Stephens)	25	+	-	-	-
5.	Trichoptera larvae					
	Limnephilidae	25	-	+	-	-
	<i>Cyrnus</i> sp.	25	-	+	-	-
	Leptoceridae	25	-	+	-	-
6.	Diptera larvae					
	<i>Chironomus f.l. plumosus</i> L.	100	+	+	+	+
	<i>Chaoborus</i> sp.	50	-	-	+	+
	<i>Procladius</i> sp.	50	+	+	-	-
7.	Bivalvia – <i>Dreissena polymorpha</i> Pall.	25	-	+	-	-
8.	Megaloptera larvae – <i>Sialis lutaria</i> L.	50	+	+	-	-
Number of taxa			7	11	3	3

Explanation: F - Turnout

Table 20. Qualitative amount bottom fauna in the Lubiszewko Lake in July of 2010

Lp.	Taxa	F [%]	Sampling sites			
			Litoral		Profundal	
			1	2	3	4
1.	Oligochaeta	100	+	+	+	+
2.	Hirudinea					
	<i>Piscicola</i> sp.	25	-	+	-	-
	<i>Helobdella stagnalis</i> L.	50	+	+	-	-
3.	Isopoda – <i>Asellus aquaticus</i> Racov.	25	+	-	-	-
4.	Ephemeroptera larvae					
	<i>Leptophlebia</i> sp.	25	-	+	-	-
	<i>Ephemera</i> sp.	25	-	+	-	-
	<i>Caenis macrura</i> (Stephens)	25	+	-	-	-
5.	Trichoptera larvae					
	Limnephilidae	25	-	+	-	-
	<i>Cyrnus</i> sp.	25	+	-	-	-
	Leptoceridae	25	+	-	-	-
6.	Diptera larvae					
	<i>Chironomus f.l. plumosus</i> L.	100	+	+	+	+
	<i>Chaoborus</i> sp.	50	-	-	+	+
	<i>Procladius</i> sp.	50	+	+	-	-
7.	Bivalvia – <i>Dreissena polymorpha</i> Pall.	25	-	+	-	-
8.	Megaloptera larvae – <i>Sialis lutaria</i> L.	50	+	+	-	-
Number of taxa			9	10	3	3

Explanation: F - Turnout

Table 21. Qualitative amount bottom fauna in the Lubiszewko Lake in July of 2012

Lp.	Taxa	F [%]	Sampling sites			
			Litoral		Profundal	
			1	2	3	4
1.	Oligochaeta	100	+	+	+	+
2.	Hirudinea					
	<i>Piscicola</i> sp.	25	-	+	-	-
	<i>Helobdella stagnalis</i> L.	25	+	-	-	-
3.	Isopoda – <i>Asellus aquaticus</i> Racov.	50	+	+	-	-
4.	Ephemeroptera larvae					
	<i>Leptophlebia</i> sp.	25	+	-	-	-
	<i>Ephemera</i> sp.	25	+	-	-	-
	<i>Caenis macrura</i> (Stephens)	25	+	-	-	-
5.	Trichoptera larvae					
	Limnephilidae	25	-	+	-	-
	<i>Cyrnus</i> sp.	25	-	+	-	-
	Leptoceridae	25	-	+	-	-
6.	Diptera larvae					
	<i>Chironomus f.l. plumosus</i> L.	100	+	+	+	+
	<i>Chaoborus</i> sp.	50	-	-	+	+
	<i>Procladius</i> sp.	50	+	+	-	-
7.	Bivalvia – <i>Dreissena polymorpha</i> Pall.	25	-	+	-	-
8.	Megaloptera larvae – <i>Sialis lutaria</i> L.	50	+	+	-	-
Number of taxa			9	10	3	3

Explanation: F - Turnout

Table 22. Condensing of macrozoobenthos – C (10^2 individuals per m^{-2}) and wet mass M ($g_{mm} m^{-2}$) at examined measurement stations on Lubiszewko Lake (July of 2008)

Lp.	Taxa	Sampling sites							
		Litoral				Profundal			
		1		2		3		4	
		C	M	C	M	C	M	C	M
1.	Oligochaeta	2.3	1.6	8.2	3.1	7.0	2.9	6.0	2.6
2.	Hirudinea	1.5	0.7	0.8	0.2	0	0	0	0
	<i>Piscicola</i> sp.	0.6	0.2	0	0	0	0	0	0
	<i>Helobdella stagnalis</i> L.	0.9	0.5	0.8	0.2	0	0	0	0
3.	Isopoda – <i>Asellus aquaticus</i> Racov.	1.6	0.1	0	0	0	0	0	0
4.	Ephemeroptera larvae	1.6	0.7	0.8	0.39	0	0	0	0
	<i>Leptophlebia</i> sp.	0	0	0.6	0.3	0	0	0	0
	<i>Ephemer</i> sp.	0	0	0.2	0.09	0	0	0	0
	<i>Caenis macrura</i> (Stephens)	1.6	0.7	0	0	0	0	0	0
5.	Trichoptera larvae	0	0	1.0	1.7	0	0	0	0
	Limnephilidae	0	0	0.6	0.7	0	0	0	0
	<i>Cyrrus</i> sp.	0	0	0.2	0.4	0	0	0	0
	Leptoceridae	0	0	0.2	0.6	0	0	0	0
6.	Diptera larvae	0.9	0.4	1.8	1.8	4.4	4.9	3.4	9.8
	<i>Chironomus f.l. plumosus</i> L.	0.7	0.3	0.4	1.3	2.0	3.8	3.1	8.3
	<i>Chaoborus</i> sp.	0	0	0	0	2.4	1.1	0.3	1.5
	<i>Procladius</i> sp.	0.2	0.1	1.2	0.5	0	0	0	0
7.	Bivalvia – <i>Dreissena polymorpha</i> Pall.	0	0	1.2	3.6	0	0	0	0
8.	Megaloptera larvae – <i>Sialis lutaria</i> L.	1.2	3.7	0.4	1.3	0	0	0	0
Σ		9.1	7.2	14.2	12.1	11.4	7.8	9.4	12.4
Biodiversity index PIE		1.281		0.621		0.952		0.672	

Table 23. Condensing of macrozoobenthos – C (10^2 individuals per m^{-2}) and wet mass M ($g_{mm} m^{-2}$) at examined measurement stations on Lubiszewko Lake (July of 2010)

Lp.	Taxa	Sampling sites							
		Litoral				Profundal			
		1		2		3		4	
		C	M	C	M	C	M	C	M
1.	Oligochaeta	8.6	3.0	5.7	1.9	7.6	2.8	6.9	2.0
2.	Hirudinea	3.8	1.9	8.1	3.3	0	0	0	0
	<i>Piscicola</i> sp.	0	0	5.7	2.2	0	0	0	0
	<i>Helobdella stagnalis</i> L.	3.8	1.9	2.4	1.1	0	0	0	0
3.	Isopoda – <i>Asellus aquaticus</i> Racov.	0.5	0.1	0	0	0	0	0	0
4.	Ephemeroptera larvae	0.6	0.1	1.4	0.9	0	0	0	0
	<i>Leptophlebia</i> sp.	0	0	1.2	0.8	0	0	0	0
	<i>Ephemera</i> sp.	0	0	0.2	0.1	0	0	0	0
	<i>Caenis macrura</i> (Stephens)	0.6	0.1	0	0	0	0	0	0
5.	Trichoptera larvae	1.0	0.3	0.5	0.1	0	0	0	0
	Limnephilidae	0	0	0.5	0.1	0	0	0	0
	<i>Cyrnus</i> sp.	0.6	0.2	0	0	0	0	0	0
	Leptoceridae	0.4	0.1	0	0	0	0	0	0
6.	Diptera larvae	2.0	0.9	2.4	2.3	1.7	2.7	4.0	8.3
	<i>Chironomus f.l. plumosus</i> L.	1.7	0.8	0.3	0.9	0.9	2.1	3.1	6.3
	<i>Chaoborus</i> sp.	0	0	0	0	0.8	0.6	0.9	2.0
	<i>Procladius</i> sp.	0.3	0.1	2.1	1.4	0	0	0	0
7.	Bivalvia – <i>Dreissena polymorpha</i> Pall.	0	0	2.1	2.5	0	0	0	0
8.	Megaloptera larvae – <i>Sialis lutaria</i> L.	0.6	2.1	0.9	2.7	0	0	0	0
Σ		17.1	8.4	20.1	13.7	9.3	5.5	10.9	10.3
Biodiversity index PIE		1.370		0.926		0.471		0.579	

Table 24. Condensing of macrozoobenthos – C (10^2 individuals per m^{-2}) and wet mass M ($g_{mm} m^{-2}$) at examined measurement stations on Lubieszewko Lake (July of 2012)

Lp.	Taxa	Sampling sites							
		Litoral				Profundal			
		1		2		3		4	
		C	M	C	M	C	M	C	M
1.	Oligochaeta	9.2	3.5	4.7	2.2	8.1	2.9	7.0	2.6
2.	Hirudinea	4.9	2.0	3.0	1.8	0	0	0	0
	<i>Piscicola</i> sp.	0	0	3.0	1.8	0	0	0	0
	<i>Helobdella stagnalis</i> L.	4.9	2.0	0	0	0	0	0	0
3.	Isopoda – <i>Asellus aquaticus</i> Racov.	0.7	0.2	0	0	0	0	0	0
4.	Ephemeroptera larvae	1.2	0.4	0	0	0	0	0	0
	<i>Leptophlebia</i> sp.	0.3	0.1	0	0	0	0	0	0
	<i>Ephemera</i> sp.	0.6	0.2	0	0	0	0	0	0
	<i>Caenis macrura</i> (Stephens)	0.3	0.1	0	0	0	0	0	0
5.	Trichoptera larvae	0	0	1.9	2.1	0	0	0	0
	Limnephilidae	0	0	0.6	0.4	0	0	0	0
	<i>Cyrnus</i> sp.	0	0	0.9	1.6	0	0	0	0
	Leptoceridae	0	0	0.4	0.1	0	0	0	0
6.	Diptera larvae	1.6	1.5	4.7	2.1	1.8	3.1	4.6	9.0
	<i>Chironomus f.l. plumosus</i> L.	0.9	0.9	0.8	1.3	1.2	2.3	3.7	7.4
	<i>Chaoborus</i> sp.	0	0	0	0	0.6	0.6	0.9	1.6
	<i>Procladius</i> sp.	0.7	0.6	3.9	0.8	0.6	0.6	0	0
7.	Bivalvia – <i>Dreissena polymorpha</i> Pall.	0	0	1.9	3.6	0	0	0	0
8.	Megaloptera larvae – <i>Sialis lutaria</i> L.	0	0	1.2	2.9	0	0	0	0
Σ		17.6	7.6	17.9	14.8	9.9	6.0	11.6	11.6
Biodiversity index PIE		0.975		1.262		0.670		0.468	

Table 25. Macrozoobenthos condensing in summer of Lubiszewko Lake

Lp.	Taxa	Density of macrozoobenthos (indiv. · m ⁻²)			
		2008	2010	2012	Average
1.	Oligochaeta	337	385	402	375
2.	Hirudinea	32	171	117	107
3.	Isopoda – <i>Asellus aquaticus</i> Racov.	17	6	15	13
4.	Ephemeroptera larvae	35	30	16	27
5.	Trichoptera larvae	28	19	40	25
6.	Diptera larvae	274	243	284	267
7.	Bivalvia – <i>Dreissena polymorpha</i> Pall.	48	37	55	47
8.	Megaloptera larvae – <i>Sialis lutaria</i> L.	17	63	41	40
Σ		788	954	970	904
Numer of taxa		6	6	6	6
Biodiversity index PIE		0.882	0.836	0.844	0.854

Table 26. Type of bottom deposits, depth and pH of interstitial waters in measurement points Przyłęg Lake (July 2008, 2010, 2012)

Sampling site no.	Type of bottom deposits	Depth [m]	pH of interstitial waters
1	Fine sand, autochthonous detritus, the remains of shells, leftover cane	1.3	7.39
2	Fine sand, autochthonous detritus, the remains of shells	2.1	7.18
3	Hamlets tanatocenozowy, seashell scrap (<i>Dreissena</i>),	2.9	7.35
4	Hamlets tanatocenozowy, seashell scrap (<i>Dreissena</i>), silt, detritus, gravel	3.3	7.41

Table 27. Qualitative amount bottom fauna in the Przylęg Lake in July of 2008

Lp.	Taxa	F [%]	Sampling sites			
			Litoral		Profundal	
			1	2	3	4
1.	Oligochaeta	100	+	+	+	+
2.	Hirudinea					
	<i>Piscicola</i> sp.	25	-	+	-	-
	<i>Helobdella stagnalis</i> L.	25	-	+	-	-
3.	Isopoda – <i>Asellus aquaticus</i> Racov.	25	+	-	-	-
4.	Ephemeroptera larvae					
	<i>Leptophlebia</i> sp.	25	-	+	-	-
	<i>Ephemera</i> sp.	25	-	+	-	-
	<i>Caenis macrura</i> (Stephens)	25	+	-	-	-
5.	Trichoptera larvae					
	Limnephilidae	25	+	-	-	-
	<i>Cyrnus</i> sp.	25	+	-	-	-
	Leptoceridae	25	+	-	-	-
6.	Diptera larvae					
	<i>Chironomus f.l. plumosus</i> L.	100	+	+	+	+
	<i>Chaoborus</i> sp.	50	-	-	+	+
	<i>Procladius</i> sp.	50	+	+	-	-
7.	Bivalvia – <i>Dreissena polymorpha</i> Pall.	25	+	-	-	-
8.	Megaloptera larvae – <i>Sialis lutaria</i> L.	25	-	+	-	-
Number of taxa			9	8	3	3

Explanation: F - Turnout

Table 28. Qualitative amount bottom fauna in the Przylęg Lake in July of 2010

Lp.	Taxa	F [%]	Sampling sites			
			Litoral		Profundal	
			1	2	3	4
1.	Oligochaeta	100	+	+	+	+
2.	Hirudinea					
	<i>Piscicola</i> sp.	25	+	-	-	-
	<i>Helobdella stagnalis</i> L.	25	+	-	-	-
3.	Isopoda – <i>Asellus aquaticus</i> Racov.	25	-	+	-	-
4.	Ephemeroptera larvae					
	<i>Leptophlebia</i> sp.	25	+	-	-	-
	<i>Ephemera</i> sp.	25	+	-	-	-
	<i>Caenis macrura</i> (Stephens)	25	-	+	-	-
5.	Trichoptera larvae					
	Limnephilidae	25	-	+	-	-
	<i>Cyrnus</i> sp.	25	-	+	-	-
	Leptoceridae	25	-	+	-	-
6.	Diptera larvae					
	<i>Chironomus f.l. plumosus</i> L.	100	+	+	+	+
	<i>Chaoborus</i> sp.	25	-	-	+	-
	<i>Procladius</i> sp.	25	+	-	-	-
7.	Bivalvia – <i>Dreissena polymorpha</i> Pall.	25	-	+	-	-
8.	Megaloptera larvae – <i>Sialis lutaria</i> L.	25	-	+	-	-
Number of taxa			7	9	3	2

Explanation: F - Turnout

Table 29. Qualitative amount bottom fauna in the Przylęg Lake in July of 2012

Lp.	Taxa	F [%]	Sampling sites			
			Litoral		Profundal	
			1	2	3	4
1.	Oligochaeta	100	+	+	+	+
2.	Hirudinea					
	<i>Piscicola</i> sp.	25	+	-	-	-
	<i>Helobdella stagnalis</i> L.	25	+	-	-	-
3.	Isopoda – <i>Asellus aquaticus</i> Racov.	25	+	-	-	-
4.	Ephemeroptera larvae					
	<i>Leptophlebia</i> sp.	25	-	+	-	-
	<i>Ephemera</i> sp.	25	+	-	-	-
	<i>Caenis macrura</i> (Stephens)	25	+	-	-	-
5.	Trichoptera larvae					
	Limnephilidae	25	-	+	-	-
	<i>Cyrnus</i> sp.	25	-	+	-	-
	Leptoceridae	25	-	+	-	-
6.	Diptera larvae					
	<i>Chironomus f.l. plumosus</i> L.	100	+	+	+	+
	<i>Chaoborus</i> sp.	25	-	-	+	-
	<i>Procladius</i> sp.	25	+	-	-	-
7.	Bivalvia – <i>Dreissena polymorpha</i> Pall.	25	-	+	-	-
8.	Megaloptera larvae – <i>Sialis lutaria</i> L.	25	+	-	-	-
Number of taxa			9	7	3	2

Explanation: F - Turnout

Table 30. Condensing of macrozoobenthos – C (10^2 individuals per m^{-2}) and wet mass M ($g_{mm} m^{-2}$) at examined measurement stations on Przylęg Lake (July of 2008)

Lp.	Taxa	Sampling sites							
		Litoral				Profundal			
		1		2		3		4	
		C	M	C	M	C	M	C	M
1.	Oligochaeta	2.3	0.7	6.1	2.9	7.0	2.6	2.9	1.3
2.	Hirudinea	0	0	3.5	1.6	0	0	0	0
	<i>Piscicola</i> sp.	0	0	0.9	0.5	0	0	0	0
	<i>Helobdella stagnalis</i> L.	0	0	2.6	1.1	0	0	0	0
3.	Isopoda – <i>Asellus aquaticus</i> Racov.	2.3	0.2	0	0	0	0	0	0
4.	Ephemeroptera larvae	0.7	0.2	0.9	0.18	0	0	0	0
	<i>Leptophlebia</i> sp.	0	0	0.3	0.08	0	0	0	0
	<i>Ephemer</i> sp.	0	0	0.6	0.1	0	0	0	0
	<i>Caenis macrura</i> (Stephens)	0.7	0.2	0	0	0	0	0	0
5.	Trichoptera larvae	1.9	2.6	0	0	0	0	0	0
	Limnephilidae	0.6	0.9	0	0	0	0	0	0
	<i>Cyrnus</i> sp.	0.8	1.0	0	0	0	0	0	0
	Leptoceridae	0.5	0.7	0	0	0	0	0	0
6.	Diptera larvae	1.5	0.17	0.8	1.4	2.7	3.8	2.3	5.7
	<i>Chironomus f.l. plumosus</i> L.	0.7	0.3	0.6	1.3	1.6	3.4	1.9	4.2
	<i>Chaoborus</i> sp.	0	0	0	0	1.1	0.4	0.4	1.6
	<i>Procladius</i> sp.	0.8	0.4	0.2	0.1	0	0	0	0
7.	Bivalvia – <i>Dreissena polymorpha</i> Pall.	0.4	1.4	0	0	0	0	0	0
8.	Megaloptera larvae – <i>Sialis lutaria</i> L.	0	0	1.1	1.8	0	0	0	0
Σ		9.1	5.8	12.4	7.9	9.7	6.4	5.2	7.0
Biodiversity index PIE		0.896		0.618		0.734		0.511	

Table 31. Condensing of macrozoobenthos – C (10^2 individuals per m^{-2}) and wet mass M ($g_{mm} m^{-2}$) at examined measurement stations on Przylęg Lake (July of 2010)

Lp.	Taxa	Sampling sites							
		Litoral				Profundal			
		1		2		3		4	
		C	M	C	M	C	M	C	M
1.	Oligochaeta	9.8	1.1	2.9	1.4	9.3	3.1	6.7	2.4
2.	Hirudinea	7.4	2.8	0	0	0	0	0	0
	<i>Piscicola</i> sp.	5.4	2.0	0	0	0	0	0	0
	<i>Helobdella stagnalis</i> L.	2.0	0.8	0	0	0	0	0	0
3.	Isopoda – <i>Asellus aquaticus</i> Racov.	0	0	0.7	0.1	0	0	0	0
4.	Ephemeroptera larvae	1.0	0.46	0.3	0.09	0	0	0	0
	<i>Leptophlebia</i> sp.	0.9	0.2	0	0	0	0	0	0
	<i>Ephemer</i> sp.	0.1	0.06	0	0	0	0	0	0
	<i>Caenis macrura</i> (Stephens)	0	0	0.3	0.09	0	0	0	0
5.	Trichoptera larvae	0	0	1.2	0.9	0	0	0	0
	Limnephilidae	0	0	0.3	0.1	0	0	0	0
	<i>Cyrrus</i> sp.	0	0	0.4	0.6	0	0	0	0
	Leptoceridae	0	0	0.5	0.2	0	0	0	0
6.	Diptera larvae	1.6	1.7	0.7	1.3	2.5	8.0	3.4	6.1
	<i>Chironomus f.l. plumosus</i> L.	0.7	1.2	0.7	1.3	1.6	5.2	3.4	6.1
	<i>Chaoborus</i> sp.	0	0	0	0	0.9	2.8	0	0
	<i>Procladius</i> sp.	0.9	0.4	0	0	0	0	0	0
7.	Bivalvia – <i>Dreissena polymorpha</i> Pall.	0	0	1.0	2.3	0	0	0	0
8.	Megaloptera larvae – <i>Sialis lutaria</i> L.	1.0	2.6	0.3	1.5	0	0	0	0
Σ		14.8	8.6	7.1	7.6	11.8	6.5	10.1	8.5
Biodiversity index PIE		0.826		0.918		0.682		0.430	

Table 32. Condensing of macrozoobenthos – C (10^2 individuals per m^{-2}) and wet mass M ($g_{mm} m^{-2}$) at examined measurement stations on Przylęg Lake (July of 2012)

Lp.	Taxa	Sampling sites							
		Litoral				Profundal			
		1		2		3		4	
		C	M	C	M	C	M	C	M
1.	Oligochaeta	7.0	2.8	2.7	0.9	5.8	2.5	6.0	2.1
2.	Hirudinea	9.1	3.4	0	0	0	0	0	0
	<i>Piscicola</i> sp.	5.2	2.0	0	0	0	0	0	0
	<i>Helobdella stagnalis</i> L.	3.9	1.4	0	0	0	0	0	0
3.	Isopoda – <i>Asellus aquaticus</i> Racov.	0.5	0.08	0	0	0	0	0	0
4.	Ephemeroptera larvae	0.4	0.15	0	0	0	0	0	0
	<i>Leptophlebia</i> sp.	0	0	0	0	0	0	0	0
	<i>Ephemer</i> sp.	0.3	0.09	0	0	0	0	0	0
	<i>Caenis macrura</i> (Stephens)	0.1	0.06	0	0	0	0	0	0
5.	Trichoptera larvae	0	0	1.4	1.1	0	0	0	0
	Limnephilidae	0	0	0.4	0.2	0	0	0	0
	<i>Cyrrus</i> sp.	0	0	0.3	0.5	0	0	0	0
	Leptoceridae	0	0	0.7	0.4	0	0	0	0
6.	Diptera larvae	1.7	0.8	1.2	2.3	1.6	1.5	3.6	6.9
	<i>Chironomus f.l. plumosus</i> L.	0.9	0.5	1.2	2.3	0.9	1.2	3.6	6.9
	<i>Chaoborus</i> sp.	0	0	0	0	0.7	0.3	0	0
	<i>Procladius</i> sp.	0.8	0.3	0	0	0	0	0	0
7.	Bivalvia – <i>Dreissena polymorpha</i> Pall.	0	0	1.2	2.6	0	0	0	0
8.	Megaloptera larvae – <i>Sialis lutaria</i> L.	0.7	3.0	0	0	0	0	0	0
Σ		19.4	10.2	6.5	6.9	7.4	4.0	9.6	9.0
Biodiversity index PIE		1.068		0.803		0.492		0.350	

Table 33. Macrozoobenthos condensing in summer of Przylęg Lake

Lp.	Taxa	Density of macrozoobenthos (indiv. · m ⁻²)			
		2008	2010	2012	Average
1.	Oligochaeta	258	307	298	288
2.	Hirudinea	51	102	125	93
3.	Isopoda – <i>Asellus aquaticus</i> Racov.	25	8	6	13
4.	Ephemeroptera larvae	20	19	6	15
5.	Trichoptera larvae	45	21	25	30
6.	Diptera larvae	189	253	196	213
7.	Bivalvia – <i>Dreissena polymorpha</i> Pall.	18	33	38	30
8.	Megaloptera larvae – <i>Sialis lutaria</i> L.	29	54	37	40
Σ		635	797	731	722
Numer of taxa		5	5	5	5
Biodiversity index PIE		0.690	0.714	0.678	0.694

Table 34. Type of bottom deposits, depth and pH of interstitial waters in measurement points Chłop Lake (July 2008, 2010, 2012)

Sampling site no.	Type of bottom deposits	Depth [m]	pH of intersitial waters
1	Fine sand, autochthonous detritus, the remains of shells, leftover cane	1.3	7.48
2	Fine sand, autochthonous detritus, the remains of shells	1.9	7.32
3	Hamlets tanatocenozy, seashell scrap (<i>Dreissena</i>), leftover cane	2.6	7.61
4	Black silt, detritus, gravel	4.5	7.14

Table 35. Qualitative amount bottom fauna in the Chlop Lake in July of 2008

Lp.	Taxa	F [%]	Sampling sites			
			Litoral		Profundal	
			1	2	3	4
1.	Oligochaeta	100	+	+	+	+
2.	Hirudinea					
	<i>Piscicola</i> sp.	25	+	-	-	-
	<i>Helobdella stagnalis</i> L.	25	+	-	-	-
3.	Isopoda – <i>Asellus aquaticus</i> Racov.	25	-	+	-	-
4.	Ephemeroptera larvae					
	<i>Leptophlebia</i> sp.	25	+	-	-	-
	<i>Ephemera</i> sp.	25	+	-	-	-
	<i>Caenis macrura</i> (Stephens)	25	-	+	-	-
5.	Trichoptera larvae					
	Limnephilidae	25	-	+	-	-
	<i>Cyrnus</i> sp.	25	-	+	-	-
	Leptoceridae	25	-	+	-	-
6.	Diptera larvae					
	<i>Chironomus f.l. plumosus</i> L.	100	+	+	+	+
	<i>Chaoborus</i> sp.	25	-	-	+	-
	<i>Procladius</i> sp.	50	+	+	-	-
7.	Bivalvia – <i>Dreissena polymorpha</i> Pall.	25	-	+	-	-
8.	Megaloptera larvae – <i>Sialis lutaria</i> L.	25	-	+	-	-
Number of taxa			7	10	3	2

Explanation: F - Turnout

Table 36. Qualitative amount bottom fauna in the Chlop Lake in July of 2010

Lp.	Taxa	F [%]	Sampling sites			
			Litoral		Profundal	
			1	2	3	4
1.	Oligochaeta	100	+	+	+	+
2.	Hirudinea					
	<i>Piscicola</i> sp.	25	+	-	-	-
	<i>Helobdella stagnalis</i> L.	25	+	-	-	-
3.	Isopoda – <i>Asellus aquaticus</i> Racov.	25	+	-	-	-
4.	Ephemeroptera larvae					
	<i>Leptophlebia</i> sp.	25	+	-	-	-
	<i>Ephemera</i> sp.	25	+	-	-	-
	<i>Caenis macrura</i> (Stephens)	0	-	-	-	-
5.	Trichoptera larvae					
	Limnephilidae	25	-	+	-	-
	<i>Cyrnus</i> sp.	25	-	+	-	-
	Leptoceridae	25	-	+	-	-
6.	Diptera larvae					
	<i>Chironomus f.l. plumosus</i> L.	100	+	+	+	+
	<i>Chaoborus</i> sp.	50	-	-	+	+
	<i>Procladius</i> sp.	50	+	+	-	-
7.	Bivalvia – <i>Dreissena polymorpha</i> Pall.	25	-	+	-	-
8.	Megaloptera larvae – <i>Sialis lutaria</i> L.	25	-	+	-	-
Number of taxa			8	8	3	3

Explanation: F - Turnout

Table 37. Qualitative amount bottom fauna in the Chlop Lake in July of 2012

Lp.	Taxa	F [%]	Sampling sites			
			Litoral		Profundal	
			1	2	3	4
1.	Oligochaeta	100	+	+	+	+
2.	Hirudinea					
	<i>Piscicola</i> sp.	25	-	+	-	-
	<i>Helobdella stagnalis</i> L.	25	+	-	-	-
3.	Isopoda – <i>Asellus aquaticus</i> Racov.	25	+	-	-	-
4.	Ephemeroptera larvae					
	<i>Leptophlebia</i> sp.	25	+	-	-	-
	<i>Ephemera</i> sp.	25	+	-	-	-
	<i>Caenis macrura</i> (Stephens)	25	+	-	-	-
5.	Trichoptera larvae					
	Limnephilidae	25	-	+	-	-
	<i>Cyrnus</i> sp.	25	-	+	-	-
	Leptoceridae	25	-	+	-	-
6.	Diptera larvae					
	<i>Chironomus f.l. plumosus</i> L.	100	+	+	+	+
	<i>Chaoborus</i> sp.	25	-	-	+	-
	<i>Procladius</i> sp.	50	+	+	-	-
7.	Bivalvia – <i>Dreissena polymorpha</i> Pall.	25	-	+	-	-
8.	Megaloptera larvae – <i>Sialis lutaria</i> L.	50	+	+	-	-
Number of taxa			9	9	3	2

Explanation: F - Turnout

Table 38. Condensing of macrozoobenthos – C (10^2 individuals per m^{-2}) and wet mass M ($g_{mm} m^{-2}$) at examined measurement stations on Chłop Lake (July of 2008)

Lp.	Taxa	Sampling sites							
		Litoral				Profundal			
		1		2		3		4	
		C	M	C	M	C	M	C	M
1.	Oligochaeta	4.9	1.7	8.3	2.9	4.2	1.9	7.1	3.8
2.	Hirudinea	2.7	1.3	0	0	0	0	0	0
	<i>Piscicola</i> sp.	0.7	0.2	0	0	0	0	0	0
	<i>Helobdella stagnalis</i> L.	2.0	1.1	0	0	0	0	0	0
3.	Isopoda – <i>Asellus aquaticus</i> Racov.	0	0	0.9	0.08	0	0	0	0
4.	Ephemeroptera larvae	0.4	0.15	0.7	0.4	0	0	0	0
	<i>Leptophlebia</i> sp.	0.1	0.06	0	0	0	0	0	0
	<i>Ephemer</i> sp.	0.3	0.09	0	0	0	0	0	0
	<i>Caenis macrura</i> (Stephens)	0	0	0.7	0.4	0	0	0	0
5.	Trichoptera larvae	0	0	0.8	1.3	0	0	0	0
	Limnephilidae	0	0	0.4	0.7	0	0	0	0
	<i>Cyrrus</i> sp.	0	0	0.3	0.4	0	0	0	0
	Leptoceridae	0	0	0.1	0.2	0	0	0	0
6.	Diptera larvae	0.9	0.7	1.8	2.0	2.6	3.7	2.9	5.4
	<i>Chironomus f.l. plumosus</i> L.	0.3	0.5	0.9	1.6	1.2	3.4	2.9	5.4
	<i>Chaoborus</i> sp.	0	0	0.9	0.4	1.4	0.3	0	0
	<i>Procladius</i> sp.	0.6	0.2	0.9	0.4	0	0	0	0
7.	Bivalvia – <i>Dreissena polymorpha</i> Pall.	0	0	0.7	2.3	0	0	0	0
8.	Megaloptera larvae – <i>Sialis lutaria</i> L.	0	0	0.5	1.4	0	0	0	0
Σ		8.9	3.9	13.7	10.4	6.8	5.6	10.0	9.2
Biodiversity index PIE		0.683		0.928		0.501		0.738	

Table 39. Condensing of macrozoobenthos – C (10^2 individuals per m^{-2}) and wet mass M ($g_{mm} m^{-2}$) at examined measurement stations on Chłop Lake (July of 2010)

Lp.	Taxa	Sampling sites							
		Litoral				Profundal			
		1		2		3		4	
		C	M	C	M	C	M	C	M
1.	Oligochaeta	6.1	1.9	2.7	0.9	5.7	2.7	8.0	3.8
2.	Hirudinea	5.2	1.9	0	0	0	0	0	0
	<i>Piscicola</i> sp.	3.1	1.2	0	0	0	0	0	0
	<i>Helobdella stagnalis</i> L.	2.1	0.7	0	0	0	0	0	0
3.	Isopoda – <i>Asellus aquaticus</i> Racov.	0.7	0.1	0	0	0	0	0	0
4.	Ephemeroptera larvae	1.2	0.69	0	0	0	0	0	0
	<i>Leptophlebia</i> sp.	0.8	0.6	0	0	0	0	0	0
	<i>Ephemer</i> sp.	0.4	0.09	0	0	0	0	0	0
	<i>Caenis macrura</i> (Stephens)	0	0	0	0	0	0	0	0
5.	Trichoptera larvae	0	0	0.8	0.7	0	0	0	0
	Limnephilidae	0	0	0.3	0.1	0	0	0	0
	<i>Cyrrus</i> sp.	0	0	0.3	0.5	0	0	0	0
	Leptoceridae	0	0	0.2	0.1	0	0	0	0
6.	Diptera larvae	4.0	4.6	3.8	3.5	1.8	2.0	3.8	11.5
	<i>Chironomus f.l. plumosus</i> L.	1.4	2.7	0.8	1.6	0.6	1.3	1.9	6.2
	<i>Chaoborus</i> sp.	0	0	0	0	1.2	0.7	1.9	5.3
	<i>Procladius</i> sp.	2.6	1.9	3.0	1.9	0	0	0	0
7.	Bivalvia – <i>Dreissena polymorpha</i> Pall.	0	0	1.0	2.5	0	0	0	0
8.	Megaloptera larvae – <i>Sialis lutaria</i> L.	0	0	0.5	1.8	0	0	0	0
Σ		17.2	9.2	8.8	9.4	7.5	4.7	11.8	15.3
Biodiversity index PIE		0.738		0.892		0.649		0.537	

Table 40. Condensing of macrozoobenthos – C (10^2 individuals per m^{-2}) and wet mass M ($g_{mm} m^{-2}$) at examined measurement stations on Chłop Lake (July of 2012)

Lp.	Taxa	Sampling sites							
		Litoral				Profundal			
		1		2		3		4	
		C	M	C	M	C	M	C	M
1.	Oligochaeta	6.1	2.3	2,1	0,6	6,4	2,1	6,8	3,3
2.	Hirudinea	6.5	2.7	4,1	1,9	0	0	0	0
	<i>Piscicola</i> sp.	0	0	4,1	1,9	0	0	0	0
	<i>Helobdella stagnalis</i> L.	6.5	2.7	0	0	0	0	0	0
3.	Isopoda – <i>Asellus aquaticus</i> Racov.	0.7	0.2	0	0	0	0	0	0
4.	Ephemeroptera larvae	1.4	0.58	0	0	0	0	0	0
	<i>Leptophlebia</i> sp.	0.7	0.4	0	0	0	0	0	0
	<i>Ephemera</i> sp.	0.3	0.1	0	0	0	0	0	0
	<i>Caenis macrura</i> (Stephens)	0.4	0.08	0	0	0	0	0	0
5.	Trichoptera larvae	0	0	1,6	1,8	0	0	0	0
	Limnephilidae	0	0	0,3	0,1	0	0	0	0
	<i>Cyrnus</i> sp.	0	0	0,7	1,3	0	0	0	0
	Leptoceridae	0	0	0,6	0,4	0	0	0	0
6.	Diptera larvae	0.9	0.4	3,0	1,7	2,9	9,9	3,0	6,7
	<i>Chironomus f.l. plumosus</i> L.	0.5	0.3	0,3	0,6	2,0	8,1	3,0	6,7
	<i>Chaoborus</i> sp.	0	0	0	0	0,8	0,4	1,3	3,7
	<i>Procladius</i> sp.	0.5	0.3	1,8	1,1	0	0	0	0
7.	Bivalvia – <i>Dreissena polymorpha</i> Pall.	0	0	0,6	1,7	0	0	0	0
8.	Megaloptera larvae – <i>Sialis lutaria</i> L.	0	0	0,9	2,1	0	0	0	0
Σ		15.6	6.2	12.3	9.8	9.3	12.0	9.8	10.0
Biodiversity index PIE		1.257		0.739		0.528		0.947	

Table 41. Macrozoobenthos condensing in summer of Chłop Lake

Lp.	Taxa	Density of macrozoobenthos (indiv. · m ⁻²)			
		2008	2010	2012	Average
1.	Oligochaeta	348	318	297	321
2.	Hirudinea	40	71	152	88
3.	Isopoda – <i>Asellus aquaticus</i> Racov.	11	8	9	9
4.	Ephemeroptera larvae	17	19	20	19
5.	Trichoptera larvae	21	15	34	23
6.	Diptera larvae	200	350	285	278
7.	Bivalvia – <i>Dreissena polymorpha</i> Pall.	30	35	23	29
8.	Megaloptera larvae – <i>Sialis lutaria</i> L.	19	23	30	24
Σ		686	839	850	792
Numer of taxa		5	5	6	5
Biodiversity index PIE		0.712	0.704	0.762	0.726

Table 42. Type of bottom deposits, depth and pH of interstitial waters in measurement points Lubie Lake (July 2008, 2010, 2012)

Sampling site no.	Type of bottom deposits	Depth [m]	pH of intersitial waters
1	Fine sand, autochthonous detritus, the remains of shells, leftover cane	1.3	7.51
2	Fine sand, autochthonous detritus, the remains of shells	2.1	7.37
3	Hamlets tanatocenzowy, seashell scrap (<i>Dreissena</i>), leftover cane	2.8	7.38
4	Hamlets tanatocenzowy, seashell scrap (<i>Dreissena</i>), silt, detritus, gravel	3.9	7.32

Table 43. Qualitative amount bottom fauna in the Lubie Lake in July of 2008

Lp.	Taxa	F [%]	Sampling sites			
			Litoral		Profundal	
			1	2	3	4
1.	Oligochaeta	100	+	+	+	+
2.	Hirudinea					
	<i>Piscicola</i> sp.	25	-	+	-	-
	<i>Helobdella stagnalis</i> L.	25	-	+	-	-
3.	Isopoda – <i>Asellus aquaticus</i> Racov.	25	+	-	-	-
4.	Ephemeroptera larvae					
	<i>Leptophlebia</i> sp.	25	-	+	-	-
	<i>Ephemera</i> sp.	25	-	+	-	-
	<i>Caenis macrura</i> (Stephens)	25	+	-	-	-
5.	Trichoptera larvae					
	Limnephilidae	25	+	-	-	-
	<i>Cyrnus</i> sp.	25	+	-	-	-
	Leptoceridae	25	+	-	-	-
6.	Diptera larvae					
	<i>Chironomus f.l. plumosus</i> L.	100	+	+	+	+
	<i>Chaoborus</i> sp.	25	-	-	-	+
	<i>Procladius</i> sp.	50	+	+	-	-
7.	Bivalvia – <i>Dreissena polymorpha</i> Pall.	25	-	+	-	-
8.	Megaloptera larvae – <i>Sialis lutaria</i> L.	25	-	+	-	-
Number of taxa			8	9	2	2

Explanation: F - Turnout

Table 44. Qualitative amount bottom fauna in the Lubie Lake in July of 2010

Lp.	Taxa	F [%]	Sampling sites			
			Litoral		Profundal	
			1	2	3	4
1.	Oligochaeta	100	+	+	+	+
2.	Hirudinea					
	<i>Piscicola</i> sp.	25	+	-	-	-
	<i>Helobdella stagnalis</i> L.	25	+	-	-	-
3.	Isopoda – <i>Asellus aquaticus</i> Racov.	25	-	+	-	-
4.	Ephemeroptera larvae					
	<i>Leptophlebia</i> sp.	25	+	-	-	-
	<i>Ephemera</i> sp.	25	+	-	-	-
	<i>Caenis macrura</i> (Stephens)	25	-	+	-	-
5.	Trichoptera larvae					
	Limnephilidae	25	-	+	-	-
	<i>Cyrnus</i> sp.	25	-	+	-	-
	Leptoceridae	25	-	+	-	-
6.	Diptera larvae					
	<i>Chironomus f.l. plumosus</i> L.	100	+	+	+	+
	<i>Chaoborus</i> sp.	50	-	-	+	+
	<i>Procladius</i> sp.	25	+	-	-	-
7.	Bivalvia – <i>Dreissena polymorpha</i> Pall.	25	-	+	-	-
8.	Megaloptera larvae – <i>Sialis lutaria</i> L.	25	-	+	-	-
Number of taxa			7	9	3	3

Explanation: F - Turnout

Table 45. Qualitative amount bottom fauna in the Lubie Lake in July of 2012

Lp.	Taxa	F [%]	Sampling sites			
			Litoral		Profundal	
			1	2	3	4
1.	Oligochaeta	100	+	+	+	+
2.	Hirudinea					
	<i>Piscicola</i> sp.	25	+	-	-	-
	<i>Helobdella stagnalis</i> L.	25	+	-	-	-
3.	Isopoda – <i>Asellus aquaticus</i> Racov.	25	-	+	-	-
4.	Ephemeroptera larvae					
	<i>Leptophlebia</i> sp.	25	+		-	-
	<i>Ephemera</i> sp.	25	+		-	-
	<i>Caenis macrura</i> (Stephens)	25	-	+	-	-
5.	Trichoptera larvae					
	Limnephilidae	25	-	+	-	-
	<i>Cyrnus</i> sp.	25	-	+	-	-
	Leptoceridae	25	-	+	-	-
6.	Diptera larvae					
	<i>Chironomus f.l. plumosus</i> L.	100	+	+	+	+
	<i>Chaoborus</i> sp.	25	-	-	+	-
	<i>Procladius</i> sp.	25	+	-	-	-
7.	Bivalvia – <i>Dreissena polymorpha</i> Pall.	25	-	+	-	-
8.	Megaloptera larvae – <i>Sialis lutaria</i> L.	25	-	+	-	-
Number of taxa			7	9	3	2

Explanation: F - Turnout

Table 46. Condensing of macrozoobenthos – C (10^2 individuals per m^{-2}) and wet mass M ($g_{mm} m^{-2}$) at examined measurement stations on Lubie Lake (July of 2008)

Lp.	Taxa	Sampling sites							
		Litoral				Profundal			
		1		2		3		4	
		C	M	C	M	C	M	C	M
1.	Oligochaeta	2.5	0.9	3.5	1.1	6.2	2.4	3.2	1.4
2.	Hirudinea	0	0	4.0	2.0	0	0	0	0
	<i>Piscicola</i> sp.	0	0	0.4	0.1	0	0	0	0
	<i>Helobdella stagnalis</i> L.	0	0	3.6	1.9	0	0	0	0
3.	Isopoda – <i>Asellus aquaticus</i> Racov.	1.6	0.2	0	0	0	0	0	0
4.	Ephemeroptera larvae	0.7	0.1	0.6	0.15	0	0	0	0
	<i>Leptophlebia</i> sp.	0	0	0.4	0.08	0	0	0	0
	<i>Ephemer</i> sp.	0	0	0.2	0.07	0	0	0	0
	<i>Caenis macrura</i> (Stephens)	0.7	0.1	0	0	0	0	0	0
5.	Trichoptera larvae	2.0	2.6	0	0	0	0	0	0
	Limnephilidae	0.5	0.7	0	0	0	0	0	0
	<i>Cyrrus</i> sp.	0.8	1.0	0	0	0	0	0	0
	Leptoceridae	0.7	0.9	0	0	0	0	0	0
6.	Diptera larvae	1.1	0.7	0.6	1.3	2.2	3.9	2.0	5.6
	<i>Chironomus f.l. plumosus</i> L.	0.7	0.3	0.4	1.2	2.2	3.9	1.6	4.2
	<i>Chaoborus</i> sp.	0	0	0	0	0	0	0.4	1.6
	<i>Procladius</i> sp.	0	0	0.4	1.4	0	0	0	0
7.	Bivalvia – <i>Dreissena polymorpha</i> Pall.	0	0	0	0	0	0	0	0
8.	Megaloptera larvae – <i>Sialis lutaria</i> L.	0	0	0.7	1.8	0	0	0	0
Σ		7.9	4.5	5.8	7.8	8.4	6.3	5.2	7.0
Biodiversity index PIE		1.109		0.736		0.618		0.570	

Table 47. Condensing of macrozoobenthos – C (10^2 individuals per m^{-2}) and wet mass M ($g_{mm} m^{-2}$) at examined measurement stations on Lubie Lake (July of 2010)

Lp.	Taxa	Sampling sites							
		Litoral				Profundal			
		1		2		3		4	
		C	M	C	M	C	M	C	M
1.	Oligochaeta	3.8	1.6	2.0	1.4	7.0	4.8	5.9	2.9
2.	Hirudinea	6.1	3.2	0	0	0	0	0	0
	<i>Piscicola</i> sp.	4.1	2.3	0	0	0	0	0	0
	<i>Helobdella stagnalis</i> L.	2.0	0.9	0	0	0	0	0	0
3.	Isopoda – <i>Asellus aquaticus</i> Racov.	0	0	0.3	0.04	0	0	0	0
4.	Ephemeroptera larvae	1.0	0.39	0.4	0.1	0	0	0	0
	<i>Leptophlebia</i> sp.	0.8	0.3	0	0	0	0	0	0
	<i>Ephemera</i> sp.	0.2	0.09	0	0	0	0	0	0
	<i>Caenis macrura</i> (Stephens)	0	0	0.4	0.1	0	0	0	0
5.	Trichoptera larvae	0	0	1.2	0.8	0	0	0	0
	Limnephilidae	0	0	0.2	0.1	0	0	0	0
	<i>Cyrnus</i> sp.	0	0	0.4	0.6	0	0	0	0
	Leptoceridae	0	0	0.6	0.1	0	0	0	0
6.	Diptera larvae	1.4	1.8	0.5	0.8	0.8	1.8	2.9	7.8
	<i>Chironomus f.l. plumosus</i> L.	0.6	1.1	0.5	0.8	0.5	1.6	2.0	5.2
	<i>Chaoborus</i> sp.	0	0	0	0	0.3	0.2	0.9	2.6
	<i>Procladius</i> sp.	0.9	0.7	0	0	0	0	0	0
7.	Bivalvia – <i>Dreissena polymorpha</i> Pall.	0	0	0.7	1.8	0	0	0	0
8.	Megaloptera larvae – <i>Sialis lutaria</i> L.	0	0	0.5	1.9	0	0	0	0
Σ		12.3	7.0	5.2	6.8	7.8	6.6	8.8	10.7
Biodiversity index PIE		0.851		0.749		0.504		0.695	

Table 48. Condensing of macrozoobenthos – C (10^2 individuals per m^{-2}) and wet mass M ($g_{mm} m^{-2}$) at examined measurement stations on Lubie Lake (July of 2012)

Lp.	Taxa	Sampling sites							
		Litoral				Profundal			
		1		2		3		4	
		C	M	C	M	C	M	C	M
1.	Oligochaeta	8.0	3.7	1.9	0.6	9.5	2.8	4.1	0.9
2.	Hirudinea	5.0	2.1	0	0	0	0	0	0
	<i>Piscicola</i> sp.	4.2	1.9	0	0	0	0	0	0
	<i>Helobdella stagnalis</i> L.	0.8	0.2	0	0	0	0	0	0
3.	Isopoda – <i>Asellus aquaticus</i> Racov.	0	0	0.2	0.05	0	0	0	0
4.	Ephemeroptera larvae	0.8	0.29	0.1	0.06	0	0	0	0
	<i>Leptophlebia</i> sp.	0.6	0.2	0	0	0	0	0	0
	<i>Ephemera</i> sp.	0.2	0.09	0	0	0	0	0	0
	<i>Caenis macrura</i> (Stephens)	0	0	0.1	0.06	0	0	0	0
5.	Trichoptera larvae	0	0	1.0	0.8	0	0	0	0
	Limnephilidae	0	0	0.3	0.2	0	0	0	0
	<i>Cyrnus</i> sp.	0	0	0.3	0.5	0	0	0	0
	Leptoceridae	0	0	0.4	0.1	0	0	0	0
6.	Diptera larvae	1.8	1.4	0.2	0.5	3.2	7.6	3.1	7.5
	<i>Chironomus f.l. plumosus</i> L.	0.3	0.6	0.2	0.5	2.0	4.7	3.1	7.5
	<i>Chaoborus</i> sp.	0	0	0	0	1.2	2.9	0	0
	<i>Procladius</i> sp.	1.5	0.8	0	0	0	0	0	0
7.	Bivalvia – <i>Dreissena polymorpha</i> Pall.	0	0	0.6	1.5	0	0	0	0
8.	Megaloptera larvae – <i>Sialis lutaria</i> L.	1.0	2.9	0.6	2.1	0	0	0	0
Σ		16.6	10.4	4.6	5.6	12.7	10.4	7.2	6.4
Biodiversity index PIE		0.861		0.695		0.704		0.418	

Table 49. Macrozoobenthos condensing in summer of Lubie Lake

Lp.	Taxa	Density of macrozoobenthos (indiv. · m ⁻²)			
		2008	2010	2012	Average
1.	Oligochaeta	212	294	315	274
2.	Hirudinea	60	93	71	75
3.	Isopoda – <i>Asellus aquaticus</i> Racov.	18	4	3	8
4.	Ephemeroptera larvae	16	19	13	16
5.	Trichoptera larvae	46	20	18	28
6.	Diptera larvae	174	179	253	202
7.	Bivalvia – <i>Dreissena polymorpha</i> Pall.	18	15	21	18
8.	Megaloptera larvae – <i>Sialis lutaria</i> L.	25	24	66	38
Σ		569	648	760	659
Numer of taxa		5	5	5	5
Biodiversity index PIE		0.758	0.699	0.669	0.709

Table 50. Type of bottom deposits, depth and pH of interstitial waters in measurement points Wielgie Lake (July 2008, 2010, 2012)

Sampling site no.	Type of bottom deposits	Depth [m]	pH of intersitial waters
1	Fine sand, autochthonous detritus, the remains of shells, leftover cane	1.7	7.57
2	Fine sand, autochthonous detritus, the remains of shells	2.3	7.49
3	Hamlets tanatocenzowy, seashell scrap (<i>Dreissena</i>), leftover cane	3.1	7.30
4	Hamlets tanatocenzowy, black silt, detritus, gravel	4.2	7.73

Table 51. Qualitative amount bottom fauna in the Wielgie Lake in July of 2008

Lp.	Taxa	F [%]	Sampling sites			
			Litoral		Profundal	
			1	2	3	4
1.	Oligochaeta	100	+	+	+	+
2.	Hirudinea					
	<i>Piscicola</i> sp.	25	-	+	-	-
	<i>Helobdella stagnalis</i> L.	25	-	+	-	-
3.	Isopoda – <i>Asellus aquaticus</i> Racov.	25	+	-	-	-
4.	Ephemeroptera larvae					
	<i>Leptophlebia</i> sp.	25	-	+	-	-
	<i>Ephemera</i> sp.	25	-	+	-	-
	<i>Caenis macrura</i> (Stephens)	25	+	-	-	-
5.	Trichoptera larvae					
	Limnephilidae	25	-	+	-	-
	<i>Cyrnus</i> sp.	25	+	-	-	-
	Leptoceridae	25	+	-	-	-
6.	Diptera larvae					
	<i>Chironomus f.l. plumosus</i> L.	100	+	+	+	+
	<i>Chaoborus</i> sp.	25	-	-	-	+
	<i>Procladius</i> sp.	25	+	-	-	-
7.	Bivalvia – <i>Dreissena polymorpha</i> Pall.	25	+	-	-	-
8.	Megaloptera larvae – <i>Sialis lutaria</i> L.	25	-	+	-	-
Number of taxa			8	8	2	3

Explanation: F - Turnout

Table 52. Qualitative amount bottom fauna in the Wielgie Lake in July of 2010

Lp.	Taxa	F [%]	Sampling sites			
			Litoral		Profundal	
			1	2	3	4
1.	Oligochaeta	100	+	+	+	+
2.	Hirudinea					
	<i>Piscicola</i> sp.	25	-	+	-	-
	<i>Helobdella stagnalis</i> L.	50	+	+	-	-
3.	Isopoda – <i>Asellus aquaticus</i> Racov.	25	+	-	-	-
4.	Ephemeroptera larvae					
	<i>Leptophlebia</i> sp.	25	-	+	-	-
	<i>Ephemera</i> sp.	25	-	+	-	-
	<i>Caenis macrura</i> (Stephens)	25	+	-	-	-
5.	Trichoptera larvae					
	Limnephilidae	25	+	-	-	-
	<i>Cyrnus</i> sp.	25	+	-	-	-
	Leptoceridae	25	+	-	-	-
6.	Diptera larvae					
	<i>Chironomus f.l. plumosus</i> L.	100	+	+	+	+
	<i>Chaoborus</i> sp.	25	-	-	+	-
	<i>Procladius</i> sp.	50	+	+	-	-
7.	Bivalvia – <i>Dreissena polymorpha</i> Pall.	25	-	+	-	-
8.	Megaloptera larvae – <i>Sialis lutaria</i> L.	25	+	-	-	-
Number of taxa			10	8	3	2

Explanation: F - Turnout

Table 53. Qualitative amount bottom fauna in the Wielgie Lake in July of 2012

Lp.	Taxa	F [%]	Sampling sites			
			Litoral		Profundal	
			1	2	3	4
1.	Oligochaeta	100	+	+	+	+
2.	Hirudinea					
	<i>Piscicola</i> sp.	25	+	-	-	-
	<i>Helobdella stagnalis</i> L.	25	+	-	-	-
3.	Isopoda – <i>Asellus aquaticus</i> Racov.	25	-	+	-	-
4.	Ephemeroptera larvae					
	<i>Leptophlebia</i> sp.	25	+	-	-	-
	<i>Ephemera</i> sp.	25	+	-	-	-
	<i>Caenis macrura</i> (Stephens)	25	-	+	-	-
5.	Trichoptera larvae					
	Limnephilidae	25	-	+	-	-
	<i>Cyrnus</i> sp.	25	-	+	-	-
	Leptoceridae	25	-	+	-	-
6.	Diptera larvae					
	<i>Chironomus f.l. plumosus</i> L.	100	+	+	+	+
	<i>Chaoborus</i> sp.	50	-	-	+	+
	<i>Procladius</i> sp.	50	+	+	-	-
7.	Bivalvia – <i>Dreissena polymorpha</i> Pall.	25	-	+	-	-
8.	Megaloptera larvae – <i>Sialis lutaria</i> L.	25	-	+	-	-
Number of taxa			7	10	3	3

Explanation: F - Turnout

Table 54. Condensing of macrozoobenthos – C (10^2 individuals per m^{-2}) and wet mass M ($g_{mm} m^{-2}$) at examined measurement stations on Wielgie Lake (July of 2008)

Lp.	Taxa	Sampling sites							
		Litoral				Profundal			
		1		2		3		4	
		C	M	C	M	C	M	C	M
1.	Oligochaeta	1.8	0.5	4.8	2.1	7.4	4.2	3.9	2.6
2.	Hirudinea	0	0	3.3	1.9	0	0	0	0
	<i>Piscicola</i> sp.	0	0	0.2	0.1	0	0	0	0
	<i>Helobdella stagnalis</i> L.	0	0	3.1	1.8	0	0	0	0
3.	Isopoda – <i>Asellus aquaticus</i> Racov.	0.9	0.2	0	0	0	0	0	0
4.	Ephemeroptera larvae	0.6	0.2	0.5	0.18	0	0	0	0
	<i>Leptophlebia</i> sp.	0	0	0.2	0.08	0	0	0	0
	<i>Ephemer</i> sp.	0	0	0.3	0.1	0	0	0	0
	<i>Caenis macrura</i> (Stephens)	0.6	0.2	0	0	0	0	0	0
5.	Trichoptera larvae	0.4	0.9	0.4	0.7	0	0	0	0
	Limnephilidae	0	0	0.4	0.7	0	0	0	0
	<i>Cyrtus</i> sp.	0.1	0.3	0	0	0	0	0	0
	Leptoceridae	0.3	0.6	0	0	0	0	0	0
6.	Diptera larvae	1.1	0.5	0.5	1.2	2.3	6.8	2.2	6.9
	<i>Chironomus f.l. plumosus</i> L.	0.7	0.4	0.5	1.2	2.3	6.6	1.8	5.2
	<i>Chaoborus</i> sp.	0	0	0	0	0	0	0.4	1.7
	<i>Procladius</i> sp.	0.4	0.1	0	0	0	0	0	0
7.	Bivalvia – <i>Dreissena polymorpha</i> Pall.	0.5	1.8	0	0	0	0	0	0
8.	Megaloptera larvae – <i>Sialis lutaria</i> L.	0	0	0.6	1.5	0	0	0	0
Σ		5.3	4.1	10.1	7.6	9.7	11.0	6.1	9.5
Biodiversity index PIE		1.039		0.658		0.710		0.592	

Table 55. Condensing of macrozoobenthos – C (10^2 individuals per m^{-2}) and wet mass M ($g_{mm} m^{-2}$) at examined measurement stations on Wielgie Lake (July of 2010)

Lp.	Taxa	Sampling sites							
		Litoral				Profundal			
		1		2		3		4	
		C	M	C	M	C	M	C	M
1.	Oligochaeta	9.3	3.8	6.0	3.1	7.9	5.0	6.7	2.7
2.	Hirudinea	3.7	1.5	7.8	4.3	0	0	0	0
	<i>Piscicola</i> sp.	0	0	5.2	3.1	0	0	0	0
	<i>Helobdella stagnalis</i> L.	3.7	1.5	2.6	1.2	0	0	0	0
3.	Isopoda – <i>Asellus aquaticus</i> Racov.	0.2	0.05	0	0	0	0	0	0
4.	Ephemeroptera larvae	0.6	0.1	0.9	0.37	0	0	0	0
	<i>Leptophlebia</i> sp.	0	0	0.7	0.3	0	0	0	0
	<i>Ephemer</i> sp.	0	0	0.2	0.07	0	0	0	0
	<i>Caenis macrura</i> (Stephens)	0.6	0.1	0	0	0	0	0	0
5.	Trichoptera larvae	1.4	0.8	0	0	0	0	0	0
	Limnephilidae	0.3	0.2	0	0	0	0	0	0
	<i>Cyrrus</i> sp.	0.4	0.5	0	0	0	0	0	0
	Leptoceridae	0.7	0.1	0	0	0	0	0	0
6.	Diptera larvae	1.1	0.5	1.6	1.7	2.9	8.9	3.6	8.4
	<i>Chironomus f.l. plumosus</i> L.	0.4	0.1	0.2	0.7	2.1	5.8	3.6	8.4
	<i>Chaoborus</i> sp.	0	0	0	0	0.8	3.1	0	0
	<i>Procladius</i> sp.	0.7	0.4	1.4	1.0	0	0	0	0
7.	Bivalvia – <i>Dreissena polymorpha</i> Pall.	0	0	0.5	1.7	0	0	0	0
8.	Megaloptera larvae – <i>Sialis lutaria</i> L.	0	0	1.7	4.6	0	0	0	0
Σ		16.3	6.8	18.5	15.8	10.8	13.9	10.3	11.1
Biodiversity index PIE		1.106		0.681		0.839		0.526	

Table 56. Condensing of macrozoobenthos – C (10^2 individuals per m^{-2}) and wet mass M ($g_{mm} m^{-2}$) at examined measurement stations on Wielgie Lake (July of 2012)

Lp.	Taxa	Sampling sites							
		Litoral				Profundal			
		1		2		3		4	
		C	M	C	M	C	M	C	M
1.	Oligochaeta	5.6	3.8	2.7	0.9	9.6	4.3	8.5	3.9
2.	Hirudinea	3.3	0.9	0	0	0	0	0	0
	<i>Piscicola</i> sp.	2.5	0.7	0	0	0	0	0	0
	<i>Helobdella stagnalis</i> L.	0.8	0.2	0	0	0	0	0	0
3.	Isopoda – <i>Asellus aquaticus</i> Racov.	0	0	0.6	0.1	0	0	0	0
4.	Ephemeroptera larvae	1.1	0.4	0.8	0.3	0	0	0	0
	<i>Leptophlebia</i> sp.	0.7	0.3	0	0	0	0	0	0
	<i>Ephemera</i> sp.	0.4	0.1	0	0	0	0	0	0
	<i>Caenis macrura</i> (Stephens)	0	0	0.8	0.3	0	0	0	0
5.	Trichoptera larvae	0	0	1.6	1.1	0	0	0	0
	Limnephilidae	0	0	0.4	0.2	0	0	0	0
	<i>Cyrnus</i> sp.	0	0	0.6	0.7	0	0	0	0
	Leptoceridae	0	0	0.6	0.2	0	0	0	0
6.	Diptera larvae	1.7	1.8	5.8	3.3	1.6	2.1	3.6	9.5
	<i>Chironomus f.l. plumosus</i> L.	0.2	0.6	0.7	1.5	0.9	1.9	2.0	5.3
	<i>Chaoborus</i> sp.	0	0	0	0	0.7	0.2	1.6	4.2
	<i>Procladius</i> sp.	1.4	1.2	5.1	1.8	0	0	0	0
7.	Bivalvia – <i>Dreissena polymorpha</i> Pall.	0	0	0.7	2.1	0	0	0	0
8.	Megaloptera larvae – <i>Sialis lutaria</i> L.	0	0	0.6	1.8	0	0	0	0
Σ		11.7	6.9	12.8	11.4	11.2	6.4	12.1	13.4
Biodiversity index PIE		0.878		0.741		0.639		0.917	

Table 57. Macrozoobenthos condensing in summer of Wielgie Lake

Lp.	Taxa	Density of macrozoobenthos (indiv. · m ⁻²)			
		2008	2010	2012	Average
1.	Oligochaeta	273	223	393	296
2.	Hirudinea	52	173	42	89
3.	Isopoda – <i>Asellus aquaticus</i> Racov.	11	3	7	7
4.	Ephemeroptera larvae	15	20	26	20
5.	Trichoptera larvae	24	20	26	20
6.	Diptera larvae	215	287	278	260
7.	Bivalvia – <i>Dreissena polymorpha</i> Pall.	23	22	28	23
8.	Megaloptera larvae – <i>Sialis lutaria</i> L.	21	63	24	36
Σ		634	813	825	757
Numer of taxa		5	6	6	6
Biodiversity index PIE		0.750	0.795	0.794	0.780

During the macrozoobenthos Barlinek Lake there are among the collected of organisms with eight clusters: *Oligochaeta*, *Hirudinea*, *Isopoda*, *Ephemeroptera larvae*, *Trichoptera larvae*, *Diptera larvae*, *Bivalvia*, *Megaloptera larvae*.

The most represented in terms of species was represented in July which featured Insecta cluster larvae with four rows: Ephemeroptera (*Leptophlebia* sp., *Ephemera* sp., *Caenis macrura* (Stephens)), Trichoptera (Limnephilidae, Leptoceridae, *Cyrnus* sp.) Diptera larvae i Megaloptera larvae (*Sialis lutaria* L.) (table 3 - 5).

The average concentration of total benthic fauna in the Barlinek Lake in the summer of 2008 - 1371 (indiv. · m⁻²) (table 6). The Greatest the importance of littoral Oligochaeta and Hirudinea, took in the larvae of Chironomidae, that accounted for 90% of the density of benthic fauna.

The average concentration of total benthic fauna in the Barlinek Lake in the summer of 2010 - 1648 (indiv. · m⁻²) (table 7). The Greatest the importance of littoral Oligochaeta and Hirudinea, took in the larvae of Chironomidae, that accounted for 90% of the density of benthic fauna.

The average concentration of total benthic fauna in the Barlinek Lake in the summer of 2012 - 1233 (indiv. · m⁻²) (table 8). The Greatest the importance of littoral Oligochaeta and Hirudinea, took in the larvae of Chironomidae, that accounted for 91% of the density of benthic fauna.

In 2008, 2010, 2012 attendance related macrofauna test bed showed that the most common they were mudeating and larvae Chironomids, Oligochaeta (F = 100%), which consisted of Tischlera classification of the species is absolutely solid. Among larvae of Chironomidae the species is absolutely integral were *Chironomus f.l. plumosus* (F = 100%). However *Chaoborus* sp. belong to the accesoric species. Other designated species of fauna were accidental species of benthic (F) = 17% (table 3 - 5).

Concentration of macrozoobenthos in littoral zone was mostly higher than in profundal.

During the macrozoobenthos Suche Lake there are among the collected of organisms with eight clusters: *Oligochaeta*, *Hirudinea*, *Isopoda*, *Ephemeroptera larvae*, *Trichoptera larvae*, *Diptera larvae*, *Bivalvia*, *Megaloptera larvae*.

The most represented in terms of species was represented in July which featured Insecta cluster larvae with four rows: Ephemeroptera (*Leptophlebia* sp., *Ephemera* sp., *Caenis macrura* (Stephens)), Trichoptera (Limnephilidae, Leptoceridae, *Cyrnus* sp.) Diptera larvae i Megaloptera larvae (*Sialis lutaria* L.) (table 11 - 13).

The average concentration of total benthic fauna in the Suche Lake in the summer of 2008 - 616 (indiv.·m⁻²) (table 14). The Greatest the importance of littoral Oligochaeta and Hirudinea, took in the larvae of Chironomidae, that accounted for 82% of the density of benthic fauna.

The average concentration of total benthic fauna in the Suche Lake in the summer of 2010 - 864 (indiv.·m⁻²) (table 15). The Greatest the importance of littoral Oligochaeta and Hirudinea, took in the larvae of Chironomidae, that accounted for 86% of the density of benthic fauna.

The average concentration of total benthic fauna in the Suche Lake in the summer of 2012 – 953 (indiv.·m⁻²) (table 16). The Greatest the importance of littoral Oligochaeta and Hirudinea, took in the larvae of Chironomidae, that accounted for 90% of the density of benthic fauna.

In 2008, 2010, 2012 attendance related macrofauna test bed showed that the most common they were mudeating and larvae Chironomids, Oligochaeta (F = 100%), which consisted of Tischlera classification of the species is absolutely solid. Among larvae of Chironomidae the species is absolutely integral were *Chironomus f.l. plumosus* (F = 100%). However *Chaoborus* sp. belong to the accesoric species. Other designated species of fauna were accidental species of benthic (F) = 17% (table 11 - 13).

Concentration of macrozoobenthos in littoral zone was mostly higher than in profundal.

During the macrozoobenthos Lubiszewko Lake there are among the collected of organisms with eight clusters: *Oligochaeta*, *Hirudinea*, *Isopoda*, *Ephemeroptera larvae*, *Trichoptera larvae*, *Diptera larvae*, *Bivalvia*, *Megaloptera larvae*.

The most represented in terms of species was represented in July which featured Insecta cluster larvae with four rows: Ephemeroptera (*Leptophlebia* sp., *Ephemera* sp., *Caenis macrura* (Stephens)), Trichoptera (Limnephilidae, Leptoceridae, *Cyrnus* sp.) Diptera larvae i Megaloptera larvae (*Sialis lutaria* L.) (table 19 - 21).

The average concentration of total benthic fauna in the Lubiszewko Lake in the summer of 2008 - 788 (indiv.·m⁻²) (table 22). The Greatest the importance of littoral Oligochaeta and Hirudinea, took in the larvae of Chironomidae, that accounted for 82% of the density of benthic fauna.

The average concentration of total benthic fauna in the Lubiszewko Lake in the summer of 2010 - 954 (indiv.·m⁻²) (table 23). The Greatest the importance of littoral Oligochaeta and Hirudinea, took in the larvae of Chironomidae, that accounted for 84% of the density of benthic fauna.

The average concentration of total benthic fauna in the Lubiszewko Lake in the summer of 2012 - 970 (indiv.·m⁻²) (table 24). The Greatest the importance of littoral Oligochaeta and Hirudinea, took in the larvae of Chironomidae, that accounted for 83% of the density of benthic fauna.

In 2008, 2010, 2012 attendance related macrofauna test bed showed that the most common they were mudeating and larvae Chironomids, Oligochaeta (F = 100%), which consisted of Tischlera classification of the species is absolutely solid. Among larvae of Chironomidae the species is absolutely integral were *Chironomus f.l. plumosus* (F = 100%). However *Chaoborus* sp. belong to the accesoric species. Other designated species of fauna were accidental species of benthic (F) = 17% (table 19 - 21).

Concentration of macrozoobenthos in littoral zone was mostly higher than in profundal.

During the macrozoobenthos Przylęg Lake there are among the collected of organisms with eight clusters: *Oligochaeta*, *Hirudinea*, *Isopoda*, *Ephemeroptera larvae*, *Trichoptera larvae*, *Diptera larvae*, *Bivalvia*, *Megaloptera larvae*.

The most represented in terms of species was represented in July which featured Insecta cluster larvae with four rows: Ephemeroptera (*Leptophlebia* sp., *Ephemera* sp., *Caenis macrura* (Stephens)), Trichoptera (Limnephilidae, Leptoceridae, *Cyrnus* sp.) Diptera larvae i Megaloptera larvae (*Sialis lutaria* L.) (table 27 - 29).

The average concentration of total benthic fauna in the Przylęg Lake in the summer of 2008 - 635 (indiv.·m⁻²) (table 30). The Greatest the importance of littoral Oligochaeta and Hirudinea, took in the larvae of Chironomidae, that accounted for 78% of the density of benthic fauna.

The average concentration of total benthic fauna in the Przylęg Lake in the summer of 2010 - 797 (indiv.·m⁻²) (table 31). The Greatest the importance of littoral Oligochaeta and Hirudinea, took in the larvae of Chironomidae, that accounted for 83% of the density of benthic fauna.

The average concentration of total benthic fauna in the Przylęg Lake in the summer of 2012 - 731 (indiv.·m⁻²) (table 32). The Greatest the importance of littoral Oligochaeta and Hirudinea, took in the larvae of Chironomidae, that accounted for 85% of the density of benthic fauna.

In 2008, 2010, 2012 attendance related macrofauna test bed showed that the most common they were mudeating and larvae Chironomids, Oligochaeta (F = 100%), which consisted of Tischlera classification of the species is absolutely solid. Among larvae of Chironomidae the species is absolutely integral were *Chironomus f.l. plumosus* (F = 100%). However *Chaoborus* sp. belong to the accesoric species. Other designated species of fauna were accidental species of benthic (F) = 17% (table 27 - 29).

Concentration of macrozoobenthos in littoral zone was mostly higher than in profundal.

During the macrozoobenthos Chłop Lake there are among the collected of organisms with eight clusters: *Oligochaeta*, *Hirudinea*, *Isopoda*, *Ephemeroptera* larvae, *Trichoptera* larvae, *Diptera* larvae, *Bivalvia*, *Megaloptera* larvae.

The most represented in terms of species was represented in July which featured Insecta cluster larvae with four rows: Ephemeroptera (*Leptophlebia* sp., *Ephemera* sp., *Caenis macrura* (Stephens)), Trichoptera (Limnephilidae, Leptoceridae, *Cyrnus* sp.) Diptera larvae i Megaloptera larvae (*Sialis lutaria* L.) (table 35 - 37).

The average concentration of total benthic fauna in the Chłop Lake in the summer of 2008 - 686 (indiv.·m⁻²) (table 38). The Greatest the importance of littoral Oligochaeta and Hirudinea, took in the larvae of Chironomidae, that accounted for 86% of the density of benthic fauna.

The average concentration of total benthic fauna in the Chłop Lake in the summer of 2010 - 839 (indiv.·m⁻²) (table 39). The Greatest the importance of littoral Oligochaeta and Hirudinea, took in the larvae of Chironomidae, that accounted for 88% of the density of benthic fauna.

The average concentration of total benthic fauna in the Chłop Lake in the summer of 2012 - 850 (indiv.·m⁻²) (table 40). The Greatest the importance of littoral Oligochaeta and Hirudinea, took in the larvae of Chironomidae, that accounted for 86% of the density of benthic fauna.

In 2008, 2010, 2012 attendance related macrofauna test bed showed that the most common they were mudeating and larvae Chironomids, Oligochaeta (F = 100%), which consisted of Tischlera classification of the species is absolutely solid. Among larvae of Chironomidae the species is absolutely integral were *Chironomus f.l. plumosus* (F = 100%). However *Chaoborus* sp. belong to the accesoric species. Other designated species of fauna were accidental species of benthic (F) = 17% (table 35 - 37).

Concentration of macrozoobenthos in littoral zone was mostly higher than in profundal.

During the macrozoobenthos Lubie Lake there are among the collected of organisms with eight clusters: *Oligochaeta*, *Hirudinea*, *Isopoda*, *Ephemeroptera* larvae, *Trichoptera* larvae, *Diptera* larvae, *Bivalvia*, *Megaloptera* larvae.

The most represented in terms of species was represented in July which featured Insecta cluster larvae with four rows: Ephemeroptera (*Leptophlebia* sp., *Ephemera* sp., *Caenis macrura* (Stephens)), Trichoptera (Limnephilidae, Leptoceridae, *Cyrnus* sp.) Diptera larvae i Megaloptera larvae (*Sialis lutaria* L.) (table 43 - 45).

The average concentration of total benthic fauna in the Lubie Lake in the summer of 2008 - 569 (indiv.·m⁻²) (table 46). The Greatest the importance of littoral Oligochaeta and Hirudinea, took in the larvae of Chironomidae, that accounted for 78% of the density of benthic fauna.

The average concentration of total benthic fauna in the Lubie Lake in the summer of 2010 - 648 (indiv.·m⁻²) (table 47). The Greatest the importance of littoral Oligochaeta and Hirudinea, took in the larvae of Chironomidae, that accounted for 87% of the density of benthic fauna.

The average concentration of total benthic fauna in the Lubie Lake in the summer of 2012 - 760 (indiv.·m⁻²) (table 48). The Greatest the importance of littoral Oligochaeta and Hirudinea, took in the larvae of Chironomidae, that accounted for 84% of the density of benthic fauna.

In 2008, 2010, 2012 attendance related macrofauna test bed showed that the most common they were mudeating and larvae Chironomids, Oligochaeta (F = 100%), which consisted of Tischlera classification of the species is absolutely solid. Among larvae of Chironomidae the species is absolutely integral were *Chironomus f.l. plumosus* (F = 100%). However *Chaoborus* sp. belong to the accesoric species. Other designated species of fauna were accidental species of benthic (F) = 17% (table 43 - 45).

Concentration of macrozoobenthos in littoral zone was mostly higher than in profundal.

During the macrozoobenthos Wielgie Lake there are among the collected of organisms with eight clusters: *Oligochaeta*, *Hirudinea*, *Isopoda*, *Ephemeroptera larvae*, *Trichoptera larvae*, *Diptera larvae*, *Bivalvia*, *Megaloptera larvae*.

The most represented in terms of species was represented in July which featured Insecta cluster larvae with four rows: *Ephemeroptera* (*Leptophlebia* sp., *Ephemera* sp., *Caenis macrura* (Stephens)), *Trichoptera* (*Limnephilidae*, *Leptoceridae*, *Cyrnus* sp.) *Diptera* larvae i *Megaloptera* larvae (*Sialis lutaria* L.) (table 51 - 53).

The average concentration of total benthic fauna in the Wielgie Lake in the summer of 2008 - 634 (indiv.·m⁻²) (table 54). The Greatest the importance of littoral Oligochaeta and Hirudinea, took in the larvae of Chironomidae, that accounted for 85% of the density of benthic fauna.

The average concentration of total benthic fauna in the Wielgie Lake in the summer of 2010 - 813 (indiv.·m⁻²) (table 55). The Greatest the importance of littoral Oligochaeta and Hirudinea, took in the larvae of Chironomidae, that accounted for 84% of the density of benthic fauna.

The average concentration of total benthic fauna in the Wielgie Lake in the summer of 2012 - 825 (indiv.·m⁻²) (table 56). The Greatest the importance of littoral Oligochaeta and Hirudinea, took in the larvae of Chironomidae, that accounted for 86% of the density of benthic fauna.

In 2008, 2010, 2012 attendance related macrofauna test bed showed that the most common they were mudeating and larvae Chironomids, Oligochaeta (F = 100%), which consisted of Tischlera classification of the species is absolutely solid. Among larvae of Chironomidae the species is absolutely integral were *Chironomus f.l. plumosus* (F = 100%). However *Chaoborus* sp. belong to the accesoric species. Other designated species of fauna were accidental species of benthic (F) = 17% (table 51 - 53).

Concentration of macrozoobenthos in littoral zone was mostly higher than in profundal.

By comparing the average density of benthic fauna of the lakes Barlinek-Gorzów Landscape Park with the lakes Western and Northern Polish you can see big changes in the density of taxa studied (table 58).

In comparison with other lakes Western and Northern Polish in the lakes Barlinek-Gorzów Landscape Park is a large number of taxa, however, as a result of the distribution of non-harmonic doesn't translate to the indicator value of biodiversity index PIE (table 58).

On the basis of the analysis of research in the Western and Northern Polish Lakes summer macrozoobenthos it can be concluded that in the lakes Barlinek-Gorzów Landscape Park very intensively develop Oligochaeta. While the larvae of Chironomidae subdominants status in the period under review amounting to water, developed in other lakes much more intensely, acting mostly the main ingredient of benthic fauna (table 58).

The results obtained have revealed that the ecological condition of the water in the lakes Barlinek-Gorzów Landscape Park is very bad.

The biodiversity of the benthic macrofauna in the lakes Barlinek-Gorzów Landscape Park is poor, consisting of seven taxones only, where Oligochaeta and Chironomidae larvae (represented primarily by the genera *Chironomus f.l. plumosus* L., *Chaoborus* sp. and *Procladius* sp.) are dominant. According to the BMWP-PL index, the lakes water quality is generally very low [34,35,57,68,71,72].

Taxa representing Bivalvia, Ephemeroptera, Trichoptera larvae and Diptera larvae to the most frequently occurring organisms. Domination in the lakes Barlinek-Gorzów Landscape Park of Bivalvia was stated with invasive species *Dreissena polymorpha* (Pall.).

Table 58. Comparison of macrozoobenthos condensing in summer in some lakes of Western and Northern Polish

Taxa	Density of macrozoobenthos (indiv. · m ⁻²)												
	Lake												
	Jamno (Piór-Zasada 1997)	Gardno (Piór-Zasada 1997)	Krzynia (Gostomeczyk 2005)	Lubowidzkie (Obolewski, Gąska 2006)	Resko (Daniszewski, Konieczny 2013)	Starzyc (Konieczny, Daniszewski, 2013)	Barlinek (by author)	Suche (by author)	Lubiszewko (by author)	Przylęg (by author)	Chłop (by author)	Lubie (by author)	Wielgie(by author)
Oligochaeta	272	1669	666	979	774	373	692	368	375	288	321	274	296
Hirudinea	0	11	48	99	161	27	161	110	107	93	88	75	89
Crustacea	0	0	146	2	0	0	0	0	0	0	0	0	0
Ephemeroptera larvae	0	2	22	4	15	19	13	10	27	15	19	16	20
Megaloptera <i>Sialis lutaria</i>	0	0	28	6	67	37	71	33	40	40	24	38	36
Trichoptera larvae	0	0	53	12	21	22	21	27	29	30	23	28	24
Diptera larvae	487	2427	674	276	438	176	428	222	267	213	278	202	260
Caretropogonidae	0	2	0	0	0	0	0	0	0	0	0	0	0
Gastropoda	0	0	7	0	0	0	0	0	0	0	0	0	0
<i>Bivalvia – Dreissena polymorpha</i>	0	0	123	4	26	19	23	27	47	30	29	18	23
Σ	759	4111	1767	1382	1502	673	1386	797	892	709	782	651	748
Numer of taxa	2	5	9	8	7	7	7	7	7	7	7	7	7
Biodiversity index PIE	0.920	0.973	1.990	0.940	0.807	0.800	0.780	0.799	0.854	0.694	0.726	0.709	0.780

3. CONCLUSION

By comparing the average density of benthic fauna of the lakes Barlinek-Gorzów Landscape Park with the lakes Western and Northern Polish you can see big changes in the density of taxa studied (table 58).

In comparison with other lakes Western and Northern Polish in the lakes Barlinek-Gorzów Landscape Park is a large number of taxa, however, as a result of the distribution of non-harmonic doesn't translate to the indicator value of biodiversity index PIE (table 58).

On the basis of the analysis of research in the Western and Northern Polish Lakes summer macrozoobenthos it can be concluded that in the lakes Barlinek-Gorzów Landscape Park very intensively develop Oligochaeta. While the larvae of Chironomidae subdominants status in the period under review amounting to water, developed in other lakes much more intensely, acting mostly the main ingredient of benthic fauna (table 58).

The results obtained have revealed that the ecological condition of the water in the lakes Barlinek-Gorzów Landscape Park is very bad.

The biodiversity of the benthic macrofauna in the lakes Barlinek-Gorzów Landscape Park is poor, consisting of seven taxones only, where Oligochaeta and Chironomidae larvae (represented primarily by the genera *Chironomus f.l. plumosus* L., *Chaoborus* sp. and *Procladius* sp.) are dominant. According to the BMWP-PL index, the lakes water quality is generally very low.

Taxa representing Bivalvia, Ephemeroptera, Trichoptera larvae and Diptera larvae to the most frequently occurring organisms. Domination in the lakes Barlinek-Gorzów Landscape Park of Bivalvia was stated with invasive species *Dreissena polymorpha* (Pall.). The variability in individual basins of benthofauna's lake affected different physical-chemical parameters of water.

It is recommended that the application of any revitalization methods should be preceded by detailed hydrobiological studies in order to protect the restoring ecological formations.

Fot. 2. Barlinek - Gorzów Landscape Park

REFERENCES

- [1] Bajkiewicz-Grabowska E., *J. Hydrol. Sci.* 8 (1-2), (1981) 63-73
- [2] Bécares E., *Limnetica* 25(1-2), (2006) 143-154
- [3] Bielecki, A., S. Cios, J. M. Cichocka & J. Pakulnicka (2012): *Piscicola siddalli* n. sp., a leech species from the United Kingdom (Clitellata: Hirudinida: Piscicolidae).- *Comparative Parasitology* 79(2): 219-230, Washington
- [4] Brzozowska R., Dunalska J., Zdanowski B., *Arch. Pol. Fish.* 15 (4), (2007) 445-455
- [5] Brzozowska R., Dunalska J., Zdanowski B., *Limnol. Rev.* 5 (2005) 11-16
- [6] Brzozowska R., Gawrońska H., *Limnol. Rev.* 6, (2006) 39-46
- [7] Chudecki Z., Duda L., *Pol. Soil Sci.* 4 (2), (1971) 145-154
- [8] Čiamporová-Zat'ovičová Z., Hamerlik L., Šporka F., Bitušik P. 2010. Littoral benthic macroinvertebrates of alpine lakes (Tatra Mts) along an altitudinal gradient: a basis for climate change assessment. *Hydrobiologia* (w druku).
- [9] Clausen, C.P. 1940. *Entomophagous Insects*. McGraw Hill, New York, London. Heraty, J.M. and
- [10] Covich A.P., Palmer M.A., Crowl T.A. 1999. The role of benthic invertebrate species in freshwater ecosystems. *BioScience* 49, 119–127.
- [11] Cyraniak E., Daniszewski P., Draszawka - Bołzan B. *International Letters of Chemistry, Physics and Astronomy* 5 (2012) 88-95
- [12] Cyraniak E., Daniszewski P., Draszawka - Bołzan B. *International Letters of Chemistry, Physics and Astronomy* 5 (2012) 96-103
- [13] Cyraniak E., Daniszewski P., Draszawka - Bołzan B. *International Letters of Chemistry, Physics and Astronomy* 1 (2013) 70-77
- [14] Cyraniak E., Daniszewski P., Draszawka - Bołzan B. *International Letters of Chemistry, Physics and Astronomy* 1 (2013) 78-84
- [15] Daniszewski P. 2013. Evaluation of chemical and physico-chemical indicators of water of the lakes in the city of Szczecin on the basis of the EU Water Framework Directive. *Journal of Ecological Engineering*, Volume 14, No. 3, pp. 24–30.
- [16] Daniszewski P. 2013. The assessment of Lakes' vulnerability to degradation in the city of Szczecin. *Journal of Ecological Engineering*. Volume 14, No. 2, pp. 74–78.
- [17] Daniszewski P. 2014. Evaluation of Chemical and Physico-Chemical Indicators of Water in Miedwie Lake (North-West Poland). *Asian Journal of Chemistry*. Vol. 26, No. 14, 4189-4192.
- [18] Daniszewski P. 2014. Evaluation of Physico-Chemical Parameters of German-Polish Szczecin Lagoon Water. *Asian Journal of Chemistry*. Vol. 26, No. 14, 4184-4188.
- [19] Daniszewski P. 2014. Heavy Metals in Water German-Polish Szczecin (Oder-)Lagoon and Their Potentiality in Health Risk Assessment. *Asian Journal of Chemistry*. Vol. 26, No. 14, 4251-4254.

-
- [20] Daniszewski P. 2014. Quality of Water in Dabie Lake (North-West Poland) During Different Seasons (2008-2012). *Asian Journal of Chemistry*. Vol. 26, No. 14 (2014), 4193-4196.
- [21] Daniszewski P. 2014. River Odra Estuary (North-West Poland): Assessment of Physical and Chemical Parameters of Water on Basis of European Union Water Framework Directive *Asian Journal of Chemistry*. Vol. 26, No. 14 (2014), 4219-4223.
- [22] Daniszewski P. 2014. Studies of Heavy Metal Pollution in Water River Odra Estuary (North-West Poland). *Asian Journal of Chemistry*. Vol. 26, No. 14, 4247-4250.
- [23] Daniszewski P. 2014. Total Alkaline Phosphatase Activity of Water in the Lakes of Barlinek-Gorzów Landscape Park (North-West Poland). *Asian Journal of Chemistry*. Vol. 26, No. 13 (2014), 3888-3890.
- [24] Daniszewski P., 2013. Vulnerability assessment of Lakes on the degradation in the Barlinecko – Gorzowski Landscape Park. *Asian Journal of Chemistry*. Vol. 25, No. 18, 10225-10229.
- [25] Daniszewski P., 2014. Evaluation of Chemical and Physico-Chemical Indicators of Water in the Lakes of Barlinek-Gorzów Landscape Park (North-West Poland). *Asian Journal of Chemistry*. Vol. 26, No. 9 (2014), 2527-2536.
- [26] Daniszewski P., Draszawka - Bołzan B., *International Letters of Chemistry, Physics and Astronomy* 4 (2012) 96-102
- [27] Daniszewski P., Konieczny R., 2014. Heavy metal content of water in the lakes of the Barlinek-Gorzów Landscape Park (North-West Poland). *Asian Journal of Chemistry*. Vol. 26, No. 12, 3443-3449.
- [28] Daniszewski P., Konieczny R., *International Letters of Chemistry, Physics and Astronomy* Vol 10 (2013) pp 66-75
- [29] Daniszewski P., Konieczny R., *International Letters of Chemistry, Physics and Astronomy* 4(2013) pp 98-104
- [30] Daniszewski P., *The evolution of the geographical environment and nature protection in the industrialized and urbanized areas*. 44 (2012) 16-21
- [31] Darling, D.C. 1984. Comparative morphology of the planidial larvae of Eucharitidae and Perilampidae (Hymenoptera: Chalcidoidea). - *Syst. Entomol.* 9(3): 309-328.
- [32] DGO3 (Operational Directorate-General for Agriculture, Natural Resources and the Environment), 2013. Key Environmental Indicators for Wallonia in 2012 (KEIW 2012). State of the Environment Directorate (DEE), Namur. 162pp.
- [33] DIRECTIVE 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy. 2000. Off. J. Eur. Commun. L 327, 22 December.
- [34] Dobrowolski Z. Density, biomass and distribution of benthic invertebrates in the mid-lake zone of the coastal lake Łebsko. *Pol. Arch. Hydrobiol.* 1999, Vol. 46, pp. 257–275. 20.
- [35] Dobrowolski Z. Density, biomass and distribution of benthic invertebrates in the mid-lake zone of the coastal lake Gardno. *Oceanological Studies* 2001, Vol. XXX, 1–2, pp. 39–58.
- [36] Domek P., Joniak T., Piotrowicz R. 2008. Spatial and seasonal variation of macrozoobenthos in dysharmonic lakes of Drawa National Park. W: Gołdyn R., Klimaszyk P., Kuczyńska-

- Kippen N., Piotrowicz R. (red.), The functioning and protection of water ecosystems. Department of Water Protection, Poznań, s. 39–44.
- [37] Dorenbosch, M., B. Crombaghs & R. Gubbels (2012): Ruimtelijke verspreiding en scheiding van vislevensgemeenschappen in de Geul en zijbeken.- *Natuurhistorisch Maandblad* 101(3): 43-48, Maastricht (in Dutch)
- [38] Dzienia S., Pużyński S., Wrzeńska E., *Acta Agrophysica* 16(1), (2010) 25-33
- [39] Eaton A. D., Clesceri L. S., Greenberg A. E., (eds), *Standard Methods for the Examination of Water and Wastewater*, Ed. American Public Health Assoc., Washington 1995
- [40] Ejsmont-Karabin J. Rotifer occurrence in relation to age, depth and trophic state of quarry lakes. *Hydrobiologia* 313/314, (1995) 21-28.
- [41] Fleituch T., Soszka H., Kudelska D., Kownacki A., *Large Rivers vol. 13, Arch. Hydrobiol. Suppl.* 141/3 No 3-4, (2002) 225-239
- [42] Garcia-Criado F., Tomé A., Vega F.J., Antolin C., *Hydrobiologia*, Kluwer Academic Publishers, Leon, 394 (1999) 209-217
- [43] Gilka W., Abramczuk Ł. 2006. *Micropsectra davigra* sp. n. from the Tatra Mountains – a contribution to the systematic of the *Micropsectra attenuata* species group (Diptera: Chironomidae). *Pol. Pis. Entom.* 75, 39–44.
- [44] Gostomczyk J. Hamerlik L., Bitušik P. 2009. The distribution of littoral chironomids along altitudinal gradient in High Mountain lakes: Could they be used as indicators of climate change? *Ann. Limnol. – Int. J. Lim.* 45, 145–156.
- [46] Jańczak J., Brodzinska B., Kowalik A., Sziwa R., *Atlas Polish Lakes*. T. 1. Bogucki, 1996
- [47] Joniak T. 2005. Changeability of physicochemical properties of water in vertical section of a meromictic lake during spring homothermy – Czarne Lake (Drawieński National Park, Poland). *Polish Journal of Environmental Studies*. 14, V, 75–80.
- [48] Joniak T. 2007. The seasonal variability of dominants in phytoplankton of humic forest lakes. *Oceanological and Hydrobiological Studies*, 36, 2, 49–59.
- [49] Joniak T., Kraska M. 1999. Contribution to the limnology of three dystrophic lakes of the Drawieński National Park, northern Poland. *Acta Hydrobiologica* 41 (6), 191–19.
- [50] Kajak Z., *Ekol. Pol.* 31 (1983) 495-530
- [51] Kajak Z., *Hydrobiology-limnology. Inland water ecosystems*, PWN, Warsaw 1998, 355.
- [52] Kalff J., *Limnology*. New Jersey 2001.
- [53] Karabin A., *Ekol. Pol.* 33, 4, (1985) 567-616.
- [54] Kasprzak K., Niedbała W. The methods used in soil zoology. PWN. Warszawa. 1981
- [55] Klimaszyk P., Piotrowicz R., Szyper H. 2009. Transport of nutrients from the catchment areas to the lakes of Drawa National Park (Northern Poland): Cormorant colony as a source of phosphorus and nitrogen for the lake. [W]: 13th World Lake Conference, Wuhan, Chiny. Klimaszyk P., Sobczyński T.,
- [56] Kölling M., *Meyniana* 38 (1986) 1-19

-
- [57] Konieczny R., Daniszewski P. 2013. Using Macrozoobenthos to Assess the Ecological Condition of the Starzyc Lake (North-West Poland). *Journal of Ecological Engineering*. Vol. 14, No. 4.
- [58] Kottelat, M., & J. Greyhof (2007): *Handbook of European Freshwater Fishes*.- 646 pp., (Publications Kottelat) Cornol
- [59] Kownacki A., Soszka H., *Guidelines for the evaluation of the status of rivers on the basis of macroinvertebrates and for intakes of macro-invertebrate samples in lakes*, Warsaw 2004, 51.
- [60] Kubiak J., *Acta Sci. Pol. Piscaria* 2 (1), (2003) 141-158
- [61] Lampert W., Sommer U., *Ecology of inland waters*. Scientific Publishing PWN, Warsaw 2001, 415.
- [62] Lelek A. *Canadian Special Publication of Fisheries and Aquatic Sciences* 106 (1989) 469-487
- [63] Lindegard-Petersen C. 1972. An ecological investigation of the Chironomidae (Diptera) from a Danish lowland stream (Linding A). *Arch. Hydrobiol.* 69, 465–507.
- [64] Macioszczyk A., *Hydrochemistry*, Ed. Geology, Warsaw 1987, 475.
- [65] Makrozoobentosu characteristics of wypłycone reservoir dam Krzynia. Master's thesis PAP Słupsk. 2005.
- [66] Mudroch A., Azcue J. M., Mudroch P., (red) *Influence of the use of a drainage basin on physical and chemical properties of bottom sediments of lakes*, Lewis publishers Boca Raton, New York, London, Tokyo 1997.
- [67] Nemerow N. L., *Stream, Lake, Estuary, and Ocean Pollution*, Van Nostrand Reinhold Company, New York, 1985.
- [68] Obolewski K. 2006. Characteristic of periphyton inhabiting reed, *Phragmites australis* and artificial substrate in the Lubowidzkie Lake. *Arch. Envir. Protec.*, 32(3) (w druku): 67-82.
- [69] Pejler B., Berzinš B., *Hydrobiologia*, (1989) 186/187: 137-144.
- [70] Philippart, J.-C. (2007): *L'érosion de la biodiversité: Les poissons*.- Dossier scientifique réalisé dans le cadre de l'élaboration du Rapport analytique 2006-2007 sur l'état de l'environnement wallon. Région Wallon, Brussel. 315 pp. (in French)
- [71] Piesik Z., Obolewski K., Wiśniewska M. Fouling organisms (periphyton) inhabiting common reed *Phragmites australis* in Lake Jamno. *Baltic Coastal Zone* 2003, Vol. 7, pp. 91–100.
- [72] Piór-Zasada A. Makrobentos przymorskich Lakes: Jamna, Gardna Wielka and Łebska with special consideration of Oligochaeta. Master's thesis. PAP Słupsk 1997
- [73] Richards C., Host G. E., Arthur J. W., *Freshwat. Biol.* 29 (1993) 285-294.
- [74] Saksena D.N. *Acta Hydrochim. Hydrobiol.* (1987) 15, 5 481-485.
- [75] Schlacher T. A., Wooldridge T. H. How sieve mesh size affects sample estimates of estuarine benthic macrofauna. *J. Expl. Mar. Biol. Ecol.* 1996, Vol. 201, pp. 159–171.
- [76] Sládecek V. *Arch. Hydrobiol. Beih./Ergebn. Limnol.* (1973) 7: 1-218.

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- [77] Sládeček V. *Hydrobiologia* (1983) 100: 169-201.
- [78] Smith, H.S. 1912. The chalcidoid genus *Perilampus* and its relation to the problem of parasite introduction. - U. S. Bur. Ent. Tech. Ser. 19 (4): 33-69.
- [79] Steffan, A.W. 1967. Ectosymbiosis in aquatic insects. In Henry S.M (Ed.) *Symbiosis*. Academic Press, New York and London, pp 207-289.
- [80] Tokeshi, M. 1995. Species interactions and community structure. In Armitage, P.D, Cranston, P.S and Pinder, L.C.V (Eds.) *Biology and ecology of non-biting midges*. Chapman & Hall, London. pp 297-335.
- [81] Trojanowski J., Antonowicz J., Król M., Bruski J., *Annales of the Polish Chem. Soc.* 1 (2001) 131-138
- [82] Trojanowski J., Bruski J., *Baltic Coastal Zone* 4 (2000) 53-66
- [83] Trojanowski J., Trojanowska C., Korzeniewski K.: Trophic state of coastal lakes. *Pol. Arch. Hydrobiol.* 1991, Vol. 38 (1), pp. 23–34.
- [84] Van Urk G., de Vaate B., *Limnologie Aktuell* 1 (1990) 131-145
- [85] Vollenweider R. A. Scientific fundamentals of the eutrophication of lakes and flowing waters, with particular reference to nitrogen and phosphorus as factors in eutrophication. DAS/CSIO/68.27, OECD, Paris, 1968, 192.
- [86] Wright J. F., Moss D., Armitage P. D., Furse M. T., *Freshwat. Biol.* 14 (1984) 221-256
- [87] Zdanowski B., *Ekol. Pol.* 31 (1983) 287-308, 333-352.

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