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ICHTHYOFAUNA OF THE POSTOMIA RIVER WITHIN THE "UJŚCIE WARTY" NATIONAL PARK (WESTERN POLAND)

ICHTIOFAUNA RZEKI POSTOMIA W PARKU NARODOWYM „UJŚCIE WARTY" (ZACHODNIA POLSKA)

Summary. Fish play an important role in water ecosystems. In protected areas, such as national parks, the principal objectives are to study and preserve the integrity of natural systems. Studies were carried out in 2002-2006 in the Postomia River within the "Ujście Warty" (translated as the Warta Mouth) National Park. Four contrasting sites characterized by different habitats were sampled for fish. Fish were caught by electrofishing from a boat along a river bank over a distance of 500 m. Analysis of the ichthyofauna was conducted using biocenotic indexes: dominance in abundance, dominance in biomass and frequency of occurrence. Fish species were also analysed in terms of their affiliation to ecological groups, habitat preferences, threat categories and protection status. The dominant species by number included roach, white bream, pike and perch, while the highest biomass was provided by pike, ide, gibel carp and tench. A comparison of the recorded results with earlier data indicated that the ichthyofauna of the Postomia River is currently represented by a greater number of species, which is partly the result of the appearance of aquaculture species, e.g. gibel carp. Another factor which contributes to differences in the fish fauna in the Postomia River is associated with migration of fish from the Warta and Oder Rivers, particularly during the seasonal flooding of these rivers.

Key words: Postomia River, fish assemblage, species composition, species dominance, stability of occurrence, threat categories

Introduction

Until the 17th century the section of the Warta River close to its confluence with the Oder River was an inland delta with an indistinct river channel, and the entire river valley was covered by marshes and flood plain forests. River regulation and land improvement works were initiated in 1767 at the order of Frederick the Great. These activities created vast areas protected from annual flooding of the Oder and Warta Rivers and these areas were later transformed into meadows and pastures. The main waterways in the "Ujście Warty" National Park (the youngest national park in Poland, established on 1st July 2001) are currently the Postomia River together with the Warta and Stara Warta rivers and the Czerwony and Żółty Canals. Protections for the area of the confluence of the Warta with the Oder were initiated in 1965, creating an open game reserve. In 1977 the Słońsk Nature Reserve (4.200 ha) was established, which after Poland's accession to the Ramsar Convention was included in the list of water and marshy areas of international importance. In 1996 protection was extended to cover a larger area around the Warta – Oder confluence and thus the "Ujście Warty" Landscape Park was established (over 20.000 ha), part of which was finally transformed in 2001 into the "Ujście Warty" National Park, currently occupying 8.038 ha (WYPYCHOWSKA and SZYMOŃSKI 2002). The "Ujście Warty" National Park covers unique riverside and inundation areas, i.e. wetlands. This area is one of the most valuable ecosystems in Poland, at the same time being a nature and tourist attraction.

Wetland ecosystems exhibit great diversity including swamps, peat bogs, watercourses and reservoirs. All these habitats create excellent conditions for the survival and development of fauna, principally for birds (migrating, wintering and nesting species), amphibious mammals and fish. Because of their diverse structure, the water bodies covering almost half of the "Ujście Warty" National Park (rivers, ditches, canals, oxbow lakes, flood waters and lakes) constitute the perfect habitat for many fish species. Fish play an important role in the functioning of water ecosystems. Knowledge on their population size, structure and dominance provides a considerable body of information, contributing to appropriate fishery management by taking into consideration fish crops, stocking and protection of species (KOLEJKO 1998).

After joining the European Union, Polish became the responsibility of the adoption of EU law, including in the field of nature protection (COUNCIL DIRECTIVE... 1992 – i.e. the Habitat Directive). The EU member states are obliged to establish their territories of the European Network Natura 2000 Protected Areas, including the continuous monitoring of habitats, species and the degree of threat to the freshwater ichthyofauna of Poland (GATUNKI ZWIERZĄT... 2004, WITKOWSKI et AL. 2009).

The present study was undertaken to evaluate the current status of fish communities in the Postomia River, one of the main water courses within the "Ujście Warty" National Park.

The Postomia is a tributary of the Warta, flowing out of Lake Postomsko, and is 34.5 km long, of which approximately 12 km is within the "Ujście Warty" National Park (Fig. 1). The Roszkowicki Canal flows into the Postomia near Lemierzyce, collecting waters from one side of the Warta valley (the boundaries of the watershed are located near Santok), and additional water from polders is discharged into the Canal by the Chyrzyno pumping station (on average 8.0 $m^3 \cdot s^{-1}$). In the town of Słońsk the Lenka

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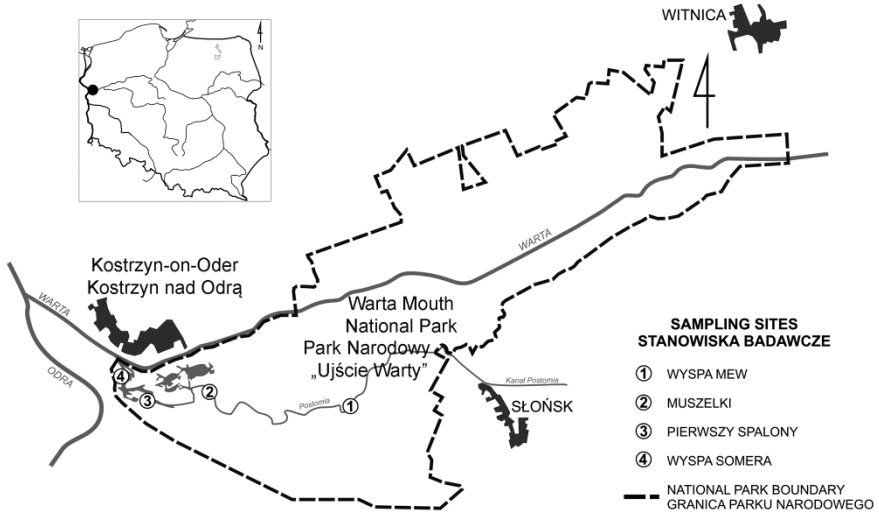

Fig. 1. The area of the Warta Mouth National Park with marked sampling sites
Rys. 1. Teren Parku Narodowego „Ujście Warty" z zaznaczonymi stanowiskami badawczymi

River flows into the Postomia (ENGEL et AL. 1998). The basin of the Postomia together with its tributaries is 1424.6 km^2, of which 1146 km^2 (80.4%) is the catchment of the Postomia itself, while 278.6 km^2 (19.6%) is the catchment of the Czerwony Canal. The Postomia catchment is formed by glacial drift as well as outwash and terrace sands, approximately 90% of which is covered by forest (PODZIAŁ... 1983, KONDRACKI 2000).

Materials and methods

Investigations of ichthyofauna in the Postomia were conducted four times: in Septembers 2002, 2003 and 2006, as well as in October 2004. Four sites, characteristic of the watercourse within the "Ujście Warty" National Park, were sampled for fish on each date (Table 1).

Fish were caught from a boat along one bank over a distance of 500 m, using a classic set for electrofishing, i.e. a generating motor set (2.5 kW, 230 V, 8 A) with a unit rectifying alternating current into pulsating rectified current. Caught fish were identified, counted and weighed to the nearest 1 g and released where they had been caught. The analysis of ichthyofauna was conducted using biocenotic indexes.

Fish species in the study were allocated to ecological groups according to the division proposed by BALON (1990). The classification of habitat preferences was based on SCHIEMER and WAIDBACHER (1992). Classification of species to categories of threat to fauna was based on WITKOWSKI et AL. (2009) according to the IUCN quantitative criteria (IUCN RED LIST... 2001). Species protection status was defined on the basis of the Ordinance of the Minister of the Environment (ROZPORZĄDZENIE... 2004) and the COUNCIL DIRECTIVE... (1992).

Table 1. Characteristics of the sampling sites on the Postomia River
Tabela 1. Charakterystyka stanowisk badawczych na rzece Postomia

Site Stanowisko	Name Nazwa	Width Szerokość (m)	Depth Głębokość (m)	Bottom substrate Substrat denny	Bank type Rodzaj brzegu
1	Wyspa Mew	18-22	2.5-4	Sand, clay Piasek, glina	Flat Płaski
2	Muszelki	30-35	2-3	Muddy Muł	Flat, bushes, Płaski, krzewy
3	Pierwszy Spalony	35-45	1.5-2	Muddy Muł	Eroded, bushes, trees Podmyte, krzewy, drzewa
4	Wyspa Somera	60-70	1.5-2.5	Muddy Muł	Flat, wooded Płaski, zadrzewienia

Results

In the four sampling sites a total of 22 fish species belonging to seven families were found (Table 2). The number of observed species per year varied from 11 in 2004 to 17 in 2002. Eight species were caught every year, i.e. pike (*Esox lucius*), roach (*Rutilus rutilus*), ide (*Leuciscus idus*), rudd (*Scardinius erythrophthalmus*), white bream (*Abramis bjoerkna*), tench (*Tinca tinca*), spined loach (*Cobitis taenia*) and perch (*Perca fluviatilis*), and three of these, i.e. pike, roach and perch, were recorded at all sampling sites. In terms of the number of fish the following species dominated in 2002: roach, pike, gibel carp (*Carassius gibelio*) and ide; in 2003 white bream and roach; in 2004 roach, perch, pike and white bream, and in 2006 roach, rudd, perch and pike. In terms of bio-

Table 2. Dominance in abundance (D_i) and in biomass (W_i) and frequency of occurrence (C_i) of fish species in the Postomia River in 2002-2006 (%)
Tabela 2. Gatunki ryb dominujące liczebnością (D_i) i biomasą (W_i) oraz częstość ich występowania (C_i) w rzece Postomia w latach 2002-2006 (%)

Species Gatunek	2002			2003			2004			2006		
	D_i	W_i	C_i	D_i	W_i	C_i	D_i	W_i	C_i	D_i	W_i	C_i
1	2	3	4	5	6	7	8	9	10	11	12	13
Pike – Szczupak *Esox lucius* L.	14.9	21.5	100	3.2	68.1	100	19.1	49.8	100	10.1	50.7	100
Roach – Płoć *Rutilus rutilus* L.	30.2	1.9	100	29.1	3.9	100	31.9	14.1	100	46.0	7.8	100
Dace – Jelec *Leuciscus leuciscus* L.	0	0	0	0.1	0.1	25	0	0	0	0	0	0

Table 2 – cont. / Tabela 2 – cd.

1	2	3	4	5	6	7	8	9	10	11	12	13
Chub – Kleń *Leuciscus cephalus* L.	0	0	0	0.6	0.1	25	0	0	0	0	0	0
Ide – Jaź *Leuciscus idus* L.	11.5	47.5	75	0.4	9.9	75	2.2	20.1	75	2.1	11.2	75
Rudd – Wzdręga *Scardinius erythrophthalmus* L.	13.9	5.3	100	1.3	1.7	100	0.5	0.1	25	11.3	3.5	100
Asp – Boleń *Aspius aspius* L.	0	0	0	0.6	0.1	75	0	0	0	0	0	0
Bleak – Ukleja *Alburnus alburnus* L.	0.3	0.1	25	2.6	0.2	75	0	0	0	4.1	0.2	50
White bream – Krąp *Abramis bjoerkna* L.	4.6	0.3	50	46.2	5.2	100	10.6	2.2	50	0.3	0.1	25
Bream – Leszcz *Abramis brama* L.	0.1	1.3	25	0	0	0	0	0	0	6.7	0.7	100
Blue bream – Rozpiór *Abramis ballerus* L.	0	0	0	0.1	0.1	25	0	0	0	0	0	0
Tench – Lin *Tinca tinca* L.	1.5	3.8	100	0.1	0.1	50	0.7	5.4	25	1.3	6.0	75
Gudgeon – Kiełb *Gobio gobio* L.	0.4	0.1	25	1.8	0.4	75	0	0	0	0	0	0
Crucian carp – Karaś pospolity *Carassius carassius* L.	0.4	0.2	25	0	0	0	0.2	0.5	25	0	0	0
Gibel carp – Karaś srebrzysty *Carassius gibelio* Bloch	14.9	17.1	75	0.1	0.3	25	0	0	0	1.3	11.8	50
Weatherfish – Piskorz *Misgurnus fossilis* L.	0.1	0.1	25	0	0	25	0	0	0	0	0	0
Spined loach – Koza *Cobitis taenia* L.	0.9	0.1	25	4.6	1.6	100	4.9	0.4	100	5.2	0.2	50
European catfish – Sum *Silurus glanis* L.	0	0	0	0.1	0.2	25	0	0	0	0	0	0
Burbot – Miętus *Lota lota* L.	0.3	0.1	25	0	0	0	1.4	0.2	75	0	0	0
Three-spined stickleback Ciernik *Gasterosteus aculeatus* L.	0.1	0.1	25	0	0	0	0	0	0	0.5	0.1	25
Perch – Okoń *Perca fluviatilis* L.	5.6	0.9	100	6.3	7.6	100	28.3	7.1	100	11.1	7.7	100
Ruffe – Jazgarz *Gymnocephalus cernuus* L.	0.3	0.1	25	2.8	0.4	75	0.2	0.1	25	0	0	0

mass, dominants in all years were pike and ide (Table 2); moreover, a notable proportion of the biomass (> 5%) was recorded for gibel carp and rudd (2002), white bream (2003), roach and tench (2004) and gibel carp, roach and tench (2006). The least common species by both number and biomass in all years were dace, chub (*Leuciscus cephalus*), asp (*Aspius aspius*), blue bream (*Abramis ballerus*), weatherfish and European catfish.

Throughout the entire study four species dominated in terms of their numbers: roach, white bream, perch and pike (summing to 79%), while the highest contribution to biomass was recorded for three species: pike, dace and gibel carp (summing to 80%) (Table 3). The most widespread fish were roach, perch, pike, dace, rudd, spined loach (*Cobitis taenia*), tench and white bream. One species, gibel carp, is non-native. Taking into consideration habitat preferences, over three quarters of the ichthyofauna were eurytopic species, while rheophillic fish of large and small watercourses were represented by four and two species, respectively. In terms of the IUCN threat categories, two native fish species belonged to the threatened group, three were near threatened, while the others were species of last concern. The spined loach and weatherfish have protected species status; and the latter species is on the list of fish from Appendix II of the Habitat Directive. The asp is found in the list of species on both appendices of the Habitat Directive (Table 3).

Table 3. Fish species recorded in the Postomia River in 2002-2006 with classification to ecological reproductive guilds
Tabela 3. Gatunki ryb odnotowane w rzece Postomia w latach 2002-2006 z klasyfikacją do ekologicznych grup rozrodczych

Reproductive guild Grupa rozrodcza	Species Gatunek	D_i (%)	W_i (%)	C_i (%)	Origin Pochodzenie	Habitat preferences Preferencje siedliskowe	IUCN category of threat Kategoria zagrożenia IUCN	Status
1	2	3	4	5	6	7	8	9
Non-guarding and open substratum egg scattering (A.1) **Niepilnujące, jaja rozproszone na odkrytym podłożu (A.1)**								
Lithopelagophils (A.1.2) Litopelagofile (A.1.2)	*Lota lota* L.	0.24	0.06	25.0	R	Rb	VU	
Lithophils (A.1.3) Litofile (A.1.3)	*Leuciscus cephalus* L.	0.34	0.03	12.50	R	Ra	LC	
	Aspius aspius L.	0.34	0.05	18.75	R	Ra	LC	CD II, CD V
	Abramis ballerus L.	0.05	0.01	6.25	R	E	LC	
Phytolithophils (A.1.4) Fitolitofile (A.1.4)	*Rutilus rutilus* L.	31.2	4.78	100.0	R	E	LC	
	Leuciscus leuciscus L.	0.02	0.01	6.25	R	Ra	NT	
	Leuciscus idus L.	2.65	27.6	75.0	R	Ra	LC	

Table 3 – cont. / Tabela 3 – cd.

1	2	3	4	5	6	7	8	9
	Alburnus alburnus L.	2.03	0.09	31.25	R	E	LC	
	Abramis brama L.	0.66	0.65	31.25	R	E	LC	
	Perca fluviatilis L.	9.63	4.63	100.0	R	E	LC	
	Gymnocephalus cernuus L.	1.76	0.14	31.25	R	E	LC	
Phytophils (A.1.5) Fitofile (A.1.5)	*Esox lucius* L.	7.94	43.6	100.0	R	E	LC	
	Scardinius erythrophthalmus L.	4.21	3.29	75.0	R	E	LC	
	Tinca tinca L.	0.54	3.09	62.5	R	E	LC	
	Abramis bjoerkna L.	30.2	2.08	43.75	R	E	LC	
	Carassius carassius L.	0.1	0.14	12.5	R	E	NT	
	Carassius gibelio Bloch	2.62	8.87	25.0	I	E		
	Cobitis taenia L.	4.09	0.61	75.0	R	E	LC	P
	Misgurnus fossilis L.	0.05	0.01	12.5	R	E	VU	P, CD II
Psammophils (A.1.6) Psammofile (A.1.6)	*Gobio gobio* L.	1.15	0.14	25.0	R	Rb	LC	
Guarding and clutch tending (B.1) Pilnujące, wylęg dozorowany (B.1)								
Phytophils (B.1.2) Fitofile (B.1.2)	*Silurus glanis* L.	0.02	0.06	6.25	R	E	NT	
Guarding and nesting (B.2) Pilnujące i gniazdujące (B.2)								
Ariadnophils (B.2.4) Ariadnofile (B.2.4)	*Gasterosteus aculeatus* L.	0.07	0.01	12.5	R	E	LC	

D_i – dominance in abundance, W_i – dominance in biomass, C_i – frequency of occurrence.

Species origin: R – native, I – introduced.

Habitat preferences of species: Ra – rheophillic of big streams, Rb – rheophillic of small streams, E – eurytypic.

IUCN category of species threat: VU – vulnerable, NT – near threatened, LC – last concern.

Species status: P – strictly protected by law in Poland, CD II – from Appendix II of Council Directive 92/43/EEC, CD V – from Appendix V of Council Directive 92/43/EEC.

D_i – dominacja w liczebności, W_i – dominacja w biomasie, C_i – częstość występowania.

Pochodzenie gatunku: R – rodzimy, I – introdukowany.

Preferencje siedliskowe gatunku: Ra – reofilny dużych strumieni, Rb – reofilny małych strumieni, E – eurytypowy.

Kategoria zagrożenia gatunku IUCN: VU – wrażliwy, NT – bliski zagrożenia, LC – niższego ryzyka.

Status gatunku: P – ściśle chroniony przez prawo w Polsce, CD II – z Załącznika II Dyrektywy Rady 92/43/EWG, CD V – z Załącznika V Dyrektywy Rady 92/43/EWG.

The most numerous breeding groups of fish in the Postomia were phytophilous (nine) and phytolithophilous species (seven), jointly accounting for over three quarters of all species. Only three species were lithophilous, while only one representative was recorded for each of the three other groups, i.e. lithopelagophilous, psammophilous and ariadnophilous (Table 3).

Discussion

The occurrence of ichthyofauna in rivers is determined by many factors. Hydromorphometric characteristics of habitats and water quality have a significant effect both on the species composition, as well as quantitative relations within this assemblage (WYŻGA et AL. 2008). The most important abiotic characteristics of lothic ecosystems is their hydrological characteristic, the course of the flow, the type of the bottom substrate, and variation in the topographic features of the bottom and banks (ALLAN 1998). The above mentioned factors have a direct effect on biotic factors, such as vegetation cover of banks, the presence of hydromacrophytes, and the species composition and quality of food. Intensification of the negative human impact on the environment is a consequence of industrial development, urban growth and intensive farming. Anthropopressure on ecosystems of rivers takes four forms: water pollution, regulation of river channels, land reclamation in catchments and excessive fishing (PRZYBYLSKI 1994, WIŚNIEWOLSKI 2002).

During the four year study on the Postomia River considerable fluctuations were observed in the number of species, population sizes and biomass of fish among sampling periods. Many fish species select different habitats in the course of their entire life cycle, which results from changing requirements in terms of flow rates, water temperature, substrate and food (WELCOMME et AL. 1989, AMOROS and BORNETTE 2002). High variability, indicating dynamics of river ecosystems, was also recorded by PENCZAK et AL. (2000, 2003) and GOLSKI (2007), who investigated migration of ichthyofauna between oxbow lakes and the Pilica and Warta Rivers. Marked fluctuations in the species composition of river ichthyocenoses, manifest in high variation coefficients, were also shown by MATTHEWS (1998) while GROSSMAN et AL. (1990) stated that natural lothic assemblages are characterized by high variability.

The Postomia flows into the Kostrzyń Retention Reservoir (the area covering the Warta to Oder confluence) and is subjected to spring and summer flooding and mixing of waters from the Warta and Oder. During high water levels fish migration and dispersion are observed over a considerable area, which is also reflected in the structure and biomass of ichthyofauna in the Postomia. Results of studies conducted to date on the ichthyofauna of the Kostrzyń Retention Reservoir indicate seasonal variation not only in the species composition, but also biomass of caught fish. During spring fishing (high water levels) (KLIMASZYK 1998) confirmed the occurrence of species characteristic of flowing waters, i.e. asp, blue bream, dace as well as other species, such as bream (*Abramis brama*), white bream, roach, carp, bleak, rudd, pike and perch. A higher concentration of fish was recorded in deeper water, while adult specimens were not found in shallow areas. During low water levels (summer, early autumn) limnophilous species, such as bream and tench, predominated whereas gibel carp and perch were found in

smaller numbers and single specimens of catfish and carp were caught. In the autumn catches a marked increase in fish biomass and rheophilic species, such as asp and dace, occurred.

The ichthyofauna of the Postomia River was dominated by phytophilous and phytolithophilous species, typical of medium-sized lowland rivers. When comparing the results of this study with published data (SZABLIKOWSKI and ZAPOLNIK 1980) certain changes could be detected in the ichthyocenosis of the river over the course of 20 years. Notably, gibel carp appeared; previously not recorded in catches. Dominance of eurytopic species was also observed in the earlier study.

A considerable increase in the numbers of phytolithophilous species at the expense of species with higher requirements in lowland rivers of Europe has been observed in many studies (MANN 1996, WOLTER and VILCINSKAS 1998, PENCZAK and KRUK 1999, 2000, KRUK et AL. 2000). These authors agreed that in highly transformed ecosystems, several eurytopic species occurred in high numbers.

KRUK et AL. (2000), on the basis of caught fish crops, considered the ichthyofauna of the Warta to be significantly depleted in relation to that of the 1960s. They observed more than 90% of lithophytophilous and lithophilous species in the population. They suggested water pollution and the creation of a dammed reservoir as the most important causes of the negative condition of the ichthyofauna. MASTYŃSKI (1992) also linked the gradual extinction of fish species between 1950 and 1992 with increasing pollution of the Warta. The composition of the ichthyofauna in the Kostrzyń Retention Reservoir, and thus the Postomia, is indirectly affected by the quality of the Warta water (KUCZYŃSKI et AL. 1998).

A comparison of our results with earlier data (SZABLIKOWSKI and ZAPOLNIK 1980) indicated that the ichthyofauna is now represented by a greater number of species which, to some degree, is the result of the appearance of aquaculture species e.g. gibel carp. PENCZAK et AL. (2006), who carried out studies in the Obra River system, observed that a modification of ichthyofauna composition in rivers takes place when fish breeding ponds are established in the catchment. WITKOWSKI and PASZKOWSKI (2002) also confirmed a significant effect of aquaculture on changes in the composition of ichthyofauna in open waters. Observations by these authors report that most representatives of stagno- and limnophilic species escaped from ponds, which under typical environmental conditions usually survive for only short periods of time (up to several months).

The catches in our study show that the dominant species in terms of abundance was roach, while in terms of biomass, pike and ide dominated. KRUK et AL. (2000), when studying the Warta River, recorded similar results: roach dominated in terms of abundance and biomass, while pike ranked second in terms of biomass. Typical river species were found in small numbers and accounted for 7.5% of the population.

The ichthyofauna of the Elbe and static waters linked with the river was dominated in terms of abundance by roach, ide, perch, white bream, bream and bleak (FLADUNG et AL. 2003). In the central and lower Wisła River a total of 36 species was collected, with bleak and roach being co-dominant in terms of numbers (WIŚNIEWOLSKI et AL. 2001). In the Nida River the greatest abundance was recorded for roach and perch, while rheophilic fish disappeared almost completely (BURAS et AL. 2001).

The roach is a typical eurytopic species (ZALEWSKI and PENCZAK 1973) which, thanks to its high plasticity in terms of habitat and food, has achieved the greatest developmental success across Central Europe (SKÓRA 1972, HORPPILA and PELTONEN 1994). OBERDORFF and HUGHES (1992) proposed considering the roach as an indicator species for watercourse degradation. The dominant role of the roach is often linked, by many authors, with the disappearance of rheophilic fish, which until the early 1960s were common in the Warta River system (PENCZAK 1969, KRUK et AL. 2000).

Pike is a species found in relatively large numbers in the investigated area. The presence of large predators is significant for the functioning of the entire ichthyocenosis. JAŚKOWSKI (1962) confirmed that the pike is most abundant in the sections of the Warta where flooded areas and oxbow lakes are frequent.

A disturbing phenomenon observed in the course of the study on the Postomia is an increase in gibel carp at the expense of the other stagnophilic species. The gibel carp, a non-native species, was reported by GĄSOWSKA (1934) to be a new component of Polish ichthyofauna. The gibel carp belongs to a group of fish with the highest tolerance to adverse environmental conditions; moreover, thanks to gynogenesis, it achieves considerable breeding success, at the same time weakening the recruitment of the other *Carassius* sp., including the crucian carp (SZCZERBOWSKI and SZCZERBOWSKI 1996).

In oxbow lakes and on flooded areas of the Dyje River the proportion of tench in catches was observed to decrease as the gibel carp increased. Throughout the entire study area the latter species accounted for, on average, 6.5% by number and 20.6% by biomass (LUSK et AL. 1998). JAŚKOWSKI (1962) reported that the gibel carp in the Warta River was found only within the city of Poznań which were specimens coming from Maltański Reservoir.

In summing up the results presented in this study it must be stressed that, apart from factors such as water pollution or transformation of the river channel, the interrelationship with the Oder and Warta Rivers, is key to the structure of ichthyofauna in the „Ujście Warty" National Park. Thus the fish community of the Postomia is very similar to the composition of ichthyofauna in the lower sections of these two rivers.

Conclusions

1. The presence of lothic and lenthic elements in the Postomia Rriver system and the interrelationship with the Oder and Warta Rivers has an effect on the considerable dynamics in species structure and quantitative relationships in the ichthyofauna.

2. The dominance of roach, indicating the poor ecological condition of the river, is a common feature, observed not only in the Postomia, but also in most lowland rivers of Europe.

3. The small proportion of rheophillic species in the structure of the ichthyofauna in the Postomia is in agreement with their disappearance in the entire Oder river system.

4. In the analysed watercourse living conditions are advantageous to pike which may have an effect on the stocking rates of cyprinid species, including roach.

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ICHTIOFAUNA RZEKI POSTOMIA W PARKU NARODOWYM „UJŚCIE WARTY" (ZACHODNIA POLSKA)

Streszczenie. Badania ichtiologiczne przeprowadzono w latach 2002-2006 w rzece Postomia znajdującej się na terenie Parku Narodowego „Ujście Warty". Na rzece wyznaczono cztery stanowiska poboru prób ryb reprezentujące zróżnicowane biotopy. Ryby łowiono z łodzi spływającej wzdłuż jednego brzegu na odcinku 500 m, z użyciem zestawu do elektropołowu (spalinowy agregat prądotwórczy z przystawką prostującą prąd zmienny na stały pulsujący: 2,5 kW, 230 V, 8 A). Wszystkie pozyskane ryby były sortowane według gatunków, indywidualnie ważone, a następnie wpuszczane z powrotem w miejscu złowienia. Gatunki ryb uszeregowano według ich przynależności do ekologicznych grup rozrodczych zgodnie z podziałem zaproponowanym przez BALONA (1990). Ponadto w analizie ichtiofauny wykorzystano wskaźniki biocenotyczne: dominacji (D) ilości i masy oraz stałości występowania (C). W ichtiofaunie Postomii stwierdzono występowanie ogółem 22 gatunków ryb, przy czym na poszczególnych stanowiskach oznaczono od 14 do 20 gatunków. Dominantami w ilości były: płoć, krąp, szczupak i okoń, natomiast największy udział w biomasie miały: szczupak, jaź, karaś srebrzysty oraz lin. Na wszystkich przebadanych stanowiskach występowało 10 gatunków: szczupak, okoń, jazgarz, płoć, wzdręga, jaź, leszcz, krąp, lin i koza. Ichtiofauna rzeki była zdominowana przez gatunki fitofilne i fitolitofilne, typowe dla rzeki nizinnej średniej wielkości. Po porównaniu uzyskanych wyników z wcześniejszymi danymi stwierdzono, że ichtiofauna Postomii obecnie jest liczniej reprezentowana, co w pewnym stopniu jest wynikiem pojawienia się gatunków typowo hodowlanych, np. karasia srebrzystego. Innym czynnikiem wpływającym na zróżnicowanie składu ichtiofauny w Postomii są migracje ryb z Warty i Odry, szczególnie podczas okresowych wezbrań wody w tych rzekach.

Słowa kluczowe: Postomia, ichtiofauna, struktura gatunkowa, dominacja gatunkowa, stałość występowania, kategorie zagrożeń

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