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THE MIĘDZYODRZE ICHTHYOFAUNA AS CAUGHT BY VARIOUS GEAR

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Abstract

Within 1993-1998, exploratory catches with a small trawl, trammels, a scoop net, and fishing rods were made in the Międzyodrze waters. Composition of the catches as well as numbers and weight of the fish caught were compared with the corresponding data obtained for commercial catches. The exploratory catches were clearly dominated by roach, followed by bream, bleak, and perch. Composition of the catches by weight was substantially different from the above pattern. Although still dominated by roach, the weight data revealed a pronounced contribution of white bream, perch, tench, pike, and rudd. Commercial catches were dominated by bream, followed by blue bream, white bream, and pikeperch. Perch and tench, numerous in the exploratory catches, contributed less than 1% of the commercial landings; bleak, rudd, and ruffe were altogether absent in commercial catch reports.

Key words: fish fauna, catches, fishing gear, River Odra estuary

INTRODUCTION

When, in 1993, the Lower Odra Valley Landscape Park was established in a part of the River Odra estuary called Międzyodrze, which covers a network of canals between the western and eastern branches of the River Odra, it became necessary to collect detailed information on the park's fauna and flora. A detailed inventory of the park's natural resources is, on the one hand, required by law and, on the other, forms a prerequisite for successful resource conservation. The natural resources include the fish fauna, difficult to get a census of due to their natural mobility, and dwelling in a habitat hard to get an access to. Records of commercial catches are doubtless of importance also from the standpoint of the said inventory. They have also provided a basis for numerous discussions (e.g., Kozikowska 1970, Pęczalska 1973, Winkler 1991, Trzebiatowski 1999) on the composition of the fish fauna species and dynamics of their changes. However, the commercial catch records do not suffice as a

source of information on the species structure and biomass of the fish inhabiting the areas subject to fishing operations. This view has long been shared by different authors (Jaskowski 1962, Casselman *et al*. 1990, Heese 1995) who reiterate that assessing the status of ichthyofauna solely from catches and landings statistics may be quite erroneous.

Exploratory catches effected by the Department of Marine Biological Resources in the Międzyodrze canals within 1993-1998 provided a good opportunity and a database for comparisons with species composition records in commercial catches and landings statistics, and for detecting potential differences, which was at the same time the objective of this work.

MATERIALS AND METHODS

The exploratory catches (Table 1) were made predominantly with a set of trammels of different size and having 20, 22, and 40 mm mesh sizes of the netting. In addition a small trawl (15 m horizontal wing opening; 10 mm wing mesh size; 5 mm codend mesh size) and a 10 mm mesh size 1 x 1 m scoop net were used.

Table. 1

Summary of material collected

Year/Month	Number of fish caught			
	small trawl	trammel	scoop net	fishing rod
1993/May	–	–	46	–
/June	–	–	128	–
/July	–	29	–	–
1994/April	–	5	–	–
/June	–	12	7	–
/July	–	23	–	–
1995/May	–	79	10	–
/July	–	29	–	–
/August	–	20	–	–
/September	–	29	–	–
/October	–	194	–	–
1996/May	–	80	–	–
/July	173	–	–	–
/August	215	53	–	–
/September	274	17	–	–
/October	103	11	–	–
1997/May	172	12	–	–
/June	155	107	–	–
/July	2481	42	–	–
/September	151	–	–	–
/October	–	1	7	–
1998/May	–	203	–	2
/July	–	–	–	3
/August	–	–	–	18
/September	–	63	–	62
TOTAL	3724	1009	198	85

The set of gear listed was, in 1998, supplemented by a lightweight fishing rod adapted for catching small fish. Information on the 1993-1998 commercial catches in Międzyodrze was extracted from the records of the „Regalica" Fishermen's Cooperative at Gryfino.

The fish caught were identified to species, following the key developed by Gąsowska (1962). Subsequently, they were measured (total length) to 1 mm and weighed to 0.1 g. The procedures applied to the fry caught with the small trawl were somewhat different. Immediately after capture, the juveniles were preserved in 10% formaldehyde and, should any doubt as to their identity arise, the fry were examined under a stereo microscope. In addition, all the specimens of an individual species were weighed together.

RESULTS

Commercial catches

The commercial catch records for 1993-1998 listed 18 species, 7 of which, that is bream, blue bream, white bream, pikeperch, eel, roach, and perch accounted for more than 90% of the total catch (by weight) (Fig. 1). Bream, contributing almost 50% of the total catch, was an uncontested dominant, followed by blue bream (14.4%) and white bream (8.3%). Pikeperch and eel, valued by the market, made up 7.6 and 4.8% of the total catch recorded, respectively, somewhat lower contributions being accounted for by roach (4.5%) and pike (3.0%). It was an exception that carp (4.2% of the total annual catch in 1997) and ide (3.4% of the total annual catch in 1998) were numbered among the dominant species.

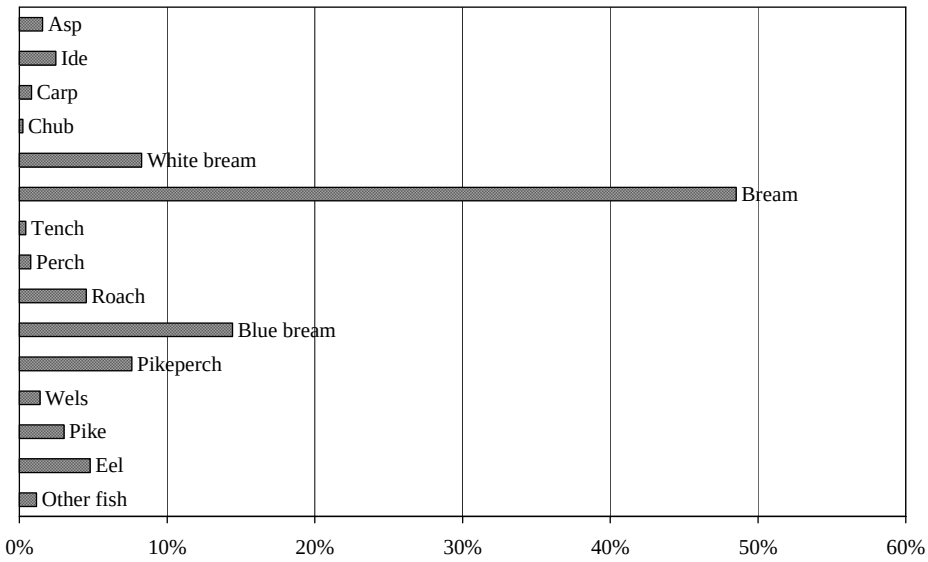

Fig. 1. Species composition of commercial catches in Międzyodrze within 1993-1998

Exploratory catches

Small trawl

The trawl was deployed at two sites in 1996 and 1997. A total of 3724 individuals were caught, representing 10 species (Fig. 2). The most abundant species included roach (63.1%), bream (19.9%), bleak (10.8%), and asp (2.9%).

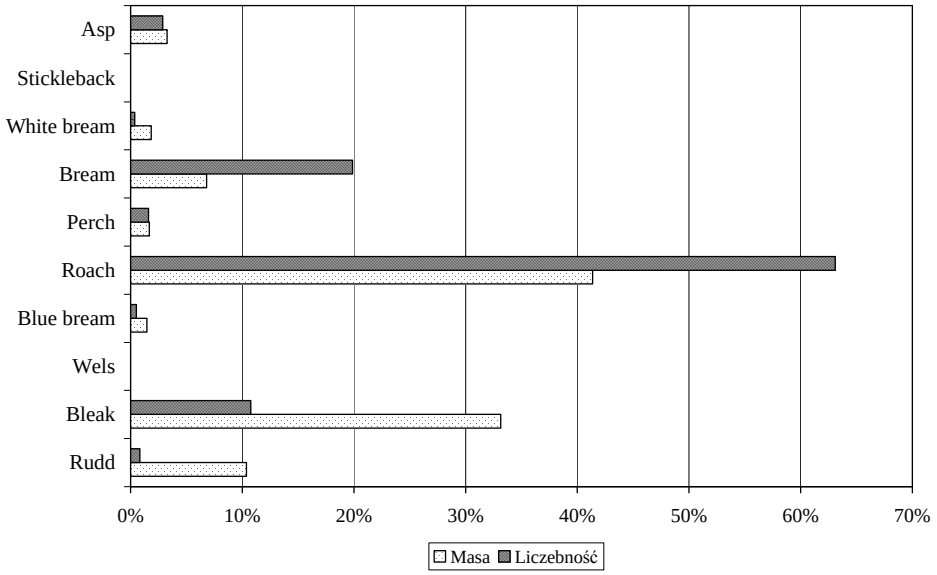

Fig. 2. Species composition of exploratory small trawl catches in Międzyodrze

Partitioning of the total catch weight (3019.3 g) between the dominant species was somewhat different: while roach was still dominant, its domination was less pronounced (41.4%), the respective contributions of bleak (33.4%) and rudd (10.4%) being higher. Individuals of the two last species, rudd in particular, were larger than the seine-caught bream, perch, and roach (Table 2).

Table 2

Number of individuals, size, and weight of fish caught within 1993-1998 in Międzyodrze with different gear

Gear	Species	n	Total length (mm)		Total weight (g)	
			range	arithmetic mean	range	arithmetic mean
Small trawl	Asp	107	22-106	43.4	-	0.92
	Stickleback	1	25	25.0	-	0.10
	White bream	14	64-88	75.7	-	3.98
	Bream	740	21-76	32.6	-	0.28
	Perch	60	29-113	40.7	-	0.85
	Roach	2350	19-147	39.3	-	0.53
	Blue bream	19	52-84	68.4	-	2.35
	Wels	1	48	0.90	-	0.90
	Bleak	401	15-126	56.7	-	2.50
	Rudd	31	19-146	90.0	-	10.10

Table 2 continued

Trammel	Ruffe	29	69-140	91.5	4.4-38.4	10.49
	White bream	211	118-341	166.1	3.0-561.6	71.11
	Crucian carp	5	229-328	278.0	300.6-925.3	588.18
	Bream	17	138-498	277.1	22.5-1437.6	315.28
	Tench	24	139-423	305.0	39.5-1425.6	558.91
	Perch	211	62-295	167.2	2.4-357.9	69.77
	Roach	312	60-322	167.1	1.8-469.2	64.38
	Blue bream	2	151-163	157.0	26.6-33.4	30.00
	Pikeperch	1	750	750.0	3682.1	3682.10
	Wels	2	500-740	620.0	1002.0-2920.0	1961.00
	Pike	25	262-605	418.2	110.1-1347.8	530.62
	Bleak	10	97-127	115.1	5.4-14.6	10.72
	Eel	2	615-662	638.5	450.0-560.0	505.00
	Rudd	158	73-290	157.1	3.8-374.2	51.78
Scoop net	Ruffe	39	67-104	80.4	3.6-12.8	6.27
	Gudgeon	1	117	117.0	11.8	11.80
	White bream	4	85-288	185.0	8.8-266.0	110.18
	Bream	9	72-127	85.4	3.1-16.8	5.77
	Perch	107	60-161	86.5	2.3-44.3	7.19
	Roach	36	47-166	75.1	0.75-50.7	5.00
	Pikeperch	1	166	166.0	26.9	26.90
	Bleak	1	80	80.0	3.2	3.20
Fishing rod	Asp	2	190-200	195.0	50.0-55.0	52.50
	White bream	2	240-245	242.5	175.0-180.0	177.50
	Roach	29	110-185	133.1	10.0-74.1	25.28
	Bleak	27	119-199	149.9	12.3-51.8	24.89
	Rudd	25	95-175	137.1	10.0-60.0	30.05

Trammels

The trammel catches consisted of a total of 1,009 individuals belonging to 14 species and supplied a total biomass of 102,061 g. In terms of the number of individuals caught, the catch was dominated by the following 4 species which collectively accounted for 88.4% of all the individuals caught: roach (30.9%), perch (20.9%), white bream (20.9%), and rudd (15.7%) (Fig. 3). Due to the differences in average size of the fish, mentioned above (Table 2), the fish biomass dominance structure was slightly altered, although roach, perch, and white bream were still prevalent and jointly accounted for 56.8% of the total catch by weight. Quite important also were tench and pike: in spite of having been represented by a relatively low number of individuals (collectively providing 4.9% of all individuals caught), they supplied 13% each of the total trammel catch weight (Fig. 3).

Scoop net

The scoop catches consisted of 198 individuals belonging to 8 species and a total weight of 1,728.5 g (Fig. 4). Perch was an absolute dominant, both in terms of the number of individuals caught and by weight (54.0 and 44.5% of the total number of individuals and total weight, respectively). Numerous also were ruffe (19.7% of the total number of individuals) and roach (18.2%). A disproportionately high white bream weight (25.5% of the total scoop catch weight) resulted from catching a single, atypically large (for a scoop catch) individual measuring 288 mm and weighing 266 g (Table 2).

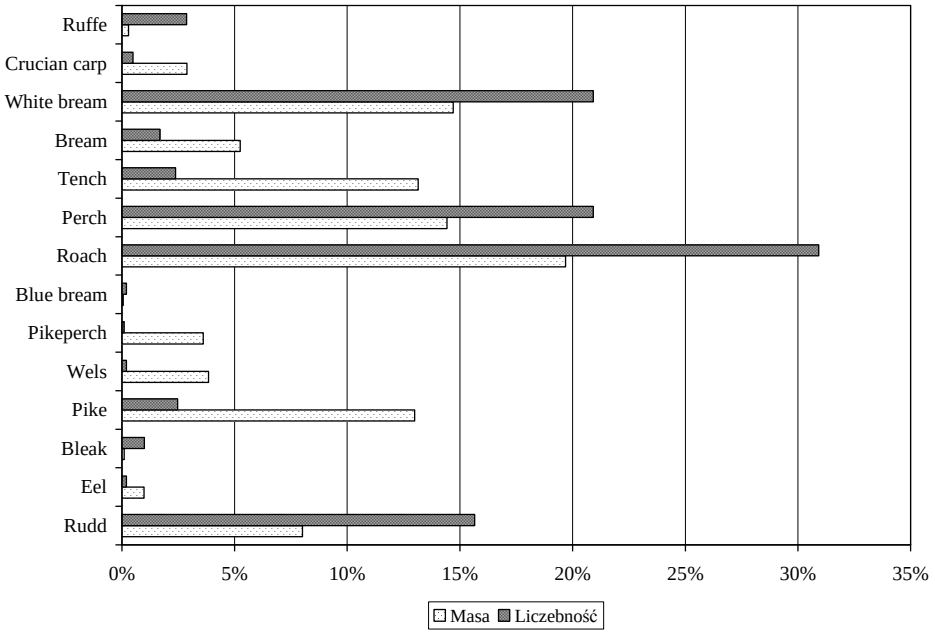

Fig. 3. Species composition of exploratory trammel catches in Międzyodrze

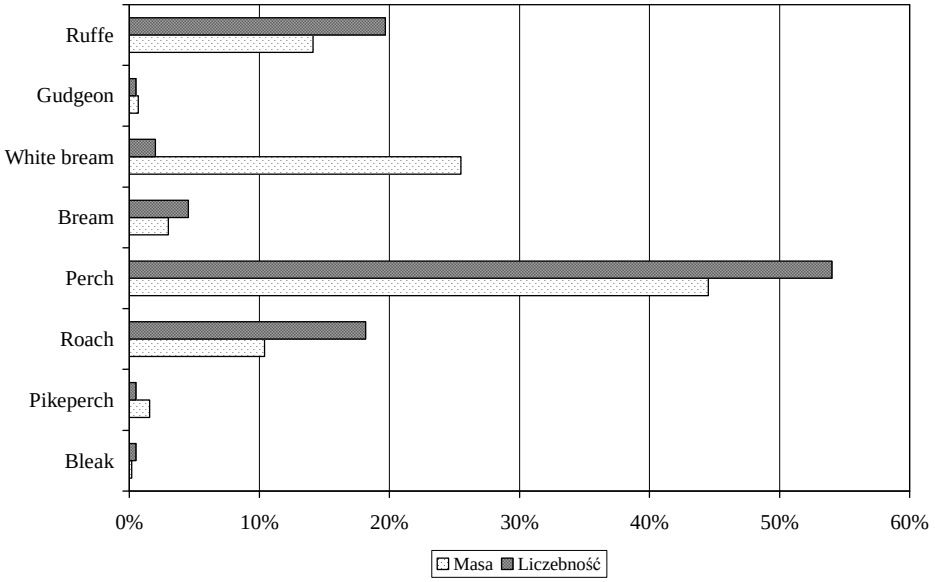

Fig. 4. Species composition of exploratory scoop net catches in Międzyodrze

Fishing rod

The exploratory catches, carried out in 1998 only, provide no basis for any generalisation. Noteworthy, however, is the fact that the three numerically dominant species (Fig. 5) include large bleak of 149.9 mm mean length, not recorded either in the trammel or in scoop catches (Table 2).

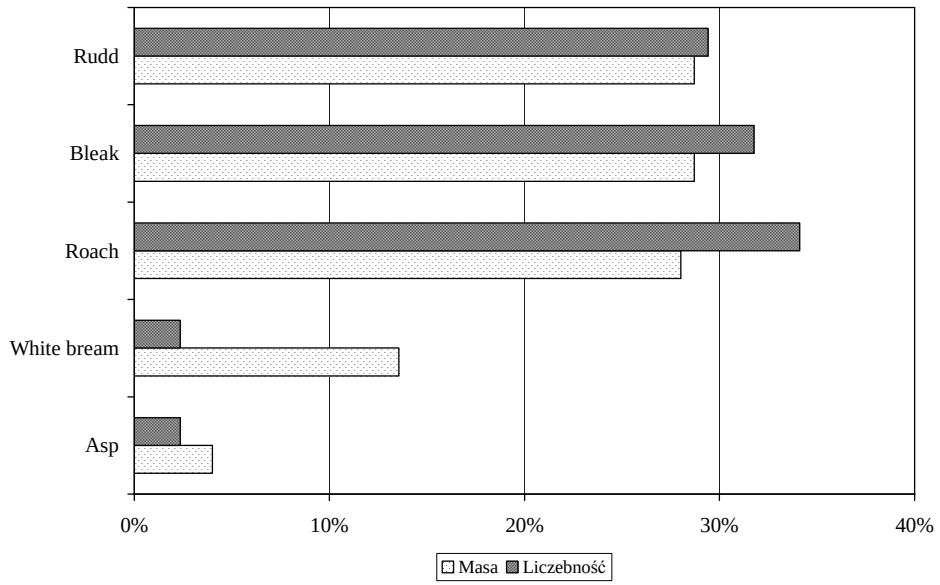

Fig. 5. Species composition of exploratory fishing rod catches in Międzyodrze

DISCUSSION

As seen from the data, each type of gear used supplied catches of differing species composition. The contribution of bream, unquestionably highest in commercial catches, was lower in the small trawl and trammel catches by a factor of about 7-9 and as much as 16-fold lower in the scoop net catch. The pattern looks quite differently with respect to perch: while almost negligible in commercial catches (as little as 0.8% of the total catch by weight), the species was an absolute dominant in the scoop catch and one of the four dominants in the trammel catches. Jaskowski (1962), too, observed that perch, in spite of conditions in the slack-current sections of rivers Warta and Noteć being favourable for its reproduction and dwelling, contributed very little (0.4%) to the catches. Similarly, tench, regarded as a commercially valuable species, but almost negligible in the commercial catch (0.4% of the total weight), was one of the five dominants in the trammel catch and was absent in the exploratory catches effected with other types of gear. By the same token, the contribution of pike to the trammel catch was more than 4 times that in the commercial catch, while being

absent in catches obtained with the trawl, scoop, and fishing rod. Wide gear-dependent differences in contributions, by numbers or by weight, to the catch were found by Wilkońska and Żuromska (1978) studying exploratory fry catches, and by Jelonek and Amirowicz (1987) who dealt with exploratory catches of adult fish. Similarly distinct differences were observed in the case of small, hence less commercially valuable, fish. The commercial fishery records loop them together under a joint category „Other fish" along with valuable species caught in low numbers (e.g., vimba, white fish, rainbow trout). As a whole, the category „Other fish" accounted for as little as 1.2% of the total 1993-1998 catch (Fig. 1). Most probably, this did not reflect the true abundance of those species among and their importance for the entire Międzyodrze fish fauna. The small fish, predominantly bleak, ruffe, and rudd, not identified in the commercial catch, accounted for as much as 13.1 and 10.6% of the total number of individuals caught and their weight, respectively, in the exploratory catches, their contribution to the small trawl catch reaching as much as 43.5% by weight. A similar situation, i.e., a numerical predomination of fish without commercial importance and growing to a small size only, was observed particularly frequently in fry catches effected with a small trawl. The Lake Licheń catches were dominated by bleak and white bream (Wilkońska and Żuromska 1978), bleak and sunbleak providing 33% of all fry caught with a small trawl in the Rożnów dam reservoir (Jelonek and Amirowicz 1987); in the Zegrzyńskie dam reservoir, stickleback provided 21.5 – 75.0%, depending on the site, of all fry caught (Terlecki 1993).

As shown by the analysis presented above, both the commercial and exploratory fishing, when carried out with the use of a single type of gear, is very selective and targets different species. The species preferred by the market are over represented in the commercial catches, for obvious reasons targeting those species. On the other hand, those species regarded as the so-called „rejects" seem to be underrepresented in the commercial catches relative to the true species composition of the fish fauna studied. A different pattern emerges from the exploratory catches which may be selected against the commercially valuable species, particularly when catching them requires the use of gear operated by professional fishermen. In this context, it is particularly relevant to invoke, by way of an example, commercial and exploratory catches obtained in the Vistula Lagoon. In the first, effected within 1992-1996, eel and pikeperch provided as much as 29.4 and 19.3% of the total catch[a)] by weight (Borowski and Dąbrowski 1997), while the extensive and representative programme of exploratory catches in 1996 yielded the respective contributions of the two species amount to 11.5 and 9.7 % of the total catch[a)] by weight (Borowski *et al*. 1997). It can be thus concluded that neither the commercial catch records, nor those of exploratory fishery, particularly when a single type of gear is used, can be a fully reliable source of information on the respective biomasses of the species present in a given area and on the species composition of the area's fish fauna. Consequently, when monitoring fish resources in an area, there is a need for parallel exploratory fishing which would involve a suite of different fishing gear.

[a)] freshwater and migratory fish

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PORÓWNANIE METOD POŁOWU ICHTIOFAUNY MIĘDZYODRZA

Streszczenie

W wodach Międzyodrza prowadzono w latach 1993-1998 połowy badawcze. Stosowano: włoczek narybkowy, drygawice, podrywkę i wędkę. Liczbę i masę złowionych ryb porównano ze składem gatunkowym połowów komercyjnych. W połowach badawczych zdecydowanie dominowały liczebnie płocie (54,4% ogółu złowionych osobników) przed leszczami (15,3%), uklejami (8,8%) i okoniami (7,5%). Udział wagowy poszczególnych gatunków różnił się znacząco od rozkładu ich liczebności. Nadal przeważała płoć (20,3% całkowitej masy złowionych ryb), lecz następne pozycje zajmowały krąp (14,5%), okoń (14,2%), lin (12,3%), szczupak (12,1%) i wzdręga (8,5%). Leszcz i ukleja, łowione przede wszystkim włoczkiem narybkowym, stanowiły tylko 5,1 i 1,6% całkowitej masy połowów badawczych. W połowach komercyjnych występowały głównie leszcze (48,5% ogólnej masy w latach 1993-1998), a w mniejszych ilościach rozpióry, krąpie i sandacze (łącznie 30,3%). Licznie występujące w połowach badawczych okonie i liny stanowiły poniżej 1% połowów komercyjnych, a wzdręga, ukleja i jazgarz w ogóle nie były wyszczególniane w statystykach połowowych. Przeprowadzona analiza struktury gatunkowej porównywanych połowów wskazuje na konieczność sceptycznego podejścia do połowów komercyjnych, jako jedynego wskaźnika biomasy i składu gatunkowego ryb w badanych zbiornikach. Połowy te są bowiem bardzo selektywne i ukierunkowane na cenne gospodarczo gatunki. Rzadko obejmują ryby mało wartościowe, zwłaszcza gdy osiągają one niewielkie rozmiary. Sugeruje to potrzebę prowadzenia równoległych połowów badawczych przy pomocy różnych narzędzi.