

Fishfaunistical monitoring of the Hungarian part of the River Drava (1999-2004)

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SALLAI, Z. & KONTOS, T.: *Fishfaunistical monitoring of the Hungarian part of the River Drava (1999-2004)*

Abstract: Fishfaunistical monitoring in the Hungarian part of the river Drava between 1999 and 2004 was carried out. A small-capacity, pulsating direct current electric fishing machine with rechargeable battery was used for the surveys. During the monitoring altogether 22.649 fish specimens were caught and identified, representing 44 species. Beyond the monitoring sites, fishfaunistical data were collected in other types of habitats, in side arms, the main channel and backwater arms as well. In addition, our own data was complemented with verified data supported by evidence species or picture documentation regarding the occurrence of species, and also with catching data from the fishery database, so the presence of altogether 57 species has been confirmed. Out of the 57 species of verified occurrence, 23 species have nature conservation status. 5 of these protected species have highest level protection status (*Eudontomyzon mariae*, *Hucho hucho*, *Umbra krameri*, *Zingel zingel*, *Zingel streber*). Out of the identified species 22 species are listed in the Annexes of the Habitat Directive. Based on the number of species found, the absolute (TA: 114) and relative natural value (TR: 2.036) of the fish fauna was defined. The recent fauna list of the river has been compiled using literature and own data; based on this, the occasional or regular occurrence of altogether 63 species is presumable in the river Drava. Compared to previously published species list, 8 new species could be identified in the Hungarian segment of the Drava, namely: *Eudontomyzon mariae*, *Alburnoides bipunctatus*, *Gobio uranoscopus*, *Gobio kessleri*, *Sabanejewia bulgarica*, *Barbatula barbatula*, *Umbra krameri*, *Neogobius fluviatilis*.

Keywords: Drava, fishfaunistical monitoring

Introduction

Our research team has undertaken fishfaunistical monitoring activities on the Hungarian part of the river Drava since November 1999. The timeliness of the monitoring surveys was underlined by the plans of the Croatian government regarding the construction of a hydroelectric power plant at Novo Virje. During more than 5 years of surveys, the occurrence of several fish species, which earlier were not known in the Hungarian part of the river, has been confirmed, and information on the size of their population has been collected.

During the monitoring surveys, so far 22.649 fish specimens have been caught, representing 44 species. In order to make the species list as complete as possible, exploratory data were collected in various biotopes in addition to the monitoring sites, and our data were supplemented with information regarding the catch of anglers, so the presence of 57 species was verified until December 2004. Up to now 23 of the species found are under nature conservation protection according to Hungarian legislation, emphasizing

the outstanding significance of the findings. We would like to draw attention to the occurrence of the Danubian gudgeon (*Gobio uranoscopus*) in the Drava, which is the third verified location of the species beside its presence in the Upper Tisza and Mura within our faunistic area. Another significant natural value is the constant presence of the bullhead (*Cottus gobio*) in the Drava, as the only known self-sustaining population of the species is in the Szigetköz region, beside the occasional occurrence in the river Ipoly. The presence of the population of ukrainian brook lamprey (*Eudontomyzon mariae*) is especially outstanding; it has been found in the entire Hungarian part of the Drava (Órtilos, Barcs, Drávakeresztúr, Matty). There are less than 10 habitats of this species in Hungary, and it is well-known for indicating clear water. The occurrence of the protected Kessler's gudgeon (*Gobio kessleri*) should also be underlined. It was first found in April 2002 by the gravel at Órtilos. Our research team was the first to record the presence of the monkey goby (*Neogobius fluviatilis*) and the protected riffle minnow (*Alburnoides bipunctatus*); this latter has been found in the entire Hungarian river segment. It is also important to note that our working group was the first to find two smaller populations of the highly protected European mudminnow (*Umbra krameri*) in the dead bed along the Drava.

Up to the 1990s, fish fauna of the river was described only by data from the 19th century and the early 20th century.

The studies of JURANIC (1880, 1881, 1884) treated the river segment close to Varaždin. The occurrence of 34 and 38 species was registered, without synonyms.

GŁOWACKI (1885) stated the occurrence of 63 species in the Drava, containing several synonyms.

VUTSKITS (1904, 1918) listed 46 species in the river, mainly based on the above literature.

The study of ROTARIDES (1944) reports on catching 18 species, identified from the catch of fishermen at the lower segment of the Drava.

The Drava was seriously underresearched - this is well reflected by the fact, the museum revision of MIHÁLYI (1954) could not mention any fish collected in the Drava. Only a few fishes are published, collected by Rotarides in the Drávaszög region from the Bélyei Lake and the Kopácsi Lake.

VÁSÁRHELYI (1961) used earlier, mainly 19th century species list (which will be later detailed) instead of own survey results, therefore the listed species can be ignored in the case of the River Drava.

GICZI (1966) explains the reasons why the starlet and the barbel disappeared from the Drava.

BERINKEY (1972) in his museum revision lists only 10 species from the Drava.

HONSIG-ERLENBURG (1989) names the Drava as habitat in the case of 34 species from the Austrian (Carinthian) segment of the Drava. In addition he calls two species common: the chub (*Leuciscus cephalus*) and the brown trout (*Salmo trutta m. fario*). Later HONSIG-ERLENBURG & FRIEDL (1995a, 1995b) reports, that the Danubian gudgeon (*Gobio uranoscopus*) was found in the tributary of the Drava, in the lavant in December 1994. Then in 2001, again in the lavant, the Danubian semling (*Barbus petényi*), which had been believed to be extinct, was collected.

The book of POVŽ & SKET (1990) indicates the Drava as habitat in the case of 35 species; in the case of common species, the locations are not mentioned.

POVŽ (1992) lists 50 fish species and 2 lamprey species from the Slovenian part of the Drava.

HARKA (1992a) compiled the current fishfaunistic list of the Drava based on his own survey and the catch data of fishermen and anglers, registering the occurrence of altogether 48 species.

The manuscript of MICSKU (1993) is valuable primarily from an ethnographical point of view; however, there is also some information on the occurrence of economically important fish species, such as the eel.

Subsequently MAJER (1998), also based on his own survey and the catch data of fishermen, described the presence of 48 species in the Drava. In this list bleak (*Alburnus alburnus*) is mentioned twice, under a different Hungarian name. The sunbleak (*Leucaspis delineatus*) has no verified occurrence; nevertheless it is among the species listed.

The statement of P. L. Á. (2000) is not faunistic, but Mihály Plecskó, the interviewee, who provided data also to the article of HARKA (1992a), reports on brown and rainbow trouts caught in recent years.

MAJER (2001) publishes the occurrence of the Ukrainian brook lamprey (*Eudontomyzon mariae*) based on the data of other authors. One of the references concerns the book of VÁSÁRHELYI (1961). We could buy the manuscript of this book from the inheritance of Vásárhelyi in a second-hand bookshop. Based on the manuscript, we can state that Vásárhelyi lists the locations mentioned in the fauna catalogue of VUTSKITS (1918), completed with own observations in a few cases, such as the water system of the Tisza. The other reference is made to the article of GYEGINSZKI (1967); he saw the brook lamprey not in the Drava, but in the Raba; Drava is not even mentioned in the article. This latter data is inaccurate in the book of GYÖRE (1995) as well.

MAJER & BÍRÓ (2001) summarized the fishfauna of Somogy county. Their study claims that 64 fish species occur in the waters of the county, out of which 57 lives in the Drava. As this number is primarily a result of literature, it cannot be used as a data for the recent fauna of the Drava; in addition, the species list does not clarify which species are included in the 57. There are several inaccuracies in the study: it is written in the introduction, that Danubian roach (*Rutilus pigus virgo*) was not recorded in the Drava by any other previous authors. In the work of HARKA (1992a) it is listed in the Austrian part of the river, while the earlier publications of MAJER (1995, 1998) do not refer to this species, although all three mentioned literature is cited in the case of Danubian roach. The publication of HARKA (1992a) gives a faunistic overview of the river, therefore the list includes the species appearing the records of the late 19th and early 20th century, but there are no recent observations regarding these species. Thus the study describes the Black Sea shad (*Alosa pontica*) and the souffia chub (*Leuciscus souffia agassizi*), and also the great sturgeon (*Huso huso*) and the stellate sturgeon (*Acipenser stellatus*), but in the summary of the before-mentioned two authors the first two species are not listed at all. All in all, the fauna catalogue compiled by MAJER & BÍRÓ (2001) recent and archive data can not be distinguished.

In the summary of the publication of MAJER & BORDÁCS (2001) the occurrence of 40 fish species is reported from the upper, Hungarian segment of the Drava, however, the list of species includes only 39 species.

MAJER (2002) suggest that an Integrated Biotic Index should be introduced, also described in detail in the protocol to the NBmR (National Biodiversity Monitoring System). Without listing the species, he mentions the figure of 59 fish species in the Drava, including also the data of relevant literature.

SALLAI (2002a) published the occurrence of 50 species based on his own surveys. His own observations were completed with the data of fishermen, evidenced by photo documentation; he confirmed the presence of altogether 53 species in the Hungarian part of the Drava.

Table 1. Species detected in the Drava and its tributaries in the last 15 years, based on literature and own data (Protected species in bold)

No.	Species	Literature	Own results
1	<i>Eudontomyzon mariae</i>		o
2	<i>Acipenser nadvetrinis</i>	HÁ	(+)
3	<i>Acipenser ruthenus</i>	HÁ, MJ	(+)
4	<i>Anguilla anguilla</i>	HÁ	(+)
5	<i>Rutilus rutilus</i>	HÁ, MJ	+
6	<i>Rutilus pigus virgo</i>		+
7	<i>Ctenopharyngodon idella</i>	HÁ, MJ	+*
8	<i>Scardinius erythrophthalmus</i>	HÁ, MJ	+
9	<i>Leuciscus leuciscus</i>	HÁ, MJ	+
10	<i>Leuciscus cephalus</i>	HÁ, MJ	+
11	<i>Leuciscus idus</i>	HÁ, MJ	+
12	<i>Aspius aspius</i>	HÁ, MJ	+
13	<i>Leucaspis delineatus</i>	HÁ	+*
14	<i>Alburnus alburnus</i>	HÁ, MJ	o
15	<i>Alburnoides bipunctatus</i>		+
16	<i>Abramis bjoerkna</i>	HÁ, MJ	+
17	<i>Abramis brama</i>	HÁ, MJ	+
18	<i>Abramis ballerus</i>	HÁ, MJ	
19	<i>Abramis sapa</i>	HÁ, MJ	+
20	<i>Vimba vimba</i>	HÁ, MJ	+
21	<i>Pelecus cultratus</i>	HÁ, MJ	
22	<i>Chondrostoma nasus</i>	HÁ, MJ	+
23	<i>Tinca tinca</i>	HÁ, MJ	+
24	<i>Barbus barbus</i>	HÁ, MJ	+
25	<i>Gobio gobio</i>	MJ	+
26	<i>Gobio albipinnatus</i>	HÁ	+
27	<i>Gobio uranoscopus</i>		o
28	<i>Gobio kessleri</i>		o
29	<i>Pseudorasbora parva</i>	HÁ, MJ	+
30	<i>Rhodeus amarus</i>	HÁ, MJ	+
31	<i>Carassius carassius</i>	HÁ, MJ	+
32	<i>Carassius gibelio</i>	HÁ, MJ	+
33	<i>Cyprinus carpio</i>	HÁ, MJ	+
34	<i>Hypophthalmichthys molitrix</i>	HÁ, MJ	+*
35	<i>Hypophthalmichthys nobilis</i>	HÁ, MJ	
36	<i>Misgurnus fossilis</i>	HÁ, MJ	+
37	<i>Cobitis elongatoides</i>	HÁ, MJ	+
38	<i>Sabanejewia bulgarica</i>		o
39	<i>Barbatula barbatula</i>		o
40	<i>Ameiurus nebulosus</i>	HÁ, MJ	+
41	<i>Ameiurus melas</i>	MJ	+
42	<i>Silurus glanis</i>	HÁ, MJ	+
43	<i>Esox lucius</i>	HÁ, MJ	+
44	<i>Umbra krameri</i>		o
45	<i>Thymallus thymallus</i>	MJ	
46	<i>Hucho hucho</i>	MJ	(+)
47	<i>Salmo trutta m. fario</i>	HÁ, MJ	(+)
48	<i>Oncorhynchus mykiss</i>	HÁ	
49	<i>Salvelinus fontinalis</i>	MJ	
50	<i>Lota lota</i>	HÁ	+
51	<i>Cottus gobio</i>	MJ	-
52	<i>Lepomis gibbosus</i>	HÁ, MJ	+
53	<i>Micropterus salmoides</i>	HÁ, MJ	+
54	<i>Perca fluviatilis</i>	HÁ, MJ	+
55	<i>Gymnocephalus cernuus</i>	HÁ, MJ	+
56	<i>Gymnocephalus baloni</i>	HÁ, MJ	+
57	<i>Gymnocephalus schraetser</i>	HÁ, MJ	(+)
58	<i>Sander lucioperca</i>	HÁ, MJ	+
59	<i>Sander volgensis</i>	HÁ	(+)
60	<i>Zingel zingel</i>	HÁ, MJ	+
61	<i>Zingel streber</i>	HÁ, MJ	+
62	<i>Neogobius fluviatilis</i>		o
63	<i>Proterorhinus marmoratus</i>	HÁ, MJ	+
Total species		48/47 (54)	50+7 (63)

Abbreviations: HÁ: HARKA, Á., 1992a; MJ: MAJER, J., 1998; +: Its presence in the Drava confirmed; (+): Catch of anglers (verified); o: New species compared to other lists; *: Found in the water system

SALLAI (2002b, 2002c) published the results of a three-year survey in his summarizing study on the fishfauna of the Hungarian segment of the Drava-Mura water system. Taking into account his earlier results (SALLAI 1999), the occurrence of 55 species in the Drava, 46 species in the Mura was proven. Considering literature, he set forth 64 species living in the Hungarian catchment area of the Drava.

In the book of HARKA & SALLAI (2004) on the fishfauna of Hungary, the Drava is mentioned in the case of 63 species as a site of occurrence.

The study of SALLAI (2004) summarizes the information available on the Drava. Based on his own data, literature and the catch of fishermen, the regular or occasional occurrence of 63 species can be presumed in the recent period.

There are overlaps and differences among the above quoted species lists. When the recent species number is defined, only the occurrence of the minnow (*Phoxinus phoxinus*) is not confirmed in the Hungarian segment, out of the 64 species mentioned in the study of SALLAI (2002b, 2002c). After comparing the species lists, the Hungarian part of the Drava is characterized by the regular or occasional occurrence of 63 fish species in the last 15 years, based on own observations and different literature. (Table 1).

Material and method

Features of the Drava

The entire length of the Drava is 695 km, rising at a height of 1238 m at the Western end of the Carnic Alps. The scope of the catchment area was defined as 40.000 km² (MAROSI & SZILÁRD 1967). In Hungary, there is only a section of 170 km, crossing the borderline several times. Considering its length and catchment area, it is one of the most important tributaries of the Danube.

The Hungarian part of the Drava crosses two microregions. The microregion of the valley of the Middle Drava covers the southern part of Somogy county, including the river segment from Órtilos to Drávatomási, out of which 87 km is on the Hungarian side, extending over 300 km². The most typical forest community in this microregion is the rich scrubs and lianas of oak-ash-elm forest, but ash groves, willows, alders and ash-alder bog forests can be also found.

The microregion of the plain of the Drava is located in Somogy and Baranya counties, spanning from Drávatomási to Old, with a territory of 400 km². The typical forest communities of the microregion are forests with willow, poplar and alder, and forests with oak, ash and elm.

The water quality of the entire Hungarian part of the River Drava is class I, making it the clearest Hungarian river. The class II, or sometimes class III water of the Mura is counterbalanced by the significantly larger rate of flow of the Drava.

The fluctuation of the water level is above 400 cm in the case of all three measuring sites. The average discharge (KÖQ) is close to 600 m³/s in the case of the upper two

Table 2. Fluctuation data of the Drava (MAROSI & SOMOGYI 1990)

Measuring sites	LKV	LNV	KQ	KÖQ	NQ
	cm		m ³ /s		
Órtilos	-50	476	276	590	2300
Barcs	-64	618	278	595	2570
Drávaszabolcs	-10	596	151	486	2100

measures, and to 500 m³/s at Drávaszabolcs. The quantity of water flowing during larger floods (NQ) exceeded eight times the smallest discharge (KQ), while at Drávaszabolcs it can reach a 13 times higher volume (MAROSI & SOMOGYI 1990). The fluctuation data is shown in Table 2.

Short description of the monitoring sites

When the monitoring sites were selected, we were looking for habitats, where the most diverse river habitats can be found together in one place, where most of the species preferring current can find appropriate living conditions. These selection criteria are justified by the fact that these habitats will reflect soonest the changes in the population of more sensible species requiring higher oxygen levels in the case of the possible power plant construction.

The status of the sampling sites was registered by Fujifilm S1Pro digital camera.

11 permanent sampling locations were appointed in the surroundings of five settlements by the Drava (Órtilos, Vízvár, Barcs, Drávakeresztúr, Matty), where monitoring surveys were undertaken from 1999. Because of the hydroelectric power plants on the upper segment of the Drava, the natural hydrological patterns are impossible to track; the water level might change relatively fast, even with several meters. Therefore we had to appoint extra sites in addition to the permanent sampling sites, where the fish fauna could be sampled under extreme conditions of high water level; these sites can be found within 500 meters of the permanent sites.

In the surroundings of Órtilos two or three sites have been used, depending on elevation. One of the sampling sites is the bank protecting apron in front of the railway station. The second permanent sampling site is the large gravel reef in front of the watchhouse No. 4. The Danubian gudgeon (*Gobio uranoscopus*) was first found here. The sampling site is shallow, but the current is rapid, with a coarse gravel bed. In the case of higher elevations, the tributary also contains water; in such cases fishing was made by wading in the coastal zone, but as sampling here depends on the water level, this location is not considered a permanent sampling site.

Usually we used four sampling sites in the area of Vízvár. There is a stone dam beyond the 191 river kilometer panel, square with the river bank, next to built boat launching ramp. The second site is a smaller, gravel-bed tributary, directly under the stone dam. We caught Danubian roaches (*Rutilus pigus virgo*) in this tributary several times. The third site is about 1 km above the stone dam, an 80-100 cm deep, rapid current tributary with coarse gravel bed, where we also regularly go fishing. The fourth site is the bank of the tributary close to the main riverbed. The tributary is separated from the main riverbed by a gravel reef; here we also regularly take samples.

In the surroundings of Barcs three sites are used for fishing. One of the sampling sites is under Barcs; next to the C28 border stone there is a longer stone closure, with water on both sides. The outer side is under strong current, the inner side has the characteristics of a stillwater. Another sampling site is right under the bridge of the border crossing at Barcs. The third permanent sampling site is the bathing shore of Barcs, also above the settlement.

Close to Drávakeresztúr, under the mouth of Korcsina there is a longer bank protecting apron, where we also made regular monitoring to collect fishfaunistical data.

We use one permanent sampling site in the area of Matty, in Keselyősfapuszta, the bank protecting apron at the end of the wooden bridge, where a sand-bed can be found between two stone aprons.

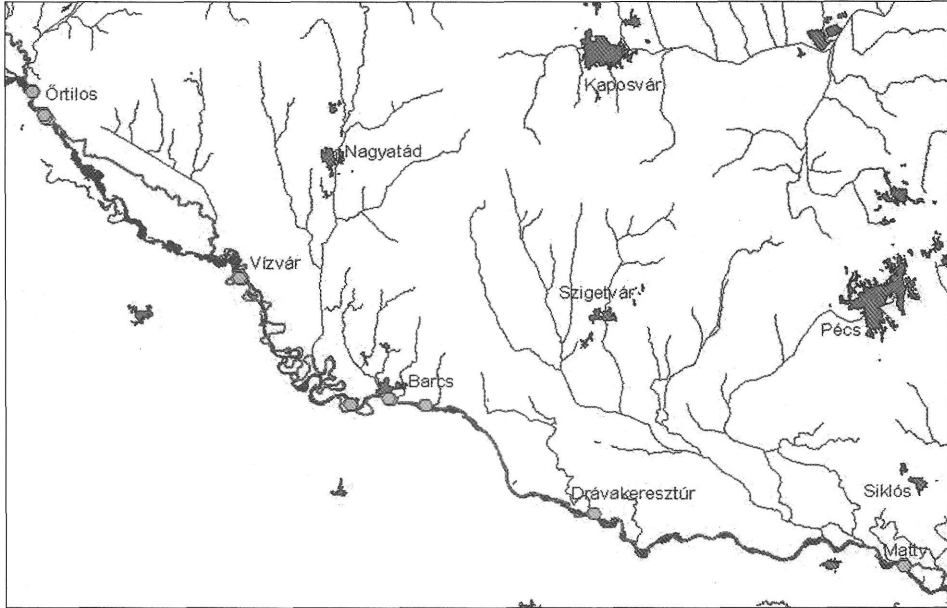


Fig. 1.: Sampling sites along the River Drava

Method of the survey

Fishfaunistical data has been collected with two pulsating direct current electric fishing machines with rechargeable battery: an IUP-12 model (350 V, 4-15 A, 40-120 W) produced in Poland, and a Hans Grassl IG600 model (max. 565 V, 30 A, 1200 W) produced in Germany. Their use does not cause any lasting damage in the caught fishes; they recover and swim away within a short time. Fishes were released after being identified, none of them was collected. Fishing was made from the bank, wading or sometimes from a boat.

Sampling sites were located by a Garmin eTrex Legend GPS, using EOVC-coordinates (national projection system). Geocoordinates were measured at the upper and lower points of the segments surveyed, if possible. Consequently the length of the sampling units can be measured relatively precisely. The EOVC-coordinates obtained were processed in ArcView 3.0a desktop GIS software (Fig. 1).

The number of specimens per species and the GPS coordinates were recorded by a Toshiba DMR-SX-1 digital dictafon. On-site orientation was supported by 1:25.000 scale military maps. During sampling, the scope of the fishing machine was set to the width of 2 m, square to the cross-section of the riverbed.

In addition to the monitoring sites, we took samples occasionally in other habitats along the Drava, and the catch of anglers was also reviewed several times. Thus we acquired outstanding faunistical data, aiming to obtain the most complete fishfaunistical knowledge of the river.

This is how we could record the occurrence of the European mudminnow (*Umbra krameri*) for the first time in two deadbeds of the Hungarian river segment. In the catch of anglers Danubian roach (*Rutilus pigus virgo*), white-eyed bream (*Abramis sapa*), striped ruffe (*Gymnocephalus schraetser*), zingel (*Zingel zingel*), brown trout (*Salmo trutta m. fario*) and danube salmon (*Hucho hucho*) were found.

Processing of faunistical data was made by Access database management software.

Results

During the monitoring activities between November 1999 and October 2004 altogether 22.649 fish specimens were caught and identified, representing 44 species. Out of the total annual number of specimens the number and percentage of species under nature conservation protection was the following: in 1999: 81 specimens (50.9 %) out of the 159 fish specimens; in 2000: 499 specimens (21.2 %) out of the 2.356 fish specimens; in 2001: 1.580 specimens (31.1 %) out of the 5.081 fish specimens; in 2002: 2.415 specimens (31.2 %) out of the 7.735 fish specimens; in 2003: 1.677 specimens (41.0 %) out of the caught 4.089 specimens; and in 2004: 1.183 specimens (36.6 %) out of the caught 3.229 fish. As a summary it can be stated, that a quarter (24,7%) of the more than 22.000 fish species caught during the monitoring activities is protected.

Proportion of specimens of protected species in the fish fauna of the Drava

Hereby we would like to give an overview of the frequency of protected species caught in the Hungarian part of the Drava from 1999 (Fig. 2). The results clearly reflect that the frequency of the rifle minnow (*Alburnoides bipunctatus*) within protected species was the highest is almost all years, exceeding 14% in 2003. Stone loach (*Barbatula barbatula*) was found in each year, with a frequency of less than 1%, changing between 0.03 and 0.63% during the years. The number of spined loach (*Cobitis elongatoides*) was relatively low in 2002, due to high elevations. If the water level is low, the species can be caught relatively easily; this fact is appropriately proved by the results of the other years, where its proportion was between 0.8 and 10.6%. Up to the present the number of specimens reached its maximum in 2004. Bullhead (*Cottus gobio*) was caught in each year, with a relatively constant frequency, its proportion changing between 0.6 and 2.5%. The minimum of the frequency of the species was recorded in 2004. Ukrainian brook lamprey (*Eudontomyzon mariae*) was first found in 2000, then in 2001 could not be found in any of the sampling sites, while in 2002 it occurred at locations where earlier had not been seen. Its frequency was under 0.1% in each year. The number of white-finned gudgeons (*Gobio albipinnatus*) was outstandingly high in 1999 (13.2 %), due to having only one sampling occasion in the autumn of the first year. From 2000 the frequency of its occurrence was relatively stable, between 0.4 and 2.9%. The common gudgeon (*Gobio gobio*) appeared in the samples only from 2001, in a more or less stable proportion, with a frequency between 0.03 and 0.21%. The frequency of both gudgeons was on the minimum in 2004. Kessler's gudgeon (*Gobio kessleri*) was first caught in 2002, with 3-3 specimens in both years; its frequency remained under 0.1. The most valuable species of the faunistic area is the Danubian gudgeon (*Gobio uranoscopus*); it was first found in the spring of 2000 from the Órtilos segment of the Drava. Unfortunately the species could not be found at the previous locations in 2003 and in 2004, due to the relatively high daily fluctuation of the water level at Órtilos. Its frequency was around 0.2%. Balon's ruffe (*Gymnocephalus baloni*) can also be caught primarily at low water levels. Specimens were caught each year; the percentage of the species was between 0.9 and 6.3%. The expansion of the tubenose goby (*Proterorhinus marmoratus*) is still continuous. In the first year it was found only in the river segment of Baranya county, in 2000 also at Barcs, then in 2003 also at Vízvár. Its frequency was between 1.3 and 8.9%. The expansion of the species is well represented by the fact that it reached the maximum of its frequency in 2004. The bitterling (*Rhodeus amarus*) appears among the caught fishes from 1999; despite the increasing frequency in the previous two years, in 2004 its proportion dropped to 3.5%, with figures changing between



Fig. 2: The River Drava near Barcs



Fig. 3: Ukrainian brook lamprey (*Eudontomyzon mariae*)



Fig. 4.: Danubian gudgeon (*Gobio uranoscopus*)

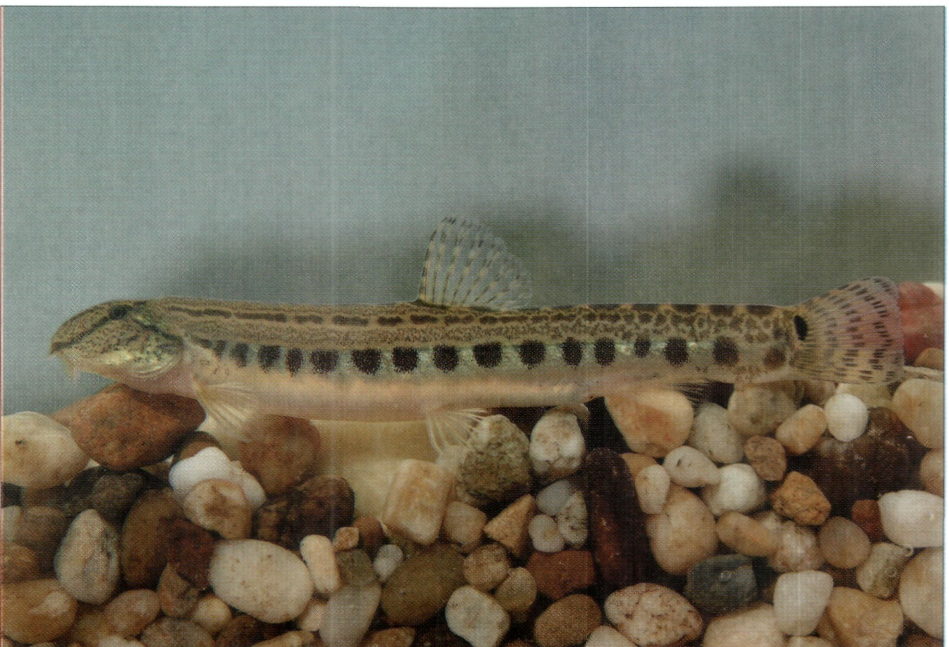


Fig. 5: Spined loach (*Cobitis elongatoides*)

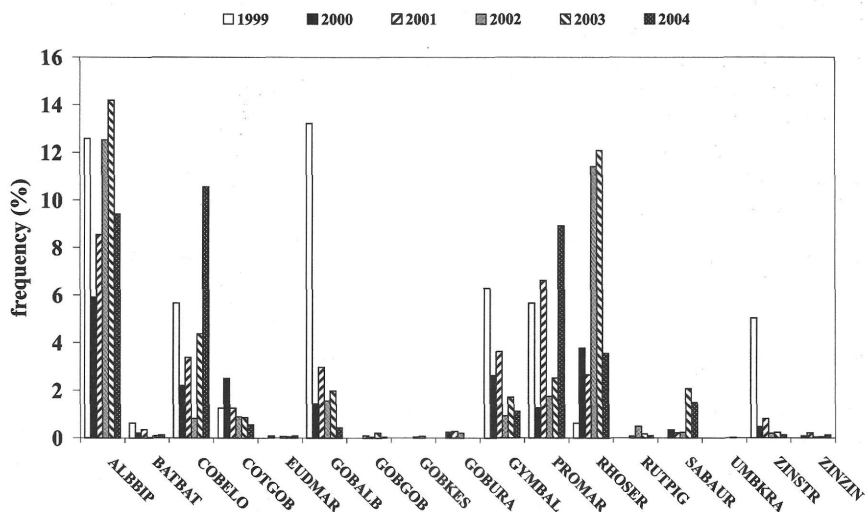


Fig.:6.: Frequency of protected species caught in the Hungarian part of the Drava

0.6 and 12.1 %. The Danubian roach (*Rutilus pigus virgo*) is a particularly endangered, rare endemism. During high waters, more of its specimens were caught, with a percentage between 0.08 and 0.48%; from 2001 it appeared each year. Bulgarian loach (*Sabanejewia bulgarica*) was first identified in the samples in 2000, its proportion reaching its maximum 2.07% during the low waters of 2003, but its frequency was 1.5% even in 2004. The occurrence of the European mudminnow (*Umbra krameri*) is not typical in the main riverbed; previously it was found in two landside deadbeds, near Cún and Barcs. The adult specimen caught in 2003 had been presumably drifted with high waters through the Mura. The streber (*Zingel streber*) is a highly protected endemic fish, appearing in our samples from 1999. The high number of streber specimens in the first year can be explained by the low number of total specimens caught and the single sampling in autumn. The frequency of the species was under 1% every year, changing between 0.12 és 0.88%. Unfortunately the minimum of its frequency occurred also 2004. The zingel (*Zingel zingel*) was first recorded in the Drava in 2000, with a low number of specimens each year; its percentage was between 0.04 and 0.21%.

Species endangered nationally and on the European level

Below you can find an overview of the species nationally protected and listed in the Annexes of the Habitat Directive, caught in the Drava during the survey period. The figures illustrating frequency always compare the number of specimen belonging to the described species caught in the gives aspect to the total number of specimens caught in the given aspect.

Ukrainian brook lamprey - *Eudontomyzon mariae* (Berg, 1931)

We found this species two times in 2000 near Barcs, at the stone apron near the C27 border stone. During the samplings of 2001, we were systematically looking for the species in the areas covered by soft sediment and detritus, but it was not found in any of

the sampling sites. The statement made in 2001, claiming that the species is a constant element of the fauna of the Drava, could be confirmed with data in April 2002. During the low waters of spring, one adult was caught in the surroundings of Órtilos, 2 adults and 2 specimens in larva state near Révfalu, and one adult near Matty. The species appeared two times in 2003, an adult was caught in April under Barcs at the earlier location, at the stone apron near the C28 border stone, then in August a specimen in larva state was recorded near Keselyősfapuszta, at the end of the wooden bridge. In 2004 two specimens were caught again at Keselyősfapuszta, in August and in October; then in October another specimen was found at the sampling site near the C28 border stone at Barcs. The above data prove that the species lives in the entire Hungarian segment of the Drava (Fig. 7). It has a high protection status and is listed in Annex II to the Habitat Directive.

Ship sturgeon - *Acipenser nudiiventris* Lovetsky, 1828

Almost all of the literature of the 19th century (JURANIC 1880, GLOWACKI 1885, HERMAN 1887) mentions its occurrence in the Drava. The only recent specimen in the Drava was found in 1989 near Heresznye, caught by an angler called Péter Petrik; the fish weighted 20,5 kg (PINTÉR 1991b). The specimen was identified by Károly Pintér. In his bibliography on acipenseridae, published in 1994, there is also a photo (PINTÉR 1991b, 1994). The occurrence data was used by HARKA (1992a) and MAJER (1995), so it does not mean the occurrence of several specimens. As catching acipenseridae with electric fishing machine is almost impossible, we tried to use other fishing equipment, but due to the high transparency of the Drava, our attempts always failed. Protected and listed in Annex V to the Habitat Directive.

Sterlet - *Acipenser ruthenus* Linnaeus, 1758

Unfortunately the presence of the starlet in the Drava is also known only from angling journals. Between 1975 and 1987, 3 sterlets of record size were caught by anglers in the Hungarian segment of the Drava. It is an interesting fact that there is no data available on starlets caught after 1987. We can declare this after reviewing the last 25 volumes of angling journals. During several discussions, anglers said that they had not seen the species for the last years, and they have no information on any starlets caught. Unfortunately the data of the Fishery Database also confirms the same: in 2001 24kg, in 2002 58 kg starlet was recorded within the territory of the entire Hungarian catch area, which is a sadly low amount. The species is rare, endangered, and listed in Annex V to the Habitat Directive.

Danubian roach - *Rutilus pigus virgo* (Heckel, 1852)

Endangered endemism of the Danube. In 2000 two specimens were caught by anglers. In 2001 our surveys also confirmed its presence. In 2001, during the review of catch of anglers 3 specimens was again recorded, near Matty and Révfalu (Drávakeresztúr). Only a smaller population was presumed in the Drava, but the number of specimens (38) found in 2002 proves that the most stable domestic population of the species lives in the Hungarian segment of the Drava. Young and adult specimens were both found, also proving the stability and self-sustaining of the population. Although the number of specimens found in 2003 was less than in the previous year, we caught 1 specimen in August and 4 specimens in October near Vízvár, and 1 specimen both near Barcs and Órtilos. We had no previous data available regarding the occurrence of the Danubian roach at Órtilos. In April 2004 an adult specimen was caught by anglers at Révfalu; as the species is protected, we made them throw the fish back. In 2004 only 3 specimens were caught,

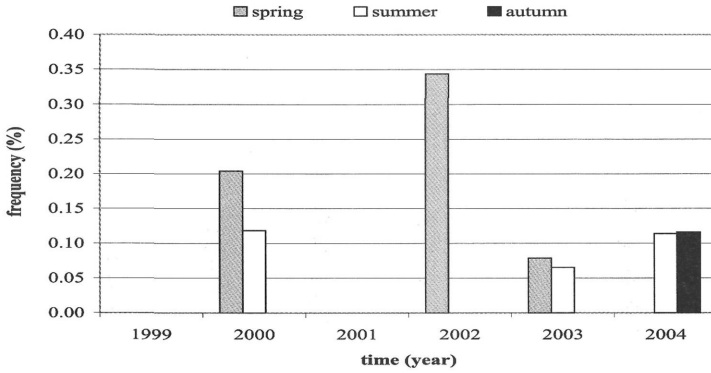


Fig.7.: The frequency of *Eudontomyzon mariae* seasonally between 1999-2004

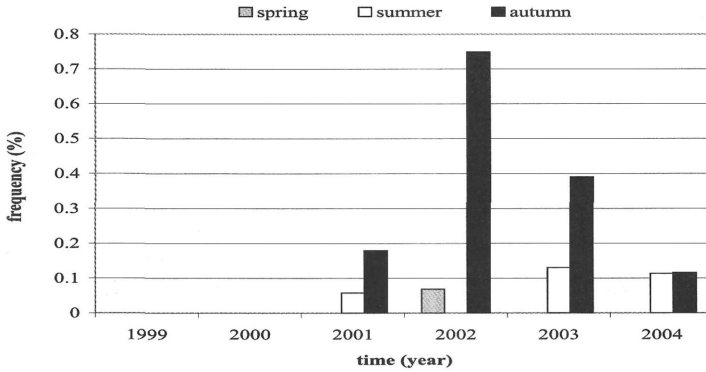


Fig. 8.: The frequency of *Rutilus pigus virgo* seasonally between 1999-2004

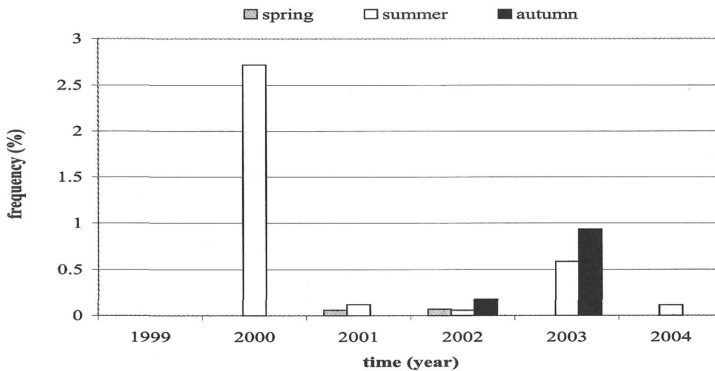


Fig. 9.: The frequency of *Aspius aspius* seasonally between 1999-2004

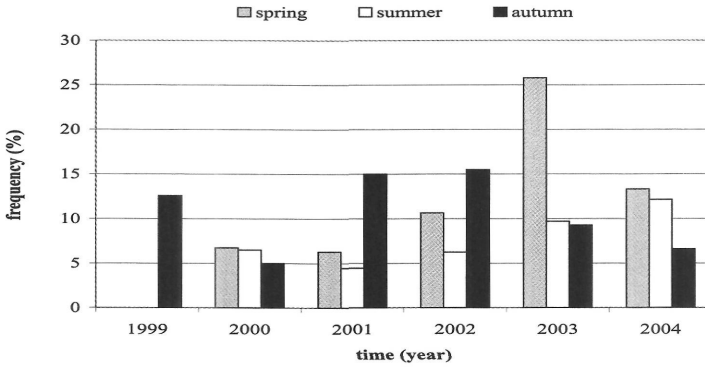


Fig. 10.: The frequency of *Alburnoides bipunctatus* seasonally between 1999-2004

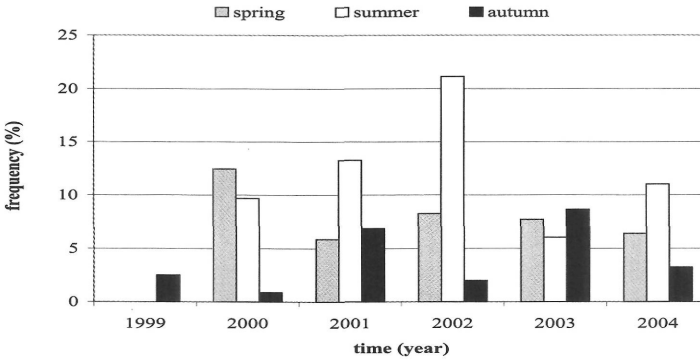


Fig. 11.: The frequency of *Barbus barbus* seasonally between 1999-2004

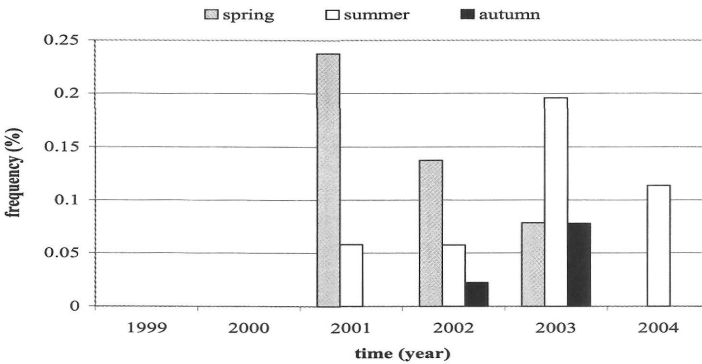


Fig. 12.: The frequency of *Gobio gobio* seasonally between 1999-2004

all of them near Vízvár. (Fig. 8). Occurrence data clearly confirm that the Danubian roach lives in the entire Hungarian segment of the Drava, which is a finding of outstanding importance from nature conservation point of view. This rare species is protected under Hungarian legislation, and listed in Annex II and V to the Habitat Directive as well.

Asp - *Aspius aspius* (Linnaeus, 1758)

A species endangered on the European level, with stable domestic populations. In 1999 1 specimen, in 2000 38 specimens, in 2001 11 specimens, in 2002 10 specimens, in 2003 21 specimens and in 2004 1 specimen were caught in the river. In 2003 we found it at all of the sampling sites, primarily young, 0+ - 2+ old specimens (Fig. 9). The species occurs in the entire Hungarian segment, and listed in Annex II and V to the Habitat Directive.

Sunbleak - *Leucaspis delineatus* (Heckel, 1843)

The species appear in the species list of MAJER (1998), but no verified occurrence data is published. One single specimen was found in Tornyi-Rinya in 2000 (SALLAI 2002b, 2002c). In spite of several samplings, we failed to catch other specimens, although HARKA (1992a) reports the occurrence of several hundreds of specimens in this tributary. We were looking for the species in the marshland habitats along the Drava, but up to now it was not found. It is a rare element of our fauna, under national protection.

Riffle minnow - *Alburnoides bipunctatus* (Bloch, 1782)

Out of the protected species, riffle minnow was represented with the highest number of specimens. The species was not mentioned in any previous fishfaunistical studies (HARKA 1992a, MAJER 1995, 1998), although it was found in the entire Hungarian segment of the river. In 1999 20 specimens, in 2000 397 specimens, in 2001 489 specimens, in 2002 967 specimens, in 2003 596 specimens, in 2004 304 specimens were caught. It is protected (Fig. 10).

Barbel - *Barbus barbus* (Linnaeus, 1758)

Out of the economically important species, barbel was found in the highest numbers. The number of specimens caught confirms the existence of large populations (1999: 5 specimens, 2000: 206 specimens, 2001: 466 specimens, 2002: 572 specimens, 2003: 302 specimens, 2004: 193 specimens), indicating the optimal breeding conditions of the species in the Drava (Fig. 11). High numbers can be found in the catch of anglers; the amount caught was 625-826 kg in the segment of Baranya, and 396-1807 kg in the segment of Somogy. The species is listed in Annex V to the Habitat Directive.

Common gudgeon - *Gobio gobio* (Linnaeus, 1758)

The first specimen was caught in November 2000 near Drávasztára. In the Drava it is considered rare, also stated by HARKA (1992a); in 2000 one, in 2001 8, in 2002 4, in 2003 9, and in 2004 one specimen were found (Fig. 12). It is often confused with the close relative, the white-finned gudgeon (*Gobio albipinnatus*), which is common in our larger rivers (HARKA 1996), and also the most common gudgeon in the Drava. Protected.

White-finned gudgeon - *Gobio albipinnatus* Lukasch, 1933

It can be commonly found all throughout the Hungarian segment of the Drava, having a stable, self-sustaining population. In spite of this fact, the only reference made to the species in the relevant literature is the article of HARKA (1992a). We caught 42 specimens in 1999, 82 specimens in 2000, 202 specimens in 2001, 121 specimens in 2002, 83

specimens in 2003, but only 14 specimens in 2004 (Fig. 13). Protected and listed in Annex II to the Habitat Directive.

Danubian gudgeon - *Gobio uranoscopus* Agassiz, 1828

Our working group was the first to record the species in the Drava. It is a rare fish living in the upper segments with rapid current and gravel bed. Beside the Drava, two other Hungarian habitats are known: Upper Tisza and Mura. In 2000 6 specimens, in 2001 14 specimens, in 2002 16 specimens were found. Earlier the only site to find the species was near Órtilos, but in October 2001 a young specimen occurred near Vízvár. In April 2002 another specimen was caught near Vízvár, unfortunately we have not met the species since then. The population in the Drava is small and vulnerable! (Fig. 14) An endemic and endangered element of the fauna of the Danube basin, listed in Annex II to the Habitat Directive, besides being nationally protected.

Kessler's gudgeon - *Gobio kessleri* Dybowski, 1862

Earlier literature never mentioned the Kessler's gudgeon in the river. After finding the species in the Mura River (SALLAI 2002b), its presence in the Drava was also presumed. The low waters in spring favoured the appearance of the fish; we managed to catch adult specimens in April 2002 and 2003 as well, on the gravel reef of the monitoring sites at Órtilos. It is a rare endemism living in the upper segments, with rapid current, sand and gravel beds. It is protected and listed in Annex II to the Habitat Directive.

Bitterling - *Rhodeus amarus* (Bloch, 1782)

The Hungarian population of the species is considered stable; numerous populations can form, where the large mollusc required for its breeding are available in appropriate quantity. We caught 49 specimens in 1999, 181 specimens in 2000, 259 specimens in 2001, 883 specimens in 2002, 508 specimens in 2003, and 115 specimens in 2004 (Fig. 15). Based on the results of recent years, the bitterling became the third most common protected species in the Drava, after riffle minnow and spined loach. It is protected and listed in Annex II to the Habitat Directive.

Weatherfish - *Misgurnus fossilis* (Linnaeus, 1758)

A rare species of marshland habitats. It can be found in silt-charged tributaries and deadbeds with rich, thick vegetation. In the habitats surveyed middle-sized populations live. No specimen was caught at the monitoring sites. Besides being protected under national legislation, its European importance is recognized by being listed in Annex II to the Habitat Directive.

Spined loach - *Cobitis elongatoides* Băcescu & Majer, 1969

The taxon was created during the complex taxonomic revision of *C. taenia* (FREYHOF et al. 2000). All populations of spined loaches living in our faunistic area belong to the species *C. elongatoides* (ERŐS 2000). It is a common species in domestic national waters as well as the Drava River. Often we caught specimens in great quantities in the river segments covered with soft sediment. Stable, self-sustaining populations live in the Drava and its tributaries. In 1999 18 specimens, in 2000 248 specimens, in 2001 279 specimens, in 2002 65 specimens, in 2003 184 specimens were caught. Until now, the maximum of its frequency was reached in 2004, with 341 specimens caught (10.6 %), making the spined loach the most frequent protected species in 2004 (Fig. 16). Protected and listed in Annex II to the Habitat Directive.

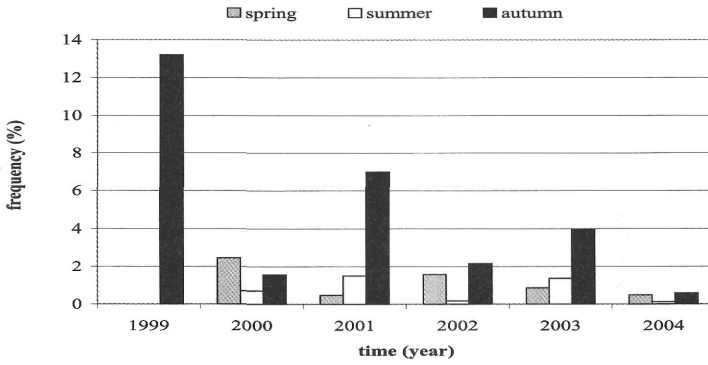


Fig. 13.: The frequency of *Gobio albipinnatus* seasonally between 1999-2004

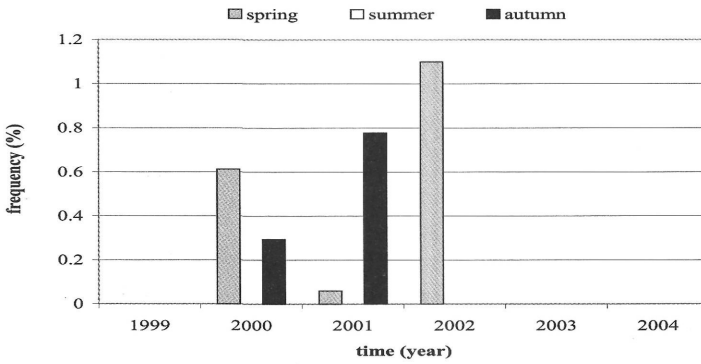


Fig. 14.: The frequency of *Gobio uranoscopus* seasonally between 1999-2004

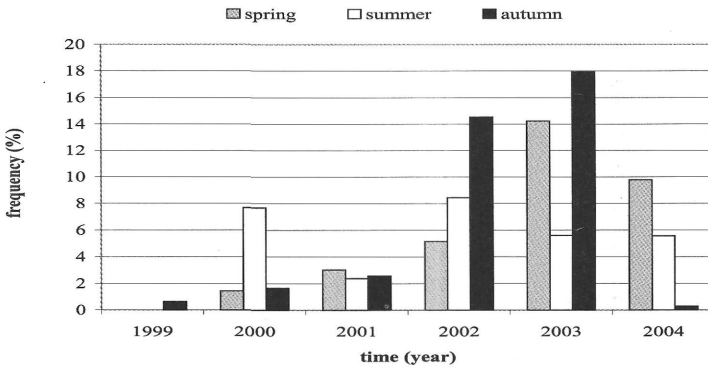


Fig. 15.: The frequency of *Rhodeus amarus* seasonally between 1999-2004

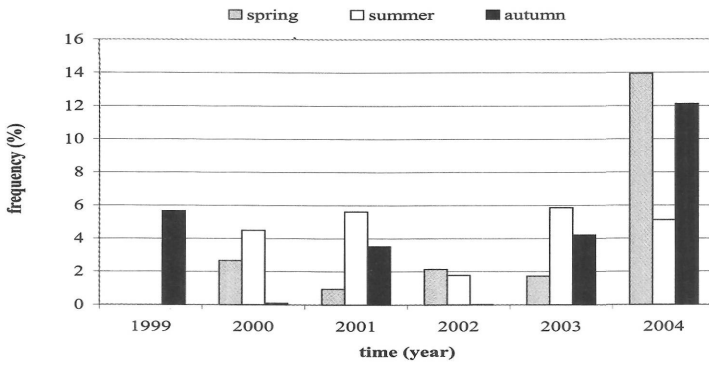


Fig. 16.: The frequency of *Cobitis elongatoides* seasonally between 1999-2004

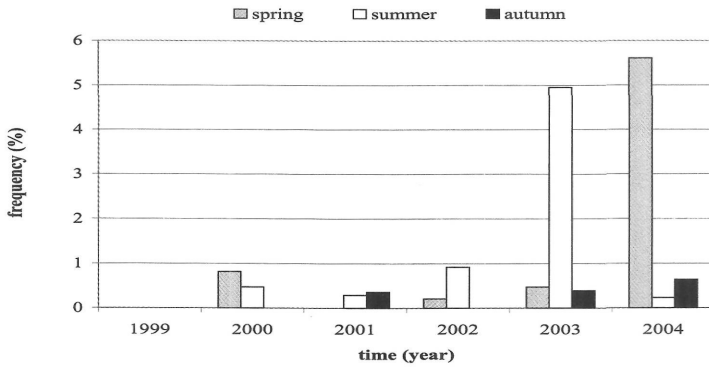


Fig. 17.: The frequency of *Sabanejewia bulgarica* seasonally between 1999-2004

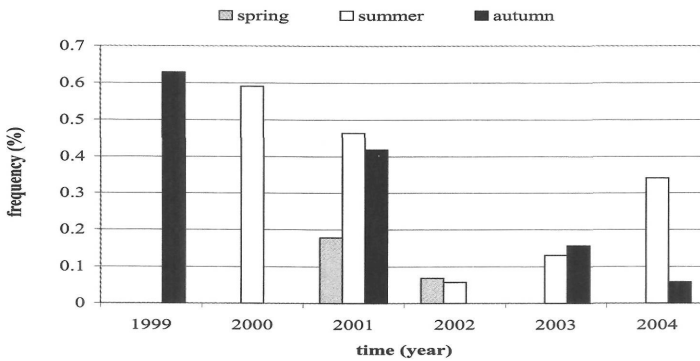


Fig. 18.: The frequency of *Barbatula barbata* seasonally between 1999-2004

Bulgarian loach - *Sabanejewia bulgarica* (Drensky, 1928)

Previously there was no published data available regarding its occurrence in the Drava recently. We first found it in the area of Vízvár in March 2000. Later it was caught at several locations from Órtilos to Révfalu (Drávakeresztúr). A stable, self-sustaining population lives in the river. In 2000 13 specimens, in 2001 47 specimens, in 2002 18 specimens, in 2003 87 specimens and in 2004 48 specimens were caught. (Fig. 17). This rare and endangered species is nationally protected and also listed in Annex II to the Habitat Directive.

Stone loach - *Barbatula barbata* (Linnaeus, 1758)

Earlier literature (HARKA 1992a, MAJER 1995, 1998) does not make reference to its occurrence in the Hungarian segment of the Drava. Because of its presence in the Mura River (SALLAI, 1999), its appearance in the Drava was also expected. So far it has been found in the river from Órtilos to Révfalu (Drávakeresztúr); 1 specimen in 1999, 6 specimens in 2000, 24 specimens in 2001, 2 specimens in 2002, 4 specimens in 2003 and 2004 as well (Fig. 18). Its population in the Drava is small, requires high level of oxygen, protected.

European mudminnow - *Umbra krameri* Walbaum, 1792

The presence of the species in the Hungarian segment of the Drava was not known earlier. POVŽ (1992) indicates the species in the Slovenian segment of the Mura River, but the presence of the European mudminnow is confirmed also on the Hungarian side of the river (SALLAI 1999). In 2001 it was found in the deadbeds: in Cún-Szaporcai-Holt-Dráva and in Nagy-Bók (Barcs). Since we had to take samples among difficult situation at both sites - rich aquatic vegetation, soft sediment - we could not provide reliable information on the size of the population, but as both locations have the typical marshland habitat requirements, stable, self-sustaining populations are presumed. On 5 April 2005 in a silent bay close to the railway station of Órtilos, a 70 mm standard and an 85 mm fully developed, healthy, adult specimens were found in the nest. The specimen was released after making photographs. It is a rare, endangered species, living in moors and marshland habitats, with a high protection status under national legislation and listed in Annex II to the Habitat Directive.

Danube salmon - *Hucho hucho* (Linnaeus, 1758)

MAJER (1998) reports a specimen caught in October 1990 near Órtilos, based on the data provided by Ferenc Énok. The publication refers to the name of the collector inappropriately, as László Énok. A stable population lives in the Austrian segment of the Drava, proven by the record specimens found (SCHULZ 1985, OFFERMANN 1986). The only data on its verified occurrence in the country was provided by Péter Tóth, angler in Fityeháza. He made available the photo of the specimen caught in December 1998, which we would like to thank hereby. During our surveys, we have not met the species, the power plant constructed on the Croatian side blocks the migration of the populations living in the upper segments, therefore we can declare that the species has disappeared from this section of the Drava; nevertheless, drifted specimens might be found. An indigenous species of the Danube basin, having a high protection status under national legislation and listed in Annex II and V to the Habitat Directive.

Bullhead - *Cottus gobio* Linnaeus, 1758

The first occurrence of the species in Hungary, in the Drava was published by MAJER (1995, 1998); suggesting only occasional occurrence. Recent findings have completely cleared off this presumption. In the Hungarian segment of the Drava, between Órtilos

and Révfalu (Drávakeresztúr) it was found at each of the sampling sites. The self-sustaining population of the species can be considered stable, appropriately confirmed by the number of specimens found: in 1999 2 specimens, in 2000 89 specimens, in 2001 98 specimens, in 2002 69 specimens, in 2003 36 specimens and in 2004 18 specimens were caught (Fig. 19). The presence of the species in the Drava is remarkable from a nature conservation point of view, as there is only one population in Szigetköz known in Hungary! A rare, endangered species, which is protected under national legislation and also listed in Annex II to the Habitat Directive.

Balon's ruffe - *Gymnocephalus baloni* Holčík & Hensel, 1974

A stable, self-sustaining population of the species lives in the entire Hungarian segment of the Drava. It was found all the way from Órtilos to Matty, in convincing numbers: in 1999 20 specimens, in 2000 119 specimens, in 2001 318 specimens, in both 2002 and in 2003 72 specimens, and in 2004 36 specimens were caught (Fig. 20). It is protected under national legislation and listed in Annex II and IV to the Habitat Directive. Most of them were seen near the bank protection aprons every year.

Striped ruffe - *Gymnocephalus schraetser* (Linnaeus, 1758)

The occurrence of the species in the Drava was first described by JURANIC (1880, 1884) and by GLOWACKI (1885). It is mentioned in all of the recent articles (HARKA 1992a, MAJER 1998, MAJER & BORDÁCS 2001). Nevertheless, we have no own data regarding its occurrence in the Drava. One specimen was found near Órtilos, caught by an angler, who told us that in this segment he regularly catches striped ruffe. We asked him to keep the fish alive, if he manages to catch one. The angler was trying to help us, but unfortunately the specimen swallowed the hook too deep and did not survive. We took the specimen, which will be placed in the fish collection of the Museum of Natural Sciences. Very rare, endangered endemism, protected and listed in Annex II and V to the Habitat Directive.

Zingel - *Zingel zingel* (Linnaeus, 1758)

Zingel is a very rare, endangered fish of the Danubian water system, the center of its area is the Danube basin. It was found in the entire Hungarian segment of the Drava; based on the number of specimen found, its population is stable. It was found at the majority of the sampling sites between Órtilos and Matty, including both end-points. We caught 9 specimens in 2000, 16 specimens in 2001, 3 specimens 2002 3, 2 specimens in 2003 and 4 specimens in 2004 (Fig. 21). Although the number of specimens caught is decreasing during the years, but this does not necessarily mean the decline of its population. It has a high protection status under national legislation and listed in Annex II and V to the Habitat Directive.

Streber - *Zingel streber* (Siebold, 1863)

A very rare, endangered endemism of the country. Its oxygen-demand is higher, then that of the previous species, therefore it was only found between Órtilos and Barcs. In 1999 8 specimens, in 2000 18 specimens, in 2001 48 specimens, in 2002 15 specimens, while in 2003 only 10 specimens, and in 2004 only 4 specimens were caught (Fig. 22). The number of specimens found indicates a stable, self-sustaining population, despite the decreasing numbers. It has a high protection status under national legislation and listed in Annex II to the Habitat Directive.

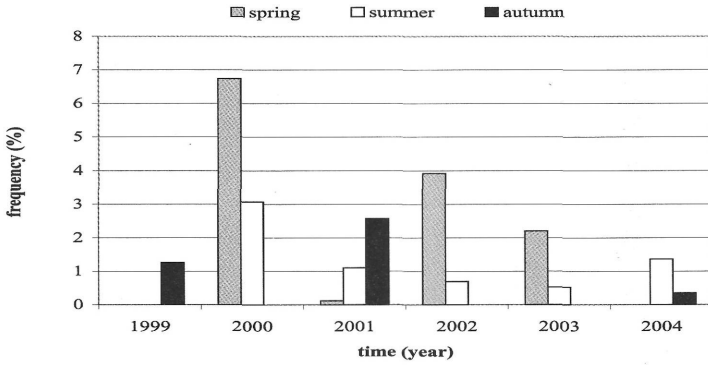


Fig. 19.: The frequency of *Cottus gobio* seasonally between 1999-2004

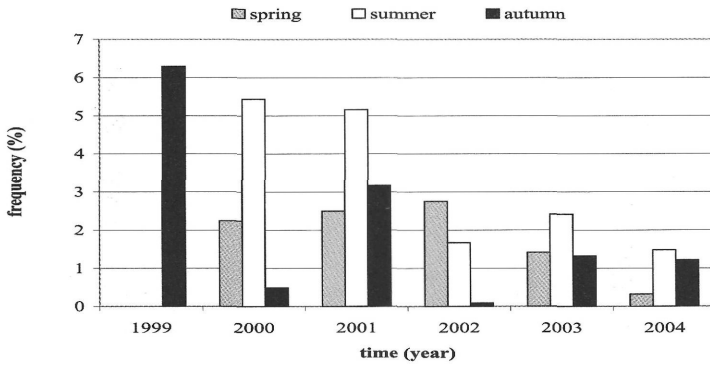


Fig. 20.: The frequency of *Gymnocephalus baloni* seasonally between 1999-2004

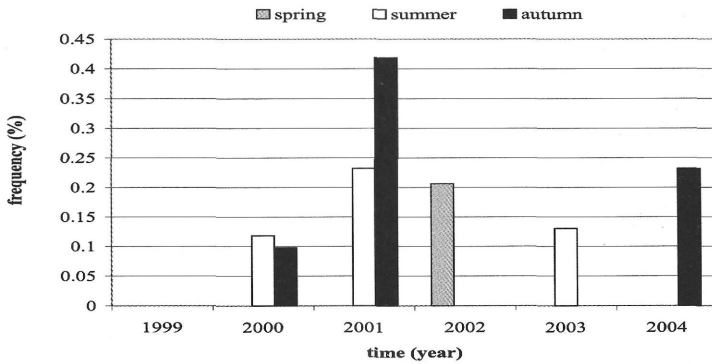


Fig. 21.: The frequency of *Zingel zingel* seasonally between 1999-2004

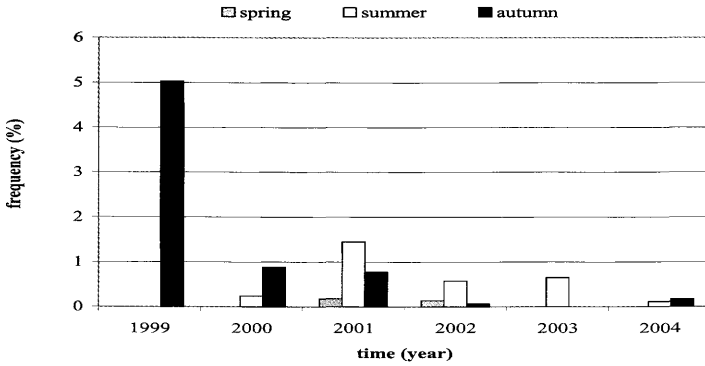


Fig. 22.: The frequency of *Zingel streber* seasonally between 1999-2004

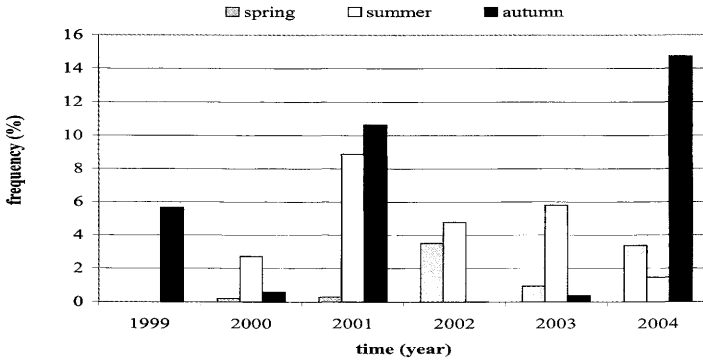


Fig. 23.: The frequency of *Proterorhinus marmoratus* seasonally between 1999-2004

Tubenose goby - Proterorhinus marmoratus (Pallas, 1814)

A pontocaspic faunistic element in expansion, with an increasing population also in the Drava. Increase in 2001 was especially good, as specimens of the age 0+ been caught in great quantities at several of the sampling sites. A stable, self-sustaining population lives in the Drava, confirmed by the number of specimens found: in 1999 39 specimens, in 2000 71 specimens, in 2001 351 specimens, in 2002 135 specimens, in 2003 106 specimens were caught; the high number of the year 2001 is explained by catching many young ones. It is also worth mentioning that previously it was found upstream the river only until Barcs, but in 2003 it appeared also near Vízvár. The maximum of its frequency was reached in 2004: 8,9%, with 288 specimens (Fig. 19). Its national protection was justified by the suggestion to include it in the Annexes to the Habitat Directive, which was finally not approved because of its invasive nature.

Characteristics of the fish fauna

The quality composition of the fish fauna is determined by the number of species, the quantity composition is determined by frequency of the species. The objective of fish-

faunistic researches is to regularly collect fishes in large quantities, but also the identification of the specimens. Because of the economic importance of fishes, catching fish is regulated by legislation, which he also had to respect during the survey.

The rapid current and the meandering bed of the Drava is like epipotamon, favouring primarily species living on the level of nase and barbel, therefore its fauna consists of mainly reophil species, preferring rapid currents, such as the dace (*Leuciscus cephalus*), the nase (*Chondrostoma nasus*), the riffle minnow (*Alburnoides bipunctatus*), the barbel (*Barbus barbus*), the white-finned gudgeon (*Gobio albipinnatus*), the Danubian roach (*Rutilus pigus virgo*), the Balon's ruffe (*Gymnocephalus baloni*), the East European bream (*Vimba vimba*), the burbot (*Lota lota*), the bullhead (*Cottus gobio*), the streber (*Zingel streber*). In addition to the above listed species, other endangered endemic species preferring rapid currents are also represented with smaller populations, such as the Danubian gudgeon (*Gobio uranoscopus*), the Kessler's gudgeon (*Gobio kessleri*), the stone loach (*Barbatula barbatula*) and the zingel (*Zingel zingel*).

Besides reophil species, almost the same numbers of eurytop species easily adopting to lotic and lenitic conditions as well were found, such as the bleak (*Alburnus alburnus*), the roach (*Rutilus rutilus*), the Prussian carp (*Carassius gibelio*), the bitterling (*Rhodeus amarus*), the tubenose goby (*Proterorhinus marmoratus*), the pike (*Esox lucius*), the silver bream (*Abramis bjoerkna*) and the perch (*Perca fluviatilis*).

In addition these species, significant populations of adventive species with a broad range of tolerance are also present, such as the false rasbora (*Pseudorasbora parva*) and the pumpkinseed (*Lepomis gibbosus*).

In some of the deadbeds and tributaries earlier separated, stagnophil species preferring marshland habitats can also find appropriate living conditions, and occasionally can be drifted to the main riverbed, such as the rudd (*Scardinius erythrophthalmus*), the tench (*Tinca tinca*) and the European mudminnow (*Umbra krameri*).

In the main riverbed of the Drava, reophil species are dominant, which is partly due to the favourable breeding conditions. This statement is also supported by the high number of young specimens of reophil species. In the tributaries, depending on currents, eurytop species prevail over reophil species. Stagnophil species preferring marshy habitats were represented in the smallest proportion.

Expressing the natural value of the fish fauna

GUTI (1993, 1995) developed a system to express the nature conservation status of domestic fish species, using the categories of IUCN. Based on the suggested system, our natural waters can be qualified by the nature conservation status of the species, expressing their relative and absolute natural value. The absolute natural value (T_A) of the fish fauna is made up of the scale of value of the faunistic elements and the number of endemic species; relative natural value (T_R) is the absolute natural value (T_A) divided by the number of faunistic elements with an assigned scale of value (GUTI 1993, 1995).

$$\text{Absolute natural value: } T_A = 4n_E + 3n_V + 2n_R + n_A + 0n_{in} + n^*$$

$$T_A = 4 \cdot 4_E + 3 \cdot 13_V + 2 \cdot 18_R + 14_T + 0 \cdot 7_X + 9^* = 16 + 39 + 36 + 14 + 0 + 9 = 114$$

$$\text{Relative natural value: } T_R = \frac{T_A}{n_E + n_V + n_R + n_A + n_{in}}$$

$$T_R = \frac{114}{4_E + 13_V + 18_R + 14_A + 7_{in}} = \frac{114}{56} = 2,036$$

If the natural value of the fauna is quantified, the absolute natural value (T_A) mainly reflects the number of endangered fish species, while relative natural value (T_R) reflects their proportion.

Based on the scale of value, all faunistic elements, of which the presence in the Drava is verified (the table does not contain the species listed in literature), were classified, together with the corresponding scale of value, as summarized in Table 3.

Based on Table 3, the absolute and relative natural value of the fish fauna of the Drava has been defined. The species list in the table has been compiled using the nomenclature of KOTTELAT (1997) and the taxonomic order of NELSON (1984). As a comparison, the absolute (T_A) and relative natural value (T_R) of some other national waters are also shown, based on the book of GYÖRE (1995) (Table 4).

Discussion

Based on relevant literature and own survey, the recent fish faunistic list of the Drava has been compiled, illustrated in Table 1. Data from literature and from own surveys are shown separately. Thus the regular or occasional occurrence of 63 species is presumable. The number of species under nature conservation protection is 23, out of which 5 species has a high protection status (Ukrainian brook lamprey - *Eudontomyzon mariae*, Danube salmon - *Hucho hucho*, European mudminnow - *Umbra krameri*, zingel - *Zingel zingel*, streber - *Zingel streber*).

22 of the species are listed in the Annexes to the Habitat Directive. The value of the fish fauna is further increased by 9 endemic faunistic element of the Danube catchment area (roach - *Rutilus pigus virgo*, Danubian gudgeon - *Gobio uranoscopus*, Kessler's gudgeon - *Gobio kessleri*, Danube salmon - *Hucho hucho*, European mudminnow - *Umbra krameri*, Balon's ruffe - *Gymnocephalus baloni*, striped ruffe - *Gymnocephalus schraetser*, zingel - *Zingel zingel*, streber - *Zingel streber*).

Legend to Table 3:

E: *Endangered*: The population decreased during the 20th century, the species could be occasionally seen in the last decade. The size of the population and the extension of its habitat are supposedly under the critical level. The species faces extinction - scale of value: 4

V: *Vulnerable*: The species has some habitats, but the number of specimens is decreasing and the habitats decline. If the factors causing the decline of the population become constant, it is classified under category "disappearing" - scale of value: 3

R: *Rare*: Generally the species can be found in small numbers and in specific habitats. Unlike the previous categories, it is potentially endangered. In case its habitats decline, it is classified under category "endangered" - scale of value: 2

A: *Abundant*: Specimens can be found in the majority of natural waters in large numbers, living in different habitats. Relatively resistant to anthropogenic impacts, but if natural supplies are not sufficient, it falls under category "rare" - scale of value: 1

In: *Introduced*: Species introduced in the Carpathian basin deliberately or accidentally during the last 100 years, with steady self-sustaining populations - scale of value: 0

Im: *Immigrant*: Occasionally occurring species, living Europe-wide, which presumably had no self-sustaining population in domestic waters.

*: *Endemic*: Endemic faunistic element of the catchment area of the Danube

Table 3. The endangered status and nature conservation scale of value of fish species of the Drava

No.	Scientific name	Endangered status	Nature conservation value
1	<i>Eudontomyzon mariae</i>	E	4
2	<i>Acipenser nudiiventris</i>	E	4
3	<i>Acipenser ruthenus</i>	R	2
4	<i>Anguilla anguilla</i>	Im	-
5	<i>Rutilus rutilus</i>	A	1
6	<i>Rutilus pigus virgo</i>	V*	4
7	<i>Ctenopharyngodon idella</i>	In	0
8	<i>Scardinius erythrophthalmus</i>	A	1
9	<i>Leuciscus leuciscus</i>	R	2
10	<i>Leuciscus cephalus</i>	A	1
11	<i>Leuciscus idus</i>	R	2
12	<i>Aspius aspius</i>	R	2
13	<i>Leucaspis delineatus</i>	V	3
14	<i>Alburnus alburnus</i>	A	1
15	<i>Alburnoides bipunctatus</i>	V	3
16	<i>Abramis bjoerkna</i>	A	1
17	<i>Abramis brama</i>	A	1
18	<i>Abramis sapa</i>	R	2
19	<i>Vimba vimba</i>	V	3
20	<i>Chondrostoma nasus</i>	R	2
21	<i>Tinea tinea</i>	R	2
22	<i>Barbus barbus</i>	A	1
23	<i>Gobio gobio</i>	A	1
24	<i>Gobio albipinnatus</i>	R	2
25	<i>Gobio uranoscopus</i>	E*	5
26	<i>Gobio kessleri</i>	V*	4
27	<i>Pseudorasbora parva</i>	In	0
28	<i>Rhodeus amarus</i>	A	1
29	<i>Carassius carassius</i>	R	2
30	<i>Carassius gibelio</i>	A	1
31	<i>Cyprinus carpio</i>	A	1
32	<i>Hypophthalmichthys molitrix</i>	In	0
33	<i>Misgurnus fossilis</i>	R	2
34	<i>Cobitis elongatoides</i>	R	2
35	<i>Sabanejewia bulgarica</i>	V	3
36	<i>Barbatula barbata</i>	R	2
37	<i>Ameiurus nebulosus</i>	In	0
38	<i>Ameiurus melas</i>	In	0
39	<i>Silurus glanis</i>	R	2
40	<i>Esox lucius</i>	A	1
41	<i>Umbra krameri</i>	V*	4
42	<i>Hucho hucho</i>	E*	5
43	<i>Salmo trutta m. fario</i>	R	2
44	<i>Lota lota</i>	V	3
45	<i>Cottus gobio</i>	V	3
46	<i>Lepomis gibbosus</i>	In	0
47	<i>Micropterus salmoides</i>	In	0
48	<i>Perca fluviatilis</i>	A	1
49	<i>Gymnocephalus cernuus</i>	A	1
50	<i>Gymnocephalus baloni</i>	R*	1
51	<i>Gymnocephalus schraetser</i>	V*	4
52	<i>Sander lucioperca</i>	R	2
53	<i>Sander volgensis</i>	V	3
54	<i>Zingel zingel</i>	V*	4
55	<i>Zingel streber</i>	V*	4
56	<i>Neogobius fluviatilis</i>	R	2
57	<i>Proterorhinus marmoratus</i>	R	2

Table 4.: Absolute and relative natural value of the fish fauna of some natural waters on the basis of the book of GYÖRE (1995), including own data (in decreasing order based on the absolute natural value (T_A)).

Water	Author	Natural value	
		Absolute (T_A)	Relative (TR)
Tisza	Györe 1995	120	2,034
Drava	Sallai+Anglers' data	114	2,036
Drava	Sallai 2002	111	2,018
Duna	Guti 1995	112	1,931
Upper-Tisza	Györe et al. 1995	98	2,279
Rába	Harka 1992	90	1,800
Tisza Lake	Györe 1995	88	1,660
Mura	Sallai 1999	84	1,953
Bodrog	Harka 1992	64	1,778
Hármas-Körös	Györe 1988	58	1,634
Maros	Nalbant 1995	56	1,647
Sajó	Harka 1992	54	1,800
Hortobágy-Berettyó	Sallai 1996	51	1,378
Túr	Harka 1994	50	1,428
Zagyva	Harka 1989	47	1,566
Hernád	Harka 1992	43	2,047
Balaton	Bíró 1993	43	1,303
Fertő Lake	Guti 1990	34	1,308

We carried out fishfaunistical monitoring activities in the Hungarian segment of the Drava River between 1999 and 2004. A small-capacity, pulsating direct current electric fishing machine with rechargeable battery has been used for the surveys.

During the monitoring surveys, in 1999 159 specimens, in 2000 2.356 specimens, in 2001 5.081 specimens, in 2002 7.735 specimens, in 2003 4.089 specimens, and in 2004 3.229 specimens were caught and identified. The altogether 22.649 fish specimen represented 44 species.

As our knowledge on the river was insufficient, fishfaunistical data was collected in other types of habitats, in side arms, the main channel and backwater arms as well, beyond the monitoring sites. In addition, our own data was complemented with verified data supported by evidence species or picture documentation regarding the occurrence of species, and also with catching data from the Fishery Database, so the presence of altogether 57 species has been confirmed. Out of the 57 species of verified occurrence, 23 species have nature conservation status. 5 of these protected species have highest level protection status (Ukrainian brook lamprey - *Eudontomyzon mariae*, Danube salmon (*Hucho hucho*), European mudminnow - *Umbra krameri*, zingel - *Zingel zingel*, streber - *Zingel streber*). Out of the identified species 22 species are listed in the Annexes of the Habitat Directive. Based on the number of species found, the absolute natural value (T_A : 114) and relative natural value (TR: 2,036) of the fish fauna was defined. The high absolute natural value of the Drava (114) clearly reflects the proportion of endangered species.

Based on relevant literature and own survey, the recent fish faunistic list of the Drava has been compiled; based on this list, the regular or occasional occurrence of 63 species is presumable. Compared to previously published species list, we have recorded 8 species in the Hungarian segment of the Drava: Ukrainian brook lamprey (*Eudontomyzon mariae*), riffle minnow (*Alburnoides bipunctatus*), Danubian gudgeon (*Gobio uranoscopus*), Kessler's gudgeon (*Gobio kessleri*), Bulgarian loach (*Sabanejewia bulgarica*), stone loach (*Barbatula barbatula*), European mudminnow (*Umbra krameri*), monkey goby (*Neogobius fluviatilis*). Out of the recorded species, 22 are listed in the annexes to the Habitat Directive.

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A Dráva magyarországi szakaszának halfaunisztikai célú monitorozása (1999-2004)

SALLAI ZOLTÁN & KONTOS TIVADAR

1999-2004 között halfaunisztikai célú monitorozást végeztünk a Dráva folyó magyar szakaszán. A vizsgálathoz kisteljesítményű, pulzáló egyenáramot előállító, akkumulátoros rendszerű elektromos halászgépet használtunk.

A monitoring jellegű vizsgálatok során az 1999-es évben összesen 159, 2000-ben 2356, 2001. évben 5081, 2002-ben 7735, 2003-ban 4089, míg 2004-ben 3229 halegyedet fogtunk és határoztunk meg. Az eddig fogott 22649 halpéldány összesen 44 fajt képviselt.

Mivel a folyóról rendelkezésre álló eddigi ismereteink meglehetősen hiányosak voltak, a monitoring helyeken kívül, más jellegű élőhelyeken és végeztünk halfaunisztikai célú adatgyűjtéseket, mellékágakban, holtmedrekben és a főágban egyaránt. Továbbá saját adatainkat kiegészítettük horgászoktól származó, bizonyító példánnyal vagy képdokumentációval hitelesített fajok előfordulási adataival, valamint a Halászati Adattárban lévő fogási adatokkal, így összesen 57 faj jelenlétét tudtuk eddig bizonyítani. Az 57 bizonyított előfordulási fajból 23 faj természetvédelmi oltalom alatt áll. A természetvédelmi oltalom alatt álló fajok közül 5 faj fokozottan védett (dunai ingola - *Eudontomyzon mariae*, galóca - *Hucho hucho*, lápi póc - *Umbra krameri*, magyar bucó - *Zingel zingel*, német bucó - *Zingel streber*). A megállapított fajszám alapján kifejeztük a halfauna abszolút (TA: 114) és relatív természeti értékét (TR: 2,036). A Dráva halfaunájának magas (114) abszolút természeti értéke hűen tükrözi az előforduló veszélyeztetett fajok magas arányát.

Szakirodalmi és saját adatok alapján összeállítottuk a folyó recens faunalistáját, mely alapján összesen 63 faj alkalmi vagy rendszeres előfordulása valószínűsíthető a Drávában. A korábbi publikált fajlistákhoz képest új fajként sikerült a Dráva magyar szakaszáról kimutatnunk eddig 8 fajt, melyek a következők: dunai ingola (*Eudontomyzon mariae*), sujtásos küsz (*Alburnoides bipunctatus*), felpillantó küllő (*Gobio uranoscopus*), homoki küllő (*Gobio kessleri*), kőfűrös csík (*Sabanejewia bulgarica*), kövicsík (*Barbatula barbatula*), lápi póc (*Umbra krameri*), folyami géb (*Neogobius fluviatilis*). A megállapított fajszámból 22 faj a Habitat Directive függelékeiben is megtalálható.