Researches on the fish fauna in some SCIs Natura 2000 from Romania

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Abstract. In the autumn 2010 the fish fauna of water basins from 12 sites of community interest (SCI) Natura 2000 were investigated as follows: river Mureș (ROSCI0108 Lunca Mureșului Inferior), river Timiș (ROSCI0109 Lunca Timișului), rivers Târg, Argeșel and Râușor (ROSCI0381 Râul Târgului-Argeșel-Râușor), river Nera (ROSCI0031 Cheile Nerei – Beușnița), river Ialomița (ROSCI0290 Coridorul Ialomiței), river Little Danube (ROSCI0173 Pădurea Stârmina), river Suceava (ROSCI0379 Râul Suceava), Danube-Black Sea channel (ROSCI0398 Straja-Cumpăna), valleys Argel and Moldovița (ROSCI0328 Obcinele Bucovinei), river Siret (ROSCI0162 Lunca Siretului Inferior), Casimcea valley (ROSCI0215 Recifii Jurasici Cheia) and Danube (ROSCI0044 Corabia-Turnu Măgurele). The researches were focused on the fish species of community interest (Annex II of Habitat Directive), its position in the ichthyocoenose (numerical abundance, biomass) and anthropic disturbances. In investigated area 15 species of community interest were found while in the Form SCIs 20 ones are included. Concerning the ecological parameters used, in Alpine bioregion (ROSCI0381 and ROSCI0328) *Cottus gobio* and *C. poecilopus* were dominant while in Continental bioregion *Barbus meridionalis* and *Romanogobio spp.* were dominated. Regarding to anthropic impact, it have to be mention disturbance due to water pollution especially by wastes, the built dams, ballast and forestry exploitation.
Key words: ichthyofauna, abundance, biomass, anthropic impact, Romanian SCIs.

Introduction. The implement of “Natura 2000” network in Romania was a condition of EU integration (Brânzan 2013). Thus, Romanian Ministry of Environment promoted by authoritative acts 273 sites of community interest (SCIs) which occupy 13.21% from Romania surface in 2007, but after revision since 2011 more sites were enlarged in surface and also new sites were designated thus reaching to 383 SCIs, occupying 16.76% from Romania surface (Brânzan 2013) according to Romanian Order 2387/2011 modifying Order 1964/2007. These sites contain 26 fish species of community interest for Romania. The 12 chosen SCIs contain water bodies in which 20 species of community interest were listed from literature (Bănărescu 1964, 1965, 1993, 1994, 2005; Tatole et al 2009): *Alosa immaculata*, *Eudontomyzon mariae, E. vladykovi* (Bănărescu 1969), *Aspius (Leuciscus) aspius, Barbus meridionalis* (4 species of *B. meridionalis* in Romania) (Kotlik et al 2002; Iftime 2004; Antal et al 2015), *Cobitis elongata, C. elongatoides, C. taenia* (Nalbant 1993, 1994, 2003), *Cottus gobio, Romanogobio vladykovi* (*Gobio albipinnatus*), *R.* (*Gobio*) *kessleri, R.* (*Gobio*) *uranoscopus* (Nowak et al 2008), *Gymnocephalus baloni, Gymnocephalus schraetser, Misgurnus fossilis, Pelecus cultratus, Rhodeus amarus, Sabanejewia balcanica* (*S. aurata*), *S. bulgarica* (*S. aurata*), *Zingel streber*, *Zingel zingel* (in accordance with the nomenclature adopted under the Habitats Directive species lists). Most records are based on relatively old data from the literature, considering as necessity that the next step to consist in monitoring of these species in the field in order to assess the actual status of these ones and adopting the most appropriate measures for their protection. Thus, in 2007 started a project entitled "Scientific validity of a model law enforcement Nature 2000 in Romania, taking as a study case the animal species listed in the Habitats Directive no. 92/43/EEC", with the holder Museum of Natural History "Grigore Antipa", and Danube Delta National Institute

Tulcea as cooperating part. The present study was based on this project, after first article with fish fauna from Banat (Romania) (Otel & Nastase 2010).

Material and Methods. The research was conducted during September-October 2010 in twelve sites Natura 2000: river Mureș (ROSCI0108 Lunca Mureșului Inferior), river Timiș (ROSCI0109 Lunca Timișului), rivers Târg, Argeșel and Râușor (ROSCI0381 Râul Târgului-Argeșel-Râușor), river Nera (ROSCI0031 Cheile Nerei – Beușnița), river Ialomița (ROSCI0290 Coridorul Ialomiței), river Little Danube (ROSCI0173 Pădurea Stârmina), river Suceava (ROSCI0379 Râul Suceava), Danube-Black Sea channel (ROSCI0398 Straja-Cumpăna), valleys Argel and Moldovița (ROSCI0328 Obcinele Bucovinei), river Siret (ROSCI0162 Lunca Siretului Inferior), Casimcea valley (ROSCI0215 Recifii Jurasici Cheia) and Danube (ROSCI0044 Corabia-Turnu Măgurele) (Figure 1).

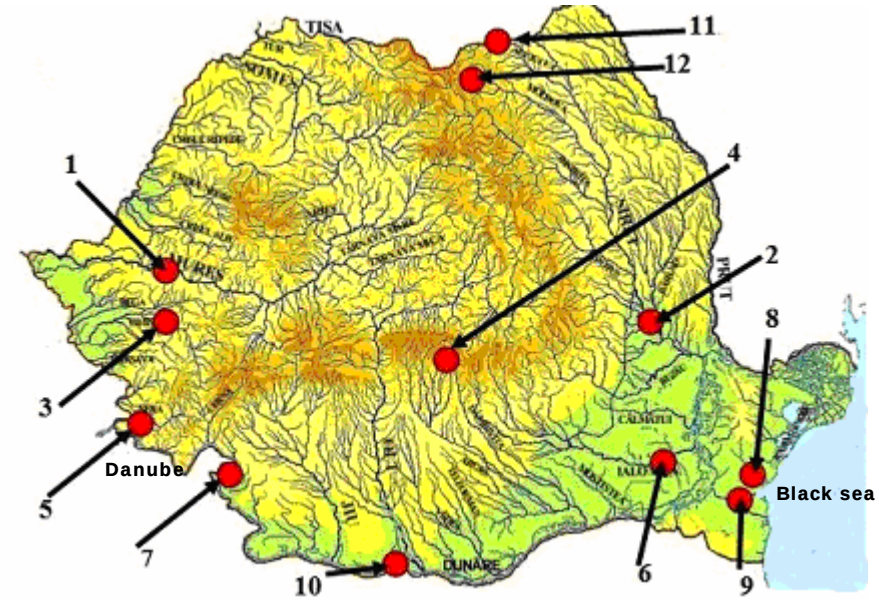


Figure 1. Location of the 12 SCI Natura 2000 fish sampling in Romania. 1 - Lower Mureş Defile (Mureş river), 2 - Lower Siret Valley (Siret river), 3 - Timiş Meadow (Timiş river), 4 - Târg-Argeşel-Râuşor rivers (Râușor, Argeşel, Târg rivers), 5 - Nera-Beuşniţa keys (Nera river), 6 - Ialomita corridor (Ialomiţa river), 7 - Stârmina (Little Danube river), 8 - Jurrasic reefs from Cheia (Casimcea river), 9 - Straja-Cumpăna (Danube-Black Sea channel), 10 - Corabia–Turnu Măgurele (Danube), 11 - Suceava river (Suceava river and tributaries), 12 - Bucovina hills (Moldoviţa river and tributaries).

Depending on the morphology of water bodies and the flow velocity, we used different gear for fish sampling as follows: an inflatable boat of 2-person, gill nets sets of 30 m in each category, respectively of bleak (mesh side 12 mm), roach (mesh side 20 mm), vimba bream (mesh side 40 mm), shad (mesh side 30 mm), carp (mesh side 50 mm) and Nordic gillnets (with 12 panels 2.5 m each panel, with multiple meshes size 6-55 mm), also electric fishing device SAMUS 725MP with accumulator 12V and 5-60 Amps output 600 W also with downstream river seine nets for collected all individuals which may escape from electric fishing (Figure 2) Also angling and data from local fishermen were used. Electric fishing was carried out on day and gillnets fishing on night (12 hours stationary) or drifting in day time. It was assessed the presence of community interest species (Habitats Directive no. 92/43/EEC), quantitative structure (numerical abundance and biomass), specimen dimensions, overall status of aquatic habitats in terms of existing anthropogenic pressures.

The camps were installed as close as to the banks of water bodies (Figure 2), about the middle sites. At each site, we performed fishing at least one point (approximately to the middle of SCI sites) or in two points each with a length of approx. 100 m river beds (according to the methodology specified in the Habitats Directive no. 92/43/EEC).

Figure 2. Fish sampling used: lectric fishing (up and down left) and gillnets sets (up right), near camp (original).

The catch was sorted by species (Figure 3) (fish identification after Bănărescu [1964] with updates after Bănărescu [1994, 2004], Nalbant [2003], Lelek [1987], Kottelat [1997], Kottelat & Freyhof [2007], Froese & Pauly [2016]); weighing and measuring of lengths were performed.

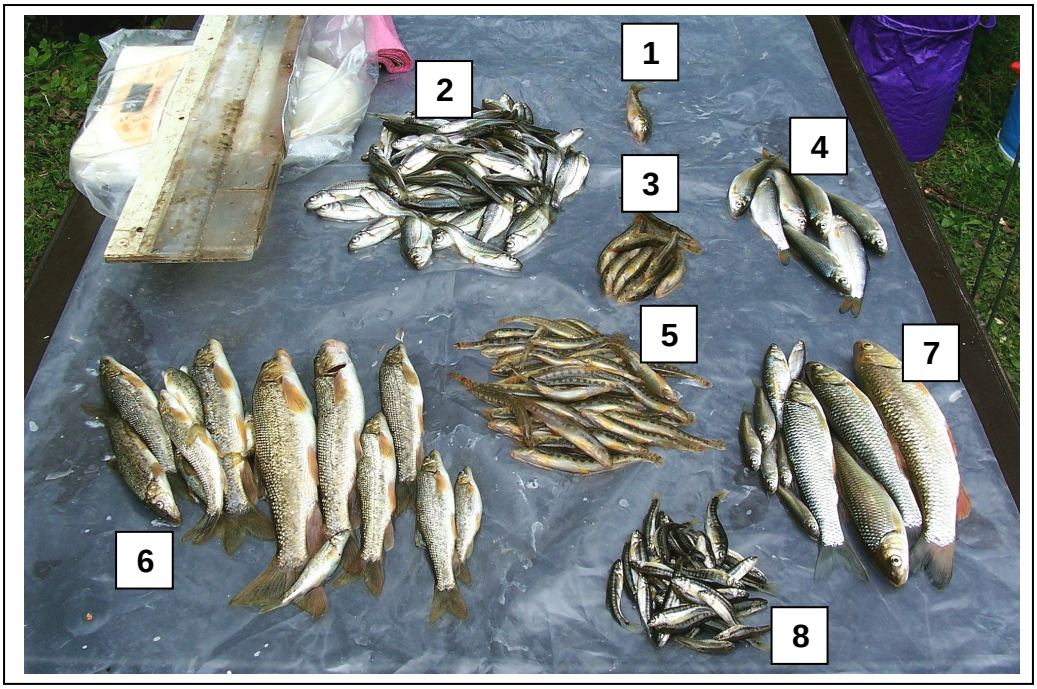


Figure 3. Fish species identification, numbered and measurements in length and biomass at electric fishing: 1 - *Gobio sp.*, 2 - *Alburnoides bipunctatus*, 3 - *Barbatula barbatula*, 4 - *Chondrostoma nasus*, 5 - *Sabanejewia (aurata) balcanica*, 6 - *Barbus meridionalis*, 7 - *Squalius cephalus*, 8 - *Phoxinus phoxinus* (original).

The numerical abundances and biomass were determinates to each species and site, in order to find the status of species in the fish community. After work field measurements, the remaining individuals were released into the river. It was also pursued human impact.

Few specimens were collected in preserved liquid for more detailing taxonomical analysis for species for which we had doubts of correct identification, according to the latest systematic reviews.

Results and Discussion. In Romania are listed from literature 38 fish species which are included in Habitats Directive no. 92/43/EEC and in addition there are other 12 species protected by Romanian Law OUG 57/2007, total meaning 50 protected fish species present in Romania. In this article we are looking for fish species of community interest (Annex II from DH/1992 and Annex 3/OUG 57/2007, approved by 49/2011 Law) meaning 31 fish species in European and Romanian laws, but only 26 are really found in Romania; 1 species split in two and 4 species never captured or few individuals captured many years ago, now missing, shady are uncounted in Table 1.

In that 12 studied SCI sites it is assumed that there are found 15 species of community interests (bold in Table 1) which are IN MOD means for a better representation needs extending or new SCIs in Romania. In the field sampling were captured 15 fish species of community interest but not the same species: have not been captured in 2010 *Eudontomyzon danfordi, E. mariae, E. vladykovi* and *G. schraetser* (the last one was captured in 2008 in Timis river Otel & Năstase (2010), instead were captured *Alosa immaculata, C. gobio* and *S. aurata* split in two species *(S. aurata bulgarica* and *S. aurata balcanica* with visible differences body drawing between them in sense *S. bulgarica* has fewer black dots in midlateral row then *S. balcanica* [Figure 4]), moreover our proposal for introduction in DH as fish species community interest *Cottus poecilopus* was captured (Table 2).

Sabanejewia (aurata) balcanica *Sabanejewia (aurata) bulgarica*

Figure 4. Morphological differences between *Sabanejewia (aurata*) *balcanica* left and *Sabanejewia (aurata) bulgarica* right (original).

In 2010 sampling program of 12 SCIs captured/observed 51 fish species, from what 15 Community interest species (Table 2): in Lower Mureş river from 13 captured fish species 5 are community interest, in Lower Siret river from 17 fish species 2 are community interest, in Timiş river from 13 fish species 3 are community interest, in Târg-Argeşel-Râuşor rivers from 4 fish species 1 are community interest, in Nera river from 15 fish species 6 are community interest, in Ialomita river from 6 fish species 0 are community interest, in Little Danube river from 14 fish species 3 are community interest, in Casimcea river from 4 fish species 0 are community interest, in Danube-Black Sea canal from 13 fish species 2 are community interest, in Danube river (Corabia-Turnu Măgurele) from 28 fish species 7 are community interest, in Suceava river and tributaries from 17 fish species 6 are community interest, in Moldoviţa river and tributaries from 10 fish species 2 are community interest (Table 2).

Table 1

Fish species from Romania included in DH/1992 and Romanian law OUG 57/2007

No.	Species	DH/1992			OUG 57/2007					Presence in Romania
		Year 2	Year 4	Year 5	**Year 3**	Year 4A	Year 4B	Year 5A	Year 5B	
1	*Acipenser gueldenstaedtii*			1				1		P
2	*Acipenser nudiventris*			1				1		D
3	*Acipenser ruthenus*			1				1		P
4	*Acipenser stellatus*			1				1		P
5	*Acipenser sturio*	1	1			1		1		D
6	*Alburnus (Chalcalburnus) chalcoides*	1			1					VR
7	***Alosa immaculata (A. pontica)***	**1**		**1**	**1**			**1**		**P**
8	*Alosa maeotica*	1		1				1		N
9	*Alosa tanaica (A. caspia nordmanni)*	1		1	1			1		P
10	***Leuciscus (Aspius) aspius***	**1**		**1**	**1**					**P**
11	***Barbus meridionalis***	**1**		**1**	**1**			**1**		**P**
12	*Barbus barbus*			1				1		P
13	*Carassius carassius*						1			P
14	***Cobitis elongata***	**1**			**1**					**P**
15	***Cobitis elongatoides (C. taenia)***	**1**			**1**					**P**
16	***Cottus gobio***	**1**			**1**					**P**
17	*Cottus poecilopus*						1			P
18	*Eudontomyzon danfordi*	1			1					P
19	*Eudontomyzon mariae*	1			1					P
20	*Eudontomyzon vladykovi*	1			1					VR
21	*Gymnocephalus baloni*	1	1		1	1				P
22	*Gymnocephalus schraetser*	1		1	1					P
23	*Hucho hucho*	1		1	1		1			VR
24	*Huso huso*			1				1		P
25	*Leuciscus souffia*	1			1					VR
26	*Lota lota*						1			P
27	*Mesogobius batrachocephalus*								1	P
28	***Misgurnus fossilis***	**1**			**1**					**P**
29	***Pelecus cultratus***	**1**		**1**	**1**					**P**
30	*Percarina demidofii*						1			P
31	*Petroleuciscus borysthenicus*						1			P
32	*Ponticola eurycephalus (Neogobius cephalarges)*								1	P
33	*Ponticola (Neogobius) syrman*						1			P
34	*Proterorhinus marmoratus*						1			P
35	***Rhodeus amarus (R. sericeus amarus)***	**1**			**1**					**P**
36	*Romanichthys valsanicola*	1	1				1			VR
37	***Romanogobio vladykovi (Gobio albipinnatus)***	**1**			**1**					**P**
38	***Romanogobio (Gobio) kessleri***	**1**			**1**					**P**
39	***Romanogobio (Gobio) uranoscopus***	**1**			**1**					**P**
40	*Rutilus frisii*	1		1						N
41	*Rutilus pigus*	1		1	1			1		VR
42	***Sabanejewia bulgarica (S. aurata)***	**1**			**1**					**P**
43	***Sabanejewia balcanica (S. aurata)***	**1**			**1**					**P**
44	*Sander volgensis (Stizostedion volgensis)*						1			P
45	*Scardinius racovitzai*						1			VR
46	*Thymallus thymallus*			1				1		P
47	*Umbra krameri*	1			1					P
48	*Zingel streber*	1			1					P
49	***Zingel zingel***	**1**		**1**	**1**	**1**		**1**		**P**
50	*Zosterisessor ophiocephalus*								1	VR
	Total	26	3	15	24	3	11	12	3	-

1 or P - fish species present, shady - uncounted, D - disappeared, VR - very rare, N - no info, uncaptured, but possible to exist. Bolded are 15 IN MOD species means for a better representation must extend or declare new SCIs in Romania.

Table 2

Richness species from 12 sampled Nature 2000 SCIs from Romania in 2010 and fish species of community interest in bold

No.	Species/Site	Danube-Black Sea channel	Ialomița river	Little Danube (Starmina)	Siret river	Lower Mures river	Nera river	Moldovița and tributaries	Suceava river	Targ-Argesel-Rausor rivers	Casimcea river	Timis river	Danube (Corabia-Turnu M.)
1	*Abramis brama*	1		1	1							1	1
2	*Abramis sapa*												1
3	*Alburnoides bipunctatus*					1	1	1	1				
4	*Alburnus alburnus*	1	1	1	1	1	1		1		1	1	1
5	***Alosa immaculata***												**1**
6	***Leuciscus (Aspius) aspius***	**1**		**1**	**1**	**1**						**1**	**1**
7	*Barbatula barbatula*							1	1				
8	*Barbus barbus*		1		1	1	1		1				1
9	***Barbus meridionalis***						**1**	**1**	**1**				
10	*Blicca bjoerkna*	1		1	1	1							1
11	*Carassius carassius*			1									
12	*Carassius gibelio*	1	1	1	1						1		1
13	*Chondrostoma nasus*		1		1	1	1	1	1			1	1
14	***Cobitis elongata***						**1**						
15	***Cobitis elongatoides (C. taenia)***								**1**				**1**
16	***Cottus gobio***						**1**			**1**			
17	*Cottus poecilopus*							1					
18	*Cyprinus carpio*	1	1	1	1							1	1
19	*Esox lucius*	1		1			1						1
20	*Gobio obtusirostris*						1						
21	*Gobio sp*						1	1	1				
22	*Gymnocephalus cernuus*				1								
23	*Hypophthalmichthys molitrix*												1
24	*Lepomis gibbosus*			1									
25	*Leucaspius delineatus*			1									1
26	*Leuciscus idus*												1
27	*Neogobius fluviatilis*				1								1
28	*Ponticola kessleri*												1
29	***Misgurnus fossilis***			**1**									
30	*Babka gymnotrachelus*										1		
31	*Neogobius melanostomus*	1											1
32	***Pelecus cultratus***					**1**							**1**
33	*Perca fluviatilis*			1	1		1		1			1	1
34	*Phoxinus phoxinus*							1	1	1			
35	*Pseudorasbora parva*								1		1		
36	***Rhodeus amarus***			**1**			**1**		**1**			**1**	**1**
37	***Romanogobio vladikovy (G. albipinnatus)***	**1**			**1**	**1**							**1**
38	***Romanogobio (Gobio) kessleri***					**1**			**1**				
39	***Romanogobio (Gobio) uranoscopus***						**1**		**1**				
40	*Rutilus rutilus*	1		1	1							1	1
41	***Sabanejewia balcanica (S. aurata)***						**1**	**1**	**1**				
42	***Sabanejewia bulgarica (S. aurata)***											**1**	**1**
43	*Salmo trutta fario*							1	1	1			

No.	Species/Site	Danube-Black Sea channel	Ialomița river	Little Danube (Starmina)	Siret river	Lower Mures river	Nera river	Moldovița and tributaries	Suceava river	Targ-Argesel-Rausor rivers	Casimcea river	Timis river	Danube (Corabia-Turnu M.)
44	*Salvellinus sp*									1			
45	*Sander lucioperca*	1			1	1						1	1
46	*Scardinius erythrophthalmus*												1
47	*Silurus glanis*	1	1	1	1	1						1	1
48	*Squalius cephalus*				1	1	1	1	1			1	
49	*Tinca tinca*												1
50	*Vimba vimba*	1			1							1	1
51	***Zingel zingel***					**1**							
	Total	13	6	14	17	13	15	10	17	4	4	13	28
	Number of community interest species	2	0	3	2	5	6	2	6	1	0	3	7

1 - present fish species.

Number of community interest species listed is bigger than what was recorded in 2010 in mostly sites, but are some SCIs where were first time recorded and added in SCI Form new fish species, but not in all investigated sites were captured fish species community interest for example in Ialomita river and Casimcea river was not found any community interest species (Figure 5). Completing with Otel & Nastase (2010) list we approach to the maximun species list present.

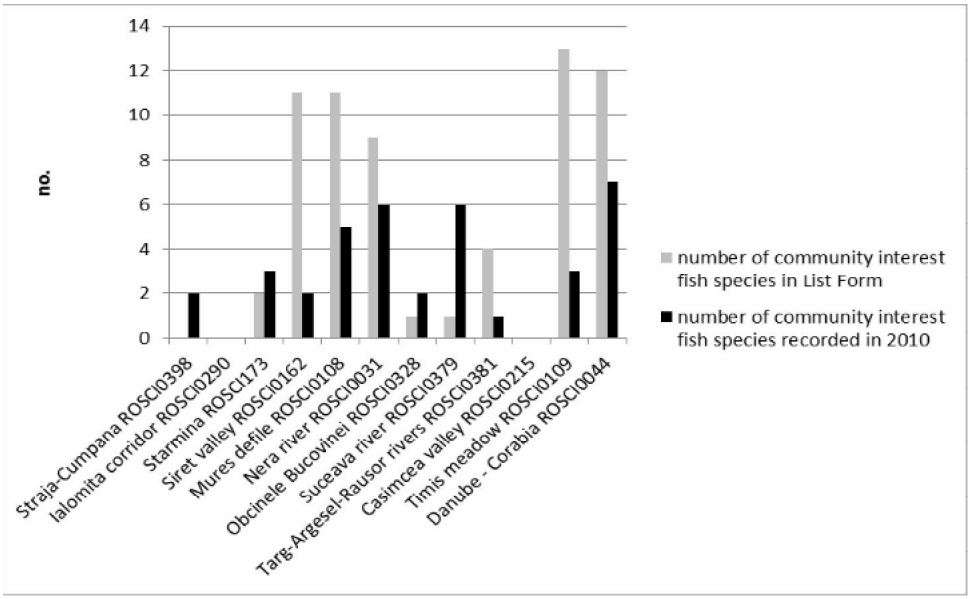


Figure 5. Species number (no.) of community interest captured in 2010 (black) and present in SCI Form (grey).

Reported of presence Community interest species in 2010 investigated SCI, completed with scientifically ichthyofauna literature, we can notice the followings:

Mureş river (ROSCI0108). The main reason for the extension of the site in the downstream Mures river, was recommendation of European Commission for enlarge area for *R. vladykovi (G. albipinnatus)* in Continental bioregion.

Old site form contains 11 species of community interest, but we recorded 5 species, including *R. vladykovi* (*G. albipinnatus)* (well represented in extended area), also present are *Zingel zingel, R. (Gobio) kessleri, Pelecus cultratus* and *Aspius aspius*. Fish fauna is dominated in abundance by *Alburnus alburnus* (bleak) and in biomass by *Barbus barbus* (Figure 6 and 7). Follow results from fish literature can be found in Hamar & Sárkány-Kiss (1995).

Timiş river (ROSCI0109). The old site was extended in Timis river to the near Lugoj locality, since in this portion was observed after approx. 5-10 years ago *E. vladykovi*. Compared to the 11 species from Community Site Form, we record 3 species in the extended area, none of them new community interest species also *E. vladykovi* was not found. Fish fauna is dominated in abundance by *Squalius cephalus, A. alburnus, Perca fluviatilis* and in biomass by *S. cephalus, Vimba vimba* and *A. alburnus* (Figure 6 and 7). Main references for the enumerated taxa: Cojocaru (2006), Bănăţean-Dunea et al (2008).

Târg - Argeşel - Râusor rivers (ROSCI0381). This new SCI was not proposed for fish, but containing three mountain rivers including a lake reservoir (hydropower), ichthyofauna inventories was required. In this site we found one species of community interest *Cottus gobio* (bullhead) the most dominant in abundance, but biomass is dominated by *Salmo trutta fario* (Figure 6 and 7). Many anthropic impacts observed included dams, rivers rocks, ballast and forestry exploitations (Figure 8).

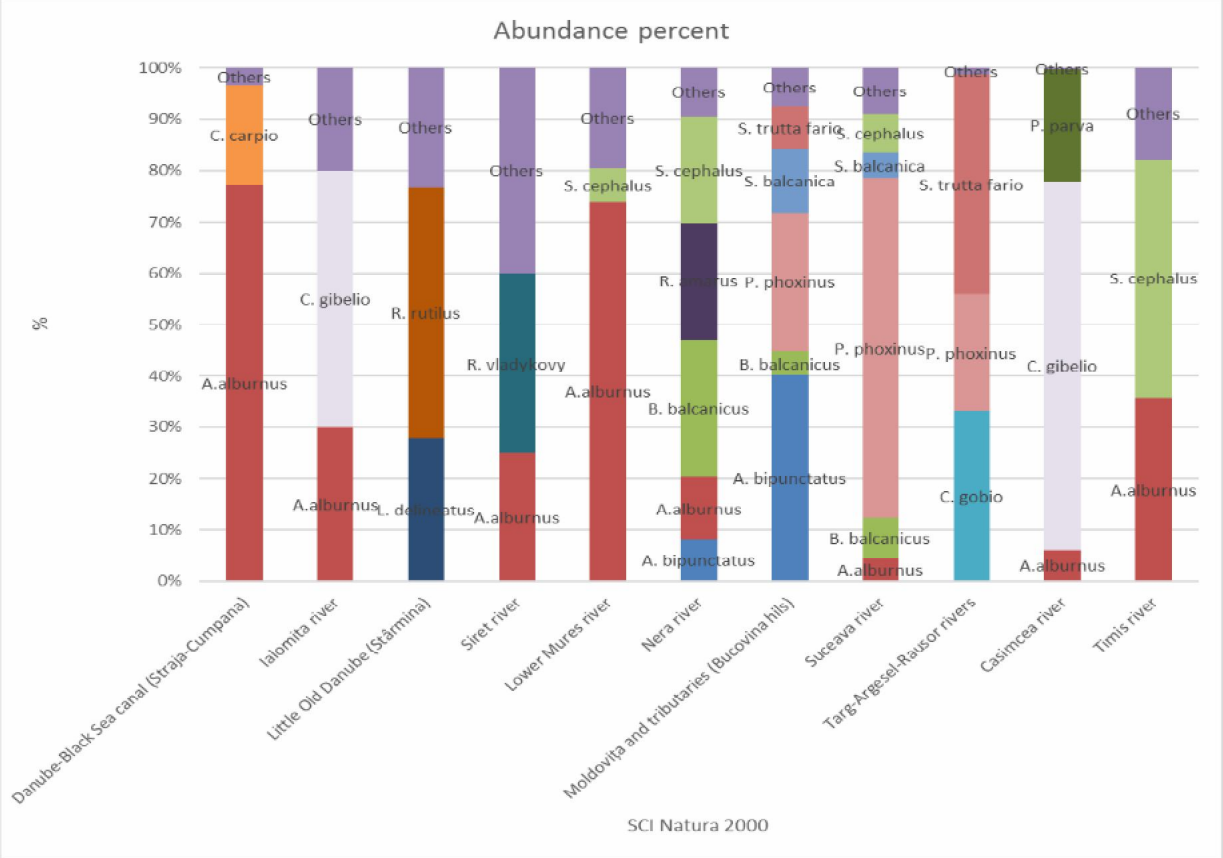


Figure 6. Abundance percent of fish species in some SCIs Natura 2000 captured in 2010.

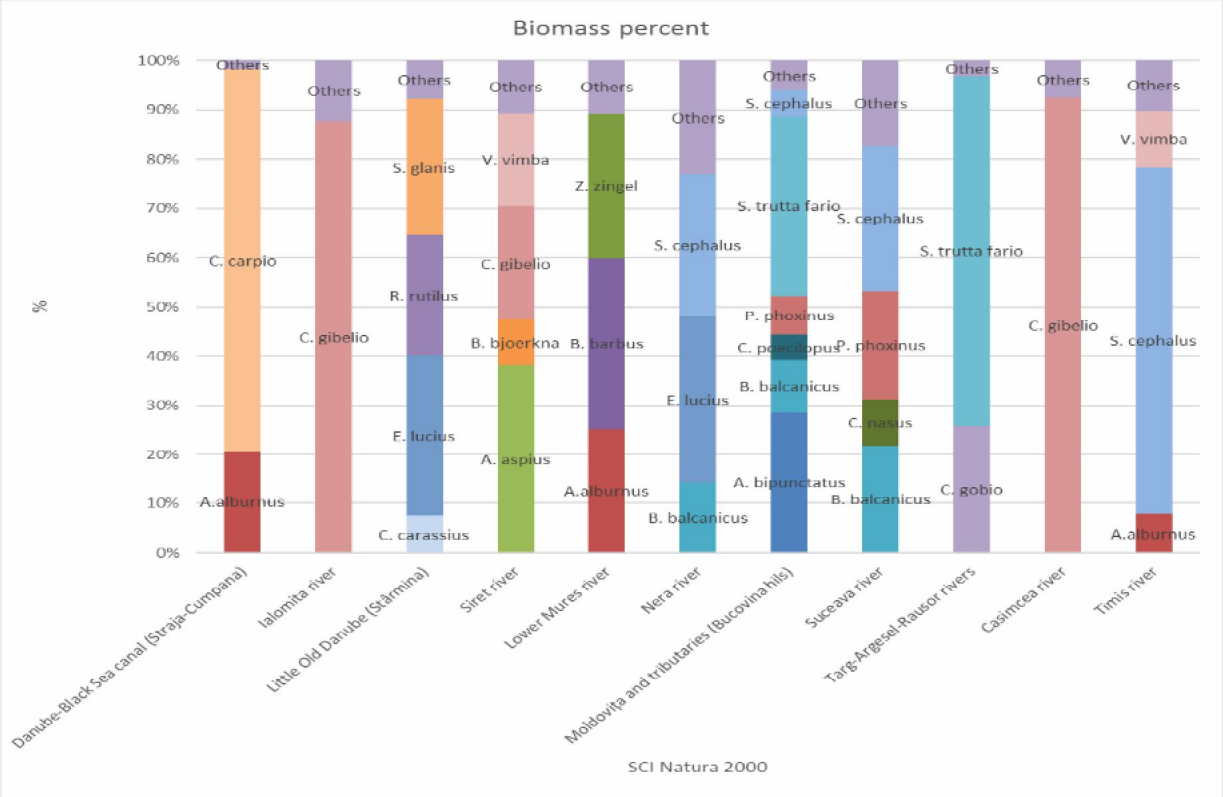


Figure 7. Biomass percent of fish species in some SCIs Natura 2000 captured in 2010.

Figure 8. Anthropic impact in some rivers (dams, rivers rocks exploitation) (original).

Nera river (ROSCI0031). For request of the European Commission to increase the protection range of species *B. meridionalis, R. kessleri, R. amarus, C. elongata* in Continental, was extended the SCI to the border Romania-Serbia. In this extended SCI we have identified 4 community interest species, but neither new compared with existing 9 community interest species from Form of SCI. Fish fauna is dominated in abundance by *B. meridionalis*, *R. amarus*, *S. cephalus, A. alburnus, Alburnoides bipunctatus* and in biomass by *Esox lucius, S. cephalus* and *B. meridionalis* (Figure 6 and 7). A guide from literature in this regard is Bănărescu & Oprescu (1971) and Oțel & Năstase (2010).

Ialomita river (ROSCI0290). This new SCI was not proposed for fish, but contain large rivers like Prahova River tributaries Ialomita and Teleajen, attempts to investigate the ichthyofauna in the river Ialomiţa. It is one of the only places we did not register any species of community interest but only a few common resistant species, situation due to intense pollution.

Little Danube (ROSCI0173) in Stârmina forest. Extended SCI is not for fish, but due to Little Danube presence was necessary to complete SCI Form with fish. Our investigations have led to the identification of 3 species of community interest, namely *L. aspius*, *R. amarus* and *M. fossilis* all species well represented. Fish fauna is dominated in abundance by *Rutilus rutilus, Leucaspius delineatus, R. amarus* and in biomass by *E. lucius, Silurus glanis, R. rutilus* (Figure 6 and Figure 7).

Suceava river (ROSCI0379). New proposal SCI for fish IN MOD in Continental for species like *E. mariae, R. uranoscopus, R. kessleri, C. taenia, S. aurata.* We recorded a total of 6 species of community interest, namely: *B. meridionalis, C. taenia, R. kessleri, R. uranoscopus, R. amarus, S. aurata*, all very well represented in SCI. Instead wasn not captured *E. mariae*. Fish fauna is dominated in abundance by *Phoxinus phoxinus, S. cephalus, S. trutta fario*, *B. meridionalis* and in biomass by *S. cephalus, B. meridionalis, P. phoxinus* and *C. nasus* (Figures 9, 6 and 7). Follow scientifically information from Ion et al (2001), Battes et al (2007).

Figure 9. Present traces of *Chondrostoma nasus* using lower lip like shovel scrape periphyton on rocks (original).

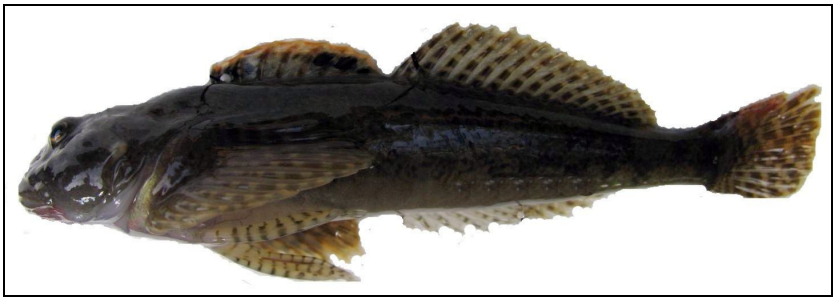
Danube-Black Sea channel (ROSCI0398) in Straja-Cumpăna. SCI not designated for fish, but having Danube-Black Sea channel which never was scientific investigated for fish fauna, we found it necessary to do so. Due to high concrete embankment slope conditions were not favorable for nets and electrofishing, using angle and direct observation to local fishermen.

However, we recorded a total of two species of community interest, namely *L. aspius* and *R. vladykovi* (*G. albipinnatus)* well represented. Fish fauna is dominated in abundance by *A. alburnus* and *Cyprinus carpio*, but in biomass by *C. carpio, Carassius gibelio* and *A. alburnus* (Figures 6 and 7).

Should be noted that the investigation of ichthyofauna in the future is only possible through travel with naval assets (boat, motor boat) with input from the Danube.

Moldoviţa rivers and tributaries (ROSCI0328) in Bucovina Hills SCI not designated for fish, but being crossed by two mountain rivers namely Argel and Moldovita, we thought it should be investigated in terms of fish fauna. According to the literature, we expected to find *E. mariae* (but were not found). We recorded two Community interest species *B. meridionalis* and *S. aurata* extremely well represented in SCI. Here we register several individuals of *C. poecilopus* (Eastern bullhead) (Figure 10) same fish family of community interest *C. gobio*, with Romanian area restricted to some mountain rivers in northern Romania mostly in Bucovina and also global area is reduced (Figure 11). Fish fauna is dominated in abundance by *A. bipunctatus, P. phoxinus* and *S. trutta fario*, but in biomass by *S. trutta fario, A. bipunctatus, and B. meridionalis* (Figures 6 and 7).

We believe that species *C. poecilopus* was not introduced in the list of Habitats Directive no. 92/43/EEC by error, therefore should be introduced either separately or in nomination that included both species *Cottus spp*. Maybe not too late to do so.



Figiure 10. *Cottus poecilopus* –present in North Romania - the southern extremity of species (original).

Figure 11. Geographical area for *Cottus gobio* (left) şi *Cottus poecilopus* (right) (after IUCN Red List maps).

Lower Siret river (ROSCI0162). Extended SCI for *L. aspius, R. amarus, R. vladykovi (G. albipinnatus), R. kessleri, C. taenia, M. fossilis*. In 2010 in this SCI has been identified 3 community interest species *L. (Aspius) aspius*, *R. vladykovi (G. albipinnatus)* and *R. (G.) kessleri* well represented in this site. Fish fauna is dominated in abundance by *R. vladykovi (G. albipinnatus)* and *A. alburnus*, but in biomass by *L. aspius, C. gibelio* and *V. vimba* (Figures 6 and 7). Follow literature in Battes et al (2004), Ureche (2008).

Casimcea valley (ROSCI0215) in Jurassic reefs Cheia SCI not designed for fish, but investigated for fish fauna being traversed by Casimcea river. Like some other river is one of the only places where we did not register any species of community interest, but both in abundance and biomass is dominated by *C. gibelio* (Figures 6 and 7).

Danube river (ROSCI0044) at Corabia-Turnu Magurele. Danube SCI extended, but regarding fish fauna *A. immaculata*, *L.s aspius, G. albipinnatus, R. amarus, C. taenia, S. aurata bulgarica, P. cultratus* species of community interest are present. For abundance and biomass structure need more work field data, Danube river being large area of study.

Conclusions

- In 2010 all 12 investigated SCI contains 15 species of community interest in comparison with the Form SCI where are found 20 community interest species.
- Advanced researchers in time and space for some SCIs (like large river Danube) and for some species capture like lamprey species (*Eudontomyzon spp.)* are necessary.
- Abundance and biomass of fish species of community interest is different from mountain to hill to plain area: *Cottus sp.* in mountain area, *B. meridionalis* in hill area, but in plain area *Gobio sp.* and *Romanogobio sp.* plus *L. (Aspius) aspius* and *Zingel spp.* to the Danube were dominated in the investigated SCIs.
- Nera river is last place in Romania with *C. elongata* survives nowadays and where it still has a numerous specimen and vigorous population.

- Interesting situation is in Nera river, where in investigated sub-mountain area, mountain fish species like *C. gobio* are sympatric with *A. alburnus*, *R. amarus, P. fluviatilis* or even *E. lucius,* which usually meet in aquatic vegetation from hill and especially in plain area.
- Looks like community interest species *C. gobio*, captured *C. poecilopus* (Eastern bullhead) is rare in Romania, in mountain rivers of northern Romania, also reduced global area can be reason to introduce *C. poecilopus* in Annex 2 of Habitate Directive.
- In some water basins of investigated SCI were built dams, exploitation of rivers rocks, ballast and forest activity have negative impacts on fish movement or water habitat disturbing pristine condition.
- Some investigated water bodies (Ialomita river) were affected by pollution which has negative impact for fish community.
- Some SCIs like Timiş meadow, where full of tourists wastes, but other sites like Nera-Beuşniţa Keys and Bucovina Hills did not appears to be affected by tourists or other human activities.

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References

Antal L., László B., Kotlík P., Mozsár A., Czeglédi I., Oldal M., Kemenesi G., Jakab F., Nagy S. A., 2015 Phylogenetic evidence for a new species of Barbus in the Danube River basin. Molecular Phylogenetics and Evolution 96:187–194.

Battes K. W., Pricope F., Ureche D., Stoica I., 2004 Ichtyophauna status in the Siret catchment area, with emphasis on the effect of the January 2001 pollution. Analele Ştiinţifice ale Universităţii "Alexandru Ioan Cuza din Iaşi", Biologie Animală, Tome 51:123-144.

Battes K. W., Pricope F., Ureche D., Stoica I., 2007 Ichthyofauna status from the Suceava catchment area from 2001 to 2005. Studii şi Cercetări, Biologie, Universitatea din Bacău, 13:11-20.

Bănărescu P., 1964 Fauna R.P.R. Vol. XIII. Pisces-Osteichthyes. Editura Academica R.P.R., Bucureşti, 962 pp.

Bănărescu P., 1965 Peşti rari şi cu areal restrâns din fauna ţării noastre şi problemele ocrotirii lor. Ocrotirea Naturii 9(1):5-21.

Bănărescu P., 1969 Fauna Republicii Socialiste România. Cyclostomata şi Chondrichthyes, Vol. XII, fasc. 1, Editura Academica RSR, 125 pp.

Bănărescu P., Oprescu T., 1971 Ihtiofauna Râului Nera şi ocrotirea ei. Ocrotirea Naturii 15(2):139-148.

Bănărescu P., 1993 Considerations on the threatened freshwater fishes of Europe. Ocrotirea Naturii şi a Mediului Înconjurător 37(2):87-98.

Bănărescu P., 1994 The present-day conservation status of the freshwater fish fauna of Romania. In: Ocrotirea naturii şi mediului înconjurător. Acadademia Română Tome 38(1):1-16.

Bănărescu P., 2004 Situaţia actuală a ihtiofaunei de apă dulce a României sub aspect faunistic, taxonomic şi al protecţiei. Studia Universitatis Vasile Goldiş Arad, Seria Ştiinţele Vieţii 14:43-49.

Bănărescu P., 2005 Pesti. [Pisces]. In: Red book of Romanian vertebrates. Botnariuc N., Tatole V. (eds), pp. 215-260, Bucuresti.

Bănăţean-Dunea I., Grozea A., Bura M., Patruica S., Mandiţa D., 2008 Researches regarding ichthyofauna from Nădrag river basin. Lucrări Ştiintifice Zootehnie şi Biotehnologii, Timişoara, 41(2):6-12.

Brânzan T. (ed), 2013 Catalogul habitatelor, speciilor şi siturilor Natura 2000 din România. Editura Fundaţia Centru Naţional pentru Dezvoltare Durabilă – Bucureşti, 784 pp.

Cojocaru D. C., 2006 Studiul ihtioparazitofaunei Banatului. PhD thesis. Faculty of Veterinary Medicine, Timişoara, 619 pp.
Hamar J., Sárkány-Kiss A. (eds), 1995 The Maros/Mureş River Valley. A study of the geography, hydrobiology and ecology of the river and its environment. TISCIA monograph series, Szolnok-Szeged-Târgu Mureş, pp. 225-235.
Iftime A., 2004 Preliminary data on the distribution of two twin species of the genera Barbus (Pisces: Teleostei: Cyprinidae) in Southern Romania. Travaux du Museum Nationale d'Histoire Naturale „Grigore Antipa", Bucureşti, 47:263-268.
Ion I., Gache C., Zamfirescu Ş., Ion C., 2001 Aspects regarding the vertebrate fauna from Suceava county. Analele Ştiințifice ale Univerității "Alexandru Ioan Cuza din Iaşi", Biologie Animală, Tome 47:54-60.
Froese R., Pauly D. (eds), 2016 FishBase. World Wide Web electronic publication. www.fishbase.org, version (02/2016).
Kotlik P., Costas S., Tsigenopoulos C., Rab P., Berrebi P., 2002 Two new *Barbus* species from the Danube River basin, with redescription of *B. petenyi* (Teleostei: Cyprinidae). Folia Zoologica 51(3):227–240.
Kottelat M., 1997 European freshwater fishes: a heuristic checklist of the freshwater fishes of Europe (exclusive of former USSR), with an introduction for non-systematists and comments on nomenclature and conservation. Biologia (Bratislava), 52(Supplement 5):1-271.
Kottelat M., Freyhof J., 2007 Handbook of European freshwater fishes. Kottelat, Cornol, Switzerland and Freyhof, Berlin, Germany, 464 pp.
Lelek A., 1987 The Freshwater fishes of Europe. Vol. 9, Threatened fishes of Europe. Aula-Verlag Wiesbaden, 343 pp.
Nalbant T., 1993 Some problems in the systematics of the genus *Cobitis* and its relatives (Pisces, Ostariophysi, Cobitidae). Revue Roumaine de Biologue, Serie Biologie Animale, Tome 38(2):101-110.
Nalbant T., 1994 Studies on loaches (Pisces: Ostariophysi: Cobitidae). I. An evaluation of the valid genera of *Cobitinae*. Travaux du Museum d'Histoire Naturelle "Grigore Antipa" 34:375-380.
Nalbant T., 2003 Checklist of the fishes of Romania. Part one: freshwater and brackishwater fishes. Studii şi Cercetări, Biologie, 8, Universitatea Bacău, pp. 122-127.
Nowak M., Koščo J., Popek W., 2008 Rewiev of the current status of systematics of gudgeons (Gobioninae, Cyprinidae) in Europe. AACL Bioflux 1:27-38.
Oţel V., Năstase A., 2010 Researches on ichthyofauna in the Natura 2000 sites from Banat (Romania). In: Scientific Annals of the Danube Delta Institute, Tulcea, 16:33-38.
Tatole V., Iftime A., Stan M., Iorgu E.-I., Oţel V., 2009 Speciile de animale Natura 2000 din România. Editura Imperium Print, Bucureşti, pp. 60-86.
Ureche D., 2008 Studii ecologice asupra ihtiofaunei în bazinul mijlociu şi inferior al râului Siret. Editura PIM, Iaşi, pp. 161-178.
*** DH 1992 Directiva Consiliului Uniunii Europene nr. 92/43/1992 privind conservarea habitatelor naturale, faunei şi florei sălbatice (Habitats Directive) [Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and wild fauna and flora]. IN: Official Journal of the European Union, vol.: L206 (published 22 July 1992), pp. 7–50, Luxembourg – last modification in 2007.
*** OUG 57, 2007 Ordonanţa de Urgenţă a Guvernului nr. 57 din 20 iunie 2007 privind regimul ariilor natural protejate, conservarea habitatelor natural, a florei şi faunei sălbatice. In: Monitorul Oficial al României, Partea I, anul 175 (XIX), nr. 442 (29 iunie 2007), pp. 1-32, Bucureşti, Romania.
*** 2011 Legea nr. 49 din 7 aprilie 2011 pentru aprobarea Ordonanţei de urgenţă a Guvernului nr. 57/2007 privind regimul ariilor natural protejate, conservarea habitatelor natural, a florei şi faunei sălbatice. In: Monitorul Oficial al României, Partea I, anul 179 (XXIII), nr.262 (13 aprilie 2011), pp. 2-12, Bucureşti, Romania.
*** 2011a Ordin al Ministrului Mediului şi Pădurilor nr. 2387/29 IX 2011 pentru modificarea Ordinului Ministrului Mediului şi Dezvoltării Durabile nr. 1964/13 XII

2007 privind instituirea regimului de arie naturală protejată a siturilor de importanţă comunitară, ca parte integrantă a reţelei ecologice europene Natura 2000 în România. In: Monitorul Oficial al României, Partea I, anul 179 (XXIII), nr. 864 (din 29 noiembrie 2011), pagina 11, Bucureşti, Romania.
*** IUCN Red List maps (www.iucnredlist.org)

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