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6. Fish fauna from ROSCI0103 Buzău meadow (Romania)

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Abstract: In the autumn 2010 ichthyofauna was investigated in ROSCI0103 Buzau meadow Natura 2000 site (from Siriu dam to near Vișani locality, in main riverbed). The status of fish species of community interest (An. II / H.D.) inside of ichthyocenoses, as abundance, biomass and anthropogenic impact were assessed. In this sites it was recorded 4 species of Community Interest: *Barbus meridionalis, Romanogobio kessleri (Gobio kessleri), Romanogobio uranoscopus (Gobio uranoscopus), Sabanejewia aurata (S.balcanica* or *S. vallachica)*, but in comparison with Standard Sheet of Natura 2000 ROSCI0103 which contain also 4 species but *C. taenia* missing, in addition is *Sabanejewia balcanica*. Between abundance and biomass of fish species is different from submountain to plain area: *Barbus meridionalis* and *Barbatula barbatula* in submountain area to *Squalius cephalus, Chondrostoma nasus* from hill area to *Carassius gibelio, Alburnus alburnus* in plain area were dominating species as abundance and biomass. A main anthropogenic pressure consists in the building of dams in investigated water bodies (like Siriu dam), which stop the fish movement at the normal water levels (every define time the dam is open disturbing the water transparency affecting fish populations), also the ballast exploitation from riverbed and pollution by locals and tourist increase negative impact on fish community.

Key words: fish species richness, abundance, biomass, fish conservation, Buzau river

INTRODUCTION

Structure of ichthyofauna from the Buzău catchment area is composed by 27 fish species present before 1960, from which 24 lived in rivers and 3 in the pools nearby **[2]**, but between 2003-2005 23 fish species collected with other 3 more new fish species appeared (*Leuciscus idus, Proterorhinus marmoratus* and exotic Chinese fish species *Pseudorasbora parva* accidentally brought and rapid spread) totalling 30 species captured in time in main river, tributaries and nearby lakes [**18**].

As a condition of EU integration Romania promoted by authoritative acts 273 sites of community interest (SCIs) which occupy 13.21% from total surface in 2007 one of this SCIs is ROSCI0103 Buzau meadow, but after 2011 revision a lot of sites are increased in surface and new sites included to 383 SCIs occupying 16.76% from Romania surface [**8**] according to Romanian Order 2387/2011 modifying Order 1964/2007.

This site (ROSCI0103 Buzau meadow) contains 4 fish species of community interest for Romania listed from literature **([3], [4], [5], [7], [16])** *Barbus balcanicus (B. meridionalis*) (more info in **[10], [13]),** *Romanogobio kessleri (Gobio kessleri), Romanogobio uranoscopus (Gobio uranoscopus)* (**[14]),** *Cobitis taenia,* (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 nest 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 92/43/EEC (Annex II)", with the holder Museum of Natural History "Grigore Antipa", and we (Danube Delta National Institute Tulcea) as cooperating part. The present manuscript was based on this project, like fish fauna article from Banat (Romania) **[15].**

In the last reference **[19]** summarizes all previous data, so that we will refer to the data mentioned of last Ureche's paper, which in fact is a publication of the PhD thesis of the author. This allowed to extract only the data referring to the river Buzău (not his whole basin) so no tributaries or stagnant water, investigation area been downstream Siriu dam, from Coltu Pietrii to Vişani localities.
We divided the river into three main sections (**Table 1**), in each extracting species identified by Ureche **[17]** in 2003-2005, to compare with our results for an overview of fish fauna from riverbed of Buzau.

Table 1
Fish species captured in Buzău river between 2003 –2005 (after Ureche, **[16], [17], [18])**

Nr.	**Species** (after Ureche)		**Sect.1**	**Sect. 2**	**Sect. 3**
	Scientifically name	**Common name**			
	Squalius cephalus	chub		+	+
	Leuciscus idus	ide			+
	Phoxinus phoxinus	Eurasian minnow	+		
	Leucaspius delineatus	belica			+
	Alburnus alburnus	bleak			+
	Alburnoides bipunctatus	schneider	+	+	+
	Chondrostoma nasus	nase		+	+
	Gobio obtusirostris	gudgeon	+	+	+
	Romanogobio kessleri	**Kesslers gudgeon**		**+**	**+**
	Pseudorasbora parva	Stone moroko			+
	Barbus barbus	barbel	+	+	+
	Barbus petenyi	**Mediterranean barbel**	**+**	**+**	
	Carassius gibelio	Giebel carp			+
	Barbatula barbatula	Stone loach	+	+	
	Sabanejewia vallachica	**Eastern Carpathian golden loach**	**+**	**+**	**+**
	Silurus glanis	catfish			+
Total number of fish species			7	9	13
Total number of community interest fish species (with bold)			2	3	2

MATERIAL AND METHODS

The research was conducted during one week to the end of September 2010 in ROSCI0103 Buzau meadow Natura 2000 site divided in 3 sectors of sampling (**Fig. 1**): sector 1 from Siriu dam to Bâsca river mouth in submontain area, sector 2 from Bâsca river mouth to Mărăcineni locality in hill area and sector 3 from Mărăcineni to Vişani locality in plain area.
Depending on the morphology of water bodies and the flow velocity, we used electric fishing device SAMUS 725MP with accumulator 12V and 5-60 Amps output 600 W with barrage nets downstream river like seine nets for collected all individuals which escape from electric fishing visible fish species (**Photo 1**), also was used hand lines and questionnaire at commercial fishermen. Electric fishing carries on day, in shore line zone. It was assessed the presence of priority species (from An.II of DH), their quantitative structure (numerical abundance and biomass), specimen dimensions, overall status of aquatic habitats in terms of existing anthropic pressures (**Photo 2**).
The camps were installed as close to the banks of water bodies about the middle site (Pătârlagele locality). We performed fishing in three sites for each sector with approx. 100 m river beds (according to the methodology specified in the Habitats Directive no. 92/43/EC) for each site.
The catch was sorted by species (**Photo 3**) (fish identification after Bănărescu **[2]** with latest updates **[5], [6], [9], [11], [12]**); weighing and measuring of lengths are performed. The numerical abundances and biomass were calculated to each species and site, presented in order to realize the status of species in the fish community. For taxonomical details, some fish specimens were aware preserved in alcohol 40%. Also, we assist anthropic impact on fish communities.

RESULTS AND DISSCUTIONS

Fish ecology

Using just electrofishing and nets barrage in studied river, it was found that fish fauna from ROSCI0103 N2000 sites is very diversification, beginning with mountain or submontain fish species and finishing with plain water fish species.
In 2010 year 14 fish species were captured, from which 4 ones Community interest (**Table 2**).
The number of Community interest fish species listed in references of SCI list are the same what was recorded in 2010, but *Sabanejewia balcanica (S. aurata)* seems to be confused and replacement with *Cobitis taenia* (present in standard sheet of SCI) which wasn't found in 2010 in Buzău River or earlier, but possible to be find in the futures due to the broad spectrum spreading. Totally we consider fill up Standard Sheet of Natura2000 SCI list with 5 Community Interest fish species including both Cobitidae family species *S. aurata* and *C. taenia*.

Table 2

Richness species in ROSCI0103 Nature 2000 Buzau meadow (bold letters means community interest fish species) (1=present fish species) for each sampling point (sampling locality) in all 3 sectors

No.	Species / Site	Common name	Sector 1			Sector 2			Sector 3		
			Coltu Pietrii	Valea Lupului	Patarlagele	Viperesti	Ciuta	Berca	Maracineni	Beilic	Visan
1	*Alburnoides bipunctatus*	schneider	1	1	1	1	1		1	1	1
2	*Alburnus alburnus*	bleak									1
3	*Barbatula barbatula*	Stone loach	1	1							
4	*Barbus barbus*	barbel	1	1	1	1	1		1	1	1
5	***Barbus meridionalis***	**Mediterranean barbel**	**1**	**1**	**1**	**1**	**1**		**1**		
6	*Carassius gibelio*	Giebel carp						1	1	1	1
7	*Chondrostoma nasus*	nase		1	1	1	1	1	1	1	1
8	*Gobio sp.*	gudgeon			1	1	1			1	1
9	*Phoxinus phoxinus*	Eurasian minnow	1								
10	*Pseudorasbora parva*	Stone moroko							1		
11	***Romanogobio kessleri***	**Kesslers gudgeon**					**1**		**1**	**1**	**1**
12	***Romanogobio uranoscopus***	**Danubian longbarbel gudgeon**					**1**			**1**	
13	***Sabanejewia balcanica***	**loach**	**1**			**1**	**1**		**1**		
14	*Squalius cephalus*	chub	1	1	1	1	1	1	1	1	1
	TOTAL		**7**	**6**	**6**	**7**	**9**	**3**	**9**	**8**	**8**

Comparison between 2010 sampling and 2003-2005 survey the results are that 4 species are miss captured in 2010 (*Silurus glanis, Leuciscus idus, Leucaspius delineates* and *Gobio obtusirostris* none in ROSCI0103 site), but in addition was found in 2010 *Gobio sp.* (**Photo 4)** (no species identification, probably same hybrid, need genetic identification) and *Romanogobio uranoscopus* (Comunnity Interest species).

In ROSCI0103 Buzău meadow are listed from literature 4 fish species which are included in Habitat Directive (DH)/1992 and in addition other 1 species managed by Romanian Law OU 57/2007 approved by 49/2011 Law, total meaning 5 fish species listed in Habitat Directive, remaining 9 fish species which are common or present in IUCN Red List or Berna Convention). So *Barbus "meridionalis", Romanogobio kessleri, Romanogobio uranoscopus, Sabanejewia balcanica* founded in Annex II of DH, also are found in another annexe of Romanian OU 57/2007 law) and *Barbus barbus* founded in another annexe of Romanian OU 57/2007 law (**Tab. 3**).

Considering documents and other international and national conventions conferring protection of fish species, the situation of the 14 fish species recorded in the Buzău river is as follows in **table 3**.

Table 3

International and national protection for all captured fish species from ROSCI0103 Buzau river (also preference to water current: reo=reophilous, stag=stagnant)

Species	Water current preference	IUCN Red List 2010	Habitats Directive	Berna Conv.	OUG 57 / 2007 Romanian Law	Red Book of vertebrates from Romania
Barbus meridionalis	Reo	Near Threatened	An. II	An. III	An. 3, 5A	
Romanogobio kessleri	Reo	Least Concern	An. II	An. III	An. 3	Vulnerable
Romanogobio uranoscopus	Reo	Least Concern	An. II	An. III	An. 3	Vulnerable
Sabanejewia balcanica	Reo	Least Concern	An. II	An. III	An. 3	
Alburnus alburnus	Stag-reo	Least Concern				
Alburnoides bipunctatus	Reo	Vulnerable		An. III		
Barbatula barbatula	Reo	Least Concern				
Barbus barbus	Reo	Least Concern	An. V		5A	
Carassius gibelio	Stag-reo					
Chondrostoma nasus	Reo	Least Concern		An. III		
Gobio sp.	Reo	Least Concern				
Phoxinus phoxinus	Reo	Least Concern				
Pseudorasbora parva	Stag-reo					
Squalius cephalus	reo	Least Concern				

The percent of abundance, biomass (**Fig. 2)** and frequency (**Fig. 3),** also the abundance in each zone **(Fig. 4)** in studied area of Buzau river (ROSCI0103) are presented. In abundance and biomass dominant are *S. cephalus*

and *B. meridionalis,* together with more than 50 %, but regarding frequency 100% present in all 9 sampling points from 3 sectors used *are A. bipunctatus, B. barbus* and *S. cephalus*. Fish zoning demonstrate that from submountain area fish abundance (*P. phoxinus*, many specimens of *B. meridionalis* and *S. cephalus*) differ to hill area (decreasing abundance of *B. meridionalis, S. cephalus*) to plain area (*C. gibelio, A. alburnus* appears and low values of *B. meridionalis*).

The missing of *Rhodeus amarus* (which has a large area of spreading in Romania) demonstrate that there are not natural bioaquatic filters like Lamellibranchia class (shells) in Buzau river. The shells bodies represents breeding area for *R. amarus,* concluded that missing *R. amarus* used as an indicators of shell presence, indicate no cleaning water for various reasons.

Anthropic impacts

Anthropogenic negative impacts highlighted during our research, which are able to affect fish fauna from Buzau river were the following:
1. Daily river level fluctuation due to discharges from the Siriu dam lake. Lake, completed in 1985, has a length of 10 km and is intended to produce electricity in hydroelectric 42MW. We found that during the day, at Pătârlagele locality, where we set camp, the water level of the river grew by 15-20 cm, resulted that the suspension disturbed water transparency. Overnight level was reduced and the water became clearer. We found out that these daily discharges were made in order to adjust electricity to certain parameters. This phenomenon is produced throughout the investigation of the riverbed and negatively affect fish fauna in sense of:
- fluctuation the water level at short intervals lead to lack of fish appetite
- resulted suspensions are deposited on rocks obstruct bioderm and periphyton formation, which representing trophic base for several species of Cyprinidae family (*Chondrostoma, Gobio, Romanogobio*), or for some invertebrates that also fall within the spectrum of fish food
- water turbidity affects movement and feeding of all fish species and also produce gill irritation.
2. Household waste were strewn everywhere on the banks and riverbed, following many localities arranged near river, with domestic pollution.
3. In all investigated sites along the river, the banks of the river, especially in areas spared vision (shrubs and trees) were stored numerous piles of waste from construction materials (debris, etc.) and other materials, which of course these during floods reach the riverbed, with adverse consequences for aquatic flora and fauna.
4. Water turbidity was accentuated during the day and harvesting sandstone slabs from the riverbed.
5. In the study area have finding of 5 active ballast exploitation (**Foto 2**) gravel harvested from the riverbed namely: two between Berca and Mărăcineni, two near Mărăcineni locality and one in Beilic locality. In addition, daily we met in various places people were harvesting ballast and sand from the riverbed edge with trucks or horse carts. Of course, this activity by altering the texture riverbed and maintenance turbidity is harmful for fish fauna.

Systematic consideration

The observations are preliminary, and in the next period to undertake more detailed morphological studies on specimens are needed, also doubled by future genetic analysis.

Barbus "meridionalis" (Mediterranean barbel): according to Kotlik [**13**] Antal **[1],** in Romania there were 4 species of Mediterranean barbel namely: *B. balcanicus, B. carpathicus, B. petenyi* and *B. biharicus*. Between *B. carpathicus* and *B. petenyi* are not obvious morphological differences than genetic, but *B. balcanicus* species has beveled snout and body with all fins with pronounced dark spots. *B. carpathicus* and *B. petenyi* fins are missing or few spots, except the pectoral fin with no spots. These morphological differences have been described by Iftime [**10**]. *B. biharicus* is present in Bihor county in Crisul Repede river **[1]**. No recent data published on mediterranean barbel taxonomy in Eastern Romania (Moldova). From our observations, we consider that in Romania at the moment there are two species, taking names: *B. balcanicus* in Banat and *B. carpathicus* in the rest of the country, including Moldova. In the investigated area on the river Buzau there may be a form intergrade with intermediate characters between these two. In the picture (**Photo 5**) is observed pigmentation fins, including the pectoral, but weaker than mediterranean barbel from Banat.

Sabanejewia balcanica (loach) in his work [**19**], Ureche use the name *S. vallachica* probably for the following reasons: Bănărescu in his monograph [**2**] gives to the Buzau and Siret basins *Cobitis aurata vallachica*, who is currently raised to the rank of species: *Sabanejewia vallachica* [**12**]. Morphologic variability between *S. vallachica* and *S. balcanica* are almost zero, which affirms Bănărescu [**2**] referring to *Cobitis aurata vallachica vs Cobitis aurata balcanica* the only difference that the first one (*C. a. vallachica*) not intergrade with *Cobitis aurata bulgarica* (currently *Sabanejewia bulgarica*). We believe that this is insufficient and difficult to prove, so now we use for nomination species of Buzau River as *Sabanejewia balcanica*.

Gobio sp. (gudgeon) (**Photo 4**): Ureche [**19**] nominates species as *Gobio obtusirostris*, we suspect that the same reasons as the previous species: Bănărescu **[2]** mentions that only one race geographic throughout Romania on *Gobio gobio obtusirostris* raised later to the rank of species: *Gobio obtusirostris* **[12].** But Kottelat &

Freyhof give that Romanian area for this species only Banat region, but for all remain Romanian territory (except Moldova) nominates species *Gobio carpathicus*. Analyzing the differential characteristics of *Gobio carpathicus* and *Gobio obtusirostris* as Kottelat & Freyhof in their work **[12],** we do not observe morphological differences to justify their separation into distinct species. Therefore, now we abstain to nominate species, further analyze specimens and continue documenting are needed.

CONCLUSIONS

Fish investigations are particularly difficult to achieve in the area of ROSCI0103 N2000 site Buzau meadow (river), due to difficulties to approach of the river banks, also due to fast current, high sides of banks and all kinds of waste pollution near banks.
The only suitable fishing method used is electric, even this method is hampered by low water transparency and high flow velocity, corrected with nets barrage.
In 2010 was captured 14 fish species, from which 4 ones Community interest found (missing *Cobitis taenia* which is in Standard List of N2000 site), with 11 rheophiles and 3 stagnant-rheophiles, but only one exotic species (*Pseudorasbora parva*).
Comparison between 2010 sampling (14 species captured) and 2003-2005 survey (16 species captured) the results are that 4 species are absent from captures in 2010 (*Silurus glanis, Leuciscus idus, Leucaspius delineates* and *Gobio obtusirostris* none of them are not of Community Interest, but accidental in studied area), but in addition were found in 2010 *Gobio sp.* (no species identification, probably same hybrid, need genetic identification) and *Romanogobio uranoscopus* (Community Interest species).
In abundance and biomass dominant are *S. cephalus* and *B. meridionalis,* together with more than 50 %, but regarding frequency 100% present in all 9 sampling points from 3 sectors used *are A. bipunctatus, B. barbus* and *S. cephalus*.
Fish zoning demonstrate that from submountain area fish abundance (*P. phoxinus*, many specimens of *B. meridionalis* and *S. cephalus*) differ to hill area (decreasing abundance of *B. meridionalis, S. cephalus*) to plain area (appearance of *C. gibelio, A. alburnus* and low values of *B. meridionalis*).
Missing *Rhodeus amarus* (which has a large area of spreading in Romania) demonstrate no natural bioaquatic filters like Lamellibranchia class (shells) present in Buzau river indicate no cleaning water.
Regarding all 4 Community fish species Interest (An. II Habitat Directive) - *Barbus meridionalis, Romanogobio kessleri (Gobio kessleri), Romanogobio uranoscopus (Gobio uranoscopus), Sabanejewia aurata (S. balcanica or S. vallachica)* captured in ROSCI0103 will be noted with C (wide spread) at Population, Conservation, Isolation and Global in Standard Sheets of N2000 site.
Currently anthropogenic disturbing is particularly violent to fish fauna at least in the investigated area through changes daily water level created by the hydroelectric administration Siriu, turbidity caused also by harvesting ballast and sand on a large scale by ballast exploitation and lower scale by locals; also, household waste and debris from building materials are deposited everywhere including on the banks and riverbed.
Fish sampling is needed to continue to confirm presence of possible other species of community interest, like *Cobitis taenia* with wide area spreading, very probable present here.

REZUMAT (SUMMARY IN ROMANIAN LANGUAGE). În campania din toamna lui 2010 a fost investigat timp de o săptămână situl Natura 2000 ROSCI0103 Lunca Buzăului, de la barajul Siriu în aval până în dreptul localității Vișani, pentru identificarea speciilor de pești. Singura metodă de eșantionare pretabilă a fost pescuitul electric în completare cu baraj de plasă ce reține indivizii pierduți în tulbureala apei. Au fost capturate 14 specii de pești dintre care 4 specii de interes comunitar, noi am identificat în plus *Gobio uranoscopus* în comparație cu anii anteriori când fusese identificate 16 specii de pești și doar 3 specii de interes comunitar. Lipsește *Cobitis taenia* din toate perioadele de eșantionare, deși în Fișa Standard N2000 este prezentă, totuși considerăm că nu trebuie scoasă din Fișa Standard deoarece este foarte probabil să existe sau să apară într-un viitor apropiat având în vedere larga răspândire a speciei. S-au identificat disturbanțe antropice relativ violente asupra faunei piscicole: deversări zilnice de la barajul Siriu, exploatări de balast din albia râului și poluării în cele mai diverse feluri. Sunt câteva specii ale genurilor *Barbus, Gobio* și *Sabanejewia* ce necesită clarificări taxonomice.

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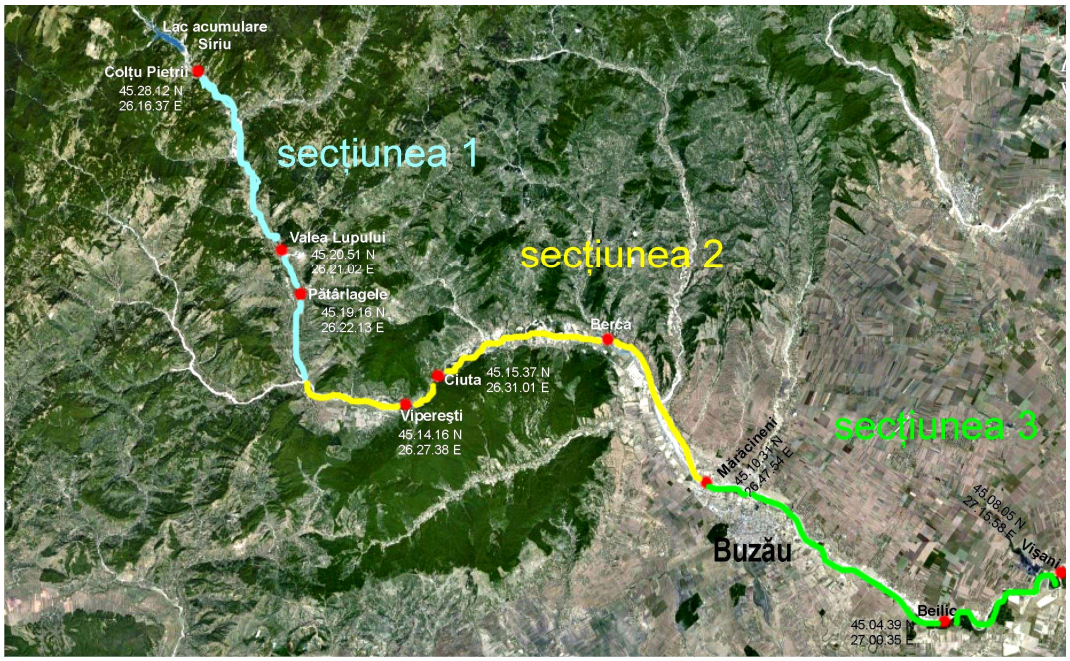
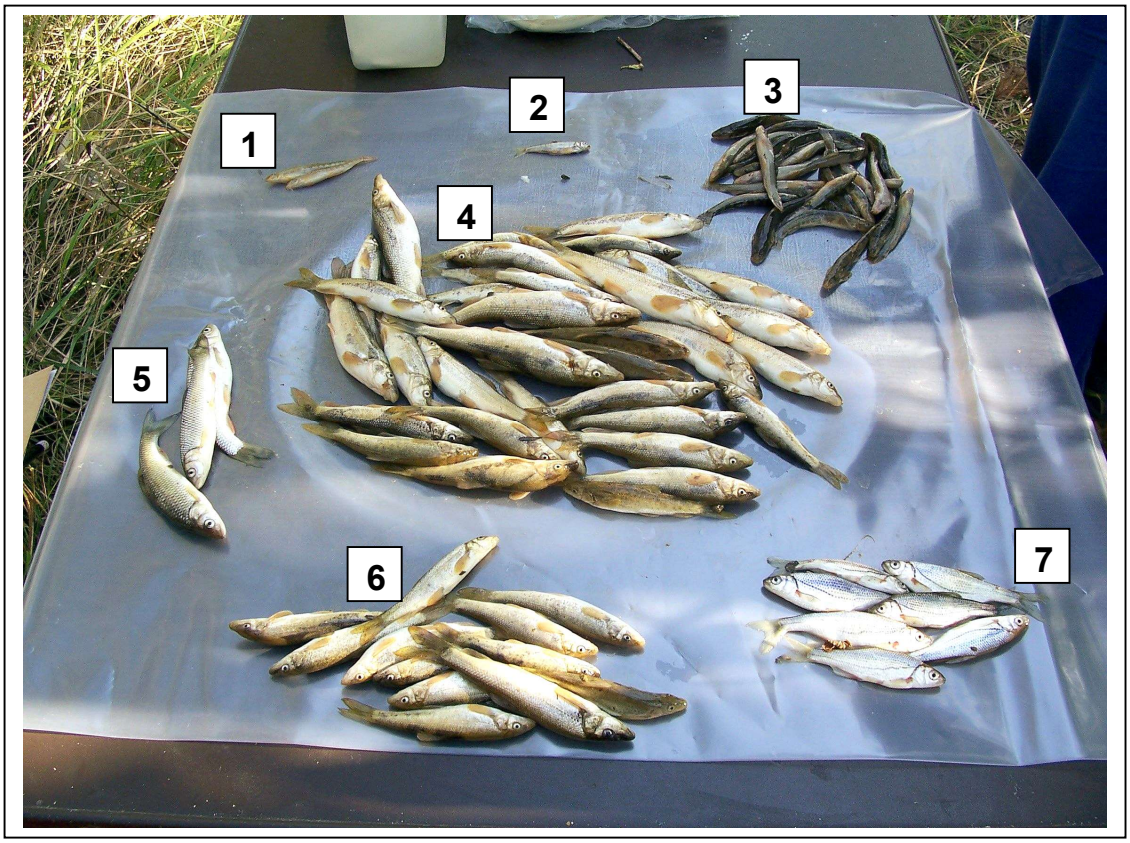


Fig. 1 Riverbed location (3 sectors) and GPS points of the fish sampling sites in ROSCI0103 Buzau meadow

Photo 1 Fish sampling main uses: electric fishing device and barrage nets

Photo 2 Ballast exploitation in Buzau riverbed



1. *Sabanejewia balcanica* 2. *Phoxinus phoxinus* 3. *Barbatula barbatula* 4. *Barbus "meridionalis"* 5. *Squalius cephalus* 6. *Barbus barbus* 7. *Alburnoides bipunctatus*

Photo 3 Fish species identification, numbered and measurements in length and biomass in one site at electric fishing from Buzau River

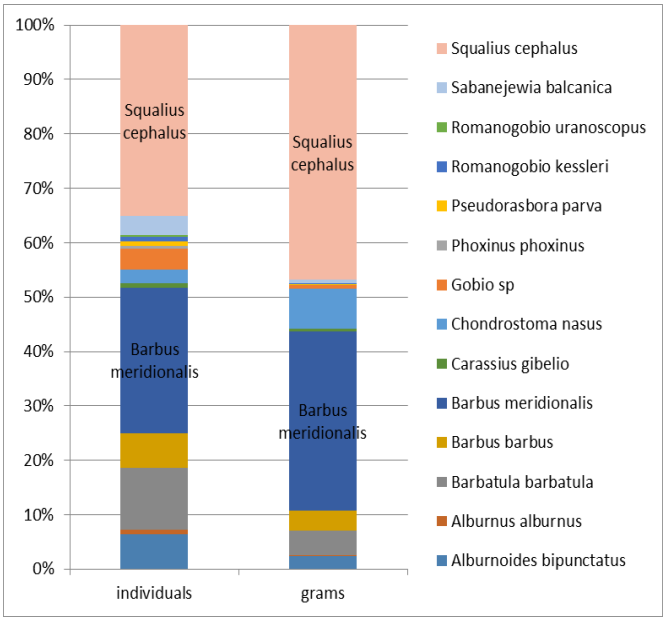


Fig. 2 Percent of abundance (individuals) and biomass (grams) of fish species captured in Buzau River in 2010

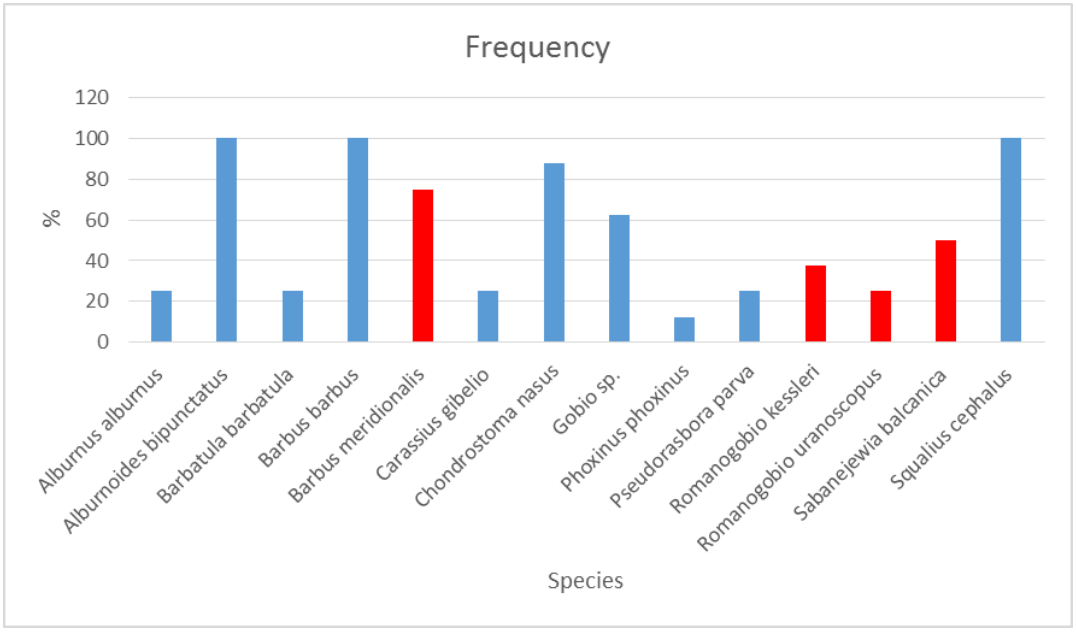


Fig. 3 Species frequency/constancy in **ROSCI0103 Buzau meadow** Natura 2000 site

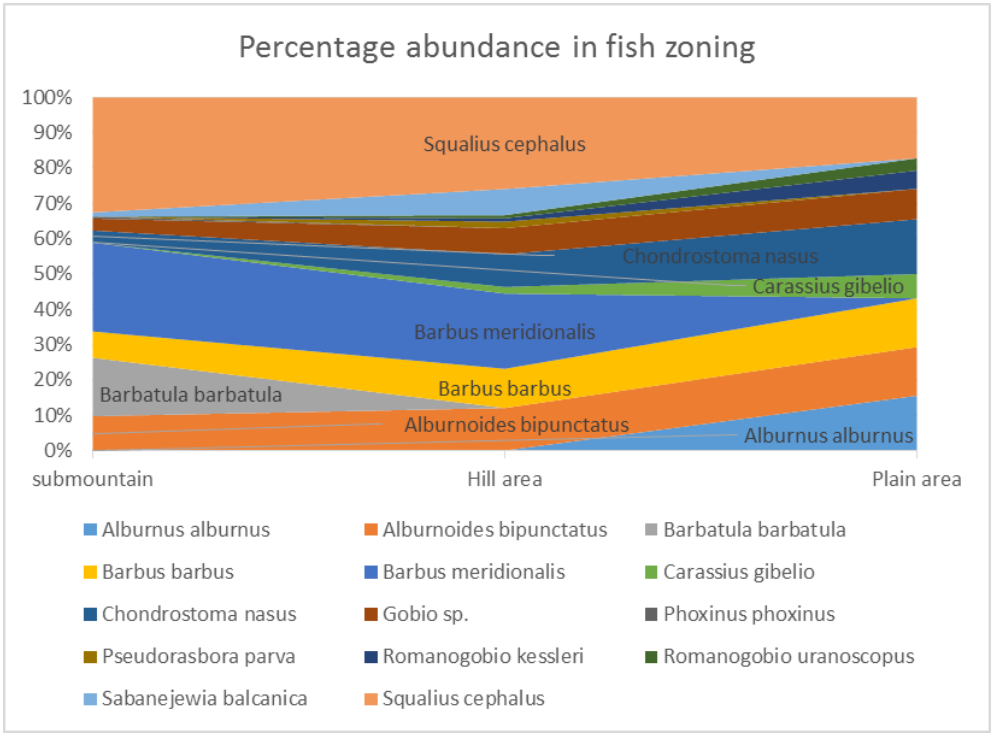


Fig. 4 Species abundance (%) from submountain to plain area in **ROSCI0103 Buzau meadow** Natura 2000 site

Photo 4 *Gobio sp.* (gudgeon) from Buzău river (Pătârlagele site)

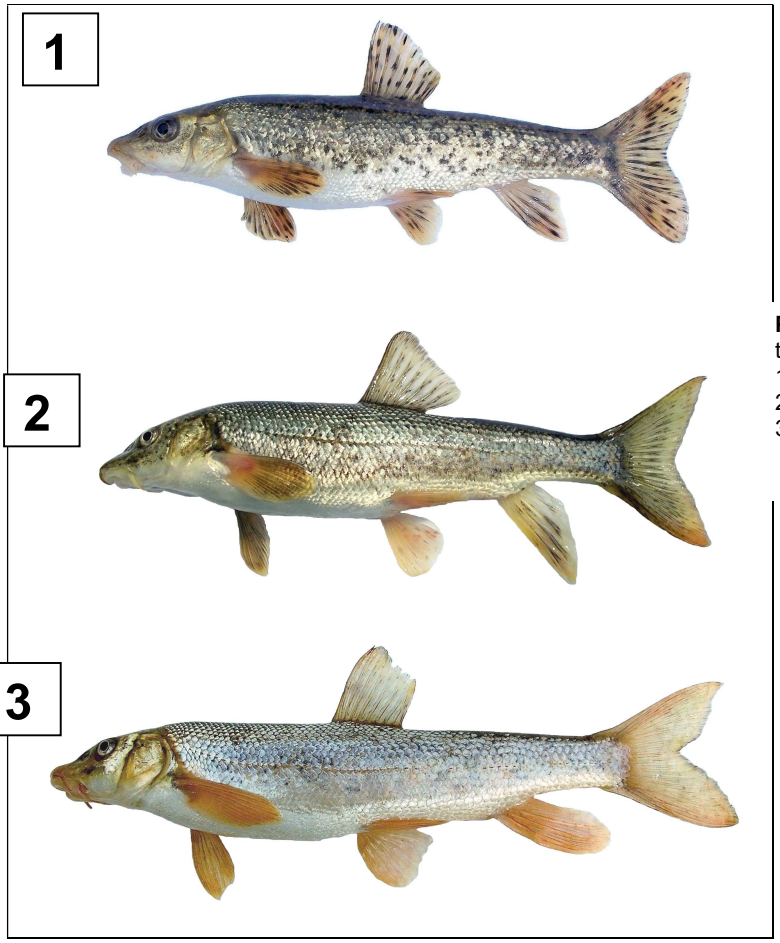


Photo 5 Mediterannean barbel types in Romania (original)**:**
1. From Nera river (Banat).
2. From Buzău river (Colţu Pietrii).
3. From Suceava river