

DATA CONCERNING THE FISH FAUNA OF THE ROSCI0224 SCROVIȘTEA NATURA 2000 SITE (ROMANIA) AND MANAGEMENT MEASURE PROPOSALS

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The aim of this study was to carry out an ichthyological survey on the ROSCI0224 Scroviștea Natura 2000 site, which is situated near Bucharest, in order to elaborate management measures for the fish species of Community interest. The only fish species in the Standard Data Form of the site is the *Umbra krameri*, and it is indicated with a question mark. That means that there is no reliable information on the presence of this species in the site. Between June 28th and July 1st, 2013, as well as on September 2nd, 2013, we conducted our survey and detected 19 fish species from 20 sampling stations within and next the site. Unfortunately we could not detect the presence of the *Umbra krameri*. However, we detected five Natura 2000 species, but we recommended only *Misgurnus fossilis* and *Rhodeus amarus* to be added to the Standard Data Form, because the other three species were present in the Ialomița River and the river barely overlaps the area. Along with the two recommended species, we also added a species of national interest (*Carassius carassius*) to our proposal. We identified the main threat factors and proposed management measures in order to ensure the long-term survival of these fish species.

Key words: ROSCI0224 Scroviștea Natura 2000 site, fish species of Community interest, threat factors, management measures.

INTRODUCTION

The ROSCI0224 Scroviștea (3391 ha) is situated at 30-40 km North-West from Bucharest. Its main water bodies are: Sticlărie Valley Lake 20 ha, Bălteni Lake 23 ha, Scroviștea Lake 74 ha, a small section of the Ialomița River and other small ponds and drainage channels. The three large lakes together with two other lakes (Țigănești and Scursura Lakes) from outside the area are oxbow lakes of the Ialomița River. The lakes receive their water supply from the river (Roșu, 1980). Intensive fish farming is practiced on the Scroviștea and Țigănești lakes. Almost 95% of the site is covered with deciduous forest and the remaining few percents are represented by vineyards and orchards according to the Standard Data Form of the site.

Our aim was to carry out an ichthyological survey on the ROSCI0224 Scroviștea Natura 2000 site in order to elaborate management measures for the fish species of Community interest. The problems we faced before the actual fieldwork

were the lack of recent data on the fish fauna of the site and the fact that the only fish species (*Umbra krameri*) in the Standard Data Form of the site was indicated with a question mark. This means that the Forest Research and Management Institute (ICAS) had no reliable information on the presence of the *Umbra krameri* in the water bodies of the area in 2007, when they compiled the documentation in order to designate the site as part of the Natura 2000 network (Standard Data Form).

Therefore our questions before the survey were:

1. Is the *Umbra krameri* present in the water bodies of the ROSCI0224 Scroviştea Natura 2000 site?
2. What other fish species of Community interest are present in the site, which can be recommended to be added to the Standard Data Form of the site?
3. What are the main factors that threaten the potential fish species of Community interest and which are the most appropriate management measures for these species in order to ensure their favorable conservation status in the long term run?

MATERIAL AND METHODS

DATA COLLECTION

Between June 28th and July 1st, 2013, and on September 2nd, 2013, we conducted ichthyological surveys on the ROSCI0224 Scroviştea Natura 2000 site. The only species as target of the survey was the *Umbra krameri* from the Standard Data Form; therefore, we first examined the suitable habitats of the species: shallow, clean and cold waters with dense submerged vegetation (Bănărescu, 1964). The main targets were the following lakes within the area: Sticlărie Valley Lake, Bălteni Lake, Scroviştea Lake and next to the area: the Țigăneşti and Scursura Lakes. Other ponds, small lakes and drainage channels were also examined, as well as the small section of the Ialomiţa River within the site. Fish were captured by electro-fishing (SAMUS-725MP) (Pricope *et al.*, 2004). Samples were taken from 20 sampling stations (Fig.1, Table 1): 12 stations within the site and 8 stations next to the site, but all the stations (except for the Ialomiţa River) were connected to each other (Table 1). 19 samplings were carried out from the banks of the different water bodies (wading in the bed 20-200 m) and one sampling station was on the Bălteni Lake (sampling station 13, Fig. 1) from a boat with continuous electro-fishing (approx. 3500 m between sampling station 13 and 16). The fishes were identified based on external morphological characteristics (Bănărescu, 1964; Gyurkó, 1972; Pintér, 1989, 2002). After a few minutes, fishes were recovered and released without injury at a slower section of the water bodies (Keresztessy, 2007). Sampling stations were recorded with a GARMIN GPS and all the data, observations were recorded on data sheets.

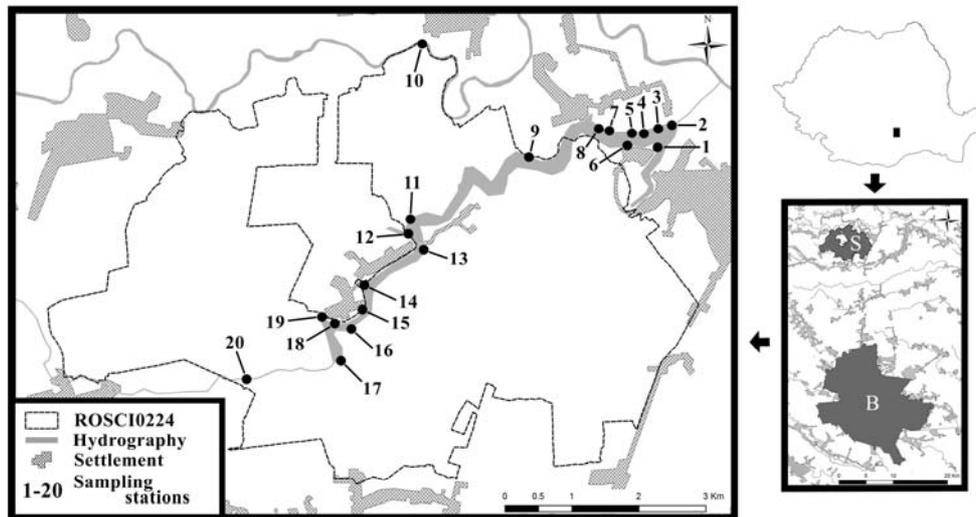


Fig. 1. The sampling stations inside and next to the ROSCI0224 Scroviştea (B – Bucharest; S – ROSCI0224 Scroviştea).

Table 1
The location of the sampling stations within and next to the site

	Sampling station / Water body	1	2	3	4	5	6	7	8	9	10
Next to the site	Scursura Lake	X									
	Artificial ponds 1-4		X	X	X	X					
	Țigănești Lake						X		X		
	Drainage channel							X			
Within the site	Scroviştea Lake									X	
	Ialomița River										X
	Sampling station / Water body	11	12	13	14	15	16	17	18	19	20
Within the site	Scroviştea Lake		X								
	Podișoru Valley	X									
	Bălteni Lake			X	X	X	X				
	Sticlărie Valley Lake							X	X	X	
	Sticlărie Valley Pond										X

RESULTS AND DISCUSSION

A total of 19 fish species were detected from the 20 sampling stations (Table 2). Five species (*Barbus petenyi*, *Romanogobio kesslerii*, *Rhodeus amarus*, *Misgurnus fossilis* and *Sabanejewia aurata*) were Natura 2000 fish species, but none of them were on the Standard Data Form of the site. Unfortunately we could not detect the presence of the *Umbra krameri*, although there are suitable habitats within the site for this species. Due to the fact that only a small section of the Ialomița River is

within the site, we could not emphasize the importance of three Natura 2000 species from the river (Table 2) for the future management of the site, but these are important data for a potential expansion of the site towards the Ialomița River. However, the other two Natura 2000 species from the Lakes of the site (*Misgurnus fossilis*, *Rhodeus amarus*) and one endangered species of national interest (*Carassius carassius*) (Government Emergency Ordinance No. 57/2007: Annex 4 B) also from the lakes of the site (Table 2) will represent the main subject of the Management Plan and our management measure proposals. From the Scroviștea Lake, where intensive fish farming is practiced, an employee listed for us a few fish species with economic value: *Ctenopharyngodon idella*, *Hypophthalmichthys nobilis*, *Hypophthalmichthys molitrix* and *Sander lucioperca*.

Table 2
The detected fish species of the site and its immediate neighborhood

Fish species/Water body/Density (ind./100m ²)	Scursura Lake	Artificial ponds 1-4	Țigănești Lake	Drainage channel	Scroviștea Lake	Ialomița River	Podișoru Valley	Bălteni Lake	Șicelăre Valley Lake	Șicelăre Valley Pond
<i>Esox lucius</i>			0.01					0.04		0.03
<i>Cyprinus carpio</i>								0.0003		
<i>Barbus petenyi</i>						1.25				
<i>Romanogobio kesslerii</i>						1				
<i>Gobio gobio</i>						0.01				
<i>Rhodeus amarus</i>					1.18	0.07		0.02		
<i>Leucaspis delineatus</i>	0.01							0.07		
<i>Carassius carassius</i>								0.17	0.5	
<i>Carassius gibelio</i>	0.4	1.7	0.55	0.75	0.96		0.01	0.004	0.2	0.05
<i>Pseudorasbora parva</i>	0.35	1		1						
<i>Scardinius erythrophthalmus</i>		0.14	0.01		0.25			0.08		
<i>Squalius cephalus</i>						0.9				
<i>Rutilus rutilus</i>			0.01		0.45		0.04	0.4		
<i>Alburnoides bipunctatus</i>						0.07				
<i>Alburnus alburnus</i>					0.03	0.3	0.14			
<i>Misgurnus fossilis</i>									0.03	
<i>Sabanejewia aurata</i>						0.6				
<i>Lepomis gibbosus</i>	0.005	0.46	0.12		2.18			0.38		
<i>Perca fluviatilis</i>					0.12			0.002		

Three invasive species were present which can threaten the native fish fauna: *Pseudorasbora parva* (in 6 of 20 stations), *Lepomis gibbosus* (in 9 of 20 stations) and *Carassius gibelio* (in 15 of 20 stations) (Table 3). The *Pseudorasbora parva*, which is native in Asia, was accidentally introduced into Romania in the 1960s among the fingerlings of Chinese carp, imported from China (Bănărescu, 1964). *Lepomis gibbosus*, native to North America, was first recorded in Romania since 1929 according to Bănărescu (1964) and since 1918 according to Băcescu (1942). *Carassius gibelio*, which originates from the Amur basin, was mentioned for the

first time in 1912 (Pojoga, 1959), then Bănărescu (1964) puts the date of introduction to around 1920, but Vitos (1894) has already described it in 1894 from the Ciuc Basin, Transylvania.

Table 3
The occurrence of fish species according to the sampling stations

Species	Sampling stations
<i>Esox lucius</i>	8,13,14,20
<i>Cyprinus carpio</i>	13
<i>Barbus petenyi</i>	10
<i>Romanogobio kesslerii</i>	10
<i>Gobio gobio</i>	10
<i>Rhodeus amarus</i>	9, 10, 12, 13
<i>Leucaspis delineatus</i>	1, 13
<i>Carassius carassius</i>	13, 14, 15, 16, 17, 18, 19
<i>Carassius gibelio</i>	1, 2, 3, 4, 5, 6, 7, 9, 11, 12, 13, 14, 16, 18, 20
<i>Pseudorasbora parva</i>	1, 2, 3, 4, 5, 7
<i>Scardinius erythrophthalmus</i>	2, 4, 6, 9, 12, 13, 14, 15, 16
<i>Squalius cephalus</i>	10
<i>Rutilus rutilus</i>	8, 11, 12, 13
<i>Alburnoides bipunctatus</i>	10
<i>Alburnus alburnus</i>	10, 11, 12
<i>Misgurnus fossilis</i>	19
<i>Sabanejewia aurata</i>	10
<i>Lepomis gibbosus</i>	1, 2, 7, 8, 9, 13, 14, 15, 16
<i>Perca fluviatilis</i>	9, 12, 13, 15

It is important to understand the distribution of invasive species and their effect on native, endangered and protected species at a landscape scale within the oxbow lake system of the site and next to the site. *Pseudorasbora parva* is present in the 4 artificial ponds near the Țigănești Lake (Table 2; Fig. 1) and the Scursura Lake (Table 2; Fig. 1) outside the area, which means that the habitat of this species is expanding towards the centre of the area. No protected species were detected from these stations. *Lepomis gibbosus* has a larger distribution area, being absent only from the Sticlărie Valley Lake and Pond and from the Ialomița River (Table 2). *Carassius gibelio* has the largest distribution area, being absent only from the Ialomița River (Table 2).

PROTECTED FISH SPECIES WHICH WILL FORM THE BASIS OF THE MANAGEMENT
PLAN REGARDING THE FISH SPECIES

1. *Misgurnus fossilis* (code: 1145)

The weatherfish, *Misgurnus fossilis* (Linnaeus, 1758), is an inconspicuous limnophilic European species, whose distribution area spreads from Spain to the Volga River (Meyer & Hinrichs 2000; Pintér, 2002). The IUCN Red List of

Threatened Species classified the weatherfish in the Least Concern category, with a decreasing population trend (IUCN 2010). In many countries the weatherfish populations are decreasing and the most important cause is the habitat loss. This species is included in the Red List in the Czech Republic (Lusk *et al.*, 2004), it has Vulnerable status in Croatia (Mrakovčić *et al.*, 2008) and Critically Endangered status in the Red List of Austria (Wolfram & Mikschi, 2007). In Romania it is considered a vulnerable species with decreasing area and population size (Wilhelm, 2000; Telcean & Bănărescu, 2002), but it is not present in the Red Book of the Romanian vertebrates (Bănărescu, 2005).

The species was present only in the Sticlărie Valley Lake in relatively low density (Fig. 1; Table 2). Knowing that the weatherfish has a stationary behavior (only 10% of the population moves longer than 100 m) and a “vertical escape behavior” (if disturbed they escape vertically to the nearest hiding place, which increases the chance of catching) (Meyer & Hinrichs, 2000; Pekárik *et al.*, 2008) we found satisfactory this density to prove the presence of a population. Although we could not detect its presence in the Bălteni Lake, the species is probably present there in low density, because the two lakes are very similar as a habitat to each other and the connection between them is ensured under the asphalt road between the lakes. Based on our data, we consider that the distribution area of the *Misgurnus fossilis* covers the Sticlărie Valley Lake entirely (Fig. 2). The conservation status of this species in the site was determined as unfavorable-inadequate, due to its low density in the Sticlărie Valley Lake and its lack from Bălteni Lake, despite the fact that the lake is a suitable habitat for the species.

The main threat factors were identified and management measures were proposed in order to ensure the long term survival of *Misgurnus fossilis* (Table 4).

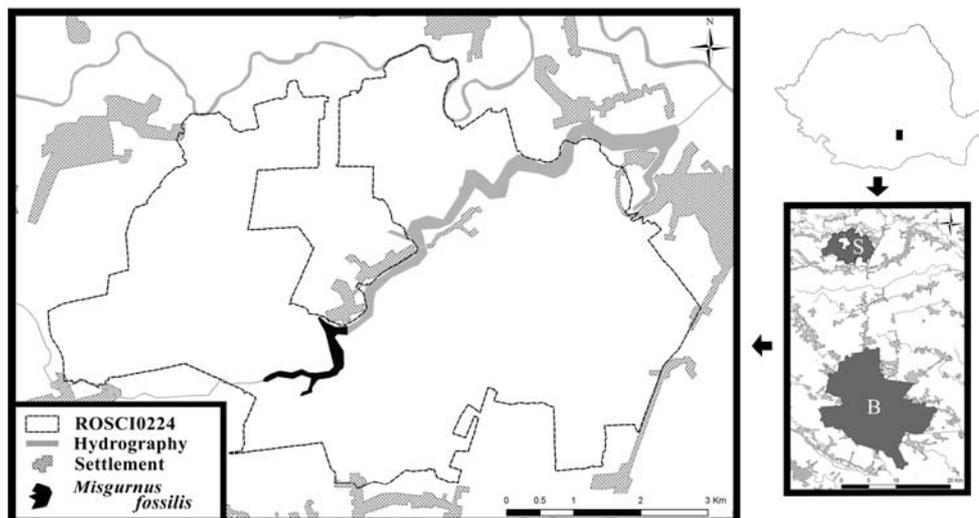


Fig. 2. The distribution area of *Misgurnus fossilis* (B – Bucharest; S – ROSCI0224 Scroviștea).

2. *Rhodeus amarus* (code 1134)

The European bitterling, *Rhodeus amarus* (Bloch, 1782), is a small cyprinid fish with a unique and complicated life cycle. The bitterling deposits its eggs inside the brachial cavity of the freshwater mussels of the *Unio* and *Anodonta* species (Bivalvia) (Reynolds *et al.*, 1997). Fertilization takes place in the gills of the mussel, and a few large elliptical eggs are produced (Bănărescu, 1964; Pintér, 2002). Embryonic development is completed inside the mussel and juvenile bitterlings then actively swim out of the host. The name *Rhodeus amarus* was considered a junior synonym of *Rhodeus sericeus* until Bohlen *et al.* (2006) showed that *Rhodeus sericeus* is restricted to Far East Asia and *Rhodeus amarus* is a valid, separate species.

In Romania, this species is widespread (Wilhelm, 2000). The IUCN Red List classifies the species as having the Least Concern status. It is present in Annex 3 of the Bern Convention and in Annex II of the Habitats Directive 92/43 EEC, which means that Natura 2000 sites can be designated based on its presence.

Rhodeus amarus was present in the Bălteni and Scrovișteea Lakes (Table 2, Fig 1). The Sticlărie Valley Lake is not a suitable habitat for *Rhodeus amarus*, because it has too dense submerged vegetation and too deep mud, but the Bălteni and Scrovișteea Lakes are appropriate habitats and the future of the species is not compromised if the presence of the freshwater mussels is assured. Based on our data, we consider that the distribution area of the *Rhodeus amarus* covers the Bălteni and Scrovișteea Lakes (Fig. 3). The conservation status of this species in the site was determined as favorable, due to its presence in the Bălteni and Scrovișteea Lakes and appropriate habitat conditions.

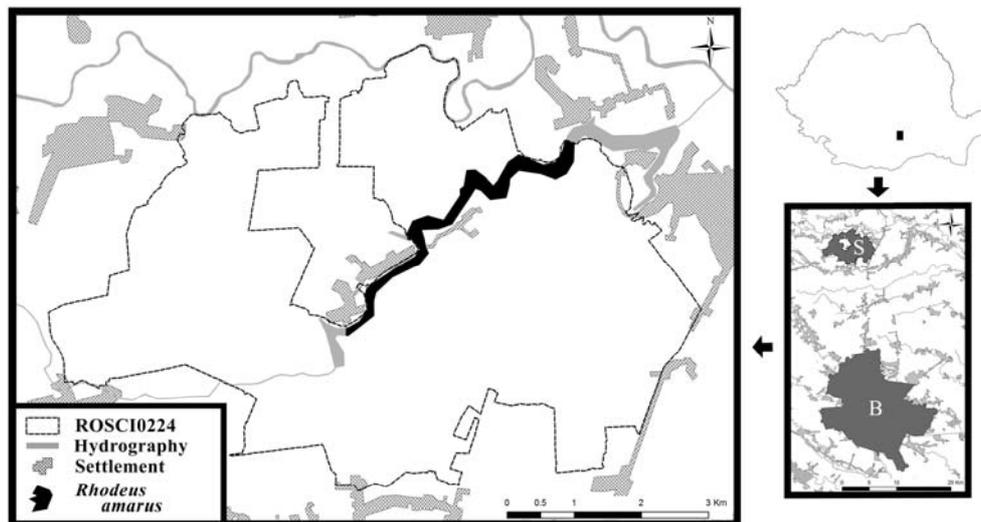


Fig. 3. The distribution area of *Rhodeus amarus* (B – Bucharest; S – ROSCI0224 Scrovișteea).

The main threat factors were identified and management measures were proposed in order to ensure the long term survival of *Rhodeus amarus* (Table 4).

3. *Carassius carassius*

The crucian carp, *Carassius carassius* (Linnaeus, 1758), is a freshwater fish, the occurrence of which is linked to shallow ponds, lakes rich in vegetation and slow flowing rivers (Bănărescu, 1964). According to the IUCN Red List of Threatened Species, the crucian carp has a decreasing population trend. In Romania it is a species of national interest, which needs a strict protection (Government Emergency Ordinance No. 57/2007: Annex 4 B). It is present in the Romanian Red Book of Vertebrates as an endangered species (Bănărescu, 2005).

The species, once widespread in the country, is present sporadically in a few stagnant fresh-waters and in the Danube Delta Biosphere Reserve area in a few channels and lakes (Oțel, 2007). Due to the introduction and spreading of invasive species (*Carassius gibelio*, *Lepomis gibbosus*, *Pseudorasbora parva*) and to the habitat loss in the last decades its populations drastically decreased and it is on the way to disappear from the country (Bănărescu, 2005; Gavriiloaie, 2007; Oțel, 2007). The Order No. 400 of March 15, 2013 states that the fishing of the crucian carp is prohibited in any period of the year for any purpose.

Carassius carassius was present in relatively high density in the Bălteni and Sticlărie Valley Lakes (Table 2, Fig. 1). Despite the fact that the species was indicated early in the Scroviștea Lake (Bănărescu, 1964), we could not detect its presence. On the Scroviștea Lake intensive fish farming is practiced which lead to the introduction of two invasive species (*Carassius gibelio*, *Lepomis gibbosus*). The *Carassius gibelio* is also present in the Bălteni and Sticlărie Valley Lakes, but only in small density so far (Fig. 2). The introduction of invasive species has to be prohibited and the species that are already present have to be eliminated by means of direct methods (for ex. periodic electro-fishing), because everywhere in Europe where invasive species appeared (especially *Carassius gibelio*), these eliminated the crucian carp (Gavriiloaie, 2007). Based on our data we consider that the distribution area of the *Carassius carassius* covers the Bălteni and Sticlărie Valley Lakes (Fig. 4). *Carassius carassius* can become a symbolic species of the site due to its national importance and high local density. The conservation status of this species in the site was determined as favorable due to its presence in the Bălteni and Sticlărie Valley Lakes and appropriate habitat conditions.

The main threat factors and the management measures proposed for ensuring the long term survival of this species are listed in Table 4.

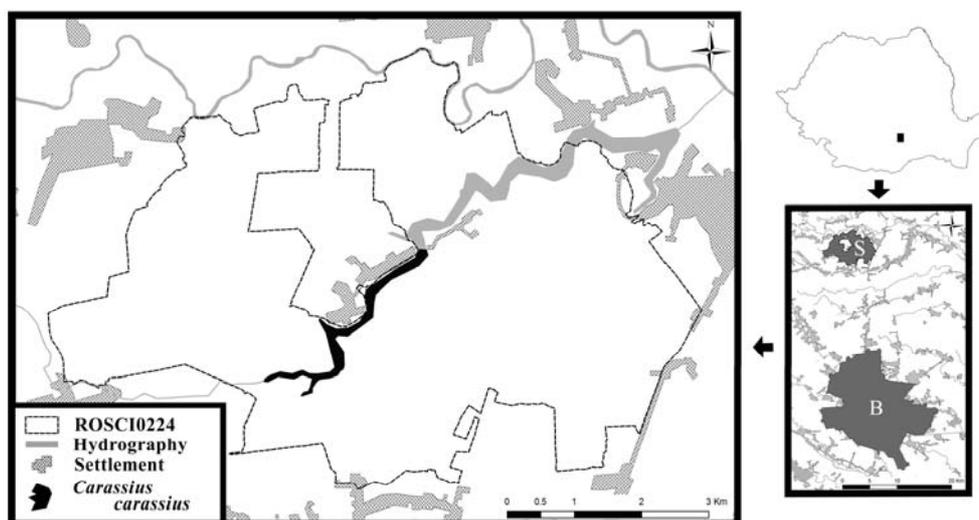


Fig. 4. The distribution area of *Carassius carassius*
(B – Bucharest; S – ROSCI0224 Scroviştea).

Table 4

Main threat factors and management measures for the three target species detected

Species	Threat factor	Management measure
<i>Misgurnus fossilis</i> , <i>Rhodeus amarus</i> , <i>Carassius carassius</i>	Bridges, roads – the settlements and the holiday homes in the vicinity of the lakes are sources of pollutants to the lakes. Mostly during weekends, the surroundings of the lakes become crowded because people from (the city of) Bucharest come here to relax (30-40 km from the site).	Bridges and roads near these lakes have to be monitored and the degree of pollution reduced (through patrolling, controls and active cleaning). The best example is the bridge between the Bălteni and Sticlărie Lakes.
<i>Misgurnus fossilis</i> , <i>Rhodeus amarus</i> , <i>Carassius carassius</i>	Tourist and recreation areas – it is linked to the first threat factor which also represents a source of pollutants because the number of holiday houses is increasing near the lake.	All sources of pollution should be eliminated in order to preserve/improve the water quality (awareness, patrolling and controls).
<i>Misgurnus fossilis</i> , <i>Rhodeus amarus</i> , <i>Carassius carassius</i>	Continued urbanization – pressure on the remained habitats.	As the urbanization continues, it will be required for tampon zones to be designated, where construction will be prohibited.

Table 4 (continued)

<i>Misgurnus fossilis</i> , <i>Rhodeus amarus</i> , <i>Carassius carassius</i>	Storage of waste on the banks and in the water - unfortunately a big amount of waste is stored in the lake, which is a risk both to the water quality and for the target species.	The banks and the lakebeds need to be cleaned and monitored periodically, along with patrolling and control.
<i>Misgurnus fossilis</i> , <i>Rhodeus amarus</i> , <i>Carassius carassius</i>	Driving off road with motorized vehicles – not the driving but the washing of the vehicles can represent a source of pollution.	This phenomenon has to be monitored and eliminated.
<i>Rhodeus amarus</i> , <i>Carassius carassius</i>	Fishing – the problem of fishing is indirect, because the anglers do not usually catch the bitterlings, but they use invasive species (for ex. <i>Carassius gibelio</i>) as a bait to catch predatory fish species (ex. <i>Esox lucius</i>), and at the end of the day, bait fish are thrown into the water. This means habitat and food competition for <i>Rhodeus amarus</i> . For <i>Carassius carassius</i> it means habitat, food and reproduction competition which will end with its elimination.	Fishing with natural bait has to be prohibited in the lakes.
<i>Misgurnus fossilis</i> , <i>Rhodeus amarus</i>	Fishing, with different traps and nets – this is an illegal activity and despite the fact that not the weatherfish, the bitterling or the crucian carp is the target, specimens of these species can be easily caught with traps.	Illegal fishing has to be eliminated in the site.
<i>Misgurnus fossilis</i> , <i>Carassius carassius</i>	Reducing habitat connectivity.	A permanent flux and debit has to be secured for the Sticlărie Lake, especially during dry periods, and the connection between the Sticlărie Lake and the Bălteni Lake also needs to be monitored and secured.
<i>Rhodeus amarus</i>		A permanent flux and debit has to be secured for the Bălteni and Scroviștea Lakes, especially during dry periods, and the connection between these two lakes also needs to be monitored and secured.
<i>Rhodeus amarus</i>	Intensive fish farming – the introduction of different invasive species. Two invasive species were detected in the Bălteni and Scroviștea Lakes: <i>Carassius gibelio</i> and <i>Lepomis gibbosus</i> . These species represent a real threat to the long term survival of <i>Rhodeus amarus</i> .	The introduction of invasive species (even if they are considered economically important) should be banned on the site.

Table 4 (continued)

<i>Carassius carassius</i>	Intensive fish farming – the introduction of different invasive species. From the habitats of the <i>Carassius carassius</i> , the <i>Lepomis gibbosus</i> (Bălteni Lake) and the <i>Carassius gibelio</i> (Bălteni and Sticlărie Lakes) were identified. <i>Pseudorasbora parva</i> was present at the north-eastern limit of the site, which means that sooner or later it will also be present on the site, if no adequate management measures will be taken. All three invasive species represent a significant threat to the long-term survival of <i>Carassius carassius</i> .	
<i>Misgurnus fossilis</i> , <i>Rhodeus amarus</i> , <i>Carassius carassius</i>	Introduction of disease (microbial pathogens) – during the uncontrolled introduction of species, which can bring new diseases into the lakes.	Legal introduction needs to be monitored and supervised, illegal introduction needs to be eliminated.
<i>Rhodeus amarus</i>	Competition – habitat and food competition between <i>Rhodeus amarus</i> and the invasive species.	Elimination of the invasive species that are present and the prohibition of introduction of new invasive species.
<i>Carassius carassius</i>	Competition – competition for habitat, food and reproduction between <i>Carassius carassius</i> and the invasive species.	
<i>Misgurnus fossilis</i>	The decline or disappearance of the population.	Taking into account that the weatherfish population on the site is at a very low scale, the monitoring of the species has to be repeated periodically, along with the elimination of the threat factors, in order to quantify the efficiency of the management.
<i>Carassius carassius</i> , <i>Misgurnus fossilis</i>	Clearing the submerged vegetation.	Interdiction of this action.

CONCLUSION

1. We could not detect the presence of *Umbra krameri* in the water bodies of the ROSCI0224 Scroviștea Natura 2000 site. This confirms the question mark in the Standard Data Form of the site regarding this species.

2. We detected the presence of 19 fish species, of which 5 were species of Community interest (Table 2). From these we recommend only *Misgurnus fossilis* and *Rhodeus amarus* to be added to the Standard Data Form. Three Natura 2000 species from the Ialomița River only have a river section of a few hundred meters as a distribution area within the site, and their management could not achieve its purpose. These data are important in the case of a potential expansion of the Natura 2000 site towards the Ialomița River. Along with these two recommended species, we also added a species of national interest (*Carassius carassius*) to the proposed management measures of the site. Taking into account the size and the quality of the habitats, in which these species are present in various density we determined that *Misgurnus fossilis* has unfavorable-inadequate conservation status, and *Rhodeus amarus* and *Carassius carassius* have favorable conservation status. Sticlărie Valley, Bălteni and Scroviștea Lakes are the most important habitats for the valuable fish species of the site.

3. We identified the main threat factors and proposed management measures in order to ensure the long-term survival of the fish species of Community and national interest (Table 4). The main threat factors are invasive species, habitat loss, illegal fishing and pollution.

We believe that efforts should be focused primarily on increasing the level of available information, providing local actors with the means and incentives to participate in the management of the protected area, promoting deliberative techniques to increase citizens' participation in decision-making processes and integrating more participatory oriented policies mainly in relation to fishing and fish farming problems. Through such actions the process of adapting to changes may be significantly facilitated, and these can also bring several environmental, social and economic benefits to the local community accompanying the designation of this protected area. These actions can assure the favorable conservation status of the fish species of Community and national interest and will comply with the goals of the Natura 2000 directives (Dimitrakopoulos *et al.*, 2010).

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