DATA CONCERNING THE FISH FAUNA OF THE ROSCI 0386 VEDEA RIVER NATURA 2000 SITE (ROMANIA)

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The aim of this study was to carry out an ichthyological survey on ROSCI 0386 Râul Vedea Natura 2000 site which covers a significant part of Vedea River and its tributaries with their floodplain in order to elaborate management measures for the fish species of Community interest. Between June and July 2015 we conducted ichthyological surveys on this site and we captured fish by electro-fishing from Vedea River, its tributaries (Bârza, Dorofei, Ciobănoiul, Tecuci, Bratcov, Burdea, Fântâna cu Scripete, Tinoasa and Câinele Streams) and backwaters. A total of 19 fish species were detected from 41 sampling stations in the Natura 2000 site (and close vicinity), of which six were species of Community interest. We could not detect only one Community interest species from the list of the Standard Data Form, but we detected the presence of other three, of which we proposed two to be added to the list. These proposals were accepted and the list of these Standard Data Forms were extended in 2016. We identified the main threat factors and proposed management measures in order to ensure the long-term survival of the fish species.

Key words: fish species of Community interest, Natura 2000 site, management measures, Vedea River.

INTRODUCTION

The Vedea River basin is located in the south of Romania and it is a sub-basin of the Argeș-Vedea hydrographic area, with a 5,430 km^2 surface (Popescu-Busan *et al.*, 2010). The ROSCI0386 Râul Vedea Natura 2000 site was designated in 2011 based on the following fish species (among other species): *Gobio kessleri, Sabanejewia aurata, Cobitis taenia* and *Rhodeus sericeus amarus*. The site (9077 ha) spreads in Olt (20%) and Teleorman (80%) counties and overlaps with the Vedea River between Corbu and Alexandria localities, as well as with the lower sections of its main tributaries in that area.

Our aim was to carry out an ichthyological survey on the Natura 2000 site in order to elaborate management measures for the fish species of Community interest. Therefore our questions before the survey were:

1. Are the fish species of Community interest from the Standard Data Form present in the site (*Gobio kessleri, Sabanejewia aurata, Cobitis taenia, Rhodeus sericeus amarus*)?

2. What other fish species of Community interest are present in the site and which of them can be recommended to be added to the Standard Data Form of the site?

3. What other fish species inhabit this site?

4. What are the main factors that threaten the 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 through an efficient Management Plan?

MATERIAL AND METHODS

Between June–July 2015 we conducted ichthyological surveys on the ROSCI0386 Natura 2000 site (Fig. 1). We examined all potential habitats in the site: Vedea River, its tributaries (Bârza, Dorofei, Ciobănoiul, Tecuci, Bratcov, Burdea, Fântâna cu Scripete, Tinoasa and Câinele Streams) and backwaters. Fish were captured by electro-fishing (SAMUS-725MP) (Pricope *et al.*, 2004). Samples were taken from 41 sampling stations (Fig. 1, Table 1), from which 12 on Vedea River. The length of a station was a minimum 100 m and 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.

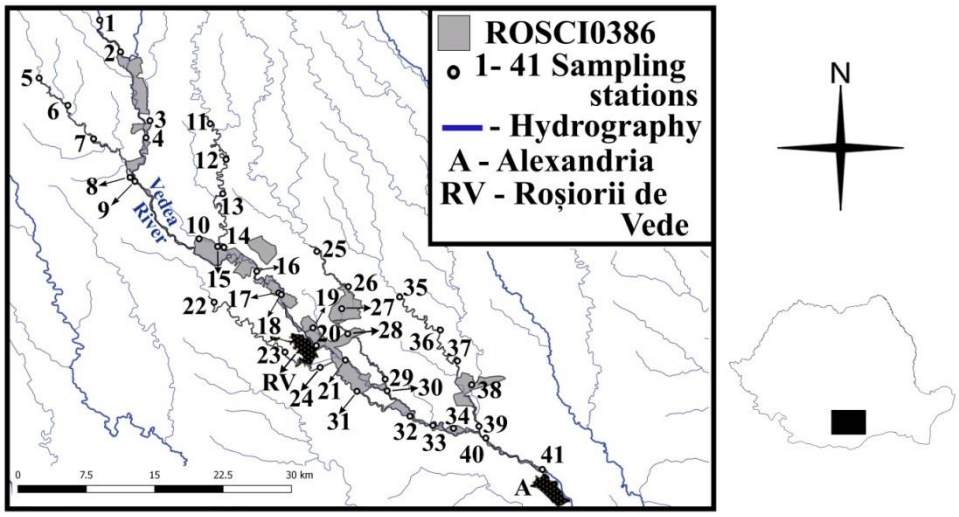

Fig. 1. The study area and the location of the sampling station is the Natura 2000 site.

Table 1

The coordinates of the sampling stations

Sampling station	Y (Latitude)	X (Longitude)	Sampling station	Y (Latitude)	X (Longitude)
1	44.43127	24.71415	22	44.15302	24.87234
2	44.39997	24.74280	23	44.10385	24.96948
3	44.33212	24.78370	24	44.08877	25.01764
4	44.31535	24.77829	25	44.20327	25.01324
5	44.37381	24.63092	26	44.16846	25.05632
6	44.34699	24.67072	27	44.14673	25.04731
7	44.31407	24.70619	28	44.12199	25.05548
8	44.27604	24.75655	29	44.07707	25.10666
9	44.27221	24.76319	30	44.06560	25.10940
10	44.21570	24.85149	31	44.04052	25.14049
11	44.32919	24.86662	32	44.06519	25.06802
12	44.29404	24.88846	33	44.03137	25.17191
13	44.26024	24.88402	34	44.02842	25.20012
14	44.20723	24.88570	35	44.15827	25.12671
15	44.20803	24.87706	36	44.12551	25.18241
16	44.18368	24.93076	37	44.09500	25.20572
17	44.16227	24.96083	38	44.07138	25.22513
18	44.16060	24.96438	39	44.03043	25.23489
19	44.12785	25.00781	40	44.01875	25.24427
20	44.11030	25.01237	41	43.98760	25.32144
21	44.09599	25.05226			

RESULTS AND DISCUSSION

A total of 19 fish species were detected from the 41 sampling stations in the ROSCI0386 Râul Vedea Natura 2000 site, of which six were species of Community interest (Table 2). In the case of the Community interest species we used their old names in parentheses, the ones are mentioned in the Habitats Directive (Council Directive 92/43/EEC of 21 May 1992) for better understanding. From the four species, based on which the area was designated, we could not detect the presence of *Romanogobio (Gobio) kesslerii*, but we detected other three species (*Barbus (meridionalis) petenyi, Romanogobio (Gobio) albipinnatus, Misgurnus fossilis*), of which *Barbus (meridionalis) petenyi* and *Misgurnus fossilis* were proposed to be added to the Standard Data Form. Bănărescu (1964) states about the spread of the *R. (Gobio) kesslerii* in the Vedea River, that is it was present from upstream Roșiorii de Vede city until the confluence with the Danube River, and during periods of decreasing in water level, the species is retracted downstream Roșiorii de Vede. Given the current situation (presence of a dam/concrete threshold near Alexandria city) we have to assume that most probably during the last decades the species retracted several times during dry periods downstream of the Roșiorii de Vede city, but also downstream Alexandria city and the dam/threshold near

Alexandria stopped the species from returning upstream. This way the populations downstream Roșiorii de Vede city slowly disappeared. We indicated the presence of four invasive species, of which *Carassius gibelio* was present in 40 sampling stations out of 41, *Pseudorasbora parva* in 38 out of 41, *Lepomis gibbosus* in 12 and *Gambusia holbrooki* in 3 out of 41 sampling stations (Table 2). We could not detect the presence of *Carassius carassius*, although Bănărescu (1964) mentioned this species from all the ponds from the Vedea River system. Most probably the disappearance of this species is caused by the spread of *Carassius gibelio*, which gradually replaces the native *C. carassius* in the whole county (Gavriloaie, 2007). Compared to the frequency of invasive species the most frequent native species was *Cobitis (taenia) elongatoides*, which was present in 32 sampling stations. In addition we have to underline that there were nine sampling stations where only invasive species were present and two where there were more invasive species than native species. In Ciobănoiul Stream we caught only invasive species (Table 2). These data reflect the degree of infection by invasive species of this watersystem. We also captured the rare *Leucaspius delineatus* from only one sampling station (from the Tecuci Stream), species that was mentioned by Bănărescu (1964) from the Vedea River and his tributary Cotmeana. This species reduced drastically his distribution area in Romania in the last decades and we recommend increased attention to this species and protection of its remaining habitats.

Table 2

The occurrence of fish species according to different sampling stations
(*species of Community interest)

Species	**Sampling stations**
Rutilus rutilus	7, 25, 26, 27, 28, 29, 31, 32, 39
Squalius cephalus	1, 2, 3, 4, 5, 6, 7, 8, 9, 12, 13, 14, 16, 18, 20, 21, 25, 26, 27, 28, 29, 30, 31, 32, 33, 38, 39, 40, 41
Leucaspius delineatus	12
Alburnus alburnus	1, 2, 4, 6, 7, 8, 9, 12, 14, 16, 18, 20, 21, 25, 26, 27, 28, 29, 30, 32, 33, 38, 39, 40, 41
*Barbus (meridionalis) petenyi**	1, 2, 4, 8, 9, 14, 16, 18, 20, 21, 28, 29, 30, 32, 33, 38, 39, 40, 41
Gobio gobio	1, 2, 4, 5, 7, 8, 9, 11, 13, 14, 16, 18, 21, 24, 26, 27, 28, 29, 30, 32, 33, 35, 38, 39, 40, 41
*Romanogobio (Gobio) albipinnatus**	4, 8, 9, 12, 13, 26, 27, 28, 29, 32
Pseudorasbora parva	3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 39, 40, 41
*Rhodeus (sericeus) amarus**	1, 2, 3, 4, 5, 6, 7, 8, 9, 12, 13, 14, 16, 18, 20, 25, 26, 27, 28, 29, 30, 31, 32, 38, 39, 41
Carassius gibelio	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41
Cyprinus carpio	32
*Misgurnus fossilis**	3, 31
*Cobitis (taenia) elongatoides**	2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 16, 20, 21, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 35, 36, 37, 38, 39, 40, 41

Table 2 (continued)

*Sabanejewia (aurata) balcanica**	1, 2, 4, 8, 9, 16, 18, 20, 21, 30, 32, 35, 40, 41
Sabanejewia romanica	1, 4
Gambusia holbrooki	32, 34, 41
Lepomis gibbosus	2, 3, 7, 12, 14, 25, 27, 28, 32, 38, 39, 41
Neogobius fluviatilis	28
Proterorhinus semilunaris	27, 28, 29, 41
Sampling station types/waterbodies	
Vedea River	1, 2, 4, 9, 16, 18, 20, 21, 30, 33, 40, 41
Bârza Stream	3
Dorofei Stream	5, 6, 7, 8
Ciobănoiul Stream	10, 15
Tecuci Stream	11, 12, 13, 14
Backwater	17, 19, 34
Bratcov Stream	22, 23, 24
Burdea Stream	25, 26, 27, 28, 29
Fântâna cu Scripete	31, 32
Tinoasa Stream	35, 36, 37, 39
Câinele Stream	38

* species of Community interest

Barbus (meridionalis) petenyi

It is a benthopelagic freshwater fish, which prefers clear and fast flowing water sectors with hard substrate. The main threatening factors are pollution, habitat destruction and water takeout (Bănărescu, 1964; Bănărescu & Bănăduc, 2007). The species was introduced under the name of *Barbus meridionalis* in the Habitats Directive, but after that its scientific name was clarified, as being *Barbus petenyi* (Tsigenopoulos *et al*., 1999; Tsigenopoulos & Berrebi, 2000; Machordom & Doadrio, 2001; Kotlík *et al*., 2002). The species has a stable population in the site, being present in numerous waterbodies: Vedea River, Burdea, Câinele, Dorofei, Fântâna cu Scripete, Tecuci and Tinoasa Streams (Fig. 2). The conservation status of this species was favorable. The main threat factors and the management measures proposed for ensuring the long term survival of this species are listed in Table 3.

Rhodeus (sericeus) amarus

Rhodeus amarus 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. It has a stable but vulnerable population in the site, due to river regularization and sand and gravel exploitation the *Unio* and

Anodonta species are in a great decline, which will result in the disappearance of this species too. It is present in Vedea River, Bârza, Burdea, Câinele, Dorofei, Fântâna cu Scripete, Tecuci and Tinoasa Streams (Fig. 3). The conservation status of this species was favorable. The main threat factors and the management measures proposed for ensuring the long term survival of this species are listed in Table 3.

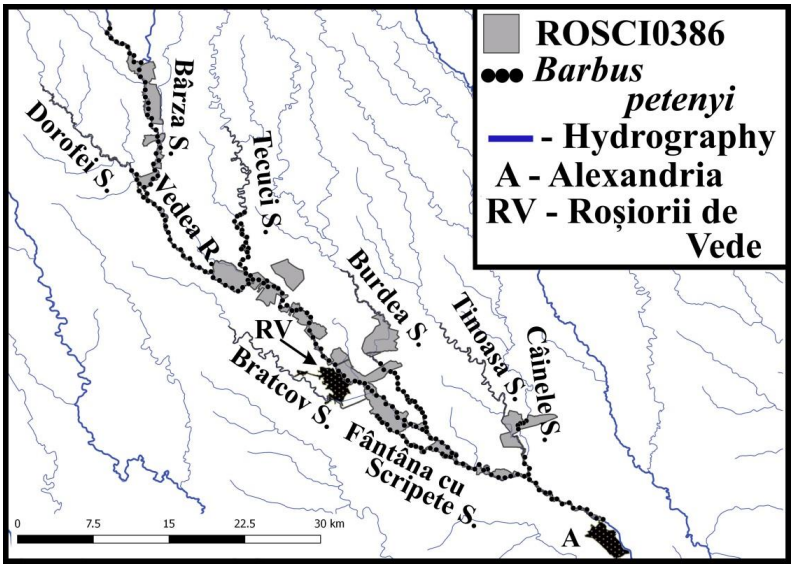

Fig. 2. The distribution area of *Barbus (meridionalis) petenyi*.

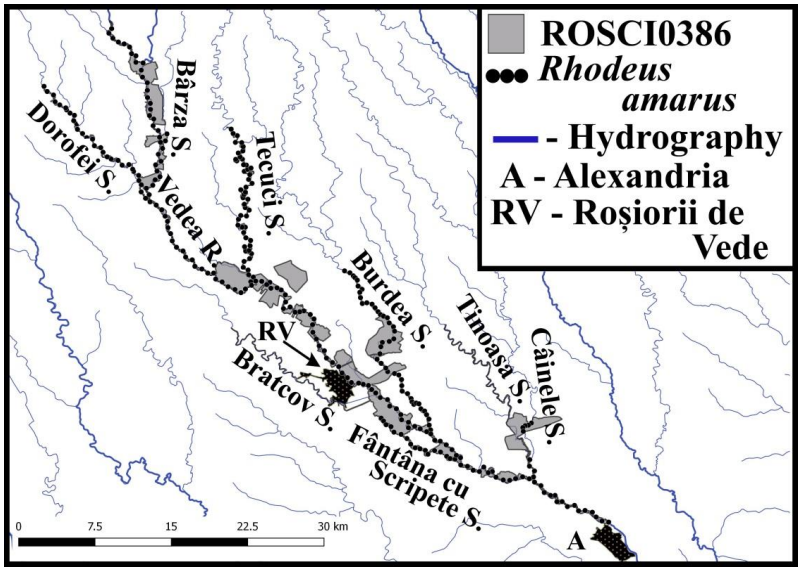

Fig. 3. The distribution area of *Rhodeus (sericeus) amarus*.

Misgurnus fossilis

Misgurnus fossilis is an inconspicuous limnophilic European species, whose distribution area spans from Spain to the Volga River (Meyer & Hindrichs, 2000; Pintér, 2002) but at the same time it is one of the most threatened fish species in the world (Hartvich *et al*., 2010). The IUCN Red List of Threatened Species classified this species in the Least Concern category, with a decreasing population trend (IUCN 2016). This species is included in the Red List in the Czech Republic (Lusk *et al*., 2004), Vulnerable status in Croatia (Mrakovčić *et al.*, 2008) and Critically Endangered status in the Red List of Austria (Wolfram & Mikschi, 2007). In Romania the species is not included in the Red Book of Vertebrates (Bănărescu, 2005), but it is considered a vulnerable species with decreasing area and population size (Wilhelm, 2000). Its occurrence is linked to specific biotopes in floodplains of larger rivers (Meyer & Hinrichs, 2000), but the river regulations lead to a significant decrease in these original natural biotopes (Mendel *et al*., 2008). The species has a small and fragmented population in the site, being present in only two waterbodies: Bârza and Fântâna cu Scripete Streams (Fig. 4). The species had an unfavorable-bad conservation status due to its low population size, decrease of habitat and the high cumulative effect of impacts and threats to the species. The conservation of its habitat and other possible habitats is pivotal for this site and in general for the co-species of *M. fossilis* (Müller *et al.*, 2015). At this stage artificial propagation of this species and growth in captivity of juvenile can be a solution in order to repopulate the potential habitats (Imecs *et al.*, 2015). New habitats can also be created for this species based on its habitat requirements (Tatár *et al.*, 2015). The main threat factors and the management measures proposed for ensuring the long term survival of this species are listed in Table 3.

Cobitis (taenia) elongatoides

This species was introduced under the name of *Cobitis taenia* in the Habitats Directive, but after genetic studies it has been clarified that only *Cobitis elongatoides* lives in the Danube water system (Culling *et al*., 2006). *Cobitis elongatoides* lives in slow-flowing and standing waters, with sand or clay substrate, rarely on stony substrate. The main threatening factors are pollution and habitat destruction (Bănărescu, 1964; Bănărescu & Bănăduc, 2007). *Cobitis elongatoides* has a stable population in the site, being present in numerous waterbodies: Vedea River, Bârza, Bratcov, Burdea, Câinele, Dorofei, Fântâna cu Scripete, Tecuci and Tinoasa Streams (Fig. 5). The conservation status of this species was favorable. The main threat factors and the management measures proposed for ensuring the long term survival of this species are listed in Table 3.

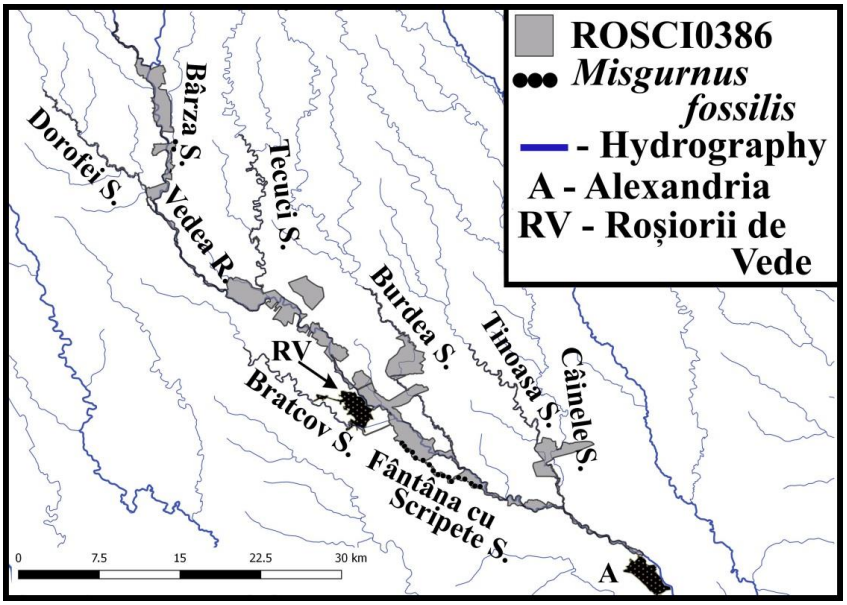

Fig. 4. The distribution area of *Misgurnus fossilis*.

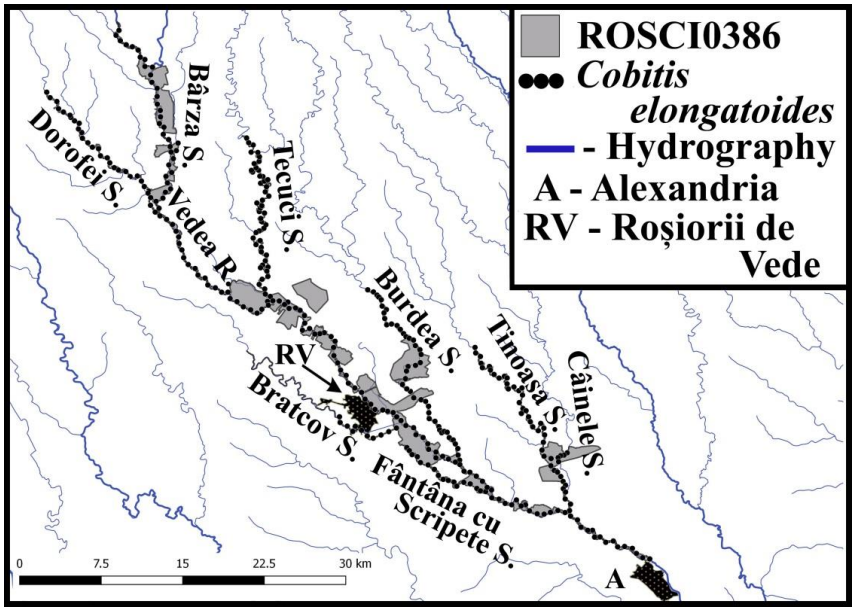

Fig. 5. The distribution area of *Cobitis (taenia) elongatoides*.

Sabanejewia (aurata) balcanica

This species name was used by Bănărescu (1964) as *Cobitis aurata*, but in the late decades it was used as *Sabanejewia aurata* by several authors (Bănărescu *et al.*, 1972; Bănărescu *et al.*, 1999; Davideanu & Davideanu, 2004; Bănăduc, 2007) and it was introduced under the same name in the Habitats Directive. Until recently four subspecies were known to this species: *balcanica, bulgarica, vallachica* and *radnensis* (Bănărescu & Bănăduc, 2007), but genetic research showed us that these are standalone species and *Sabanejewia aurata* is a separate species, which is not present in Romania (Perdices *et al.*, 2003). According to Bănărescu (1964) in the Vedea River between its spring and Roșiorii de Vede is present a transitional form between *Sabanejewia (aurata) balcanica* and *S. (aurata) vallachica*. Overall the situation of the *Sabanejewia* genus is very unclear today. Further genetic analyses are needed to clarify this situation. The species has a restricted and fragmented population in this site, being present in a few waterbodies: Vedea River, Dorofei, Fântâna cu Scripete and Tinoasa Streams (Fig. 6). The conservation status of this species is unfavorable-inadequate due to its decrease of population, habitat and the cumulative effect of impacts and threats to the species. The main threat factors and the management measures proposed for ensuring the long term survival of this species are listed in Table 3.

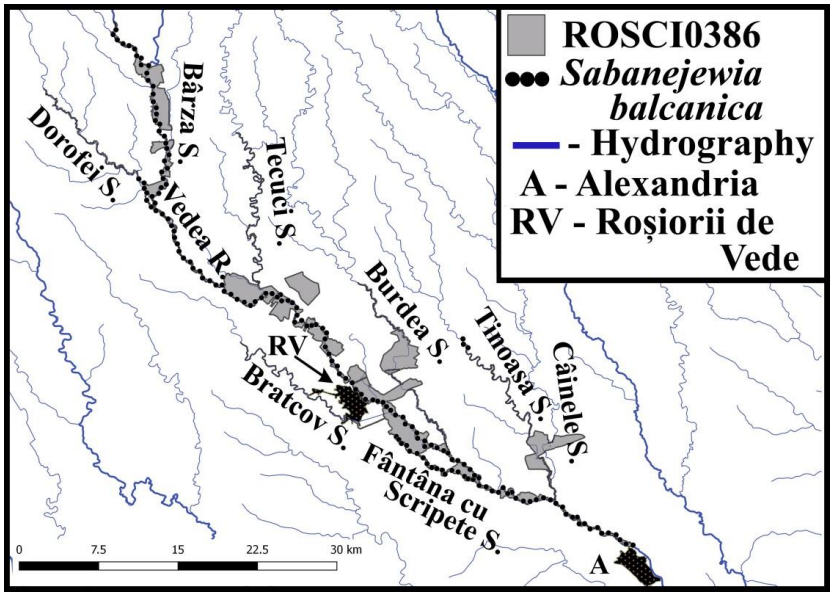

Fig. 6. The distribution area
of *Sabanejewia (aurata) balcanica*.

Table 3

The main threat factors and management measures for the target species detected

Species affected	Threat factor	Management measures
B. (meridionalis) petenyi, R. (sericeus) amarus, C. (taenia) elongatoides	The lack of trees on the bank of the river/tributaries: causes the faster heating of the water and the decrease in dissolved oxygen level also causes lack of the shelter places;	It is necessary planting trees (alder, willow) near river/streams to provide water surface shading. Cutting down trees from the banks of the river/tributaries should be banned. 50% of a riverside should be covered with trees all the time.
B. (meridionalis) petenyi, R. (sericeus) amarus, C. (taenia) elongatoides, M. fossilis	Expanding settlements along the river bank, building houses right next to them: entails the loss of floodplain, habitats, trees and the need for flood prevention works in the riverbed – barriers.	Human construction should be banned in the floodplain, existing illegal buildings should be removed/replaced.
B. (meridionalis) petenyi, R. (sericeus) amarus, C. (taenia) elongatoides, M. fossilis	Barriers without fish ladder: surface water catchments, loss of habitat, continuous disturbance, reducing migration and genetic exchange, fragmentation.	Barriers need to be equipped with a functional fish ladder. Other thresholds must be removed (concrete, wood) from the riverbeds; upstream and downstream migration/movement must be ensured through bypass channels and/or functional fish ladders. The construction of dams or other barriers higher than 20 cm should be banned everywhere.
B. (meridionalis) petenyi, R. (sericeus) amarus, C. (taenia) elongatoides, M. fossilis	Water poluation: settlements along the watercourses discharge wastewater into the river/stream;	The discharge of household wastes/wastewater and/or industrial in rivers/streams will be banned. Purification stations in the area to be repaired/upgraded to meet current standards. Big polluters should be eliminated.
B. (meridionalis) petenyi, R. (sericeus) amarus, C. (taenia) elongatoides, M. fossilis	Exploitation of sand and gravel from the riverbed: results turbid water, fragmentation, loss of hiding, feeding and breeding habitats;	For gravel pits must be developed an integrated plan of operation (which can be implemented only on the law, regularly inspected by the custodian). It should be prohibited direct extraction of sand and gravel from the riverbed (also the ones that are called “flood prevention works”) and the water cannot be reintroduced in the river without proper decanting (from the sorting station). If possible it is necessary to designate “quiet areas”, where extraction is banned during the implementation of the Management Plan. Areas should have minimum of 10 km length.

Table 3 (continued)

B. (meridionalis) petenyi, R. (sericeus) amarus, C. (taenia) elongatoides, M. fossilis	Maintenance and flood prevention: loss of hiding, feeding and breeding habitats, also causes the death of the fish specimens.	Consolidation of banks should be regulated by the custodian to prevent the homogenization of habitats. Flood prevention work must be developed without destroying banks, without concreting, without tree cutting and without construction of bottom thresholds. Maintenance should be executed only in autumn. The most important regularization was carried out on Dorofei Stream in 2012, which now, thanks to the massive change of its course, is no longer in the protected area (Fig. 7).
B. (meridionalis) petenyi, R. (sericeus) amarus, C. (taenia) elongatoides, M. fossilis	Forest exploitation: clearcutting results the driving of suspended solids (especially ground, mud from forest roads) in the minor river beds of streams by floods, causing death by clogging gills of fish species and also death of the eggs. Clearcut areas cannot retain enough water during rainfall and this results also in increased floods	Forest exploitation must be monitored and strictly regulated in a way that does not endanger the conservation of fish species: clearcutting must be banned on the left and right riverside along the river/tributaries. Exploitation upstream the sites should be controlled because it has an effect on the sites fish fauna.
B. (meridionalis) petenyi, R. (sericeus) amarus, C. (taenia) elongatoides	The presence of invasive fish species (*P. parva, C. gibelio, G. holbrooki, L. gibbosus*): habitat, food and reproduction competition for the protected species, which ends for the invasive species benefit.	Controlling the introduction of species in the natural and artificial habitats and prohibiting the introduction of invasive species (e.g *Carassius gibelio, Lepomis gibbosus, Perccottus glenii, Ictalurus nebulosus, Pseudorasbora parva*). Fisherman should be encouraged not to let go of these species one catched and not to use these species as bait.
B. (meridionalis) petenyi, R. (sericeus) amarus, C. (taenia) elongatoides, M. fossilis	Drying up: loss of hiding, feeding and most importantly the reproduction habitats.	In the case of habitats threatened with drying up must be maintained connectivity with the Vedea River or another source of water throughout the year, but especially in spring (during spawning).

Table 3 (continued)

M. fossilis	Reducing habitat connectivity due to anthropogenic impacts causes: fragmentation, population decrease and genetic isolation.	Any fragmentation in the habitat of the species that can prevent the movement of the fish should be banned. This is important especially in spring (during spawning). A separate rehabilitation measure is needed for the habitat of this species in order to conserve it. Another important measure: ensuring connectivity of its habitats with a main watercourse, in order to ensure spread of the larvae and juveniles during and after the spawning period.
B. (meridionalis) petenyi, R. (sericeus) amarus, C. (taenia) elongatoides		Upstream and downstream migration/movement must be ensured through bypass channels and/or functional fish ladders. The construction of dams or other barriers higher than 20 cm should be banned everywhere.
M. fossilis	Transforming the habitat into a fishing lake: standing of flowing waters, if transformed into artificial lakes to serve fishermen, becomes a danger for the native species, because alien species will be introduced and the habitat characteristics will be changed.	The transforming of natural habitats into fishing lakes should be banned, all natural habitats conserved and intensive fishing should be excluded.
B. (meridionalis) petenyi, R. (sericeus) amarus, C. (taenia) elongatoides, M. fossilis	Creating new fishing lakes near the river. These anthropogenic habitats are perfect habitats for the invasive species which can escape in the natural waters.	Creating new fishing lakes near the river (closer than 500 m) should be banned. Connection with the river of the new fishing lakes (which are minimum 500 m away) is prohibited.

Table 3 (continued)

B. (meridionalis) petenyi, R. (sericeus) amarus, C. (taenia) elongatoides, M. fossilis	Poaching: several types are practiced in the area	Every type of poaching should be eliminated, the watercourses need to be monitored continuously.
B. (meridionalis) petenyi, R. (sericeus) amarus, C. (taenia) elongatoides, M. fossilis	Storage of waste on the waterfront (especially sawdust): sawdust introduces in the water results of the clogging gills of fish species and lack of oxygen.	Storage of waste and sawdust should be banned, riversides should be monitored and existing waste must be removed/replaced.

Fig. 7. The Vedea River Natura 2000 site covered the Dorofei Stream until 2012, when it was regularized and straightened. Nowadays the stream is only partially in the Natura 2000 site.

CONCLUSIONS

1. We could not detect the presence of all the fish species of Community interest that were present in the Standard Data Form of the Natura 2000 site: *R. (Gobio) kesslerii* was not present. Its absence may be explained with the presence of a barrier near Alexandria city.

2. and 3. A total of 19 fish species were detected from the 41 sampling stations in the ROSCI0386 Vedea River Natura 2000 site, of which six were species of Community interest (Table 2). We could not detect the presence of *R. (Gobio) kesslerii*, but we detected *B. (meridionalis) petenyi* and *Misgurnus fossilis* and we recommended them to be added to the Standard Data Form of the site. We detected one Community interest species (*R. (Gobio) albipinnatus*) that we did not recommend to be added to the list. These recommendations were accepted and the list of the fish species of this site was completed. We also detect the rare *Leucaspius delineatus* but we could not detect *Carassius carassius*, species which was once widespread in the Vedea River system (Bănărescu, 1964).

4. We identified the main threat factors and proposed management measures in order to ensure the long-term survival of the fish species of Community interest in the Natura 2000 site surveyed (Table 3). These management measures, once implemented, will ensure the long-term survival of all the fish species detected. The main threat factors are the exploitation of sand and gravel, habitat fragmentation, invasive fish species, water pollution, flood protection works and the drying up of habitats. From the Community interest fish species detected the *Misgurnus fossilis* is in the greatest danger: it is present in only 2 sampling stations and its habitat is mainly isolated, exposed to human impact.

The conservation of its remaining habitats and other possible habitats is inevitable and at this stage artificial propagation of this species and growth in captivity of juvenile can be a solution in order to repopulate the potential habitats and to displace the invasive species (Imecs *et al.*, 2015). Besides the ex-situ conservation measures new habitats can also be created for these species based on their habitat requirements (Tatár *et al.*, 2015).

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REFERENCES

BĂNĂDUC D., 2007, *Middle Olt River (Transylvania, Romania) – Special area for conservation (Natura 2000 site) proposal for Barbus meridionalis Risso, 1827 and associated fish species.* Acta Ichtiologica Romanica, **II**: 37–42.

BĂNĂRESCU P., 1964, *Pisces-Osteichthyes. Fauna R.P.R.*, vol. XIII, Edit. Academiei R.P.R., Bucharest, 962 pp.

BĂNĂRESCU P., 2005, *Peşti [Fish]. In:* Botnariuc N., Tatole V. (Eds.), *Cartea Roşie a vertebratelor din România*, pp.: 215–255. Muzeul Naţional de Istorie Naturală "Grigore Antipa", Academia Română, Bucharest.

BĂNĂRESCU P., BĂNĂDUC D., 2007, *Habitats Directive (92/43/EEC) fish species (Osteichthyes) on the Romanian territory.* Acta Ichtiologica Romanica, **II**: 43–77.

BĂNĂRESCU P., NALBANT T., CHELMU S., 1972, *Revision and geographical variation of Sabanejewia aurata in Romania and the origin of S. bulgarica and S. bomanica (Pisces, Cobitidae).* Annot. Zool. Et botan., Bratislava, nr. **75**:1–49.

BĂNĂRESCU P., TELCEAN I., NALBANT T., HARKA Á., CIOBANU M., 1999, *The fish fauna of the River Someș/Szamos basin. In*: Sárkány-Kiss A. & Hamar J. (Eds.): *The Someș/Szamos River Valley*. Tiscia Monograph Series, Szolnok – Szeged – Târgu Mureș, Hungary – Romania,
pp. 249–268.

BOHLEN J., ŠLECHTOVÁ V., BOGUTSKAYA N., FREYHOF J., 2006, *Across Siberia and over Europe: phylogenetic relationships of the freshwater fish genus Rhodeus in Europe and the phylogenetic position of R. sericeus from the River Amur*. Molecular Phylogenetics and Evolution, **40**: 856–865.

CULLING M.A., JANKO K., BORÓN A., VASIL'EV V.P., COTÉ I.M., HEWITT G.M., 2006, *European colonization by the spined loach (Cobitis taenia) from Ponto-Caspian refugia based on mitochondrial DNA variation.* Molecular Ecology, **15**: 173–190.

DAVIDEANU G., DAVIDEANUA A., 2004, *Date asupra ihtiofaunei râului Moldova [Data on the fish fauna of the Moldova River]*. Studii și Comunicări, Muzeul Național Brukenthal Științe Naturale, **29**: 191–203.

GAVRILOAIE I.-C., 2007, *Survey on the alien freshwater fish species entered into Romania's fauna.* Acta Ichtiologica Romanica, **II**: 107–118.

GYURKÓ I., 1972, *Édesvízi halaink [Freshwater fish].* Ceres Publisher, Bucharest, 187 pp.

HARTVICH P., LUSK S., RUTKAYOVÁ J., 2010, *Threatened fishes of the world: Misgurnus fossilis (Linnaeus, 1758) (Cobitidae).* Environmental Biology of Fishes, **87**: 39–40.

IMECS I., NAGY A.-A., BUZA E., DEMÉNY F., MÜLLER T., 2015, *Țiparul [Weatherfish]*. In. Müller T., Wilhelm S., Imecs I. (Eds.), *Conservarea și reproducerea artificială a speciilor de pești de mlaștină periclitate: țigănuș, caracudă și țipar [Conservation and artificial reproduction of endangered marsh fish species: mudminnow, crucian carp and weatherfish]*. Editura Green Steps, Brașov, 130–176.

KERESZTESSY K., 2007, *Halfaunisztikai kutatások a Rábában [Fish faunistic research in Rába River]*. Pisces Hungarici, **I**:19–26.

KOTLÍK P., TSIGENOPOULOS C.S., RÁB 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.

LUSK S., HANEL L., LUSKOVÁ V., 2004, *Red list of the ichthyofauna of the Czech Republic: development and present status.* Folia Zoologica, **53**: 215–226.

MENDEL J., LUSK S., KOŠČO J., VENTEŠNÍK L., HAKAČKA K., PAPOUŠEK I., 2008, *Genetic diversity of Misgurnus fossilis populations from the Czech Republic and Slovakia.* Folia Zoologica, **57**: 90–99.

MEYER L., HINRICHS D., 2000, *Microhabitat preferences and movements of the weatherfish, Misgurnus fossilis, in a drainage channel.* Environmental Biology of Fishes, **58**: 297–306.

MACHORDOM A., DOADRIO I., 2001, *Evolutionary history and speciation modes in the cyprinid genus Barbus.* Proceedings of the Royal Society, Biology, London, **268**: 1297–1306.

MEYER L., HINRICHS D., 2000, *Microhabitat preferences and movements of the weatherfish, Misgurnus fossilis, in a drainage channel.* Environmental Biology of Fishes, **58**: 297–306.

MRAKOVČIĆ M., DUPLIĆ A., MUSTAFÍĆ P., MARČIĆ Z., 2008, *Conservation status of the genus Cobitis and related genera in Croatia.* Folia Zoologica, **57**: 35–41.

MÜLLER T., WILHELM S., IMECS I., 2015, *Conservarea și reproducerea artificială a speciilor de pești de mlaștină periclitate: țigănuș, caracudă și țipar [Conservation and artificial reproduction of endangered marsh fish species: mudminnow, crucian carp and weatherfish]*. Editura Green Steps, Brașov.

PERDICES A., DOADRIO I., ECONOMIDIS P.S., BOHLEN J., BĂNĂRESCU P., 2003, *Pleistocene effects on the European fish fauna: double origin of the cobitid genus Sabanejewia in the Danube basin (Osteichthyes: Cobitidae).* Molec. Phylogen. a Evol., **26**: 289–299.

PINTÉR K., 1989, *Halhatározó [Handbook of fish].* Agricultural Publisher, Budapest, 55 pp.

PINTÉR K., 2002, *Magyarország halai [Fish of Hungary].* Academic Press, Budapest, 222 pp.

POPESCU-BUSAN I.-A., DAVID I., NICOARĂ Ș.-V., 2010, *The appearance and degree of fitting of the river basin territory of Romania.* Buletinul Ştiinţific al Universităţii "Politehnica" din Timişoara, Tom **55** (69), Fascicola **1**: 121–124.

PRICOPE F., BATTES W., URECHE D., STOICA I., 2004, *Metodologia de monitorizare a ihtiofaunei din bazinele acvatice naturale şi antropice [The methology for monitoring the ichtyofauna of natural and anthropic water basins]*. Studia Universitatis. **14**: 27–34.

REYNOLDS J.D., DEBUSE V.J., ALDRIDGE D.C., 1997, *Host specialization in an unusual symbiosis: European bitterlings spawning in freshwater mussels.* Oikos, **78**: 539–545.

TATÁR S., TÓTH B., IMECS I., 2015, *Realizarea de biotopuri acvatice pentru peştii de baltă [Creating aquatic habitats for pond species]*. In. Müller T., Wilhelm S., Imecs I. (Eds.) *Conservarea și reproducerea artificială a speciilor de pești de mlaștină periclitate: țigănuș, caracudă și țipar [Conservation and artificial reproduction of endangered marsh fish species: mudminnow, crucian carp and weatherfish]*. Editura Green Steps, Brașov, 177–203.

TSIGENOPOULOS C.S., BERREBI P., 2000, *Molecular phylogeny of North Mediterranean freshwater barbs (genus Barbus: Cyprinidae) inferred from cytochrome b sequences: biogeographic and systematic implications.* Molecular Phylogenetics and Evolution, **14**: 165–179.

TSIGENOPOULOS C.S., KARAKOUSUS Y., BERREBI P., 1999, *The North Mediterranean Barbus lineage: phylogenetic hypotheses and taxonomic implications based on allozyme data.* Journal of Fish Biology, **54**: 267–286.

WILHELM S., 2000, *Halak a természet háztartásában. Édesvízi halaink biológiája. [Fishes in the household of nature. Freshwater fish biology.]* Kriterion Press, Bucharest, 176 pp.

WOLFRAM G., MIKSCHI E., 2007, *Rote Liste der Fische (Pisces) Österreichs [The Red Lis of fishes, Austria]*. pp: 61–198. *In*: Zulka K.P. (Ed): *Rote Liste gefährdeter Tiere Österreichs*, Teil 2. Grüne Reihe des Lebensministeriums Band 14/2. Böhlau-Verlag, Wien, Köln, Weimar.

*** IUCN 2016. IUCN Red List of Threatened Species. Version 2013.2. (Available at: www.iucnredlist.org).

*** Standard Data Form, ROSCI0386, 2011, *Ordin pentru modificarea Ordinului ministerului mediului şi dezvoltării durabile nr. 1.964/2007 privind instituirea regimului de arie naturală protejată a siturilor de importanţă comunitară, ca parte integrantă a reţelei ecologice europene Natura 2000 în România. 29.11.2011.*

*** The European Parliament and the Council Directive 92/43/EEC of 21 May 1992, on the conservation of natural habitats and of wild fauna and flora, Official Journal of the European Communities, L 206, 22.07.1992.

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