

## The Rufford Foundation Final Report

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Congratulations on the completion of your project that was supported by The Rufford Foundation.

We ask all grant recipients to complete a Final Report Form that helps us to gauge the success of our grant giving. The Final Report must be sent in **word format** and not PDF format or any other format. We understand that projects often do not follow the predicted course but knowledge of your experiences is valuable to us and others who may be undertaking similar work. Please be as honest as you can in answering the questions – remember that negative experiences are just as valuable as positive ones if they help others to learn from them.

Please complete the form in English and be as clear and concise as you can. Please note that the information may be edited for clarity. We will ask for further information if required. If you have any other materials produced by the project, particularly a few relevant photographs, please send these to us separately.

Please submit your final report to [jane@rufford.org](mailto:jane@rufford.org).

Thank you for your help.

**Josh Cole, Grants Director**

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Grant Recipient Details	
<b>Your name</b>	Srećko Čolić
<b>Project title</b>	Assessment of distribution and conservation status of the European mudminnow ( <i>Umbra krameri</i> ) in Bosnia and Herzegovina
<b>RSG reference</b>	20191-1
<b>Reporting period</b>	August 2016 – October 2017
<b>Amount of grant</b>	4992
<b>Your email address</b>	<a href="mailto:sreckocolic84@gmail.com">sreckocolic84@gmail.com</a>
<b>Date of this report</b>	31.10.2017.

**1. Please indicate the level of achievement of the project's original objectives and include any relevant comments on factors affecting this.**

Objective	Not achieved	Partially achieved	Fully achieved	Comments
Determining distribution of <i>Umbra krameri</i>				<p>Detailed field research of suitable habitats along the Sava River confirmed the presence of a stable population of <i>Umbra krameri</i> at the only so far known locality in Bosnia and Herzegovina (swamp Gromiželj, Bijeljina municipality).</p> <p>In addition to confirming the findings in the area of the Gromiželj swamp, as part of this project a new finding of <i>Umbra krameri</i> (October 2017) was discovered, also along the river Sava, at the other end of Bosnia and Herzegovina (area of Gradiška municipality).</p>
Basic biological data on the species				<p>Morphometric analysis was performed on 40 individuals in the locality of the Gromiželj swamp. The total body length of the analysed individuals ranged from 33 mm to 85 mm, while the mass of the body ranged from 0.4 to 8.7 g. In the sample of the analysed population younger age groups (33-43 mm) dominate. Population and conservation status data were presented at the 9th Student Conference (StES 2016) and were published in abstract form. Information on the specifics of behaviour, diet and reproductive biology will be collected in the follow-up of the research using the equipment acquired through this project.</p>
Basic ecological data on habitat				<p>During field research, following ecological data were collected: physical and chemical parameters of water, floristic composition of habitat, data on the composition of invertebrates, and data was</p>

			<p>collected on the presence of other species of fish at the sites where <i>Umbra krameri</i> was discovered.</p> <p>Habitats, where the presence of <i>Umbra krameri</i> is confirmed, are characterised by cold water, low concentrations of oxygen, muddy bottom, and dense water vegetation. By analysing the physical parameters of water, the following values were determined: pH = 7,8; conductivity = 700 µS/cm; water temperature = 13,0°C; oxygen concentration = 3,7 mg/l.</p> <p>Other fish species found are: <i>Misgurnus fossilis</i>, <i>Esox lucius</i>, <i>Cobitis elongatoides</i>.</p> <p>The following invertebrate taxa were found by analysing invertebrate composition: Turbellaria, Planorbiidae, <i>Lymnaea stagnalis</i>, <i>Viviparus contectus</i>, Oligochaeta, <i>Niphargus</i> sp., <i>Asellus</i> sp., <i>Gammarus</i> sp. Baetidae, Aeshnidae, Corduliidae, Coenagrionidae, <i>Nepa cinerea</i>, Corixidae, Notonectidae, Dytiscidae - adults, Tipulidae -larvae, Chironomidae - larvae, Dixidae - larvae, Trichoptera - larvae.</p> <p>The analysis of the floristic composition confirmed the presence of the following plant species: <i>Equisetum arvense</i>, <i>Thelypteris palustris</i>, <i>Alnus glutinosa</i>, <i>Erigeron annuus</i>, <i>Helianthus tuberosus</i>, <i>Lemna minor</i>, <i>Mentha aquatic</i>, <i>Nuphar lutea</i>, <i>Physalis alkekengi</i>, <i>Plantago major</i>, <i>Populus nigra</i>, <i>Quercus robur</i>, <i>Rhamnus cathartica</i>, <i>Salix caprea</i>, <i>Solanum dulcamara</i>, <i>Stellaria media</i>, <i>Taraxacum officinale</i>, <i>Urtica kioviensis</i>, <i>Berula erecta</i>.</p>
<p>Definition of anthropogenic influences on existing populations</p>			<p>Negative anthropogenic factors on existing populations are reflected in the application of pesticides on agricultural land near the <i>Umbra krameri</i> habitat, but also in the loss of river floodplains due to sewage and</p>

			illegal fishing in the Gromiželj swamp.
Determining priority areas for survival of species in the area of BiH.			Both sites where the presence of <i>Umbra krameri</i> was found are quite far apart. Therefore, both sites are of priority for the survival of the species on the territory of Bosnia and Herzegovina and it is necessary to enforce their legal protection.
Raising public awareness of the specificity of the species and the necessity of its protection.			<p>Project objectives and research results were presented at the StES 2016 Student Conference held in Banja Luka. The project objectives, as well as the specifics of the species, were presented at the Science Festival which took place during November 2016. On that occasion, all interested citizens and decision-makers had the opportunity to learn more about the project, the specificity of the <i>Umbra krameri</i>, its distribution and the necessity of its protection and its habitat.</p> <p>Through the lectures at the Faculty of Natural Sciences and Mathematics, students of Biology and Ecology and Environmental Protection are familiarised with the project itself, the specifics of the species and its distribution, and we pointed out the necessity of actively protecting the species and its habitat.</p> <p>The objectives and results of the project were also presented to students of secondary schools in several cities of BiH.</p> <p>Also, during field research we talked with the local population and introduced them with species specificities and pointed out the necessity of their inclusion in the conservation of the species itself and its habitat.</p>
Involvement of biology and ecology students in field research			Interested students of biology and ecology and environmental protection are involved in field research, where they are familiarised with the field research methodology. Also, two students have completed

				the fieldwork of their thesis through this project on the species of <i>Emys orbicularis</i> and <i>Bombina bombina</i> .
Collection of samples for molecular analysis				Throughout the project, specimens of upper parts of the fin of a certain number of individuals from newly discovered population, from the Gradiška area, were collected.

**2. Please explain any unforeseen difficulties that arose during the project and how these were tackled (if relevant).**

One of the main difficulties we encountered during the research was terrain inaccessibility of one part of the Sava River (Municipalities: Šamac and Brod), which meant that we were not able to investigate the potential habitats in this part of the Sava River. The mentioned terrain is mined.

**3. Briefly describe the three most important outcomes of your project.**

1. A very significant outcome of this project is the confirmation of the finding of *Umbra krameri* in the area of the Gromiželj swamp. Also, through this project in the area of Gromiželj, tadpoles of *Pelobates fuscus* species have been found, extending its known area in BiH. Finding of these species has served as a significant argument for launching the procedure of restoration of protected status of the Gromiželj swamp, which is under way.
2. Involvement of students of biology and ecology and environmental protection in the field research methodology and their training for independent research in the future.
3. Finding of a new habitat of *Umbra krameri* in the area of Gradiška municipality, which is quite distant from the Gromiželj swamp.

**4. Briefly describe the involvement of local communities and how they have benefitted from the project (if relevant).**

Through the project, the students of biology have mastered the methodology of field research of the fish, and two students (Vanja Krupljanin and Maja Dubočanin) have completed the fieldwork part of their thesis through the project on the turtle *Emys orbicularis* and European fire-bellied toad *Bombina bombina*. Also, through the project, we distributed educational brochures to students, pupils and the local population, all of whom showed great interest in finding potentially new habitats and direct participation in the protection of species and habitat.

**5. Are there any plans to continue this work?**

We believe that it is necessary to continue exploring the distribution of European mudminnow along the Sava River, since we have defined several more potential habitats. It is also very important to begin monitoring the newly discovered

populations, to explore their genetic structure, but also to collect detailed data on nutrition, reproduction and behavioural specifics.

Therefore, we plan to apply for the 2nd Rufford Small grant for the 2018\2019 period, in order to continue the started research.

**6. How do you plan to share the results of your work with others?**

Part of the research results has already been published at the StES 2016 student gathering. Also, part of the research results will be published in the form of a master's thesis that is under preparation. New data will be published in scientific journals too.

**7. Timescale: Over what period was The Rufford Foundation grant used? How does this compare to the anticipated or actual length of the project?**

The project was approved in August 2016. During September and October 2016, we conducted the first detailed field trip and identified 25 potential sites where we carried out our research. During the first field research we confirmed the presence of European mudminnow in Gromiželj. The second detailed field research was conducted during April and May 2017, and the third field research during June and July 2017. Since we have noticed certain specifics in the behaviour of the species, we also carried out an additional fourth field research of suitable habitats during September and October 2017, and with this additional research we not only confirmed the presence of European mudminnow in Gromiželj, but also found a new species finding at a completely different end of Bosnia and Herzegovina (Gradiška municipality). Lectures at several high schools and at the Faculty of Natural Sciences and Mathematics were held during October 2017.

**8. Budget: Please provide a breakdown of budgeted versus actual expenditure and the reasons for any differences. All figures should be in £ sterling, indicating the local exchange rate used.**

Item	Budgeted Amount	Actual Amount	Difference	Comments
Educational material print	810	810	0	Fully spent
Educational material preparation	100	100	0	Fully spent
Laptop	350	350	0	Fully spent
Camera (NIKON D 5500 Black 18-105mm)	720	760	-40	The price difference is a result of change in the exchange rate before and after the application, and the money is added from the difference in the cost of boots.

Digital calipers	20	20	0	Fully spent
Digital scale	15	15	0	Fully spent
Landing net	35	35	0	Fully spent
Neopren Wetsuit x 2	145	85	+60	Instead of neoprene wetsuits, we bought PVC wetsuits, and we added the difference to the cost of transport due to the difference in the exchange rate.
Neopren Boots x 2	90	50	+40	Instead of neoprene boots, we bought PVC boots. We added the difference for the purchase of the camera.
Oximeter (GOX 100) Data logger (Kestrel 4000)	360	360		The money intended for the purchase of a Data logger and Oximeter we redirected to the purchase of the Aquarium with the accompanying equipment. In agreement with Jane Raymond
GPS device Garmin eTrex 30	200	250	-50	The price was somewhat bigger than we planned. We added the difference from the cost of food.
First field trip September – October 2016. (1500km)	215	235	-20	The difference resulting from changes in the exchange rate before the application and after the approval of the project. Money is added from the difference in the price of wetsuits.
Second field trip April-May 2017 (1500 km)	215	235	-20	The difference resulting from changes in the exchange rate before the application and after the approval of the project. Money is added from the difference in the price of wetsuits.
Third field trip Juni-Juli 2017 (1500km)	215	235	-20	The difference resulting from changes in the exchange rate before the application and after the approval of the project. Money is added from the difference in the price of wetsuits.
Additional field trip September-October 2017	0	235	-235	Since we attended a meeting organised by the Institute for Protection of cultural, historical and nature heritage of Republic of Srpska where we presented the goals and results of our project, we did not have the costs of the organisation, and the money intended for holding

				the meeting was diverted to additional field research during September-October.
Daily allowance (for food, drink, etc.) 16 GBT x 4 personnes x 18 days	1152	1102	+50	We added money to the difference in cost GPS device.
200 DNA tubes	50	50	0	Fully spent
Meeting in August	300	0	+300	The money intended for the meeting in August was diverted to an extra field during September- October.
<b>Total</b>	<b>4992</b>	<b>4927</b>	<b>+65</b>	

*\*The remaining money will be redirected to the presentation of the results of the project to the general public at the Science Festival which will be held during 14th-15th November, 2017.*

**9. Looking ahead, what do you feel are the important next steps?**

It is very important to carry out detailed field research of the newly discovered site to determine the size of the habitat and start legal protection by the decision-makers. It is also very important to determine the size and condition of the newly discovered population and to perform its genetic analysis. On the other hand, it is necessary to continue monitoring the population of European mudminnow in the Gromiželj swamp, but also to carry out additional field research on several other potential sites that are defined as such, based on data collected during this project.

**10. Did you use The Rufford Foundation logo in any materials produced in relation to this project? Did the RSGF receive any publicity during the course of your work?**

The Rufford Foundation logo was used according to the instructions received from the RSGF. Logo was used with printed leaflets, posters, t-shirt, Facebook page and power point presentations.

**11. Any other comments?**

I would like to thank RF for this opportunity that was given to me and my team, and it was a great pleasure to be a Rufford grant receiver and my team wants to say thanks very much to the Rufford Foundation. This was the first project I had a chance to lead and thanks for that. We really hope that this will not be the end and that we will continue our collaboration.



*Presentation at Faculty of Natural Sciences and Mathematics, University of Banja Luka*



*Lecture in high school*



*Working in the field with students*



New locality of *Umbra krameri* in Gradiška



Monitoring of *Umbra krameri* behaviour in laboratory

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**POPULATION AND CONSERVATION STATUS OF EUROPEAN MUDMINNOW  
(*Umbra krameri*) IN BOSNIA AND HERZEGOVINA**

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**Abstract:**

The European Mudminnow (*Umbra krameri*) is the only autochthonous representative of the Umbridae family in Europe, but also it is among the rarest fishes in B&H. The species is endemic to the Danube and Dniester rivers watersheds, and probably a Tertiary relict. In the IUCN's Red list it is categorized as Vulnerable, primarily due to its isolated populations consisted of small numbers of individuals, which are presumed prone to local extinctions. The main cause of its decline is, most probably, degradation and destruction of its natural habitats. It was assessed that global population of *Umbra krameri* has declined for more than 30% during the last 10 years. It's the only one finding in B&H is the Gromiželj swamp near Bijeljina, which in 2013 lost its status as a protected area. The primary goal of this paper is to provide information of the population status of *Umbra krameri* in the Gromiželj swamp. During the field research on 1<sup>st</sup> October, 2016 as part of the Rufford Small Grant Project "Assessment of distribution and conservation status of the European Mudminnow (*Umbra krameri*) in Bosnia and Herzegovina" in the area of Gromiželj swamp 40 individuals of the species *Umbra krameri* belonging to different age groups, were caught and measured. The body length ranged from 33.0 mm up to 85.0 mm, while the body weight ranged from 0.4 g up to 8.7 g. In the sample dominated the individuals of younger age classes (from 33.0 mm to 43.0 mm). From other fish species in Gromiželj swamp were found *Cobitis elongatoides*, *Esox lucius* and *Misgurnus fossilis*. Harvested sample of the European Mudminnow suggests that the population is still stable. However, on researched locality has been observed the existence of fishing (floats, bait boxes), which lead to the destruction of habitat. Mentioned above indicates the necessity of active protection of Gromiželj swamp and restore the status of the protected area. Also, the European Mudminnow is necessary to include in the list of protected and strictly protected species in drafting Regulation of strictly protected and protected wild species.

**Keywords:** European Mudminnow, Gromiželj, habitat protection.