

## Final Project Evaluation Report

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Grant Recipient Details	
Your name	Katarina Zorić
Project title	Stone Crayfish <i>Austropotamobius torrentium</i> (Schrank, 1803) in Serbia: Distribution, Population density, Genetic diversity and Conservation
RSG reference	21189-1
Reporting period	April 2017-September 2018
Amount of grant	£5000
Your email address	katarinas@ibiss.bg.ac.rs
Date of this report	29.9.2018.

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
1) to collect and map data regarding current distribution of stone crayfish in Serbia				The field survey was conducted from June to October 2017 and June to September 2018 covering 45 suitable watercourses across Serbia. The presence of stone crayfish was confirmed at total of 21 watercourses, while at eight watercourses this crayfish was recorded for the first time.
2) to estimate population density of recorded populations				Based on a number of captured specimens from 3 x10 m <sup>2</sup> profiles along 100 m stream transects, we estimated populations densities which ranged from 3.9 ind/m <sup>2</sup> (Crna reka, Divčibare) to only 0.03 ind/m <sup>2</sup> (Brankovačka river).
3) to assess the ecological status of aquatic habitats and identifying the main treats				According to our investigation we can conclude that water pollution was probably not a limiting factor for this species due to very good water quality status of hilly mountainous streams as its preferred habitat. Construction of numerous small hydropower plants could be noted as important factor in presumably declining of <i>A. torrentium</i> populations due to habitat fragmentation and isolation.
4) to collect material for genetic analyses				During the project samples for DNA analyses were collected from each estimated population (14 populations in total). Based on COI and 16sRNA markers, we found a rather high genetic diversity, with 14 and five new haplotypes, respectively.
5) to raise public awareness of importance to preserve mountainous habitats as important sites for <i>A.</i>				In order to raise public awareness regarding stone crayfish, we performed lectures and presentations in five elementary schools and distributed brochures and badges.

<p><i>torrentium</i> and biological diversity in general</p>			<p>Additionally, we established links with colleagues from protected areas and attended two scientific conferences. To estimate if our lectures were successful we performed questionnaires on the sample of approximately 240 children (sixth grade, elementary school), and based on results of second (output) questionnaire (performed few months to year later than the first one), we could note an overall moderate increase in knowledge and awareness regarding stone crayfish. For better results, a continued education and seminars in target zones, are needed.</p>
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**2. Please explain any unforeseen difficulties that arose during the project and how these were tackled (if relevant).**

During 2017 season a weather was from time to time rather capricious and unfavourable for our investigation, including heavy rains and downpours inducing rapid flows and increased turbidity of small watercourses as primary habitats of stone crayfish. Because of that we were unable to check for presence and to catch crayfish, so we were forced to repeat some of our field trips several times. Some of this field trips, due to closing of crayfish season, were prolonged to season 2018, which also was rather moody, in terms of weather in these hilly mountainous parts, so we again repeated some of our field trips in order to effective assess presence of *A. torrentium*. As a result a field expenses raised from the estimated/primary level, but we managed to efficiently cover all planed watercourses throughout country.

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

1. We collected some valuable new data regarding distribution and presence of stone crayfish in Serbia. The distribution range is now stretched northwards, including northernmost findings in our country (Rakovački potok; Fruška Gora Mountain). Additionally, a several new localities were found, and distribution map which we provided as a result of this investigation is the most complete and up to date distribution map of this species for Serbia. Obtained data, accompanied with preliminary assessment of population densities and main ecological threats, and could be used for proper assessment and management of this species in our country.
2. Crayfish tissue samples as DNA material from investigated populations of stone crayfish throughout Serbia are valuable source for further various genetic analyses. Obtained preliminary data from traditional mitochondrial markers (16sRNA and COI), suggest high genetic diversity, with over a dozen

haplotypes (nine 16sRNA and 17 COI), of which, particularly regarding COI, majority are new for this species overall (14 new COI and five new 16sRNA haplotypes). Such useful data, besides representing a solid genetic database for this species (which lacked previously in Serbia), could be implemented in additional phylogeographic and conservation studies.

3. Hopefully, we raised public awareness level in some target parts of Serbia, where this species is present, but majority of population was with low or no knowledge at all, regarding presence, importance and protection needs of stone crayfish. Organised seminars and lectures in elementary schools, established communications and links with local inhabitants and officials, should represent a basis for more appropriate future management and protection of this rare crayfish on the local level.

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

During investigation we have communicated with many people from local communities, including schoolchildren, school officials and teaching staff, fishermen, fishery officials, colleagues and officials from protected areas and national parks. We also established connections with people living in close proximity to the investigated watercourses (when it was possible), and tried to raise their awareness regarding preservation of these watercourses and its wildlife, including stone crayfish. As the stone crayfish and salmonid fishes have rather similar ecological preferences, and often share same habitats, we hope that established links with fishermen and fishery officials, as this part of community is usually one of the most active and important in preservation and protection of aquatic habitats, should be useful in attempts to protect stone crayfish. Lectures and seminars we held and attended, should benefit youth generations by raising overall ecological awareness and by in any cases first encounter with stone crayfish and its importance and ecology.

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

Yes, data obtained during this investigation are solid basis for more detailed and effective species assessment and conservation efforts. Short-term investigation (covering only season or two) is only a snapshot, while for effective management a prolonged monitoring, with inclusion of more detailed population and ecological data is needed. For this purpose, besides the rough checking of all found populations, a focusing on a few populations which should be studied in more details, including capture/recapture method, an estimation of growth rate, maturity age and fecundity, should be beneficiary.

Also, we would try to expand our educational campaigns and organize lectures for students who could later actively participate in field work and protection of species.

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

The results of the project will be visible on the Rufford website and available on websites of the ecological societies that we worked with. Also, current findings will be presented to scientific community in our Institute and Faculty in Kragujevac. A few publications have been preparing which are planned to be published in international scientific journals. Additionally, some data regarding our research, we already published and presented (two international conference papers).

**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 grant was used from April 2017 to September 2018. All the activities were conducted accordingly to the project plan, except field investigation, because additional field sampling planned for June and July 2018 were prolonged due unsuitable weather condition and ended in the middle of September.

**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
Field expenses	1,560	2,045	-385	A prolonged and repeated field investigation due to weather conditions, and higher fuel prices resulted in increased costs
Vehicle (fuel)	1,080	1,196	-116	
Supplies and equipment	750	860	-110	
Lab analyses	1,040	380	660	Majority of costs in this part we covered from other sources thanks to cooperation with colleague from genetic laboratory.
Educational activities	550	514	36	We linked some parts of educational campaign with field trips, so we had some savings here.
<b>Total</b>	<b>4980</b>	<b>4995</b>	<b>-15</b>	<b>The actual cost of the project was 15£ higher than planned, which we covered from external sources.</b>

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

Important next steps will be:

1. to continue field investigation in order to update distribution map;
2. detailed analyses of newly recorded populations;
3. to continue cooperation, education and training of employees in protected areas, primarily national parks
4. to organise educational workshops in nature for school children and training for students so that they can be actively involved in conservation activities.

## 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?

Yes, on all forms of promotional material (t-shirts, badges, brochures and posters) the Rufford logo is clearly and prominently displayed. Also, during lectures at conferences and faculties, the support of the foundation for the realization of every aspect of the research is clearly highlighted.

## 11. Please provide a full list of all the members of your team and briefly what was their role in the project.

**Katarina Zorić, Vanja Marković** and **Nikola Marinković** covered field surveys, as well as an education of local communities and communication with representatives of protected areas.

**Simona Đuretanović** and **Marija Ilić** designed all promotional material, and with help of **Katarina Zorić** prepared material for genetic analyses.

**Simona Đuretanović, Aleksandra Milošković** and **Nataša Radojković** covered lectures and questionnaires in local elementary schools and took part in distribution of promotional material (badges, T shirts, brochures and posters).

**Katarina Zorić** and **Vanja Marković** prepared conference papers and attended two conferences.

## 12. Any other comments?

The whole team participating in the project would like to express their sincere gratitude to Rufford Foundation without whose support this investigation, during which we learned a lot, connected with many quality people and hopefully collected valuable data, would not be possible. It strongly encourage us and motivate for further conservation activities on this species.

We also would wish to express our gratitude to experts providing letter of references to this project: **Dr Andrea Lucić, Dr Valentina Slavevska-Stamenković** and **Dr. Vera Nikolić**.

We are in debt to **Dr Gorana Stamenković** which helped us with genetic material preparation and analyses, and in which laboratory this part of our project took a place. **Dr Saša Marić** helped us with genetic analyses and protocols adaptations, for which we are very grateful.

**Dr Stefan Skorić** accompanied us and was a great help during a few field trips, for which we are very grateful.

Finally, we would like to thank to all great people that we met during our field trips and educational campaigns, which made this part of our project enjoyable, despite sometimes bad weather conditions and other obstacles.



