The Rufford Foundation
Final Report

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.

Thank you for your help.

Josh Cole, Grants Director

Grant Recipient Details	
Your name	Ana Ćurić
Project title	The PARADOX of metamorphosis in European Common spadefoot toad (*Pelobates fuscus*) in Bosnia and Herzegovina
RSG reference	15529-1
Reporting period	July 2014 – October 2015
Amount of grant	5543
Your email address	anna.curic@hotmail.com
Date of this report	12.10.2015.

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
Define distribution map of *P.fuscus* for B&H (Posavina region)			+	Common spadefoot toad is species which is active during a long period in the year (April – September), and the best way to research this frog is during the night, because it is a nocturnal species. For the better research, we divided Posavina region into three smaller regions: western, central and eastern region (map attached-Map1). Firstly, we checked and determined potential localities with QGis programme and Google Maps. After that, whole potential localities were personally checked to determine the best habitats for the species. In the end, we managed to confirm all three Posavina regions (western, central and eastern) and we proudly present 12 new localities for *P. fuscus* in B&H and their distribution map. Distributional map is defined due to new data localities, elevation up to 300 m a.s.l. (because it includes potential habitats which are going to be further researched) and river streams.
Describe terrestrial and water habitats		+		During the research of areas we were using the habitat protocol which we were filling on every new locality where we found *P. fuscus* individuals. In B&H we found several different water habitats: canals (irrigation and drainage), spring permanent ponds, old river streams and gravel pits where the most frequent water habitats were canals. Terrestrial habitats were mainly agriculture lands, where the soil is loose and suitable for *P. fuscus* to dig in. Many individuals were found on anthropogenic sandy areas (construction sand, sandy soil along the fences) and around river banks with natural sandy soil. In confirmed localities, according to ecological – vegetation regionalisation of Bosnia and Herzegovina, we extract four soil types: fluvisol, eugley, sugley – semigley complex, semigley. There is also pseudoeugley, soil which mostly surrounds mentioned soils. Researched area belongs to continental climate. Habitats where *Pelobates fuscus* was found and

				described habitats in the near presence are: Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoeto-Nanojuncetea*; Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* vegetation; Rivers with muddy banks with *Chenopodion rubri* p.p. and *Bidention* p.p. vegetation. Due to lack of botany experts that supposed to contribute the work, we were not able to give detailed description of the habitats vegetation.
List all other herpetofauna species found along with *P.fuscus*			+	Along the *P. fuscus* researches it was important to record all herpetofauna species that were present on the same site. This information can be use later for mapping all potential *P. fuscus* sites, not just for B&H but also for other Balkan countries. These species occurred in the same terrestrial or water habitat or (in case of reptiles) they were in near presence of the common spadefoot toad sites. During the study the list of amphibian and reptile species for B&H has been made. Amphibians are represented with nine species (*Bombina bombina, Hyla arborea, Bufo bufo, Bufotes viridis, Rana dalmatina, Pelophylax kl. esculentus, Pelophylax lessonae, Lissotriton vulgaris, Triturus dobrogicus*) which gives the total number of 10 amphibian species that are usually present on the same site (note, not all species were found on the same site in the same time). Reptiles are represented with 10 species (*Anguis fragilis, Lacerta agilis* (lowland subspecies *argus*), *Lacerta viridis, Podarcis muralis, Natrix natrix* (with two subspecies, *natrix* and *persa*), *Natrix tessellata, Coronela austriaca, Zamenis longissimus, Vipera berus* (lowland subspecies *bosniensis*), *Emys orbicularis*). The total number of 20 species (out of 28 by the last studies in Posavina region (unpublished data)) that inhabits the same type of micro(habitats) gives bigger importance to existing natural habitats and other anthropogenic habitats that are populated in mater of adjustment after natural habitats degradation.

Possible threats			+	Due to experience on field researches we can agree on several main threats that are critical for species *Pelobates fuscus*: 1. Mechanical ploughing of agricultural soil; 2. Traffic around breeding site (even a rare traffic around one studied population has led to the death of a very large number of juveniles and some adult individuals); 3. Natural habitat degradation (even we explained their adaptation, on areas where there are no more natural habitats and no agriculture soils we did not found any individuals); and 4. Water pollution. We also noticed that found Serpentes (snakes) are possible treats for juveniles and adults, but we did not found any concrete evidence.
Raise the awareness of local people			+	On visited sites we were talking with locals about herpetofauna in general and common spadefoot toads, sharing to them experiences and tips. They have been given basic brochures with *P. fuscus* pictures, characteristics of egg clutches, tadpoles and adults and filling form in case they saw a common spadefoot toad in any of these mentioned stages. Most people were cooperating and after a while they were glad to see us and share with us new experiences with frogs in their area. We managed to raise the awareness about the common spadefoot toad and other frogs and their tadpoles benefits (such as water purification, good water quality indicators, maintenance of mosquito larvae in the normal range, visual and audible aesthetics, children connection with nature etc.)
Give ecological and morphological description of the B&H populations			+	B&H populations of common spadefoot toads were mostly found on anthropogenic areas. Since they inhabit areas with near presence of water and terrestrial habitats in the northern B&H which is quite populated, these frogs have lost their natural habitats but they have adapted very well to the anthropogenic areas (e.g., instead of sandy and loose soil they were mostly found on agricultural lands which are or have been cultivated; there is a lack of natural ponds so many meta populations were found in irrigation and drainage canals). We were recording GPS coordinates of the localities, analysed sex ratio, measured abiotic factors (humidity, dew point, wind, temperatures of water, air and land with data loggers and with equipment on field). Each caught individual was photographed and measured (body mass and 20 different morphometric measurements).

				Thanks to Veterinarian Faculty in Zagreb we tested 16 samples for Chytridiomycosis of species *Pelobates fuscus* and two more frequent amphibians on site (in this case *Bombina bombina* and *Pelophylax kl. esculentus*). Samples were taken from four different sites. All of tested samples were **negative** for the disease. With all collected data we will be able to compare our studies and publish.
Education of local people, students and all other interested		+		Comments already in the fields above and as answers to questions 2 and 6.
Education of local team members			+	Our local team member consisted of three organisations members from Bosnia and Herzegovina and Croatia. Through congresses, lectures, meetings, camps and our online promotions I have met many influent people willing to help, give advice and push our little herpetology group forward. All those experiences were shared with local team members. We were studying and trying different variety of methods in our studies and were cooperating through learning and sharing our knowledge and ideas.

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

One of the following problems is inaccessible terrain. Many water areas are impassable due to large quantities of water or densely covered vegetation. The biggest problem is that many wetlands surfaces are mine polluted and some of those areas are potentially good for the species occurrence. We have used two different methods for searching common spadefoot toad in those areas (listening to male adults in breeding period and searching for individuals around mine polluted areas), but during the research we have found that males can be only heard if standing few metres from them and if we move away from the breeding water body the number of individuals are decreasing drastically. Plus, some areas are probably additionally mine polluted due to catastrophic flooding that occurred during the year of 2014.

Also one of the problems was organising lectures in elementary schools. We sent the letter to the ministry and were waiting for any answer for over 2 months. Unfortunately the procedure is much more complicated and after we sent all necessary papers we are now waiting for their permission, which can take up to 3 months. Despite that we got permissions from several schools (not those we planed) to give lectures, and we decided to continue lectures in other schools after we get the formal permission from the ministry because we want to expand and continue with the aims of the project even it is formally finished. People are enthusiastic and interested in this species which we have achieved with promo materials we made.

Through this research one of the difficulties was to find pregnant females and fertilised eggs. In 2014 there was a species breeding explosion but it occurred during mentioned flooding and the team was

not able to access the known breeding sites. In 2015 we could not found any amplexuses during the breeding season, despite we were on many field searches in breeding period. Therefore, we will be based on the reproductive ecology in the following research.

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

First and the most important outcome is that we managed to achieve all our researching goals and made a distribution map for *P. fuscus* on the area of B&H which represent the first information of this kind in our country. That means that common spadefoot toad is no more "unfamiliar" species for B&H and this project enabled us to know the exact species status which will be determine with the future update of the Red List in Republic of Srpska and Red List of Fauna of Federation of Bosnia and Herzegovina.

Second outcome is that we now know some basic and new environmental factors that are necessary for this species to survive strictly in researched areas and now we have a lot of information which can be compared in coming studies.

And the third outcome is that we managed to acquire expertise for species *P. fuscus,* promote knowledge with team, students and local people and have information that could be contributed to knowledge of the conservation status of this species in Bosnia and Herzegovina as well as in Croatia. Team members have connected with many experts in this field and managed to realize future cooperation.

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

During the project we managed to print over 2000 brochures and leaflets which are distributed during the lectures, manifestations and field trips. Also, we made roll-ups which are very useful for the visual project introduction and because of its simplicity and title it attracts a lot of attention. Posters were also made and they contain important information about species, its ecology and biology, adjusted to primary school age because this promo material is donated to schools after the lectures. To be more productive in project and species promotion, glasses cloth and pendants were made with project (*Pelobates fuscus*) logo. Almost everyone was surprised of this species existence, because it is quite rare to see due to its ecology. They also find it interesting the way of researching methods and existence of biologists/herpetologists in B&H.

On the field we were communicating to local people and sharing all the information they needed. Children were mostly interested in our work so we were taking our time to show them how does the research look like and they were actively participating and learning. Also, many other locals were interested in our work and they were also helping us by describing amphibians they are surrounded with and showing some places they are usually finding them (such as manholes).

Students were impressed with the project and that was the reason to involve the bigger number of participants in our filed studies which reflected in better promotion and education. Students were mostly from Banja Luka and Sarajevo University, interested in herpetofauna or they were curious about our research methods. Except our team, students and graduated that participated in field works are: Bojana Milinković, Bojana Vukašinović, Dubravko Čajić, Darko Lazukić, David Todić, Mladen Soldat, Tanja Zarić, BSc., Anita Babić, BSc., Jovica Sjeničić, BSc., Maja Mandić, MSc. from

University of Banja Luka, Berina Vrhovac, Maja Bradarić, BSc., Emina Šunje, MSc. from University of Sarajevo and Aleksandar Simović from Belgrade University. In order to celebrate the Frog Day and success of field reserch and cooperation, *Society for research and protection of biodiversity* organised an educational photography exibition „Frogs of Bosnia and Herzegovina“ where we presented interesting facts about frog species including selected *Pelobates fuscus* photographs from four participiants. We think that the formed team has managed to fulfil the goals and we hope that further cooperation with other experts will become even stronger during further projects.

5. Are there any plans to continue this work?

Future plans generally include similar distribution, ecology and morphology researches. Even we achieved our goals with this project, we need to continue with monitoring of known populations, physical parameters, population breeding etc. However, we also plan to monitor the several best selected populations of *P. fuscus* in B&H and to expand research on the surrounding countries (Serbia and Croatia). The biggest plan is to collect as many as information can we get in order to define true conservation status of this species in B&H.

Due to lack of data for species in surrounding countries we plan to connect and establish a research team which will be consisted of local amphibian experts. In period of 2-3 years we would prepare a regional action plan for conservation of this amphibian species and its habitats. We plan to involve public as much as possible especially in providing data related to distribution in B&H and nearby countries. Public awareness will be continually raised through educational lessons during which we will introduce the community with the importance of this species and its conservation.

After a long period of continues researches, we saw many new questions that needs to be answered and they are mostly connected with species biology. After finishing this project we have in plan to continue with applying for the 2nd RSG award.

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

Some of our results were already presented through presentations occurred on Researchers Night in Banja Luka 2014 and there was a poster presentation of the project on Researchers Night Sarajevo 2014. Also species introduction and further results were presented on Faculty of science and mathematics, University of Banja Luka in May, 2015 and we held presentation as part of regular activities in NGO “Society for research and protection of biodiversity”, Banja Luka. Latest and the most important were participation and presenting the distribution map of *Pelobates fuscus* for B&H and Croatia. The first paper, named “New data and distribution of common spadefoot toad *Pelobates fuscus* (Laurenti, 1768) in western Balkans” will be published in “Hyla herpetological bulletin” by the end of the 2015.

We plan to continue with lectures in elementary schools, and later in high schools, as long as we have promo material from this project.

Besides printed brochures, we arranged in advance to print additional brochures with results of this project.

Meanwhile, the web-page (http://pelobates.com/) and Facebook page (https://www.facebook.com/pelobatesbih) was made in order to inform the public in a timely

manner, which was not provided by budget and project plan in first. Considering the target group for sharing the information, web page was designed on local language. We are updating pages with interesting facts, new facts, our field trips and other ongoings due to the common spadefoot toad researches. We noticed the effectiveness and popularisation of common spadefoot toad after publishing news online and we are planning to continue this type of public informing. Also, we decided to make a logo, not just for this project, but for the all future projects and researches of *Pelobates fuscus*. Logo is in the process to become a regional logo for all the researches of species *Pelobates fuscus*.

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

Project was confirmed in July 2014. That period was actually the toughest in the year when common spadefoot toad is less active due to high temperatures. Luckily, that year, species had breeding explosion, probably because of the rainy season and nearby floods so we managed to find many tadpoles, juveniles and sub-adults. During the year 2014 we already started research in the near areas and continue roughly in 2015. In this year we completed our goals and found a big number of adults, mostly in breeding season (April, May 2015).

In conclusion, The Rufford Small Grant Foundation project was carried out in July, August and September 2014, and from February until October 2015. The researchers were depending on the species activity, which in total gives about 6 months of intensive field research and total of 11 months of fulfilling our project goals.

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
Februar, (4 days): Banja Luka – Kaoci-Suvaja; (353km)	106	105.94	+0.06	In first period of research we were searching for adequate habitats and had all planed four field trips. Amazingly, the budget coincided.
March, (4 days): Banja Luka – Doboj – Šamac – Orašje – Bijeljina – Bosanska Rača (508km)	152	101.06	+50.94	During the research in beginning of the season we managed to fulfil the planed task.
April - May, (10 days): First part: Banja Luka - Kaoci – Bosanska Dubica (265,5km), Second part: Banja Luka - Doboj - Šamac – Bosanska Rača (525,5km)	237	303.72	-66.72	
Jun-July, (10 days):	237	242.13	-5.13	

First part: Banja Luka - Kaoci – Bosanska Dubica (265,5km), Second part: Banja Luka - Doboj - Šamac – Bosanska Rača (525,5km)				
August-September(10 days): First part: Banja Luka - Kaoci – Bosanska Dubica (265,5km), Second part: Banja Luka - Doboj - Šamac – Bosanska Rača (525,5km)	237	351.82	-114.82	
Lectures in Bosanska Dubica, Gradiška, Brčko, Bijeljina (714km)	214	70	+144	Because of a lack of feedback from these local communities we didn't conduct all educational lectures in time. Lectures will be held and difference money will be used as planned.
Data logger HOBO U21 x 4	380	528.85	-148.85	We added money from rechargeable batteries and the Canon SLR macro lens, which we decided to give up because of different prices of several equipments. Agreed by Jane Raymond.
Kestrel Data logger x 1	300	334.35	0	With CHS - Hyla additional budget we justified Kestrel costs.
Stethoscope x 2	180	0	/	One stethoscope was donated to our project, and it was enough to examine the method. Money from stethoscope was used for gas and molecular analyses (Bd). Agreed by Jane Raymond.
Canon SLR macro lens	150	0	/	We gave up from Canon SLR macro lens because of different prices of several equipments, which we supplied as a small budget report. Agreed by Jane Raymond. With CHS - Hyla additional budget we also gave up this part of money for the mentioned reason.
Digital caliper, thermometer x 2 and measuring scale x 2	150	100	+50	Measuring scale we order was not on stock so we had to buy another, cheaper, which stopped working. For next season we will buy new measuring scale that was planed. CHS - Hyla additional budget.
Headlamp x 2; Hand lamps x 2;	400	100	+300	The rest of the money was used for batteries and molecular analyses of

rechargeable batteries (AA and AAA)				*B.dendrobatidis* and it will be used in further researches of species *P.fuscus.* CHS - Hyla additional budget.
Hand nets x 4	120	86.03	+33.97	CHS - Hyla additional budget.
Printing cost and promotional material (Brochures, souvenirs, etc.)	750	963.22	-113.22	We spent much more for the promo material which was in one part covered with CHS - Hyla additional budget (100 £)
Traps material	100	35	+65	
Exhibition rollups x2	200	200	0	The price is included in printing costs.
Train travel expenses: Sarajevo – Banja Luka (round–trip ticket) x6	150	59	+91	Train travel ticket costs were half cheaper for the students.
Daily allowance (for food, drink etc.) – 20 GBP x 2 persons x 42 days	1480	1480	0	CHS - Hyla additional budget.
Molecular analyses (RealTime(PER)) for 12 samples of *B.dendrobatidis*	/	240	-240	Money took from Canon SLR macro lens and stethoscope, which we decided to give up because of different prices of several equipments. Agreed by Jane Raymond. CHS - Hyla additional budget.
pH meter	/	50	-50	Money took from Canon SLR macro lens, which we decided to give up because of different prices of several equipments. Agreed by Jane Raymond. CHS - Hyla additional budget.
Rubber boots	/	30	-30	Because of inaccessible water bodies, we needed at least one pair of rubber boots to achieve our project goals. Agreed by Jane Raymond.
Total	5543		182.23	Extra money will be spent for conducting the rest of educational lectures (gas expenses) that are planned by project, buying new measuring scale and battery stock.

There was an additional budget funded by CHS - Hyla, Croatia, with 800 £ budget. All planned costs were combined with both budgets and it is noted in Comments box.

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

Through this research in the last 2 years, we have collected a significant amount of data. The most important goal that was achieved is that we now know the distribution and we defined crucial environmental factors of occurrence of this species for the first time in Bosnia and Herzegovina. The year 2014 was „an explosive year“, for this species and there was a large number of tadpoles and

juveniles caught. However, in 2015 we caught a large number of adult individuals and very small number of tadpoles. So, we will be focused on behaviour - breeding strategy through further research and we will try to find pregnant females and eggs and make certain morphometric measurements. We will also found new methodologies for tadpole researches.

We will also visit places that we did not visited so far and try to get new information on the distribution of species in region (not just B&H). We need to establish a regional action plan for conservation of this amphibian species and its habitats. Habitats are slowly degrading due to human impact, and even the populations of *Pelobates fuscus* in B&H are great, there are many threats for their decline.

We made a basic and big step of researching this commonly unknown species, and time spent on studying this species pointed us to many new unanswered questions. In the next period we need to process all the data we collected and publish them.

Through the website and promotional material we managed to come in contact with batrahologists from surrounding countries (Croatia, Serbia, and Romania). Future cooperation will be of great significance because we will compare the ecology of metapopulations from the neighbouring countries, and therefore the distribution of this species would be clearer on the global level.

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 with printed leaflets, brochures, roll-ups, on the web-page (this project), facebook page (this project), power point presentations and posters.

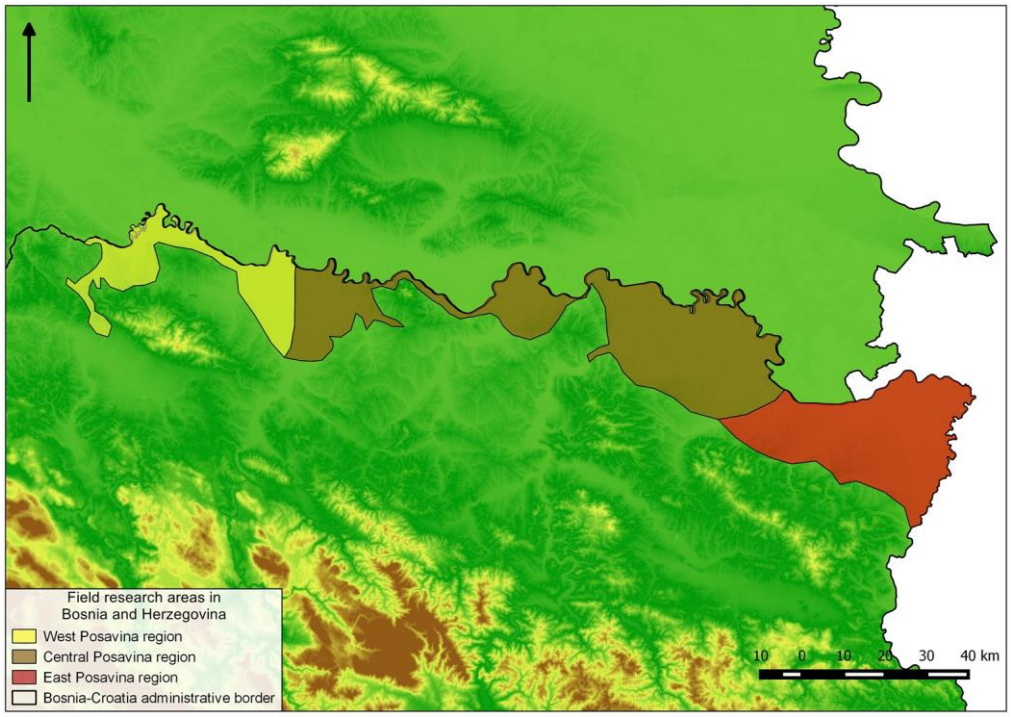
Logo was used according to the instructions received from the RSGF.

11. Any other comments?

We are very satisfied with the project outcome. We managed to achieve almost every goal more than we expected. Gas prices varied during the whole researched period so there is a variation in spent money. Than we combined months with less spent money and fulfil other months having more field trips.

I would like to thank RSGF for this opportunity to work on this project and help to achieve my goals and promote herpetology in Bosnia and Herzegovina. This project was one of the rarest which refers to amphibians in B&H and was the first project I had a chance to lead. It opened many doors for me and I managed to meet many scientists and to present them our project goals and work in general. Also, we connected our NGOs from B&H and Croatia with a strong cooperation. We are, as well, in cooperation with colleges from NGOs from Serbia and Montenegro as well as with Veterinarian Faculty of Zagreb.

Thank you again for the opportunity you gave me and my team!


Field research areas in
Bosnia and Herzegovina
West Posavina region
Central Posavina region
East Posavina region
Bosnia-Croatia administrative border
10 0 10 20 30 40 km

Map: P.fuscus