

Final Evaluation Report

Your Details				
Full Name	Michelle Monge Velázquez			
Project Title	Creating the first ever conservation action plan for the endemic and endangered Golfo Dulce Poison Dart frog using tiny-tech and citizen science			
Application ID	26982-1			
Grant Amount	£5000			
Email Address	mich.monge11@gmail.com			
Date of this Report	February 2020			



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

Objective	Not ach	Part ach	Fully ach	Comments
	ieved	ially ieved	y ieved	
Objective 1: Expand scientific knowledge on the ecology of the species: create a baseline of home ranges, population densities, habitat characterization and habitat use patterns.				We had problems in the field with the initial telemetry equipment. It took us some time to solve this problem so we had a delay of 2 months and were only able to track 21out of 30. Still, we got enough data to study home ranges, habitat characterisation and habitat use patterns. We have also recorded different behaviours. In July 2020 we will expand the number of individuals studied from 21 to 30.
Objective 2: In collaboration with citizen scientists, determine the current and past distribution of the species throughout the Osa.				We carried out more on-the-ground surveys instead of acoustic monitoring, as we had to re-adjust the budget. We partnered with the tele-detection department of the Biological Station of Doñana National Park in order to create a detailed distribution map. We created a map of the land cover of the whole distribution of the species based on data provided by Nasa Develop. This map and all the observations recorded by local partners and during surveys, allowed us to create an updated and detailed distribution map.
Objective 3: Identify key areas for habitat protection, and habitat restoration.				With the new land cover map and the updated distribution we have been able to determine the ecological niche of the species. This has allowed us to identify areas for future habitat protection and restoration. Design of the map is still ongoing for the creation of the Conservation Action Plan, which has been delayed due to our problems during our field work.
Objective4:Improvelong-termlocalconservationleadershipbyraisingawareness				 We surpassed our first goals: We reached 243 locals (mainly guides and landowners) through workshops in 13 communities.



about th	e value	e of this			
species	and	building			
scientific	skills	and			
knowledg	je in	local			
citizen scientists.					

Through our talks at eco-lodges and night tours, we reached 93 foreigners of the Osa.
We reached more than 2000 people through social media.

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

In order to track the individuals of *Phyllobates vittatus*, we used the transmitters from the company Lotek (model NTF-1-1). Unfortunately, they stopped working with the first use for no apparent reason. We contacted the company and they did not give us any solution. We also found many other researchers who had the same problem as us. As the company was not giving us any solution nor planning to give the money back, we decided to change and use another widely used technique to track amphibians, harmonic direction finder. The equipment arrived quickly, and our team managed to prepare everything to go back to the field as soon as possible. The equipment was more efficient. Despite the range of this transmitters being much lower (approx. 10m), we had no problems to find the individuals as it is a territorial species.

Unfortunately, we had 2 months delay due to this problem with Lotek and were only able to track 21 individuals. We plan to track nine more individuals this following rainy season July 2020. Nevertheless, due to this issue, we did not have enough time to finish the Conservation Action Plan for the end of the project during February 2020.

This issue also left us with almost no funds as we had to buy unexpected equipment. We were then unable to buy the Song-Meter SM4 recorders. Nevertheless, we were still able to determine its distribution area by increasing the amount of on-the-ground surveys to verify its presence and thanks to all the support by the local communities.

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

- a) Ecological needs of the Golfo Dulce Poison Frog: By tracking the individuals we have been able to observe the home range, microhabitat characterisation and habitat use. This, added to the information on its potential ecological niche, is the base for further research and development of conservation strategies. Moreover, this is the first time a study has focused mainly on this species and not comparing its behaviour with other species.
- b) Updated and detailed distribution map: This distribution map is of vital importance for the conservation of *Phyllobates vittatus* as it has allowed us to determine its potential ecological niche and see which populations seem to be fragmented. Then, we can identify areas with immediate threats like habitat loss and see potential areas for restoration. Furthermore, this map allows us to create a long-term monitoring plan. As more populations have been registered, it is now easier to track them and evaluate population trends.



c) Conservation Action Plan: the main outcome of this project is the Conservation Action Plan that is being generated with all the information produced during this project. Before this project, it was not possible to create a suitable action plan for *Phyllobates vittatus*, as its basic ecology was poorly known. This information is not broad enough for most amphibians and it is vital to understand their requirements to be able to create appropriate and efficient conservation action plans. This endangered and endemic species is in urgent need of one due to the threats that have been increasing in the last decades. Thanks to this project we are able to finally create one and work alongside the Ministry of Environment of Costa Rica to protect it. With this action plan, we will be also protecting also other species, as the *Phyllobates vittatus* is a flagship and an umbrella species as well.

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

This project would not have succeeded without the local communities as they helped us confirm populations of *Phyllobates vittatus* in its distribution area. In order to engage them with the project, we delivered workshops showing them the importance of this species and how they will benefit from protecting it. After the workshops, we always had a night walk, in which we went out looking for the species and other amphibians.

Thanks to the local communities, the observations recorded on iNaturalist increased from 45 to 120 during 2019, and we were able to expand the distribution map in the Buenos Aires region. With their involvement we were able to observe that the populations on the Dominical area seem to be isolated from the rest.

As part of this project, local communities have learned more about amphibian ecology and their importance in the ecosystem. This information was requested directly by them, as most were local guides. We ended up creating a group so the main partners could be in contact and inform each other about new finds of the species and other amphibians. In this group, we also uploaded scientific information that they were interested in with summaries translated into Spanish.

Once the information created during this project is published, partners will receive a copy of this work. Also, as we worked with a citizen science approach, certain community leaders realised they could start their own conservation/monitoring projects with other species inhabiting the Osa Peninsula region.

5. Are there any plans to continue this work?

Yes. The aim of this final goal of this project is to create the first Conservation Action Plan for this species. I feel committed to the protection of the Golfo Dulce frog and other endangered amphibians of the Osa, as well as with every community that has collaborated with me during the project. The creation of the action plan is just the first part, as it is then when we can act and get hands-on towards the protection and restoration of populations.



Since we have discovered there is a physical gap between Dominical and the Península, we would like to apply for a Rufford Booster Grant to start a second phase of the project, starting a population genetics analysis of *P. vittatus* via non-invasive techniques. Sampling the species DNA will provide key information to answer how many populations there are, what is the genetic diversity of the species and estimate other population genetic parameters like inbreeding coefficient and population size. This genetic approach is necessary in conservation plans for threatened species because it provides the tools to determine the viability of populations in short and long term.

Also, it would be important to support the restoration of a riparian habitat to expand the availability of suitable habitat for this species, as well as carry away more conservation efforts within the Dominical area and keep working with the communities to protect amphibians of the Osa for generations to come.

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

After all the analysis is finalised and the Conservation Action Plan is created, we will deliver a formal report to Rufford Foundation.

We plan to disseminate our results through a publication on peer-reviewed journal, sharing it with the scientific community. We will also share it among our partners of the project and in different social media platforms.

This Conservation Action Plan will be shared with the Ministry of Environment of Costa Rica (MINAE), for future conservation strategies they could apply, as it is one of their target species.

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

The grant was used during the whole field work of this project. The duration of this part ended up taking 2 more months than expected, delaying the rest of the project. Still, thanks to Osa Conservation's flexibility, it was possible to extend the work without increasing the budget of the project.

Field work (February – October 2019)

- Phase 1. On-the-ground surveys throughout the distribution range of the species and work to verify the update its distribution range (February August 2019).
- *Phase 2.* Tracked individuals using harmonic direction finder (May October 2019).
- Phase 3. Presentations at eco-lodges and schools. Workshops for local students and guides on survey and ID skills and raise awareness about the importance of this species (February –August 2019).

Data analysis (December 2019 – undergoing)

Having created the distribution map, we continue analysing the data collected to understand its ecology and create the Conservation Action Plan.



Due to the problems we had in the field, we have had to delay the data analysis for some months.

Once data analysis is finalised (April 2020) we will prepare a detailed final report for The Rufford Foundation as well as the manuscripts to disseminate the information generated during this project with the scientific community.

8. Budget: 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. It is important that you retain the management accounts and all paid invoices relating to the project for at least 2 years as these may be required for inspection at our discretion.

The grant from The Rufford Foundation allowed us to keep going with the project despite the problems with the telemetry equipment and buy new equipment for the technique Harmonic Direction Finder.

Item	Budgeted Amount	Actual Amount	Difference	Comments
Radio-tracking	•	•	•	
VHF Transmitters (Lotek)	1680	3100	+1420	We bought more transmitters (30) than expected as, at the beginning, we spent less in other parts of the equipment.
Antenna (Lotek)		240		
Receiver (Lotek)		1		They gave us an old version for free.
Accessories		200		
GPS				We used Osa Conservation's GPS.
HDF Equipment		2209		
HDF Accessories		100		
Bioacoustics				
Song Meter SM4	1300	2544	+1244	As mentioned above, Lotek did
Kaleidoscope One-year Professional Subscription		331		not give us the money back, which enabled us from buying
SD cards 64GB		30		the equipment for bioacoustics.
SM4 charge cable		82		
Interviews/expeditions	385	850	+465	
Workshops and talks	495	700	+205	
Hired staff				·
Research collaborator	1140	3500	+2360	



stipend for 7 months				
RUFFORD TOTAL	5000	10694	+5694	This difference came from our own money.
Overall Budget		13887	+8887	

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

The next steps could be divided in three main aspects: conservation genetics, restoration and protection and education:

- a) Conservation Genetics: IUCN recognises the need to conserve biodiversity at three levels; genetic diversity, species diversity and ecosystem diversity (Frankham 2005). Working with the species genetic diversity is required to ensure feasibility of populations in short and long term. If this species genetic diversity is adequate, we can expect a buffering effect against population collapse in events of drastic environmental changes and therefore, the conservation of the species can be assured. Since it seems that the populations, it is necessary to run a DNA analysis to identify if there is genetic variability between these populations. If so, it is necessary and urgent to focus conservation efforts on this area so we do not lose this variability.
- b) Restoration and protection: based on the information generated, identify a potential area for habitat restoration, connecting different populations and increasing the availability of suitable habitat for this species. With the map created, we will identify which populations could be under immediate threat from habitat fragmentation and/or agricultural encroachment. It is then necessary to work alongside the Ministry of Environment to protect these areas.

The Golfo Dulce Poison frog inhabits streams, riparian areas and primary lowland tropical forests. The Osa Peninsula is where the rainforest meets the ocean and streams connect these two valuable ecosystems. The diverse tropical forests of the Osa are not only inhabited by *Phyllobates vittatus* but by many unique species. Therefore, conserving forest and riparian habitats through the protection of the Golfo Dulce frog will also provide protection for a vast array of species, like fish, otters, and river shrimps, being an umbrella species.

c) Education and monitoring: Work alongside the communities to keep monitoring these populations and raise awareness not only about the Golfo Dulce frog, but about amphibians of the Osa in general. Keep delivering workshops and talks, so the communities see a continuity of this project and it is then possible to protect this species for generations to come.



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

We used The Rufford Foundation logo on every presentation delivered during workshops and talks. It has also been added to every material produced during the project, including leaflets and advertisement posters.

The support provided from The Rufford Foundation has been mentioned on every report and blog created during this project, and it will appear on the scientific publication as well as any future products from this project.

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

Project supervisor: **Dr. Andrew Whitworth**: Executive Director (Osa Conservation) and Associate Researcher (University of Glasgow)

Dr. Whitworth is an experienced herpetologist, having many publications about amphibians and reptiles, especially in response to habitat degradation. He supervised the project on the ground and ensured the project was efficiently executed.

E-mail: andywhitworth@osaconservation.org

Research associate: Marina Garrido Priego: Coordinator of the Herpetology Program (Osa Conservation)

Garrido is a herpetologist with experience on telemetry. As co-member of this project, she carried out part of this project. She planned the methodology to follow on the field as well as solved the problems found with Lotek and, efficiently, adjust the project to the new tracking technique. She carried out part of the field work and helped delivering educational workshops throughout the Osa.

e-mail: marinagarridopriego@gmail.com

Project consultant: **Hilary Brumberg**: Coordinator of the Healthy Rivers Program (Osa Conservation)

Brumberg is a specialist on water chemistry with a lot of experience working with the local community. Thanks to her work alongside Nasa Develop to create land use maps of the Osa Peninsula to see changes on land cover we were able to determine the ecological niche of *Phyllobates vittatus*.

E-mail: <u>hilarybrumberg@osaconservation.org</u>

12. Any other comments?

I would like to thank The Rufford Foundation in name of my whole team for all its support with this project. I am grateful for all the support provided and hope we can keep working together to save amphibians and protect the rich biodiversity of the Osa Peninsula.