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	Paul David Alfonso Gutiérrez-Cárdenas
Project title	Rediscovery of the Andean toad of Coloma (*Andinophryne colomai*) in the Pacific mountain of Colombian: population study and conservation strategies
RSG reference	16960-2
Reporting period	December 2015 – July 2016
Amount of grant	£5000
Your email address	pdgutierrez2@yahoo.com
Date of this report	July 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
To continue collecting ecological data, which will allow estimate demographic parameters (population size, sex ratio, survival rate) of *Andinophryne colomai*, occurring in the "RNRÑ".			■	We successfully collected data from *R. colomai** over a 2-year period (2014-2016) using a mark-recapture sampling protocol for further population analyses of the species.
Understanding patterns of movement direction is important for predicting how a riparian species persist in different habitats. Therefore, we will study the connectivity of *A. colomai* analysing the gene flow through molecular techniques.		■		This objective has yet to be met, as genetic analysis to achieve this objective requires further funding. In addition, this objective is part of a master's thesis that will begin in this period 2017-2, in which we are carrying out the standardisation of a suitable protocol for an adequate DNA analysis. * *Keep in mind that in the year 2015, the genus Andinophryne was synonimized with the genus Rhaebo*[1]
Explore areas around the "RNRÑ" to know if there are other populations of *A. colomai*			■	We were exploring areas bordering the Reserve Río Ñambí looking for populations of the toad *Rhaebo colomai*. However, no such individuals were found in these explorations.
Spread, strengthen and continue the environmental education program already established in the first phase of the project. To involve more local people, including children, youth and adults			■	We did with full success all the environmental workshops (Fig. 2-4, file attached) planned during the environmental education phase of the project.

[1] Ron, S.R., Mueses-Cisneros, J.J., **Gutiérrez-Cárdenas, P.D.A.**, **Rojas-Rivera, A.**, Lynch, R.L., Rocha, C.F.D. & Galarza, G. 2015. Systematics of the endangered toad genus *Andinophryne* (Anura: Bufonidae): phylogenetic position and synonymy under the genus *Rhaebo*. Zootaxa 3947: 347-366.

who work with the natural reserves around the "RNRÑ".				
We will make available a colouring and activity book to disseminate knowledge of amphibian species occurring in the "RNRÑ". In this way, a didactic material will help the appropriation of knowledge of the amphibian species in the area for both locals and tourists who visit it.				In the environmental education workshops were used a didactic booklet (Fig. 1, file attached) and other materials of support. The booklet, which was distributed to local people and schools in the area of influence of the Reserve Río Ñambí, had texts and illustrations for colouring allusive both to the protection of forests and amphibians.

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

During the final phase of the project, we successfully completed the collection of data concerning the population ecology of *Rhaebo colomai*, as well as carrying out all the planned environmental education activities (Fig. 2-4, file attached). However, we have not yet completed the analyses on genetic structure of the population, since as mentioned above, we require more funds to cover the analysis of all the samples.

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

A. We marked a total of 248 individuals of the species *Rhaebo colomai* and recaptured 98 of them, over a period of 2.5 years of sampling (60 effective working days), from January 2014 to July 2016, and covering two seasons: dry and rainy. The sampling of individuals was done along five transects of 100 m (three in streams and two in forest interior). In the streams, we recorded the majority of individuals (n = 219, 8%), while in the forest transects only 29 individuals were recorded.

   From the recorded data, we estimated on 13th day the following demographic parameters for *R. colomai*, using the Jolly-Seber estimator: population size (N_i), apparent survival probabilities (φ) and the gains (g_i) between day i and day (i + 1). The results are:

   Population size (N_{13}) = 113 individuals
   Apparent survival probabilities (φ) = 1.71
   Gains (g_{13}) = 100 individuals.

   Because of we did not find individuals in the surroundings of the Reserve Río Ñambí, we could consider that the population so far studied in Ñambí is the only one in the region. This result, together with our population data, allows us to corroborate the conclusions on the conservation status of this species published by Ron *et al*. (2015[2]):

[2] Ron, S.R., Mueses-Cisneros, J.J., **Gutiérrez-Cárdenas, P.D.A.**, **Rojas-Rivera, A.**, Lynch, R.L., Rocha, C.F.D. & Galarza, G. 2015. Systematics of the endangered toad genus *Andinophryne* (Anura: Bufonidae): phylogenetic position and synonymy under the genus *Rhaebo*. Zootaxa 3947: 347-366.

Rhaebo colomai is a species Critically Endangered (CR) with a restricted extent of occurrence (< 100 km^2). However, we considered that this population can persist in the time because the locality studied is a natural reserve.

B. We conducted eight environmental education workshops (Fig. 2-4, file attached) during the two phases of the project. Through these workshops, 15 students of the school "Santa Teresita de Altaquer" (corregimiento de Altaquer, municipality of Barbacoas, department of Nariño) were trained. We designed an environmental education booklet (Fig. 1, file attached) for both children and youths who attended the workshops. In the year 2016, were successfully conducted three workshops using both the booklet and support material (pictures, videos) for children to have a greater understanding of the issues on amphibian conservation given so far. Currently, the environmental education booklet is used to promote the conservation and education of amphibians in the studied area, through both the trained students belonging to the ecological group "Los Vicundos". The booklet is used during the tour of visitors of the Reserve Río Ñambí under the guidance of the young ecoguides associated to the Reserve.

C. In order to find new populations of *R. colomai* the surroundings of the Reserve Río Ñambí, we performed in the year 2015 two field trips in those areas. However, those explorations were not successful.

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

Thanks to this project and the funding received from different sources, FELCA Foundation has promoted the progress of this idea both at the regional and national levels, allowing more foundations to join this project. Thus, the process has continued and FELCA added the amphibians as symbols of conservation of the Reserve Río Ñambí along with the traditional birds. Finally, the toad *Rhaebo colomai* is being promoted as a symbol of conservation of the region's amphibians. In addition, the presence of this species in Ñambí has become an additional example to highlight the importance of the Reserve as a place where several animal and plant species are being protected.

5. Are there any plans to continue this work?

Currently, the analysis of the mark-recapture data collected during the 2 years of work is being done, along with the processing of the tissue samples for the analysis of the genetic structure of the studied population of *Rhaebo colomai*. One of the researchers of this project, Alejandra Rojas, started her master's studies, and with her thesis, we plan to do three more field sampling in 2018 to finalise our project and contribute with a complete study of the species. Also, in 2018, we intend to know how the conservation process has continued in the area, by conducting a practical workshop on amphibians, in which the results of this project will be presented together with the list of amphibians and reptiles occurring in the Reserve Río Ñambí compiled after 2 years of research associated with the doctoral thesis of Paul Gutierrez.

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

Our work on *Rhaebo colomai* and other amphibians and reptiles present in the Reserve that could be advanced with funding from Rufford have been shared at scientific meetings (X Latin-American Congress of Herpetology -Cartagena, Colombia, December 2014[3,4,5]; 1st Colombian Congress of Herpetology -Medellín, Colombia, November 2016[6,7,8,9]). Some of these works have already been published in international journals[10,11]. Also, in July 2016 in Ecuador, students from "Colegio Santa Teresita de Altaquer" made a presentation of the project to members of the Biotropica Foundation, who are partners of the Reserve Río Ñambí.

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

We conducted both the fieldwork phase as environmental education workshops between April 2015 and July 2016. After finishing the first phase of the project, we focused only on working with the species object of this study (*R. colomai*) during the second phase; at the same time, we continue with the process of environmental education that we had already started with children since January 2014. The estimated time was in line with what was planned. However, we have not yet finalised the component of analysis of the genetic structure of the population of *R. colomai*, which is the last objective that we must fulfil to finalise this project that was realised with two grants of the Foundation Rufford.

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[3] Ron, S.R., Mueses-Cisneros, J.J., **Gutiérrez-Cárdenas, P.D.A., Rojas-Rivera, A.**, Lynch, R.L., Duarte Rocha, C.F. & Galarza, G. 2014. Sistemática del género de sapos en peligro de extinción *Andinophryne* con una nueva filogenia de Bufonidae. In: X Congreso Latinoamericano de Herpetología, "La biodiversidad sensible: patrimonio natural irreemplazable" (Asociación Colombiana de Zoología, eds.). Cartagena, Colombia. Diciembre 2014.

[4] Castillo, K., **Gutiérrez-Cárdenas, P.D.A.**, Martínez, D., **Rojas-Rivera, A.** & Calderón Leyton, J.J. 2014. Dieta de *Bolitoglossa medemi* (Caudata: Amphibia) presente en la Reserva Natural Río Ñambí (Bosque Pluvial Premontano), Nariño, Colombia. In: X Congreso Latinoamericano de Herpetología, "La biodiversidad sensible: patrimonio natural irreemplazable" (Asociación Colombiana de Zoología, eds.). Cartagena, Colombia. Diciembre 2014.

[5] **Gutiérrez-Cárdenas, P.D.A.**, Castillo, K., Martínez, D., Duarte Rocha, C.F. & Rojas-Rivera, A. 2014. Ecología trófica de una población de *Pristimantis labiosus* (Anura: Craugastoridae) en el suroeste de Colombia. In: X Congreso Latinoamericano de Herpetología, "La biodiversidad sensible: patrimonio natural irreemplazable" (Asociación Colombiana de Zoología, eds.). Cartagena, Colombia. Diciembre 2014.

[6] **Gutiérrez-Cárdenas, P.D.A.***, **Rojas-Rivera, M.A.**, Castillo, K., Mantilla, J.C. & Rocha, C.F.D. 2016. Composición y diversidad de anfibios de la Reserva Natural Río Ñambí (Nariño, Colombia). In: 1er Congreso Colombiano de Herpetología (Asociación Colombiana de Herpetología, eds.). Medellín, Colombia. Noviembre 2016.

[7] Mantilla, J.C.#, **Rojas-Rivera, M.A.** & **Gutiérrez-Cárdenas, P.D.A.*** 2016. Primer registro de la serpiente minadora de Dunn *Atractus dunni* (Serpentes: Dipsadidae) en Colombia. In: 1er Congreso Colombiano de Herpetología (Asociación Colombiana de Herpetología, eds.). Medellín, Colombia. Noviembre 2016.

[8] **Gutiérrez-Cárdenas, P.D.A.***, Vargas-Salinas, F., Mantilla, J.C.#, & **Rojas-Rivera, M.A.** 2016. Descripción del canto de anuncio de *Rhaebo colomai* (Hoogmoed, 1985) (Bufonidae), una especie críticamente amenazada de Colombia. In: 1er Congreso Colombiano de Herpetología (Asociación Colombiana de Herpetología, eds.). Medellín, Colombia. Noviembre 2016.

[9] Figures 5-6 in the file attached to this report with figures.

[10] Ron, S.R., Mueses-Cisneros, J.J., **Gutiérrez-Cárdenas, P.D.A.**, **Rojas-Rivera, A.**, Lynch, R.L., Rocha, C.F.D. & Galarza, G. 2015. Systematics of the endangered toad genus *Andinophryne* (Anura: Bufonidae): phylogenetic position and synonymy under the genus *Rhaebo*. Zootaxa 3947: 347-366.

[11] **Gutiérrez-Cárdenas, P.D.A.**, Castillo, K.#, Martínez, D., Rocha, C.F.D. & **Rojas-Rivera, M.A.** 2016. Trophic ecology of *Pristimantis labiosus* (Anura: Craugastoridae) from Southwestern Colombia. North-Western Journal of Zoology 12: 102-109.

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
Camera HX300, 50X optical zoom (1)	150	0		
Unidirectional microphone Sennheiser	160	0	0	
Accommodation (£8.0/day * 72 days * 4 team members)	1000	0	0	
Food (£10.0/day * 72 days * 4 team members)	1600	0	0	
Transport Pasto-Ñambí-Pasto (£18.0/person * 9 travels * 4 people)	800	0	0	
Workshops (includes environmental workshops and educational games)	250	0		
Outreach/education activities and materials (brochures, posters, video, t-shirts, video bean)	320	0	0	
QIAquick Gel Extraction Kit™	520	0	0	
Report production and result dissemination	200	0	0	
TOTAL	**5000**			

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

The next step is to finalise the project in 2018, collecting additional tissue samples and assessing whether the process of environmental education with the Reserve's eco guides is still ongoing and is still successful. It is also important to finish the genetic analyses to support them with the population data that we have so far

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?

We use The Rufford Foundation logo in presenting our project in meetings with the Foundation FELCA board, the Principal and teachers of the school Santa Teresita Altaquer (CSTA), in talks with children and young people who attended the educational workshops and the materials used in the workshops (t-shirts, mugs). In addition, the logo was used in both national and international scientific meetings where we will present the results of the research project (see pictures attached). We always mentioned in scientific papers already published, and PhD dissertation[12] that the work was funding by the Rufford Foundation.

[12] Figures 7-9 in the file attached to this report with figures.

11. Any other comments?

We greatly appreciate the support given us by the Rufford Foundation during these two years of research, working on the knowledge and conservation of amphibians in a key area for a critically endangered amphibian species in Colombia. We hope to further disseminate our work to contribute to the knowledge of the species and the conservation process that takes place in this nature reserve.

Figure 1. Didactic booklet "conservando los anfibios de Río Ñambí" disegned for us and used in the environmental education workshops

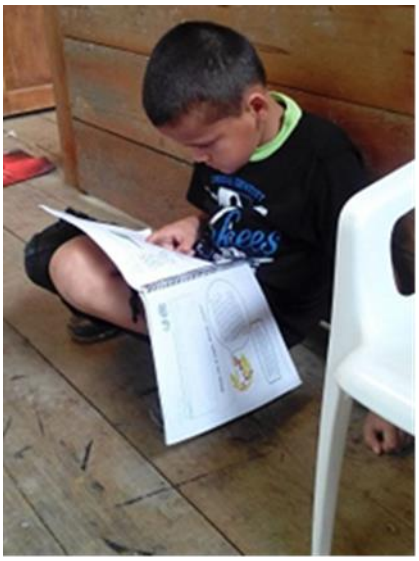

Figure 2. Students from school "Santa Teresita de Altaquer" using the booklet during the environmental education workshop

Figure 3. Ecoguides from the Reserva Río

Figure 4. Project´s researcher directing one

Ñambí attending the environmental education workshop

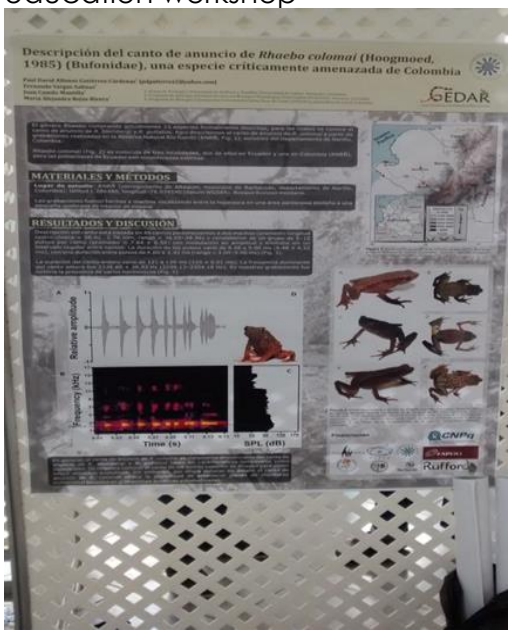

Figure 5. Poster on the description of the Rhaebo colomai advertisement call presented at the First Colombian Congress of Herpetology (Medellín, Colombia, 2016)

of the environmental workshops

Figure 6. Poster on the amphibian diversity occurring in the Reserve Río Ñambí presented at the First Colombian Congress of Herpetology (Medellín, Colombia, 2016)

Figure 7. Slide from the Ph.D. dissertation of the principal investigator Paul David Gutiérrez-Cárdenas, at the Universidade do Estado do Rio de Janeiro (Brazil). The thesis was titled: *Amphibians in a rainforest on the Pacific slope of southwestern Colombia: Assessment of species diversity and systematics, and the use of food resources*

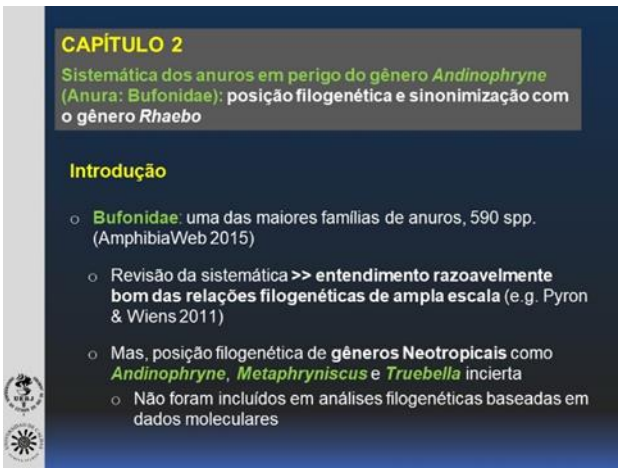

Figure 8. Slide from the first chapter of the Ph.D. dissertation of Paul David Gutiérrez-Cárdenas, at the Universidade do Estado do Rio de Janeiro (Brazil). The chapter was titled: Systematics of the endangered toad genus Andinophryne (Anura: Bufonidae): phylogenetic position and synonymy under the genus Rhaebo

Figure 8. Slide from the Ph.D. dissertation of Paul David Gutiérrez-Cárdenas, showing the Acknowledgments to the different entities and people who collaborated in the thesis