Final Evaluation Report

Your Details	
Full Name	Andrés Cristian Valenzuela Sánchez
Project Title	Darwin's frogs as a flagship for Austral temperate forest conservation
Application ID	38737-D
Date of this Report	29-04-2024

1. 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
Mitigation of chytridiomycosis in wild southern Darwin's frog populations			X	All fieldwork and laboratory analyses were conducted as planned. We completed all data analyses and drafted a manuscript summarising the results from this study. This draft was distributed among co-authors for review. Currently, we are improving some aspects and expect to submit this manuscript for publication before the end of 2024.
Amphibian-focused land conservation agreements			X	We monitored 20 out of 30 land conservation agreements and verified fully compliance in all of them. Eight out of the 10 remaining sites correspond to agreements in our lower land conservation scheme category, where landowners are expected to submit a self-monitoring report (see section 3 below). If we assume non-compliance in 100% of the agreements without monitoring data, which we consider a pessimistic scenario, this gives a compliance rate of 67%, close to the defined target for success (70%). We had to reschedule the open seminar aimed to communicate the amphibian-focused land conservation programme to stakeholders and the public. This seminar will be held during the second semester of 2024.
Amphibian-focused		X		We are still in the process of

management guidelines				collating the data necessary for producing this management guidelines. We have produced some of the infographics that we plan to use in the guidelines. We have largely underestimated the amount of work required to complete this objective, and we estimate that this will require at least 1-2 years more to be completed. We published a digital information book about Chilean amphibians that we expect will be useful as an introductory chapter to the guidelines (see section 2 below).
Awareness campaign in social media			X	We carried out a social media outreach campaign across various platforms (Facebook, Instagram, TikTok, YouTube, and the Ranita de Darwin NGO website) reaching 388k people during 2023 (see Appendix "Social media metrics"). This represents 97% of our target for success (400k people). Additionally, we engaged in in-person outreach activities and published an information book (see section 2 below).

2. Describe the three most important outcomes of your project.

a). **Conservation:** Within the context of our land conservation programme (objective 2), we established a Derecho Real de Conservación (a type of land conservation easement in Chile) for perpetuity (Fig. 1). This will provide effective protection to 368 ha of native forest and freshwater ecosystems in Los Lagos Region. Notably, this represents the first Derecho Real de Conservación focusing specifically on amphibians and their habitats in Chile.

We also organised a workshop aimed at updating the 2018-2028 Conservation Strategy for Darwin's frogs. Thirty-seven people representing 22 organisations from Chile, Argentina, UK, and Germany attended this workshop (Fig. 2). This included a wide range of stakeholders, such as government agencies, academia, NGOs, zoos,

and forestry companies. It was a productive workshop, during which we updated priority conservation actions and reached important agreements that will facilitate increased communication and collaboration among partners. The project's leader, Andrés Valenzuela-Sánchez, will be chairing the governance committee of this conservation strategy for the next 5 years.

Figure 1. Signing of a Derecho Real de Conservation (land conservation easement) between Parque Volcánico Valle Los Ulmos, Fundación Tierra Austral, and Ranita de Darwin NGO. This legal agreement, in perpetuity, will provide effective protection to 368 hectares of key ecosystems for amphibians in Los Lagos Region, southern Chile.

Additionally, we formalised an agreement with CONAF (the Chilean forestry agency) to provide guidance and training on amphibian monitoring and outreach to staff in public protected areas within Los Lagos Region in southern Chile. As part of this collaboration, we will mentor Parque Nacional Vicente Pérez Rosales staff in amphibian monitoring, as part of their application to the Green List of Protected and Conserved Areas Standard. This will represent the first large-scale amphibian monitoring programme in a public protected area in Chile, and we have had preliminary discussions with CONAF about ways to scale this up to the entire network of protected areas in the country. Founded in 1926, Parque Nacional Vicente Pérez Rosales is the oldest, most visited (519,641visitors during 2023), and one of the largest protected areas in Chile, covering an area of 253,780 ha. Several populations of the southern Darwin's frog are present in this area.

b). Outreach: We published a digital information book about Darwin's frogs and Chilean amphibians (available in Spanish only. An English version will be released during 2024). Using extensive infographics, this book aims to present information

about amphibians in an accessible way to the general public, with the goal of mobilising our audiences for amphibian conservation. We also address frequently asked questions from our social media platforms. The book has been particularly well received by our partner frog-friendly landowners, for whom we identified that gaining better knowledge about amphibians is a key expectation of their participation in our land conservation programme. By April 2024, the book website (https://www.ranitadedarwin.org/libroinformativo) has been accessed by 1,257 people.

Figure 2. Participants of a workshop held in Chile to update the 2018-2028 Darwin's frog Conservation Strategy. The organisation of this workshop was led by the project's leader, Andrés Valenzuela-Sánchez, in collaboration with several team members (also seen in the picture), including Soledad Delgado, Claudio Azat, Bastián Santana, and Andrew A. Cunningham.

c). Scientific publication: We published an article on the scientific journal *Oryx*, describing a new locality of the Barrio's frog found in one of the areas participating in our land conservation programme. The newly described Barrio's frog population is the eighth known locality of this species and one of only three occurring within a protected area. We also started a long-term capture-recapture study of Barrio's frogs in this area, which will provide key information about the population and spatial ecology of this highly understudied microendemic amphibian. The scientific publication is available as Open Access at:

https://www.cambridge.org/core/journals/oryx/article/partnerships-between-private-landowners-and-conservationists-to-protect-one-of-the-most-evolutionarily-distinct-amphibians/E6DF098FC2061B89499046731790EC80

The article was covered by Ladera Sur (the main nature-related media outlet in Chile): https://laderasur.com/articulo/descubren-nueva-poblacion-de-rana-micro-endemica-de-chile-es-uno-de-los-anfibios-evolutivamente-mas-unicos-del-mundo/

We also published an outreach blog post about this research on the ZSL website: https://www.zsl.org/news-and-events/feature/barrios-frog-conservation

3. Explain any unforeseen difficulties that arose during the project and how these were tackled.

We have not been able to obtain self-monitoring reports from any of the land conservation agreements pertaining to the lower category of our scheme (eight agreements in total). We have reached out to landowners and identified that this problem has been caused by the complexity of accessing GPS locations required to collect photo-monitoring data at predefined survey points. Therefore, we have decided to change the smartphone app that we were using, and we are producing new guidelines (including a video) to better assist landowners in collecting these data. We expect these changes will suffice to increase the percentage of self-monitoring reports received each year.

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

Local communities, specifically local landowners, have been directly participating in this project. They have benefited from a better understanding of the ecology and natural history of amphibians, and from advice and training in frog-friendly management practices necessary to align with their conservation values (i.e., their willingness to protect amphibians and habitats in their lands). Local communities have also taken part in outreach activities, including visits to the forest to observe and listen to native amphibians.

5. Are there any plans to continue this work?

Yes, we plan to continue most of the activities included in this project, as these correspond to key long-term actions of the 2018-2028 Darwin's frog Conservation Strategy. We also started a long-term capture-recapture study of Barrio's frog.

Of particular concern is an emergency that occurred in two populations of the southern Darwin's frog that we have been monitoring since 2014, with the support of

several Rufford Foundation grants. These were the most abundant known populations of this species, and intensive epidemiological monitoring shows the area where they are situated (Inio, Tantauco Park) was free of the amphibian-killing chytrid fungus until 2023. Unfortunately, in January 2023, we detected the first chytrid fungus infections in Darwin's frogs and sympatric amphibians in this area. The observed prevalence (25% of frogs infected during a single week) is the highest prevalence of chytrid infection we have ever observed in Darwin's frogs. After the introduction of this pathogen, from 2023 to 2024, abundance was reduced by 89.1% and 95.5% in the two Darwin's frog populations monitored. A broader survey conducted in March 2024 encompassing 30 sites monitored using repeated surveys evidenced local extinction of five additional Darwin's frog populations that were present in the area. We were able to identify an abundant Darwin's frog population 500 m away from the studied area, which suggests the chytrid fungus, which usually invades new areas following a wave-like spread, has not reached that population yet. We are planning and looking for funding to implement an emergency response, which will include *in situ* disease mitigation actions (e.g., using the exclusionary fences described in objective 1 of this project), as well as relocation of some Darwin's frogs to captive breeding centres.

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

To meet the needs of multiple end users we have been and will continue communicating our results in different formats, including social media, scientific publications, outreach activities, information book, and training activities.

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

I believe one of the most important next steps for us is securing long-term funding for our Darwin's frog conservation project. This will enable us to continue implementing much-needed long-term conservation actions focused on this species and its habitat. Small grants are very useful at the onset of a project, but the repetitive process of applying for them (usually on an annual basis) can be very exhausting for small teams and not a viable option for projects that aim to scale up the reach of conservation actions.

Another important next step is to identify optimal management strategies for recovering southern Darwin's frog populations. For instance, we require a decision-analytical model to guide the selection of the optimal strategy for the recovery of populations of this species in Tantauco Park.

8. 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?

Yes, the Rufford Foundation logo was used in one of the project's websites (https://www.ranitadedarwin.org/emerge) and in the information book (see above). Also, the Rufford Foundation was mentioned in the acknowledgment section of the paper published in *Oryx* (see above).

9. Provide a full list of all the members of your team and their role in the project.

Andrés Valenzuela-Sánchez: He oversaw overall project implementation, providing key technical advice and training in ecological research and conservation. He liaised with NGO partners, government agencies, local communities, and other key stakeholders.

Professor Andrew Cunningham: He collaborated in overall project implementation, providing technical oversight in monitoring and evaluation.

Soledad Delgado: She led the project's communication, running our social media channels and producing multimedia and graphical material. She produced an information book about Darwin's frog and other Chilean amphibians.

Bastián Santana: He was in charge of running the land conservation programme, working in the field in direct collaboration with landowners, managers, and other key local community members and stakeholders.

Marcela Márquez-García: She provided technical oversight, assisting the planning, implementation, and monitoring of social research.

Dr. Claudio Azat: He provided technical oversight and training, supporting overall lab work implementation (i.e., PCR analyses for detecting chytrid fungus infection).

10. Any other comments?

We are immensely grateful to The Rufford Foundation for their repeated support of our Darwin's frog conservation project. Their contributions have enabled the implementation of long-term conservation efforts and significant achievements, including the effective protection of native forests in Chile and the development of the Darwin's Frog Conservation Strategy.