

Final Evaluation Report

Your Details	
Full Name	Mildred Fabiola Corona Figueroa
Project Title	Where are the Neotropical otters (<i>Lontra longicaudis</i>)? A study on the ecology of a cryptic mammals across a transboundary basin in Mesoamerica
Application ID	35603-1
Date of this Report	6 June 2023

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
To estimate the distribution of the Neotropical otter				(80%) We cover all the field trips in Río Hondo, Laguna Bacalar and Laguna Guerrero, and we were able to carry out most of the activities to achieve this objective (see numbers 3 and 4 for more details). However, there were activities that we could not conduct successfully for methodological reasons. We were also unable to carry out the sampling in Guatemala for logistical issues (in numbers 2 and 13 we explain more details). With the data collected during the field work and the secondary information, we will carry out the Neotropical otter niche models for the biogeographical area of the Yucatán Peninsula.
To identify the components of the diet of the Neotropical otter				(60%) We collected Neotropical otter faeces samples in Río Hondo, Laguna Bacalar and Laguna Guerrero, covering the three climatic seasons in the area (dry, rainy and "nortes"). Currently, we continue with the macro-identification of diet items based on the morphological features of tissue remains (bones, scales, hair, etc. See Fig. 1). The analyses are conducted at the Laboratory of Ecology and Molecular Biology of the Universidad Autónoma del Estado de Quintana Roo (UAEQROO).
To describe the local knowledge about the conservation status of the Neotropical otter				We undertook 90 interviews (Mexico: n = 75; Guatemala: n = 15) with local people, technicians, and park rangers from the study area. The data provided has already been analysed and we are currently writing an article manuscript to publish the results in a scientific journal.



Fig. 1. Washing, drying and separation of food items from Neotropical otter faecal samples. In the lower right photo, the rest of a roly-poly bug (Isopoda) can be seen from a stereoscope.

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

a). Despite the effort of time invested in the fieldwork, we only managed to sight an otter on one occasion in Río Hondo. However, we found several latrines with the presence of faeces and food remains. We also gathered evidence of the Neotropical otter in Bacalar through camera traps (Fig. 2).

b). Related to below, we involved local people (sometimes accompanied by their children) in field support, such as boat captain and fishermen. The reaction of people when learning about an otter's faeces and the usefulness of camera traps in this type of study is satisfactory (Fig. 3).

c). Finally, we documented the perception of local people regarding the Neotropical otter and the environment they share. This effort compiles several aspects related to conservation and the possibility of using it as a flagship species of the area, mainly in the Laguna Bacalar.



Fig. 2. Neotropical otter recorded with a camera trap in Bacalar, Q. Roo, Mexico.





Fig. 3. Local fishermen, boat captains and tourist guide who supported the fieldwork for the sampling of the Neotropical otter, and the installation of camera traps in Río Hondo, Laguna Guerrero and Laguna Bacalar, Q. Roo, Mexico.

After more than a decade of not knowing about the distribution and conservation status of the Neotropical otter in southern Quintana Roo, we were able to record the current presence of this species through its traces, such as the presence of faeces and footprints and photo captures with camera traps. This is the first study that uses a mix of methodological approaches for detecting the presence of a cryptic species in a systematic way. In addition, it included a social component that allows documenting the local people perception and knowledge about the Neotropical otter.

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

The difficulties that arose were mainly related to methodological aspects that we used to sample the presence of the Neotropical otter. Regarding environmental DNA, we did not succeed in detecting otter DNA in the water samples collected from pens of Neotropical otters held under human care. Our purpose was to refine the technique of DNA collection, extraction, and amplification, but we were not able to do it in the time allotted in this thesis. Therefore, we decided to pause this activity to resume it soon. Regarding the camera traps, some of the cameras were damaged by humidity, ant invasion, destruction, and theft (Fig. 4). Thus, our capture effort was lower than planned, and altogether with a presumably low density of otters, could be a decisive factor that impeached us to photo-capture otter individuals. Finally, we were unable to carry out surveys to search for traces of otter in the Guatemalan part of the Río Hondo, since in the rainy season it is difficult to enter the area. We decided to visit this area in a future opportunity.



Fig. 4. Some inconveniences occurred during the fieldwork with the use of camera traps: destruction, humidity problems, invasion of ants and technical problems.

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

Our study allowed the participation of local fishermen and boat captains as tour guides during the sampling carried out in each waterbody. For the support provided, they were granted an economic or daily incentive, since most of the fieldwork to search for otter evidence lasted around 8 hours. As a product of our project, we designed a 2023 calendar that was printed and offered to our collaborators (Fig. 5). In a final phase of my PhD, we will use multimedia resources to share the results of this research with the communities involved.

5. Are there any plans to continue this work?

Yes, we do have plans. We hope to refine the technique of water collection and DNA extraction for the eDNA tool to develop a protocol. Given that we have several samples of faeces, we hope to carry out genetic analyses to find out the population diversity of the species in this region. We also hope to carry out the survey in northern Guatemala. In the case of Laguna Bacalar, we look forward to implementing participatory monitoring activities to sample otters on the Eastern side of the lagoon, as well as the other interconnected lagoons.

On the other hand, stable isotope studies are also expected to give us more information on the diet and trophic chain. Regarding captive Neotropical otters, we are planning to conduct behavioural studies. We also expected to carry studies to investigate the presence of microplastics in faecal samples.



Fig. 5. Local people showing the 2023 calendar.

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

We plan to publish at least three scientific articles based on this study: 1) Local knowledge about the Neotropical otter in southern Quintana Roo; 2) The current distribution of the species in southern Quintana Roo; 3) Feeding habits of the species in southern Quintana Roo.

The dissemination of our results with the local communities will be carried out through multimedia resources: 1) Short videos with information generated on the distribution, diet, and local knowledge; 2) We plan to create a signpost with a photo of the otter and other fauna captured with a camera trap in the sites where the camera traps were installed.

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

Given that this project corresponds to a doctoral thesis, the next steps are directed to the follow-up and completion of the laboratory analyses (diet, genetics and metagenomics). At the same time, we will be preparing the final thesis report. Subsequently, we will carry out the process of publishing the scientific articles of the results of this project.

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, we elaborated infographic and educational materials on the Neotropical otter in Guatemala (shown in the first progress report). The material was shared digitally through Facebook:

<https://www.facebook.com/fabiola.corona.14/posts/pfbid0HG5jAF3h7HP4tdwfaZXzBrof3MTFoL5r9weNoAXr4Uhe6q1kVE5Qj52ATz7f3ajBl>

We also made some t-shirts for the team members where we included the project logo on the front and the logo of The Rufford Foundation and others on the back. Finally, we created a 2023 calendar where we included the logos of the institutions and entities that supported us with small grants to carry out the project (Fig. 6). We also included the Rufford logo in the presentations for the SOLAMAC 2022 Congress.

We made around three threads on my personal Twitter account (@fabiologa8) in which I shared the progress of this project. In these, I tagged @ruffordgrants. Here are the links:

<https://twitter.com/fabiologa8/status/1664055805224574976?s=20>

<https://twitter.com/fabiologa8/status/1642911166664941568?s=20>

<https://twitter.com/fabiologa8/status/1585109716824338432?s=20>

Another account:

<https://twitter.com/GuatemalaPortal/status/1530187382099615747?s=20>

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

Dr. José Rogelio Cedeño Vázquez is my thesis director. He supported the logistics and guidance in the request for permits to collect Neotropical otter faeces from Mexican entities and to carry out field trips in protected natural areas. He has also supported the search for local people to conduct the interviews and to accompany them as field guides, mainly in Bacalar. Later, he will contribute to the data analysis and discussion of the project results.

Dr. D. Nataly Castelblanco Martínez is my thesis, Co-Director. She accompanied several field trips and has advised on qualitative analyses of local people's perceptions of the Neotropical otter. She has also advised on the processing of otter faeces samples to carry out the morphological analysis of the species' diet. Later, she will contribute to the data analysis and discussion of the project results.

Dr. Salima Machkour M'Rabet has advised me on laboratory analysis to extract Neotropical otter DNA from water samples and faeces samples, and PCR amplification. She has also guided the purchase of material and equipment for use in the laboratory. Her advice on genetics and metagenomics analysis will continue later in this thesis project.

Dr. Joan A. Sánchez Sánchez has advised the elaboration and analysis of the ecological niche models of the Neotropical otter in the region. His advice on distribution analysis will continue later in the project.

There is another person who has also collaborated on the project, but he is not part of my advisors. However, it seems appropriate to mention **Dr. Carlos Niño** from the UAEQROO, who has advised on the use of camera traps. He also accompanied several field trips in Río Hondo. Finally, he has supported the loan of material and equipment to carry out the morphological analysis of the otter's diet in the Laboratory of Ecology and Molecular Biology of the UAEQROO.

10. Any other comments?

We were not able to go to Guatemala to do field sampling for logistical issues, but part of the resource granted was used to pay for the trip to the SOLAMAC Congress 2022. It should be noted that the equipment purchased with this grant will remain in the Genetics Laboratory (vacuum pump and filter kit; cooler with dry ice) at El Colegio de la Frontera Sur, and in the Laboratory of Ecology and Molecular Biology at UAEQROO (protective casings for camera traps, locks with keys and microSD memories).



Fig. 6. Project calendar 2023.