Final Evaluation Report

Your Details	
Full Name	Luciana Alves Pereira
Project Title	Movement of catfishes in the Amazon Basin
Application ID	33099-1
Date of this Report	08/08/2022

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
Preparation for fieldwork				It was successfully done.
Building relationships with local stakeholders				It was successfully done.
Sampling				It was successfully done.
Sample Analysis				It was successfully done.
Sharing of results with stakeholders				It was successfully done.

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

The outcomes of this project are research and conservation outcomes. The research outcome of this project will be a model of individual migration of *P. fasciatum* using otolith microchemistry. This outcome will be published as a paper in the scientific journal Freshwater biology.

a). Regarding the primary research outcomes, I found that mostly 93% of the *P. fasciatum* fish sampled stayed in waters with the same chemical composition. This means that this species mainly shows fidelity to the basin in which they were born. However, the 7% of fish that migrated are significant ecologically, genetically, and demographically because they transfer nutrients among basins, exchange genetic material and prevent the populations from collapsing.

b). Another research outcome is that *P. fasciatum* migrates bidirectionally in the Amazon Basin. This corroborates the literature because adults migrate upstream to spawn and downstream to feed and eggs and larvae drift downstream with the currents.

c). Moreover, a third research outcome is that adults and juveniles migrate to the Amazon basin. This also corroborates previous studies once adults migrate to reproduce and feed while juveniles migrate to feed and escape predators.

The conservation outcome of this project is to build upon knowledge of catfish migration and was realised by transmitting results to stakeholders, including fishers, fishery management authorities, civil society, and environmentalists. I recommended that the basin should manage this species in the Amazon. The research findings should support the development and implementation of sustainable fishery and ecosystem management policies accounting for the interests of diverse stakeholders. Longer-term impacts would include changes in regulations for catfish fisheries and possibly changes to the law regulating the Amazon fisheries.

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

Even though I planned to overcome the difficulties due to the Covid-19 pandemic, I faced several challenges unforeseen in sampling due to the pandemic and logistic problems. Some of these unexpected difficulties were: 1) the shutdown of cities activities due to the Covid-19 pandemic; 2) two field assistants who got Covid during the project; 3) the disappearance of the species in one area due to the construction of a dam; 4) the restriction period that is prohibited to fish and fisherman got Covid consequently, in many sampling sites there was no fishing; and 5) from seven sampling sites, only one could sample *P. tigrinum*, so my advisors and I decided to no more to study this species.

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

The members of local communities are the local fishers, fisheries professionals, and undergraduate students from the Amazon. They are involved in the project by learning and being trained on sample techniques. The undergraduate students received training on laboratory techniques for preparation and sample analysis. All of them participated in the workshop on August 05, 2022. Also, they will receive a policy brief in the local language (Portuguese), highlighting the importance of project results for understanding migration patterns and, consequently, management actions.

5. Are there any plans to continue this work?

I plan to continue this project by integrating the migration model with the population genetic structure of *P. fasciatum* in the Amazon. To promote the future sustainability of the *P. fasciatum* fishery, I plan to characterise for the first time the migration of individuals in the current generation and the population genetic structure that arose from the interplay of migration and isolation among populations over many generations. Unlike prior studies, which failed to effectively define patterns of migration and population structure, this study will undertake a novel approach that will integrate the results of microchemistry and genetic analyses. That is, analyses of trace chemical composition of otoliths which record the chemical signature of the water where the catfish has lived, revealing when, where, and how far they have migrated during the individual's life (Hermann et al., 2021). Definition of population genetic structure based on microsatellite DNA markers will characterise geographic patterns of population genetic diversity and estimate rates of genetically effective migration, thereby characterising migration over the longer period through which the pattern of population genetic structure emerged. Results from these two complementary approaches will inform whether populations are demographically independent of each other and whether they warrant priority for conservation and separate management because of high genetic and ecological uniqueness from other such units (Allendorf et al., 2007).

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

Results of the data analysis were presented to and discussed with local stakeholders, including fishers, fisheries managers, and decision makers, in a hybrid workshop I organised and held via Zoom in August 2022. Specifically, I informed these stakeholders of the implications of migration patterns for defining appropriate seasons and habitats for sustainable fishing and proper siting for future construction of any dams. The final results of the analysis will be published as a policy brief in the local language (Portuguese), highlighting the importance of project results for understanding migration patterns and, consequently, management actions.

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

I foresee the next steps of this project to perform the complementary and necessary study of population genetics structure for *P. fasciatum* in the main tributaries of the Amazon. Integrating the migration model with the population structure of this species will provide the bases to define Management Units (Mus) and possible Evolutionary Sustainable Units (ESUs). Results from these two complementary approaches will inform whether populations are demographically independent of each other and whether they warrant priority for conservation and separate management because of high genetic and ecological uniqueness from other such units (Allendorf et al., 2007).

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?

I used the Rufford Foundation logo in the presentation to the Department of Fish and Wildlife of Virginia Tech on October 13, 2022. I also presented this project at the Interfaces of Global Change (IGC) Conference in May 2022. And will present the project at the AFS Annual meeting on August 23rd, 2022. Moreover, the Rufford Foundation logo was used in the workshop materials and Policy Brief.

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

My team is formed by:

- Dr. Leandro Castello
- Dr. Eric Hallerman
- Mcs. Luciana Alves Pereira

Drs. Castello and Hallerman mainly provided research and analytic guidance during the project execution. At the same time, I performed the preparation for fieldwork, built a relationship with local stakeholders, coordinated sampling, performed the microchemical analysis, and presented the workshop to the key stakeholders.

10. Any other comments?