Final Evaluation Report

Your Details	
Full Name	Everton B. P. Miranda
Project Title	Building a conservation strategy for the harpy eagle in the Amazon Forest
Application ID	31091-B
Date of this Report	May 24th, 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
Form local leaderships to conserve harpy eagles, enhance educational and socioeconomic outreach in communities, and boost school presence and social media visibility.		X		I was unable to establish a new institution dedicated to predators in the southern Amazon or promote a course on harpy eagle research for new leaders. These setbacks were due to a lack of funds during the pandemic, especially for educational activities. On the other hand, we successfully conducted numerous outreach activities and significantly increased our presence on social media over the past few years.
Complete soil collection and analysis under harpy eagle nests to show the predator's impact on Amazon forest fertility.			X	This paper, published in Nature's Scientific Reports, is currently in the top 3% for research attention.
Strengthen our harpy eagle nest network to protect more eagles, expand conservation research, and improve ecotourism appeal.			X	The ecotourism initiative has successfully expanded with the discovery of additional nests—totaling 55 in 7 years. Significant research on conservation topics has been published, summing circa 14 papers in total.

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

a). We established an alliance between local nut collectors, a tourism company, and a research initiative, resulting in a project that continues to thrive and expand

even in my absence. This growth benefits both harpy eagles and local communities by attracting tourists to the southern Amazon. Since the initiative operates on a for-profit basis, it generates revenue rather than consuming it. Consequently, our conservation model is being replicated independently. New projects focused on harpy eagle watching are emerging in Brazil and other countries such as Colombia. Additionally, similar models are being used to promote tourism centered on other eagle species in Argentina and Mexico. These alliances bring tangible benefits to local communities by encouraging responsible land stewardship and transforming the harpy eagle from a perceived livestock predator into an asset that creates green jobs for locals.

b). Over 7 years of research on harpy eagles in the southern Amazon, I have produced 10 first-author research papers, many of which hold significant conservation value and have been published in high-quality, high-impact journals. Additionally, I have co-authored seven more papers in collaboration with other harpy eagle researchers. In comparison, Projeto Harpia has been active for 25 years and has published 15 papers, many of which are brief notes. The Peregrine Fund initiative in Panama has published 10 papers over three decades, and Alexander Blanco in Venezuela has published only one paper on harpy eagles despite 25 years of research. The key impacts of my publications include:

1. My range model for the species identifies prime locations for reintroduction within the Atlantic Forest. This model has been instrumental for Itaipu Binacional and the Sociedade para Proteção da Vida Silvestre in implementing their harpy eagle reintroduction plans (https://cpsg.org/sites/cbsg.org/files/documents/Relato%CC%81rio%20Final%20Harpia.pdf).
2. The IUCN downgraded the species status from Vulnerable to Near Threatened based on my findings, which documented a 41% reduction in their range, high mortality rates due to persecution, and a 93% overlap between nest trees and highly sought-after logging species. My papers were also the first nest density estimates for the species in the Amazon Forest and in Brazil. It is important to notice that—whereas many self-proclaimed harpy eagles specialists exist—I was the single one who actively participated in the IUCN evaluation forum https://drive.google.com/file/d/1Rv8OllvCsuEAlWsLizGoO3xtaa2T-b2Q/view?usp=sharing.
3. We published guidelines for minimising disturbance in harpy eagle tourism and provided evidence that persecution, primarily on small landholdings, kills over 90 eagles per year in the Arc of Deforestation (the mortality was reduced by 98% after tourism implementation). Furthermore, our research highlighted the harpy eagle's role as a keystone species in the Amazon ecosystem, demonstrating their role in concentrating phosphorus within canopy hotspots. My research showing the mechanistic process of forest loss

that reduces eaglet survival through underfeeding receive a prize from Nature as one of the 100 more downloaded in 2022.

These contributions have been critical in advancing harpy eagle conservation and influencing both local and international conservation strategies.

c). My work has reached non-scientific audiences through extensive media coverage and dedicated outreach efforts. Two of the most significant instances include a feature in the print edition of National Geographic and coverage by the BBC, which highlighted our work in the context of cattle ranching-induced deforestation in the Amazon. Additionally, a camera trap photo from our project was awarded the most views of the year on Wikiaves, the world's largest birding website. An interview I gave became the most-watched episode on Brazil's second-largest nature podcast. Furthermore, our video on harpy eagle persecution garnered over 340,000 views on YouTube. These outreach activities have been crucial in promoting science and conservation focused on harpy eagles.

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

Despite challenges, I persisted with my work and published an extensive body of articles, establishing myself as an authority on harpy eagle biology. As a result, other harpy eagle researchers began to gravitate toward me—whether out of necessity or interest. Ultimately, I was invited to participate significantly in three workshops on harpy eagle reintroduction and worldwide congresses on raptor biology, where I had the opportunity to meet some other specialists in person and clarify some of these issues.

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

Local communities have been involved in the project in several ways:

i) Nest Discovery Rewards: Community members earned a $100 reward for each harpy eagle nest they found. This effort was promoted through extensive poster campaigns at key sites and announcements on local radio stations. Many nests (about 80%) were discovered by Brazil nut collectors, while the remainder were found by indigenous peoples and biologists working as consultants. When nests were found by indigenous communities, we provided collective rewards, such as a computer for their associations or an internet antenna for their school, instead of individual rewards.

ii) Employment Opportunities: Local community members were hired to build trails, transport materials, drive tourism vehicles, and provide other small services for the

tourism venture. Since the tourism company does not own infrastructure in the region, all services (restaurants, lodges, etc.) are outsourced, thereby spreading the economic benefits throughout the community. This approach is also applied when recording nature documentaries in the region. Additionally, locals were hired to transport, assemble, and disassemble observation towers, a task performed every 4-5 months for each of the three towers.

iii) Landowner Agreements: Landowners received $20 per tourist per day and signed agreements that included restrictions such as no further deforestation, no wood extraction within 3 km of the nest, no hunting of any wildlife, and other obligations.

After 8 years, many landowners now monitor the eagles themselves and invite us back when they observe eagle activity in the nests. Even after my departure from the project, these activities continue to thrive and expand within the southern Amazon. This ongoing involvement promotes proper land stewardship and ensures the safety of the harpy eagles.

5. Are there any plans to continue this work?

Unfortunately, no. After the pandemic, the financial support for my personal salary from The Peregrine Fund and Southwild.com ended. Additionally, the psychological toll of living in the Arc of Deforestation for 7 years led me to decide to leave Brazil. The frustration of failing to find new partners to fund my work, combined with the struggle to secure donors interested in promoting education for new leaders, motivated me to seek new opportunities.

After spending much of 2023 in South Africa as a senior postdoctoral researcher, I moved to Japan, where I am now an assistant professor at Tohoku University. Although I am no longer leading the project, the alliance I created continues to thrive. The partnerships I established, such as those with the French Government's ONF facilities in the southern Amazon, the tourism company Southwild.com, a network of informants, hundreds of Brazil nut collectors, thousands of Indigenous people, and dozens of biologists, are still actively working to protect the Amazon forest and harpy eagles.

New research initiatives on harpy eagles in the region continue to benefit from my support. Bruna Miguel, a former trainee of mine, is currently leading a large-scale effort to understand harpy eagle movement ecology. This initiative involves a partnership with the Spanish NGO CREW Foundation and Itaipu Binacional, which is now the world's main captive breeder of harpy eagles. I trust that this initiative will advance conservation research on harpy eagles, with me contributing to a supportive role rather than as a leader.

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

Below, you will find links to several dozen other interviews and media commentaries in several languages in which I participated, all of which help promote science and conservation focused on harpy eagles:

- National Geographic: Saving the World's Largest Eagle
- FAPESP Research Magazine: Deforestation and Hungry Harpy Eagles
- EcoWatch: Harpy Eagles and Deforestation
- Inhabitat: Amazon Deforestation Threatens Harpy Eagles
- France 24: Amazon Deforestation Threatens Jaguars and Giant Eagles
- Nature World News: Young Harpy Eagles in Brazil's Amazonian Forests Starving Due to Deforestation
- Regenwald Schützen: Harpyie
- El País: The Largest Eagles in the World are Dying of Hunger Due to Deforestation in the Amazon
- France 24: Forest Loss Threat to One of the World's Largest Eagles
- EFE Verde: Águila Arpía, Deforestación y Hambre en la Amazonía
- The Independent: Deforestation is Starving Eagles in the Amazon
- BBC: Science & Environment - Harpy Eagles
- ABC News: Mass Deforestation Wiping Out Species
- G1 Globo: Tourism to Save Harpy Eagles
- O Eco: Harpy Eagles and Tourism
- Jornal USP: Deforestation Threatens Rare Eagle Species in Brazil
- YouTube: Harpy Eagles and the Amazon
- Medium: How is Deforestation of the Amazon Affecting Eagles?
- Ciência Brasil
- Spotify: Nature Podcast
- O Eco: Harpy Eagles in Minas Gerais
- FAPESP Research Magazine: Food Supply and Eagle Reproduction
- EOS: Harpy Eagles Concentrate Precious Nutrients in the Amazon
- Spotify: Nature Podcast
- UNEMAT: Research Highlight
- O Eco: The Impact of Harpy Eagles on the Amazon
- LifeGate: Harpy Eagles in the Amazon
- Primeira Página: Rare Harpy Eagle Selfie
- Só Notícias: Harpy Eagle Rescued
- Mongabay: Protecting the Amazon's Largest Bird of Prey

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

Conservation efforts in the Amazon, including the preservation of harpy eagles, are essentially a battle between two contrasting approaches to the region's economic

utilization. On one side, there's the integration of the forest into regional and global markets through destructive practices such as forest incineration for cattle ranching and soybean farming. Conversely, there's a belief in economic integration through sustainable initiatives like reduced-impact logging, sportive fisheries, Brazil nut extraction, and ecotourism. Unfortunately, the prevailing approach has largely been large-scale forest incineration.

While I was able to establish a small ecotourism alliance in the region, linking investors with local stakeholders and laying the groundwork for future progress, numerous challenges remain. Millions of people in the Amazon seek better livelihoods, while wealthy landholders often see profit only in the destructive exploitation of natural resources. The future of the Amazon's forests, both on private and public lands, hinges on how we address this disparity.

The region holds immense potential not only for viable harpy eagle populations but also for other assets like manatees, freshwater dolphins, black jaguars, anacondas, arapaima fish, and black caimans, which could serve as ecotourism spearheads, providing tangible financial value for forest preservation. However, fostering a collective sense of identity and ownership for biodiversity while integrating it positively into local and global markets will require substantial effort and dedication.

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 did not incorporate the foundation logo into any of our publicity materials except posters announcing the nest-finding reward. However, the foundation was consistently acknowledged in all our publications and featured in various media platforms such as YouTube and Wikiaves, which accumulates a total that exceed half a million views. Below is a comprehensive list of papers where the foundation's name is included in the acknowledgment section:

- Paper 1
- Paper 2
- Paper 3
- Paper 4
- Paper 5
- Paper 6
- Paper 7
- Paper 8
- Paper 9
- Paper 10
- Paper 11

- Paper 12
- Paper 13
- Paper 14
- Paper 15
- Paper 16
- Paper 17
- Paper 18

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

I. Gilberto Araújo served as a driver, boat operator, and played a pivotal role in initiating contact with the local communities.
II. Roberto Stofel contributed as a climber and bush guide.
III. Niki Huizinga, Bruna Miguel, Jonas Medeiros, and Nickolas Lormand were trainees involved in the project.
IV. Cleide Arruda and Estelle Dugachard were integral stakeholders at ONF Brasil, a division of the French National Forest Office that served as our headquarters.
V. Charles Munn, the CEO of Southwild.com, spearheaded the tourism aspect of the project and funded my PhD.
VI. Cattle ranchers, indigenous leaders, and companies who own land in the region include Cristian Cavallaro, Vilmar Andreta, Eduardo Alcântara, Valdecir Silva, Lindomar Elia de La Justina, Edgar do Posto, Madenorte (company), Arara Indians, Elismar Moulaz, Rikbaktsa Indians, ONF Brasil (four nests on their land), Ricardo Werner, Cenomar and Lucilene Santos, Antônio Manoel, José and Maria Malaguti, Jaime Farinon, Colider hydroelectric plant, Augusto Zafalão, Antônio Reis, Valdeci Melo, Luiz and Anderson Bellanzon, José and Cleiton Schuster, Valdomiro Santos, Ilonir Lutz, Rafael Freitas, Cesar Pezzini, Kawayp Katu (Apiaka's association director), and Sidney Reis.

10. Any other comments?

I would like to thank The Rufford Foundation for supporting my project. I sincerely did not anticipate achieving such significant strides in species conservation. Reflecting on the knowledge our initiative has produced, I am astounded by the volume and novelty of our findings. We have uncovered new insights into the species' role in nutrient concentration in the Amazon forest, nest densities in both primary and secondary forests, and best practices for ecotourism. None of this would have been possible without the generous support of The Rufford Foundation. The foundation's flexible approach to granting has been particularly beneficial, considering the unpredictable nature of developing countries. Your support made it manageable to find new backers; I was able to approach tourism investors and other partners only

after discovering a few nests with your support. The generosity of the Rufford Foundation has been instrumental in our success.