

Final Evaluation Report

Your Details	
Full Name	Alan Monroy Ojeda
Project Title	Spatial Modelling for the search and conservation of the endangered Harpy Eagle and King Vulture in Mexico
Application ID	33949-1
Date of this Report	1 November 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
1. Analyse the spatial distribution of the Harpy Eagle (<i>Harpia harpyja</i>) in Mexico.				We successfully developed a spatial model and analysed the potential and actual distribution of the harpy eagle in Mexico.
2. Model and analyse the potential and current distribution of the King Vulture (<i>Sarcoramphus papa</i>) in Mexico and the Neotropical region.				A spatial model was successfully modelled, and we analysed the potential and current distribution of the king vulture in Mexico and the Neotropical region (from Mexico to Argentina). We found that the current distribution has diminished substantially and that there is strong evidence that support the recategorisation of the species under the IUCN Red List; passing from Least Concern to Near Threatened. A procedure inside the IUCN SSC has been started to reassess and recategorise the species in the IUCN Red List.
3. Create a model to identify and validate harpy eagle nesting areas in Mexico.				We successfully modelled and identified the highest suitable nesting areas for the harpy eagle in Mexico and across its distribution, using existing geographic data of nests across the Neotropics. We used Maxent and GIS tools.
4. Validate the models in the field and search for Harpy Eagles and King Vultures at the areas prioritized by the models.				<p>We did field validation of the models across southern Mexico. We successfully found a breeding population of king vulture in Veracruz. This species was supposed to be extirpated from the state. We also found other king vulture populations where our model predicted its presence.</p> <p>harpy eagle field validation is in its first stage. We have surveyed several areas that our model predicts its presence. We achieved five recent records of the species for the country. Harpy eagles</p>

				were thought to be extirpated from the country, but our evidence demonstrates that there are still a reduced population of harpy eagles in Mexico.
5. Carry out field monitoring with trained local/indigenous field technicians in efforts to search for the Harpy Eagle and King Vulture.				We trained and did field monitoring with three different local/indigenous groups in Frontera Corozal, Flor del Marquez and Lacanjá Chansayab. We trained a group of local indigenous young people, from the Lacandon community of Lacanjá-Chansayab. This group already does monitor in their rainforest, and after the training, they will also look for raptors, including the harpy eagle and the king vulture. This place is in one of the priority conservation areas for the harpy eagle in Mexico.
6. Assess the conservation status of the harpy eagle (<i>Harpia harpyja</i>) and the king vulture (<i>Sarcoramphus papa</i>) in Mexico.				Based on a spatial distribution analysis and our field monitoring results, we assessed the conservation status for both species. Our data and opinion were integrated in the IUCN Red List reassessment for the harpy eagle, which concluded with the species being recategorised from Near Threatened to Vulnerable.

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

a). Species Distribution Model and Field Validation. We successfully modelled and identified the highest suitable nesting areas for the harpy eagle in Mexico and across its distribution, using existing geographic data of nests across the Neotropics. We also successfully modelled and analysed the potential and current distribution of the king vulture in Mexico and the Neotropical region (from Mexico to Argentina).

b). IUCN Red List assessments. (Harpy eagle) Our data and opinion was integrated into the IUCN Red List reassessment for the harpy eagle, which concluded with the species being recategorised from Near Threatened to Vulnerable. (King vulture) We found that the current distribution has diminished substantially and that there is strong evidence that support the recategorisation of the species under the IUCN Red List, passing from Least Concern to Near Threatened. A procedure inside the IUCN SSC has been started to reassess and recategorize the species in the IUCN Red List.

c). Graduated with honours from the master's programme in Tropical Ecology. On October 12th, 2022, researcher Alan Monroy defended and graduated with honours from his master's programme in Tropical Ecology at the University of Veracruz. His

master thesis title is: "Spatial analysis of the distribution of the King Vulture (*Sarcoramphus papa*) and identification of potential nesting areas for the Harpy Eagle (*Harpia harpyja*)".

d). Local field monitoring capacity building and environmental education. Three local/indigenous monitoring groups (25 persons) have been trained on raptor identification, and monitoring techniques. These trained people live in areas that our distribution models identify as highly suitable habitat for both harpy eagle and king vulture in Mexico. These groups did monthly field monitoring effort on the protected areas of Yaxchilan, Lacanja Chasayab and Flor del Marques, Chiapas, Mexico.

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

- COVID-19 pandemic affected in many ways the logistics of the current project. The leading researcher, Alan Monroy-Ojeda contracted COVID-19 on two different occasions during field trips to southern Mexico. The researcher respectively spent 20 days in recovery and quarantine on each occasion. There were no medical complications, and the physical recovery was successful.

On the other hand, the COVID-19 pandemic affected the planned schedule of the environmental workshops with local kids. Due to the pandemic, many local schools closed during most of our year grant (2021-2022). For this reason, we had to request a 2-month extension to be able to carry out the environmental education workshops. At the end, we could successfully carry out the environmental workshops in only one of the two proposed communities, due to the covid restrictions. This issue affected the number of children we could reach during the environmental education workshops.

- Damaged car. During one of our field trips, our field vehicle broke down on the way back, for which we had to allocate money from the fund to repair the vehicle.

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

Local/Indigenous Raptor Monitoring Training

After we identified priority conservation regions for the harpy eagle, we reached two communities into these areas with the intention of train local people that could do raptor field monitoring. With the intermediation and support of the NGO Natura y Ecosistemas Mexicanos A.C. and the National Commission on Protected Areas (CONANP) we started our training workshops in the localities of Flor del Marqués and Lacanjá Chasayab in Chiapas, Mexico.

In Flor del Marqués we trained local young people that are already part of a conservation and ecotourism initiative named "Campamento Tamandúa". We trained them in: a) raptor identification, b) raptor behaviour and ecological role, c) field survey techniques, c) eBird use, and d) ethics of nest monitoring, etc. To the

training workshop we had local attendees, which also participate in bird monitoring in the local protected areas. We also had external attendees, which were mainly biology students that were doing internships at the Campamento Tamandúa.

In Lacanjá Chansayab we had the opportunity to train an already active indigenous monitoring group named Ka´nan K´ax. They are a group of young indigenous people that do monthly field monitoring inside the Bonampak and Montes Azules Biosphere Reserve. Their previous monitoring efforts were focused on reptiles and mammals, and after the training workshop they are now also searching and monitoring harpy eagle, king vulture and other top predator raptors. Ka´nan K´ax is formed by five women and six men aged between 20-30 years old.

In Frontera Corozal, we participated with Siyaj Chan, which is an active indigenous monitoring group, which whom we have worked and trained since 2016. They do regular visits and monitoring efforts inside Yaxchilan Natural Monument and Chan Kin Protected Areas. With the help of The Rufford Foundation they received two photographic cameras (Nikon P900) which were used during the field trips.

Environmental Education focused on Raptor Conservation.

One of the main conservation problems we want to tackle is avoiding the hunting of eagles out of curiosity or ignorance by local people. Based on previous experience working with local communities, we have found that one of the best ways to raise environmental awareness for the entire families is through environmental education for the children. Children share inside their homes what they have learned in the environmental workshops and influence their parent's decisions. Considering that many children accompany their fathers to the fields and to hunt, a potentially important way to avoid hunting out of ignorance / curiosity is explaining the children what a harpy eagle looks like and how important it is in the ecosystem.

For this matter we have organized environmental workshops for children in the Maya-lacandon indigenous community of Lacanjá-Chansayab. In each workshop we used participatory dynamics, films, games, and storytelling as tools to share and educate about the harpy eagle, the king vulture and other top predator raptors (*Spizaetus* spp, *Morphnus guianensis*) that live in their tropical rainforests.

Before the workshops, we also identified that many children inside the indigenous communities do not know the indigenous name of the local animals. Many parents are not teaching the indigenous language to their children anymore and mainly Spanish is used. Considering that the maya-lacandon language is by itself a deep expression of the lacandon people and their relationship with the lacandon jungle we consider that it is also fundamental to preserve alive the language by using the traditional names of the animals during the environmental education workshops.

We used the traditional names in the different educational activities, and we also printed drawings where children could read the traditional names.

We had the participation of more than 60 children (54% girls, 46% boys), aged 5 to 12 years old. In the workshops we had the support of personnel of the National Commission on Protected Areas (CONANP) and have the support of the Ka´nan

K´ax Indigenous monitoring group. Both CONANP and Ka´nan K´ax people were invited to promote the interinstitutional and intergenerational participation on the conservation of these endangered tropical raptors.

Due to the COVID-19 pandemic, our planned schedule of the environmental workshops with local kids was affected and we got only permission to do the workshops in only one of the two proposed communities.

5. Are there any plans to continue this work?

Yes, this represented the first stage of a larger conservation plan for the harpy eagle and the king vulture in Mexico.

Our plans include continue the search of the remaining harpy eagles in Mexico and estimate its population. Our current assessment of the population identifies reintroduction efforts as a needed tool to keep a viable population in the country. On our plans we include the identification of key areas that should be targeted for future reintroduction efforts.

We also plan to deploy several transmitters into wild king vultures in order to identify key nesting and roosting areas, as well as to validate our distribution model and identify key conservation areas.

We would strongly want to strengthen the local/indigenous monitoring groups, by continue training, organizing, and funding local people/efforts of monitoring and vigilance in key habitat for the conservation of the harpy eagle and the king vulture in Mexico. At the same time, we would like to strengthen birdwatching as an economic alternative compatible with tropical rainforest conservation.

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

We are sharing the results of the present investigations using the following venues:

a) Master Thesis publication.

On October 12th, 2022, Alan Monroy defended and graduated with honours from his master's programme in Tropical Ecology at the University of Veracruz. His master thesis entitled: "Spatial analysis of the distribution of the King Vulture (*Sarcoramphus papa*) and identification of potential nesting areas for the Harpy Eagle (*Harpia harpyja*)" has been published and is now a public document.

b) IUCN Red List assessments.

The results from the present research have been used and will continue to be used to inform the IUCN Red list category reassessments for both species of raptors.

Our data and opinion were integrated in the IUCN Red List reassessment for the harpy eagle in summer 2021, which concluded with the species being recategorized from Near Threatened to Vulnerable. On the other hand, we have solicited a category reassessment for the king vulture, considering the strong evidence that support its recategorisation, passing from Least Concern to Near Threatened.

c) Participation in Congresses.

Researcher Alan Monroy presented as speaker the following presentations:

- Monroy-Ojeda, A. 2021. Spatial modelling for the search and conservation of the endangered Harpy Eagle and King Vulture in Mexico. Rufford Conference, El Salvador, October 31 – November 1st, 2021.
- Monroy-Ojeda, A. 2021. Harpy Eagle (*Harpia harpyja*) in Mexico: recent efforts to find and conserve the northernmost population". 2021 Raptor Research Foundation Annual Conference, Boise, Idaho, USA, October 8 -14, 2021.

d) Local Communities Workshops.

Across the communities of Flor del Marquez, Lacanjá Chasayab and Frontera Corozal, in Chiapas, Mexico, we have been giving talks explaining our job and the importance of preserving the harpy eagle and the rainforest. We have trained three local monitoring groups that have been trained on raptor identification, and monitoring techniques. During the workshops we emphasise the importance of the local people participation in the monitoring and vigilance of the local biocultural diversity.

e) Scientific Publications.

Three scientific papers are being prepared for being submitted to peer-reviewed scientific journals. The titles of the three articles are:

- King vulture (*Sarcoramphus papa*) distribution and conservation status in the Neotropics.
- Location of suitable nesting habitat for harpy eagle (*Harpia harpyja*) using Species Distribution.
- El Zopilote Rey (*Sarcoramphus papa*) en Veracruz, México; registros recientes de una especie en vías de extirpación.

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

Yes, we have five lines where we plan to continue our work, and we identify that the following steps are:

- a) Harpy Eagle Nesting Habitat Model Validation. Continue our model field validation to estimate harpy eagle population in Mexico.
- b) King Vulture IUCN Red list reassessment. Procedure follow up for the reassessment of the species. Our analysis supports that the species should be recategorised to Near Threatened.
- c) GSM Telemetry to validate King Vulture Distribution Model. Deploy several transmitters into wild king vultures to identify key nesting and roosting areas, as well as to validate our distribution model of the species.
- d) Strengthen Local/Indigenous Monitoring Groups. Continue training, organising and funding local people/efforts of monitoring and vigilance in key habitat for the conservation of the harpy eagle and the king vulture in Mexico.

e) Strengthen birdwatching as an economic alternative compatible with tropical rainforest conservation.

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 seven presentations on National and International Congresses, including:

- 1st International Harpy Eagle (*Harpia harpyja*) management and tracking device colocation Workshop. Itaipu Binational Center, Foz do Iguacu, Brasil. November 2022.
- Monroy-Ojeda, A. 2022. 1st Harpy Eagle, King Vulture and Neotropical Raptors Identification and Monitoring Workshop. Lacanjá-Chansayab, Chiapas, Mexico.
- Monroy-Ojeda, A. 2022. Master Thesis Defence. "Spatial analysis of the distribution of the king vulture (*Sarcoramphus papa*) and identification of potential nesting areas for the harpy eagle (*Harpia harpyja*)". October 12th, 2022
- Monroy-Ojeda, A. 2022. 1st Harpy Eagle, King Vulture and Neotropical Raptors Identification and Monitoring Workshop. Flor del Marqués, Chiapas, Mexico.
- Monroy-Ojeda, A. 2021. Spatial modelling for the search and conservation of the endangered Harpy Eagle and King Vulture in Mexico. Rufford Conference, El Salvador, October 31 – November 1st, 2021.
- Monroy-Ojeda, A. 2021. Harpy Eagle (*Harpia harpyja*) in Mexico: recent efforts to find and conserve the northernmost population". 2021 Raptor Research Foundation Annual Conference, Boise, Idaho, USA, October 8 -14, 2021.
- Monroy-Ojeda, A. 2021-2022. Master Thesis Institutional Seminars. Centro de Investigaciones Tropicales, Universidad Veracruzana, Mexico.

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

Name	Institution	Role
Jorge Antonio Gómez Díaz	Universidad Veracruzana	Thesis Director Advisor
Dr. Angelina Ruiz	Universidad Veracruzana	Thesis advisor
Dr. Hernán Vargas	The Peregrine Fund	Thesis advisor and Raptor expert
José de Jesús Vargas MSc	The Peregrine Fund	Expert advisor on Harpy Eagle
Javier de la Maza	Natura y Ecosistemas Mexicanos	Conservation Efforts Main Partner
Jorge Alfonzo Matuz	Natura y Ecosistemas	Conservation Efforts Main

	Mexicanos	Partner
Santiago Gibert Isern	Dimensión Natural S.C.	Conservation Efforts Main Partner
Silvano López Gómez	Siyaj Chan	Local/indigenous field monitoring group
Francisco Centeno Cruz	Siyaj Chan	Local/indigenous field monitoring group
Feliciano Centeno Cruz	Siyaj Chan	Local/indigenous field monitoring group
César López Gómez	Siyaj Chan	Local/indigenous field monitoring group
Anselma Díaz López	Siyaj Chan	Local/indigenous field monitoring group
Aurora Narváez Arcos	Siyaj Chan	Local/indigenous field monitoring group
Francisco Javier Centeno Acosta	Siyaj Chan	Local/indigenous field monitoring group
Andrés Iván Centeno Acosta	Siyaj Chan	Local/indigenous field monitoring group
Nicolás Sánchez Cruz	Siyaj Chan	Local/indigenous field monitoring group
Uriel Ángel Díaz López	Siyaj Chan	Local/indigenous field monitoring group
Alex	Tamandúa / Flor del Marqués	Local/indigenous field monitoring group
William Chan Kin	Lacanjá Chasayab	Local/indigenous field monitoring group
Faviola Chambor Chankin	Lacanjá Chasayab	Local/indigenous field monitoring group
Hilda Chanuk Millares	Lacanjá Chasayab	Local/indigenous field monitoring group
Gabriela Chan Jiménez	Lacanjá Chasayab	Local/indigenous field monitoring group
Chankin Chambor	Lacanjá Chasayab	Local/indigenous field monitoring group
Jafet Anahí Chambor	Lacanjá Chasayab	Local/indigenous field monitoring group
Carlos Ananías Chambor	Lacanjá Chasayab	Local/indigenous field monitoring group
Bricelly Esmeralda Mendoza	Lacanjá Chasayab	Local/indigenous field monitoring group
Ernesto Chankayun Kin	Lacanjá Chasayab	Local/indigenous field monitoring group
José Luis Chankin	Lacanjá Chasayab	Local/indigenous field monitoring group
Angélica Zamora Ríos	Conanp	Environmental Education Workshops logistical support

10. Any other comments?

I deeply thank The Rufford Foundation for their support which has helped us achieve several of our goals for the conservation of the harpy eagle and the king vulture in Mexico. At the end the conservation of species such as the king vulture and the top predator, harpy eagle, mean the conservation of the entire tropical rain forest ecosystem.

The Rufford Foundation grant was tremendously helpful in times of COVID-19, especially when most of the funding sources closed due to the uncertainties of the times. This grant made a huge difference for many people with low incomes that are willing to preserve the last harpy eagles of the country.



Fig 1. Harpy Eagle and King Vulture Environmental Education Workshop for children of the Lacanjá-Chasayab Indigenous Community, Chiapas.



Fig 2. Use of indigenous traditional names during the Harpy Eagle and King Vulture Environmental Education Workshop for children in the Lacanjá-Chasayab Indigenous Community, Chiapas.



Fig 3. Harpy Eagle and King Vulture Environmental Education Workshop for children of the Lacanjá-Chasayab Indigenous Community, Chiapas.



Fig 4. Ka'nan K'ax Indigenous Monitoring Group trained to identify and monitor Harpy Eagle and King Vulture. Lacanjá-Chasayab, Chiapas.



Fig 5. Ka'nan K'ax Indigenous Monitoring Group together with researcher Alan Monroy doing raptor monitoring efforts in Bonampak Protected Area, Chiapas.



Fig 6. Adult King Vulture (*Sarcoramphus papa*) found where our spatial distribution model predicted its presence in Bonampak Protected Area, Chiapas.