

## Final Evaluation Report

---

Your Details	
<b>Full Name</b>	David Alexander Prieto Torres
<b>Project Title</b>	Integrative biodiversity studies and an action plan for the bird long-term conservation in the Zulia state (Venezuela) under Global Climate Change
<b>Application ID</b>	28502-B
<b>Date of this Report</b>	August 2021 – October 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
<p><b>1.</b> To increase the datasets of species' records and bird communities in the Zulia state based on the fieldwork (in collaboration with local communities, rangers, and students) performed in target areas (i.e., sites with limited biological information) across the region.</p>				
<p><b>2.</b> To provide evidence of potential impacts by climatic changes spatio-temporal patterns of taxonomic, phylogenetic, and functional biodiversity to the avifauna in the Zulia state, computing how many current protected areas matched with zones of great biodiversity values.</p>				<p>We modeled and validated the species distribution patterns for 620 taxa. Based on these models we estimated the spatio-temporal diversity patterns (including taxonomic, phylogenetic, and functional levels) for bird communities across Zulia state. To do this, we excluded all those exotic, aliens, and statistically non-good models.</p>
<p><b>3.</b> To identify priority areas to be protected —considering the spatio-temporal changes for taxonomic, phylogenetic, and functional biodiversity patterns in bird assemblages— in order to maximize the long-term conservation strategies in the region.</p>				
<p><b>4.</b> To develop workshops and training courses for young biologists and researchers (also including rangers and local people) focused on conservation themes, especially considering topics as: fieldwork techniques, birds' identification and/or observation, as well as the use of Geographic Information</p>				<p>We performed three editions of this course in collaboration with the postgraduate programme at UNAM. From this course, several students obtained skills and knowledge to perform their projects and thesis in conservation, climate change and biogeography topics (See point 8).</p>

Systems.			
5. To perform meetings with local people, national and international experts and organizations (scientific-educational institutes, NGOs, governmental) working on environment and wildlife conservation in order to draft a site-specific action plan for the conservation of avifauna across region.			See final comments section for a list of international and national institutions that participated in these meetings.
6. To produce reports, papers, and other scientific-educational material about the birds' diversity in the Zulia state to be disseminated among the main stakeholders.			Despite the fact that several scientific/educational materials have been produced, at this time two articles are in the submission/review process in the corresponding international journals. We hope that the article "Research priorities and action plan for long-term maintaining biodiversity's of birds in Zulia state, Venezuela" will be finally published in early-2024. This particular manuscript is important because this article corresponds to the main outcome from our meetings/workshops.

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

**a)** This project has provided updated basic information on distribution of integrative biodiversity patterns of bird assemblages (and not only species survey) across the Zulia state, as well as threats and protection levels for the present and under future climate change scenarios. Particularly, we provided evidence about how the geographical patterns of species richness, but also phylogenetic and functional levels could be affected by the future climatic fluctuation, and how many current protected areas matched with zones of great biodiversity values. To describe these two new biodiversity levels in bird communities was critical because both phylogenetic and functional diversities represent a measure that incorporates the role of species in an ecosystem and, therefore, its dynamics and resilience. Thus, using this information in combination with a systematic conservation planning approach to define priority conservation areas, will contribute to propose objective criteria for deciding where, why, and how efforts need to be focused to adequately represent all biodiversity interests.

**b)** We demonstrated that both global climate change and the current human footprint throughout the Zulia state represent the main threats for the conservation of birds and whole biota in the region. From an ecological perspective, the results

showed that impacts of climate change will be not uniform for species and bird assemblages and illustrate the differing magnitude of effects that may be expected for the diversity values (including taxonomic, phylogenetic and functional levels) of particular areas in the region (manuscript in preparation). Overall, we observed the following patterns from the models projections: (i) the species could shows a range reduction, on average from 26.8% (2040s) to 57.6% (2070s), because distributional areas in the future showed a decrease in values of suitability conditions for species; ii) only 61 (9.8%) taxa were predicted to have large potential habitat gains/stability ("winners") under future GCC; (iii) extinction (i.e., disappearance of suitable areas) is the most likely future for at least four species; (iv) species richness of birds could decrease on average more than 25% across 50% of Zulia state; (v) these modifications of the species distributional ranges and richness into assemblages could thus lead to changes (reductions) in the phylogenetic and functional diversity patterns across the Zulia state. Also, it is important to highlight that the zones of great biodiversity values could occupy higher areas above the current average elevational distribution, and for those sites where suitable areas and species richness will likely decrease, temperature metrics tended to increase by more than 1.5 °C and annual precipitation tended to decrease on average 80mm. More importantly, our results reinforce the widely accepted idea that current PAs are not now effective for safeguarding these species, nor will they be in the future: we projected reductions on average of 30% into protected surface by species, as well as reductions in taxonomic, phylogenetic, and functional diversity. In fact, our results showed that current protected areas within this region ensure a very poor representation of those avifauna distributions (except for the *Perijá* National Park). This black scenario will lead to most species being highly vulnerable to extinction due to the reduction of range size and increase in fragmentation and human footprint. Therefore, our results showed ecological information to be used in the creation of new conservation areas responding to the need to guarantee of biodiversity protection (but not only by decisions impromptu or opportunistically responding to demands of general government policies).

**c)** Definitively, an important outcome was to perform the meetings with local people, national and international experts and organisations (scientific/educational institutes, NGOs, governmental) allowed us to draft a site-specific action plan for the conservation of avifauna across the region. Based on these meetings and discussions, the main threats and conservation gaps under global changes scenarios for the bird communities, but also, we proposed urgent implementing actions for the following years. In general, our meeting included the participation of 52 persons from 17 institutions (see final comments section), who defined five main areas for future research/conservation/actions: 1) QUANTITY, QUALITY AND AVAILABILITY OF SPECIES DATA; 2) FUNDAMENTAL QUESTIONS IN ECOLOGY AND EVOLUTION PATTERNS; 3) INTEGRATING DIFFERENT KNOWLEDGE AND SCIENCES DISCIPLINE; 4) MULTI-LEVEL OF GOVERNANCE AND COMMUNITIES' PARTICIPATION; and 5) ENVIRONMENTAL EDUCATION AND SOCIAL INTEGRATION CONSERVATION PROJECTS. All this information is very important because the institutions are observing that promoting the creation of new protected or conservation areas without a systematic conservation planning approach could provoke the failure of government strategies to adequately represent all biodiversity interests, as well as increase the expenditure of inversions and resources. In addition, we develop 10 environmental education activities (including workshops and talks for more than 400

people) to promote a positive vision towards the birds as indicators of diversity and ecosystem integrity. This latter represents an important step to encourage a new perspective about their conservation.

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

- a) As we assumed from the previous Rufford project, we found many areas with multiple gaps of ornithological information across the Zulia state, but not only about the "presence" records of species but also the phylogeny and ecological traits of those. Unfortunately, the budget and time available did not allow covering all these areas of study and sampling of taxa. Considering that, the selection of sampling locations was focused on sites for increasing the biological information of bird species and for the validations of the species distribution models for those species with very low number of occurrence records. In this sense, we also promoted, in collaboration with the local communities, rangers of National Parks, and students, the social participation on international and important events such as Global Big Day and October Big Day to increase the datasets about the species distribution across the region. Besides, information about the phylogeny and functional attributes (i.e., IUCN's categories, distributional ranges, habitat specificity, weight, size, trophic level etc.) for each species were compiled from GLOBAL PHYLOGENY OF BIRDS' (<https://birdtree.org/>; see Jetz *et al.*, 2012) and AVONET websites (see Tobias *et al.*, 2022). However, we consider important to promote and continue the surveys and ecological studies of birds in the ecosystems throughout the Zulia state.
- b) The COVID-19 pandemic meant that date of the fieldwork was changed several times. Besides, several members in the original team of this project left the region/country for new job opportunities. Therefore, we needed to establish new contacts and collaborations with local institutions and people. For example, both ONG "MANGLE" and the Botanical Garden at Maracaibo city (In Spanish: "*Fundación Jardín Botánico de Maracaibo Dr. Leandro Aristeguieta*"), as well as the private company "PRODUSAL" were critical partners in the project and outcomes. Also, we used the technology or apps (i.e., ZOOM, skype, Meet) to perform the meetings and organise the activities (fieldwork, GLOBAL BIG DAYS, etc.) among collaborators.
- c) The changes of political authorities (governors and mayors) represented an important unforeseen event during the project because it made the communication among governmental institutions difficult, especially when authorities had contrary policies. To address this situation, we maintained direct communication with all possible authorities. In fact, our invitations always were open to all public (without discrimination by politics, religious or other) in all the events. Besides, to maintain good relations and communication among the main stakeholders, we always participated in all activities that governmental authorities invited us.

- d) The transportation, gasoline, accommodation, and feeding were more expensive than the expected for us, mainly due to date reprogramming of the fieldworks and particular economic-social situation in Venezuela. Also, in some cases the local guides requested a higher salary for the activities performed. However, we solved this problem modifying in some case the sampling period (i.e., fewer days) or if we needed the original budget of project using the money from other areas where there was money left over.
- e) We found great interest in learning more about bird ecology from the young population of the community. However, the current economic-social situation in the country makes it difficult to perform both fieldwork and educational activities in several localities (especially those remote towns). Therefore, we decided to promote fieldwork in concordance to important events such as Global Big Day and October Big Day. In this sense, the funds from the project were used to increase the biological data but also the community's participation in the activities and educational talks.

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

We involved local communities in the project through their participation in the collection of bird observation/records during the fieldworks and the international events such as the Global Big Day and October Big Day, as well as workshops and educational talks to young and children in Botanical Garden from the Maracaibo city. We argued that awareness of the population for the use and care of the natural resources with which they live daily is essential for the development of local capacities for biological conservation of the species and its habitat. In this sense, we use every opportunity to explain local people and visitors about the importance of birds, as well as about their diversity, the climate change effects and the importance of to protect species and environmental services (including some fieldworks night activities). Therefore, the community benefited from having knowledge given by talks and brochures on the importance of conserving the species. But we also developed other important activities, including:

- The training of young biologists (undergraduate and postgraduate) in the research focused on biological topics of species and conservation activities, as well as in the fieldwork techniques, the bird identification, and use of Geographic Information Systems. It is important to note that this included students and biologist from the Universidad del Zulia (Venezuela), preparing their thesis projects in topics about the effects of climate change scenarios in the fauna distribution and identification of conservation unit priorities.
- The motivational talks in primary and elementary schools, which were entitled (1) "*Las aves del Zulia: bellas, importantes y amenazadas*" (In English: "The Birds of Zulia state: Beautiful, important but threatened"); and (2) "*La Biodiversidad del Neotrópico ante la crisis climática: ¿Por qué estudiar biología?*" (In English: "Neotropical biodiversity under the climate crisis: Why is it important to study Biology?"). These talks had the purpose to

show the need to address problems about biodiversity conservation in the present time, and mainly we focused on demonstrating, based on increasing evidence, how the distribution and survival of species and the ecosystems in which they inhabit, are being affected by climate change, but specially the role of current protected areas in the protection of zones with great biodiversity values in the future climate scenarios. All these points showed the need for more biologists and conservationists in the world to study those effects and develop conservations strategies, specially focused in the creation of a more representative, connected, and efficient protected areas network.

- We developed academic courses for undergraduate and postgraduate students. In this course, the participants were trained in the following topics: the different uses of GPS; the development of spatial analysis of maps; the need of integrate social, ecological, and biological components in the development of future conservation projects; and the importance to attend problems about the local, national, and international distribution of species, ecosystems, and biodiversity.

#### **5. Are there any plans to continue this work?**

At this moment, I have no plans to continue with the project in the specific area due to academic compromises in other countries. However, we continue to collaborate with researchers from the "Universidad del Zulia" and the ONGs' MANGLE (*Movimiento Ambientalista No Gubernamental La Educación*) to follow up on the awareness workshops about the relevance of birds as indicators of diversity and ecosystem integrity, as well as to diffusion of action plan for the conservation across region. For instance, as we agreed in the meeting for the collective construction of an action plan for the bird long-term conservation in the Zulia state, a new Instagram's page (Aves del Zulia) was created in October 2023 by the UNAM university. In this page, the team members will share all results, maps, educational material, and information about this project but also the relevance of birds as indicators of diversity and ecosystem integrity. We expected that this social media generates a sense of protection of wildlife and their habitats in the local communities. This is important, as it is impossible to protect what we do not know.

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

This project is part of one macro-project, which will be continued during the next few years. Thus, we plan to develop public presentations of some preliminary results in local universities, and to have a discussion session after that, which allows us to show our research to other groups, as well as to explore possible collaborations in the near future. At this time, we will present several oral presentations of the results' project and its results in the following international and national events:

- International symposium "*El estudio y conservación del Bosque Seco Tropical en Latinoamérica*" (In English: "Study and conservation of Tropical Dry Forests in Latin America").

- Educational talk “*Las aves del Zulia: bellas, importantes y amenazadas*” (In English: “The Birds of Zulia state: Beautiful, important but threatened”).
- International congress “*Congreso Internacional de Cambio Climático con Enfoque Territorial – CICCET 2023*” (In English: “Climate change and territorial approach – CICCET 2023”).
- Regional Forum “Eco-retos del Zulia” (In English: “Environmental challenges to Zulia state”).
- International congress “II Ornithological Congress of the Americas”.
- National Congress “*XLI Coloquio de Investigación de la FES Iztacala*” (in English: XLI Research Colloquium from the Iztacala Faculty).
- The “FIESTA DE LAS CIENCIAS Y LAS HUMANIDADES 2023” (In English: “Sciences and Humanities meeting 2023”).
- The “13° Congreso Nacional de Investigación en Cambio Climático y 5° Congreso Latino de Investigación en Cambio Climático”. (In English: 13th National Congress on Climate Change Research – 5th Latin America Congress of Research on Climate Change).
- The “Exchanging Experiences in Conservation between Mexico and Australia 2023 Conference”.

Finally, at this time, we have submitted two papers in international scientific journals (in review and evaluation process yet), and two papers were published.

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

During this project, large amounts of data were collected with the purpose to be analysed. Thus, the most important step is to continue the production of scientific-educational material. This step is very important because the information obtained will contribute to the assessment of threats, the extinction risk and definition of conservation priorities, representing an important contribution to justify the importance of conservation planning and recovering activities in the region. Then, the next (and critical step) is formally to submit and discuss all obtained information here to the local authorities to enforce a strategy to support the conservation of natural forests while the local people keep a sustainable use of the resources they need (habitat, food, others). As I mentioned, we consider that this would be an important next goal to achieve in the protection and conservation strategies for biodiversity in the Zulia state.

In addition, it is important to continue monitoring efforts by local ONGs, academic institutions and communities in the area, which allow us to obtain new records and increase our understanding of the population dynamics of the species. One strategy to follow is to develop a plan to monitor the bird's citizen science records throughout



the region in order to have a more current state of knowledge about the whole species and to continue updating it with the help of the public.

To do all this, the media diffusion of results represent a critical step to promote the awareness among authorities and people. Therefore, in the next year we will work in the Instagram's page (Aves del Zulia) in collaboration with the "Universidad del Zulia" and the ONGs' MANGLE.

**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 RF logo was used in each of the public presentations of the results from project, as well as in the posters referring to the project and the t-shirt used by the personal during the fieldwork. Specifically, I used (and will use) the RF logo during the following presentations and events:

- International symposium "*El estudio y conservación del Bosque Seco Tropical en Latinoamérica*" (In English: "Study and conservation of Tropical Dry Forests in Latin America").
- Educational talk "*Las aves del Zulia: bellas, importantes y amenazadas*" (In English: "The Birds of Zulia state: Beautiful, important but threatened").
- Workshop "*Construcción colectiva de un Plan de Acción para la conservación a largo plazo de la avifauna del Estado Zulia*" (In English: "Meeting for the collective construction of an action plan for the bird long-term conservation in the Zulia state").
- International congress "*Congreso Internacional de Cambio Climático con Enfoque Territorial – CICCET 2023*" (In English: "Climate change and territorial approach – CICCET 2023").
- Educational talk – workshop: "*Técnicas de estudio y monitoreo de la biodiversidad*" (In English: "Monitoring methods and techniques of the biodiversity").
- Motivational talk: "*La Biodiversidad del Neotrópico ante la crisis climática: ¿Por qué estudia biología?*" (In English: "Neotropical biodiversity under the climate crisis: Why is important to study Biology?").
- Regional Forum "*Eco-retos del Zulia*" (in English: "Environmental challenges to Zulia state").
- International Symposium "*Semana Internacional de los Polinizadores*" (In English: "International Pollinator Week symposium").
- International congress "*II Ornithological Congress of the Americas*".

- National Congress “*XLI Coloquio de Investigación de la FES Iztacala*” (in English: XLI Research Colloquium from the Iztacala Faculty).
- The “*FIESTA DE LAS CIENCIAS Y LAS HUMANIDADES 2023*” (In English: “Sciences and Humanities meeting 2023”).
- The “*13° Congreso Nacional de Investigación en Cambio Climático y 5° Congreso Latino de Investigación en Cambio Climático*”. (In English: 13th National Congress on Climate Change Research – 5th Latin America Congress of Research on Climate Change).
- The “*Exchanging Experiences in Conservation between Mexico and Australia 2023 Conference*”.

Additionally, RF will be mentioned (as an important financing grant) in the acknowledgments of all documents (including scientific articles) arising from the analysis of the results of the project. This latter also included the thesis project development for several students from UNAM's, such as Sebastián Hernández de la Fuente (<http://132.248.9.195/ptd2023/mayo/0840492/Index.html>); Mariana Maya Romero (<http://132.248.9.195/ptd2023/junio/0842310/Index.html>) and Alan Geovani Medrano Hernández (<http://132.248.9.195/ptd2023/junio/0841563/Index.html>). These students are young biologists that took the training course “*Análisis espaciales para estudios en biogeografía y conservación*” (In English: “Spatial analysis tools for biogeographical and conservation studies”) performed according to the cooperative agreement between Universidad Nacional Autónoma de México and the Rufford foundation (Document No. 58726-757-3-XI-21). This was the same case for other students as Andrea Michelle Gama-Rodríguez, Andrés José Pineda Carrillo, Daniela Remolina Figueroa, María Lourdes Núñez Landa and Sonia Patricia Muñoz Pérez, who finished their thesis and submitted a research manuscript to international journals. Thus, I would like to thank The Rufford Foundation because its contribution was essential to promote and continue the activities and training of students, volunteers, guides, and rangers.

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

**BIOL. LUIS SIBIRA** (Museo de Biología at Universidad del Zulia; Venezuela). He is a technical assistant of several research projects, and has vast experience in field works, data analysis, and birds' identification. He was responsible for participating during the surveys and monitoring of birds' data during the fieldworks (including the meets and environmental education workshops with communities, setting up camps, the transportation of equipment and materials, etc.) and the database compilation. Also, he participates in the drafting of outcomes (educational material, guides, articles, etc.) from this project.

**BIOL. LERMITH TORRES** (ONG the MANGLE; Venezuela). He is the director and responsible to the ONG known as MANGLE (*Movimiento Ambientalista No Gubernamental La Educación*). Besides, Lermith is a recognized conservationist in the Zulia state and have experience on fieldwork and educational activities with local people. He

participated in the fieldwork activities —especially during the Global Big Day and October Big Day events— and the meetings/workshops.

**M.SC. ROSANNA CALCHI** (Museo de Biología at Universidad del Zulia; Venezuela) is an important national researcher on diversity, ecology, and conservation of the avifauna in the Zulia state. Her role was focused on bird identification, drafting manuscript and the development of thesis projects with Biology students. Also, she participated in the drafting of the article's outcome from the meetings/workshops.

**DR. OCTAVIO ROJAS** (Instituto de Ecología, A.C.), **DR. ADOLFO NAVARRO SIGÜENZA** (UNAM) and **DR. LUIS ANTONIO SÁNCHEZ GONZÁLEZ** (UNAM). These three international researchers have wide experience working with Ecological Niche Modelling and ecological biogeography to study the effects of future climatic change in the species distribution patterns. They collaborated performing the spatio-temporal analyses about both individual species range and diversity (taxonomic, phylogenetic, and functional levels) patterns of bird assemblage. Also, she participated in the drafting of the article's outcome from the meetings/workshops.

**SEBASTIÁN DE LA FUENTE, GIOVANNI MEDRANO, LORENA SALDAÑA** and **ALEXANDRA CONTRERAS**. They are young biologist from the Iztacala Faculty (UNAM) focused on biodiversity patterns and potential impacts of climate change's themes. These students participated and collaborated in the organization and development of fieldwork activities and meetings/workshops, as well as in the design of material to educational activities.

## 10. Any other comments?

Many thanks to The Rufford Foundation for its support, without them most of the proposed activities would not be developed. I hope to receive the support of the foundation for the development of the next projects.

On the other hand, in September 2023, I was selected as winner in the award "Premio Talento EDOMÉX: Jóvenes Científicos e Investigadores" (Young Scientists and Researchers from the Mexico state, In English) by the Consejo Mexiquense de Ciencia y Tecnología (in English, Mexican Center of Science and Technology). This award was based on my academic, research and conservation activities/experience in the Biological Sciences topic. Undoubtedly, the Rufford foundation has been an important support during this >5 years to my academic development. Therefore, it is my pleasure to share this news with you and say, "Thanks a lot for all your support".

Finally, I would like to extend my gratitude to local people, national and international experts and organizations (scientific-educational institutes, NGOs, governmental) that participate in the workshops "*Construcción colectiva de un Plan de Acción para la conservación a largo plazo de la avifauna del Estado Zulia*", which produces one of the main outcomes from this project. The list of institutions includes: the Museo de Biología at Universidad del Zulia; the MANGLE (*Movimiento Ambientalista No Gubernamental La Educación*); the Red Venezolana de Profesionales por la Conservación (Akehe); the Sociedad Venezolana de Ecología;

the CRAV-Sociedad Venezolana de Ornitología; the Fundación Jardín Botánico de Maracaibo Dr. Leandro Aristeguieta; eBird; Provita A.C.; the private company Produsal C.A.; the private company AgroBananas A.C.; the Instituto Venezolano de Investigaciones Científicas (IVIC); the Ministerio del Poder Popular para el Ecosocialismo (In English: Environmental National Office); the CMAP-IUCN en Venezuela Chapter; the U.E.P Colegio Nuestra Señora de Chiquinquirá; the Proyecto de Monitoreo de Aves Playeras de la Bahía de Sepetiba; the Instituto de Ecología, A.C.; and the Universidad Nacional Autónoma de México.





**Figure 1.** Educational talks to schools and workshops for greater dissemination of information.





**Figure 2.** Complementary activities done during environmental education workshops for children and young in the Botanical Garden at the Maracaibo city.

## AMENAZAS PARA LAS AVES

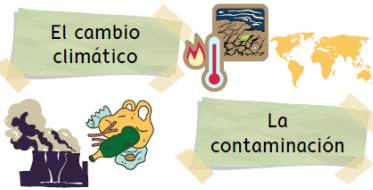


La pérdida de sus hábitats



La captura y venta ilegal

El cambio climático



La contaminación

Las especies exóticas e invasoras –es decir, que no son nativas de un lugar–



Material elaborado por: Alexandra Contreras Morales y Lorena Ivonne Saldaña Reyes.

## AMIGOS DE LAS AVES

Los biólogos se encargan de estudiar a las aves, desde sus formas y colores, hasta su distribución, ecología y evolución, además de protegerlas a ellas y a sus hábitats.



Los observadores de aves también contribuyen mucho, pues sus observaciones y registros ayudan a los biólogos en dichas tareas.



¡TÚ TAMBIÉN PUEDES CONVERTIRTE EN UN AMIGO DE LAS AVES!



¡Acompáñanos a aprender sobre ellas!

Proyecto de Investigación Rufford 28502-B  
En coordinación con:



## ¿QUÉ SON LAS AVES?

Son animales vertebrados que se distinguen por tener plumas, alas (la gran mayoría), pico y dos patas.

LAS PODEMOS IDENTIFICAR POR SU VARIEDAD DE COLORES, TAMAÑOS Y FORMAS, ASÍ COMO POR SUS SONIDOS.



¿SABÍAS QUE...

se han registrado en Zulia 715 especies de aves?



¡Cuánta riqueza!

## ¿POR QUÉ LAS AVES SON IMPORTANTES?

¡Todas juegan un gran papel en los ecosistemas!

1



Existen aves depredadoras, también llamadas rapaces

2



Otras son carroñeras

3

Hay aves dispersoras de semillas



4

Mientras que otras son polinizadoras



Además...

5

Son importantes símbolos nacionales...

como el turpial venezolano



y el cardenalito



## ¿CONOCE A 2 AVES ENDÉMICAS DE VENEZUELA QUE HABITAN EN ZULIA!

"Endémico" significa que solamente viven en ese lugar



Titiriji de Maracaibo (*Todirostrum viridanum*)



Hormiguero tororoi excelsa (*Grallaria excelsa*)

Figure 3 (part 1). Brochure for children and young people (front and back) with information on the ecological and conservation importance of birds in Zulia state.

 <b>Cardinalis phoeniceus</b> Cardenal Coriano	 <b>Tapera naevia</b> Saucé	 <b>Icterus icterus</b> Turpial Común	 <b>Pelecanus occidentalis</b> Buchón o Pelicano	<p><b>Aves del Estado Zulia.</b></p>  <p>Ubicado en el extremo occidental venezolano, el estado Zulia cuenta con una superficie territorial de 63.100 Km<sup>2</sup>. Cuenta con ecosistemas marino-costeros, lacustres, páramos y montañas, semiárido, de sabana, bosques tropicales secos, salinas, salinetas, cuevas y manglares. Según el Comité de Clasificación de Suramérica (SAAC, por sus siglas en inglés), posee una riqueza de 731 especies; lo que representa el 52 % del total del país (1403).</p> <p><b>ZONA DE INTERÉS PARA LA OBSERVACIÓN DE AVES.</b></p> 		
 <b>Thamnophilus doliatus</b> Pavita Hormiguera Común	 <b>Pyrocephalus rubinus</b> Atrapamoscas Sangre de Toro	 <b>Pipra filicauda</b> Saltarín Cola de Lanza	 <b>Chelidoptera tenebrosa</b> Bobito Mirasol			
 <b>Ramphocelus dimidiatus</b> Sangre de Toro Encendido	 <b>Fluvicola pica</b> Viudita Acuática	 <b>Trogon collaris</b> Sorocúa Acollarado	 <b>Galbula ruficauda</b> Tucuso Barranquero			
 <b>Vanellus chilensis</b> Alcaraván	 <b>Phoenicopterus ruber</b> Flamenco	<p>Diseño: Lermith Torres Texto: Luis Loyo Fotografías: Lermith Torres</p> <p><b>Zulia 2022</b> Tomo VI</p> <p>Agradecimientos: David Prieto, Luis Loyo, Luis Sibira, Hilda Naveda, Helimenes Perozo (f), Marbelis Chávez, Mayary Ferrer, Pedro Caldera, José Gustavo León, Endri Chirinos.</p>				
 <b>Piculus chrysochloros</b> Carpintero Dorado	 <b>Dryocopus lineatus</b> Atrapamoscas Barbirrayado	 <b>Atalotriccus pilaris</b> Atrapamoscas Pigmeo Ojiblanco	 <b>Chrysomus icterocephalus</b> Turpial de Agua		 <b>Herpetotheres cachinnans</b> Halcón Macagua	 <b>Caracara cheriway</b> Caricare Encrestado
 <b>Campephilus melanoleucos</b> Carpintero Real Pico Amarillo	 <b>Veniliornis kirkii</b> Carpintero Rabadilla Roja	 <b>Todirostrum viridanum</b> Titiriji de Maracaibo	 <b>Hypnelus ruficollis</b> Aguanta Piedra		 <b>Buteogallus meridionalis</b> Gavilán Pita Venado	 <b>Buteo nitidus</b> Gavilán Gris
 <b>Piscumnus cinnamomeus</b> Telegrafista Castaño	 <b>Melanerpes rubricapillus</b> Carpintero Habado	 <b>Charadrius nivosus</b> Frailecito	 <b>Jacana jacana</b> Gallito de Laguna		 <b>Rupornis magnirostris</b> Gavilán Habado	 <b>Rostrhamus sociabilis</b> Gavilán Caracolero
 <b>Dendroplex picus</b> Trepador Subesube	 <b>Dendrocincla homochroa</b> Trepador Rojizo	 <b>Egretta caerulea</b> Garcita Azul	 <b>Ptilherodius pileatus</b> García Real		 <b>Geranospiza caerulescens</b> Gavilán Zancón	 <b>Buteogallus urubitinga</b> Águila Negra

**Figure 3 (part 2).** Brochure for children and young people (front and back) with information on the ecological and conservation importance of the birds in the Zulia state.







**Figure 4.** Photographic records of birds' species, landscape and fieldworks performed across Zulia state.



**Figure 5.** Official cover for the Instagram's entitled "Aves del Zulia" (In English: "The Zulia's birds") where results and outcome from project will be share.