

The Rufford Foundation

Final Report

Congratulations on the completion of your project that was supported by The Rufford Foundation.

We ask all grant recipients to complete a Final Report Form that helps us to gauge the success of our grant giving. The Final Report must be sent in **word format** and not PDF format or any other format. We understand that projects often do not follow the predicted course but knowledge of your experiences is valuable to us and others who may be undertaking similar work. Please be as honest as you can in answering the questions – remember that negative experiences are just as valuable as positive ones if they help others to learn from them.

Please complete the form in English and be as clear and concise as you can. Please note that the information may be edited for clarity. We will ask for further information if required. If you have any other materials produced by the project, particularly a few relevant photographs, please send these to us separately.

Please submit your final report to jane@rufford.org.

Thank you for your help.

Josh Cole, Grants Director

Grant Recipient Details	
Your name	Anay Serrano Rodríguez
Project title	Genetic diversity of an endangered and endemic bird of Yucatan Peninsula (<i>Campylorhynchus yucatanicus</i>) for conservationist aims II
RSG reference	23522-2
Reporting period	9/10/2017-9/10/2018
Amount of grant	£4,995
Your email address	anayserrano1984@gmail.com
Date of this report	9/10/2018

1. Please 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 diversity and genetic structure for the identification of areas of risk and priority for conservation and management.				<p>Doctoral thesis defended in January 2018: Conservation status of <i>Campylorhynchus yucatanicus</i> (Aves: Troglodytidae): distribution and relationship of its genetic diversity with habitat fragmentation.</p> <p>Paper sent to scientific journal: Effect of anthropogenic habitat fragmentation on the genetic connectivity of the threatened endemic <i>Campylorhynchus yucatanicus</i> (Aves, Troglodytidae)</p>
To propose effective management actions for conservation of <i>Campylorhynchus yucatanicus</i> in Yucatan.				<p>We provide a technical report with suggestions for the conservation and management of the species and its habitat to the Secretary of Environment of the state of Yucatan, to the federal SEMARNAT including the National Commission of Protected Areas, and all protected area were we worked.</p>
To involve workers from protected areas, community bird observers from areas around to the study area. To educate children from schools close to the <i>Campylorhynchus yucatanicus</i> distribution.				
To make informative materials to disseminate about the importance of the conservation of <i>Campylorhynchus yucatanicus</i> and its habitat in the area.				

2. Please explain any unforeseen difficulties that arose during the project and how these were tackled (if relevant).

We planned to amplify 10 microsatellites described for *Campylorhynchus brunneicapillus*, but three of the primers were non-specific for *C. yucatanicus* in the laboratory conditions that we had. We tested different temperatures and conditions for the amplifications during the polymerase chain reactions (PCR), but we could not recover those three microsatellites. For the reason stated above, our results were successfully processed with the seven primers that were specific for the amplifications of the fragments of nuclear DNA in the PCRs. Our results are valuable with the microsatellites used.

In the laboratory, sequencing equipment breaks occurred while we determined the sizes of DNA fragments to describe the genetic variability of the Yucatan wren populations. Consequently, the time planned for the analysis of the data and the conclusion of the project was not as expected (the final report for Rufford Foundation took at least a month more than the plan). Finally, we were able to successfully complete the project, fulfilling all our objectives.

3. Briefly describe the three most important outcomes of your project.

Identifying connectivity patterns among remnant populations and their relationship with land use practices and adjacent habitat fragmentation, is the basis for implementing appropriate management strategies for species conservation. The spiny coastal scrub of dune vegetation complex in northern Yucatan Peninsula has been affected by coastal development. These human induced processes of land use change can affect the distribution and survival of the Yucatan wren (*Campylorhynchus yucatanicus*), an endemic bird, with a narrow distribution. To describe the current structure and genetic diversity of populations of *C. yucatanicus* and to identify possible anthropogenic barriers to connectivity, we used 140 samples collected between 2017-2018 from 14 localities and 7 nuclear microsatellites loci (Appendix 1, 2). We explored the relationship between genetic variability of populations and structure of landscape through regression models. In addition, we described the relationship between among-population genetic distance and landscape resistance. We found four genetic populations with Bayesian clustering methods. In general, population genetic with less diversity is 4, that contains Ría Lagartos sites and secondly, population 1 that is westernmost and includes sites from Celestún to Chuburna, west of Progreso city. This is true for both Na, He and Shannon Diversity Index (I). Regarding inbreeding index (F), in population 1 was estimate more inbreeding and secondly population 4. Two best and equally competitive models ($\Delta AIC < 2$) were those that included proportion of suitable habitat (CA1) and index of equitability or fragment uniformity (SEI). Probability that through them genetic diversity in sampling sites can be explained, measured by He was of 54% ($\sum w_i CA1$, $SEI=0.54$), although each model by itself only weighs less than 30%. Human settlements and availability of adequate habitat limit gene flow between sites due to ongoing land use changes. We suggest some management actions for conservation of this species and we propose to change the IUCN threat category to "endangered" because of the restricted distribution, small population sizes, habitat

threats, and the loss of connectivity.

In addition to the research, we developed a training programme that benefited at least 30 people belonging to the private sector (birdwatchers from localities near Yucatan Wren distribution) and government organisations (specialists and decision makers in protected areas and government) (Appendix 3A, 3B). The environmental education programme was primarily aimed at children from rural schools on the northern coast of the Yucatan Peninsula and housewives from coastal towns (Appendix 4). Talks were given and festivals were held to publicize the natural values of the area. Results of our research were disclosed in poster and informative materials (Appendix 5) and will be disseminated in scientific papers. We recommend actions that can be done by the inhabitants who live next to this important endemic bird.

Recommendations to conserving *C. yucatanicus* populations and its habitat:

- To prepare a proposal with the information obtained to define a new category of threat to IUCN.
- Increase surveillance in natural protected areas and restrict the exploitation of resources and land use by humans to the activities allowed in these areas, according to their category of management and conservation.
- Promote that livestock activities will be friendly with the environment similar to that developed in some Ría Lagartos ranches, where a large proportion of elements of the original landscape are maintained.
- Promote on the coast of the peninsula a culture of patios and green gardens that use elements of the original vegetation, instead of bare sandy soils.
- Control populations of introduced species such as dogs and cats that can affect the survival of populations of *C. yucatanicus*.
- Rethink the management plans of the protected areas in order to improve the connectivity of the landscapes and maintain the functionality of the ecosystems and their diversity at all levels.
- Implement conservation strategies that include areas that are outside the range of state or federal protection.
- Promote tourism programs of nature in the communities, focused on bird watching and hiking.

4. Briefly describe the involvement of local communities and how they have benefitted from the project (if relevant).

Several local people collaborated with us preparing the activities for the ambient education programme and for the investigation. We elaborate and delivered information material that showed Yucatan wren's characteristics and its ecological importance in schools and protected areas office. In addition, they incorporated information about the consequences of inadequate land use. These materials support educative activities in schools and communities. We teach to environmental specialists and teachers in rural schools, local people in communities and cattlemen in relation with the coastal scrub importance, biodiversity, and its role in the ecosystem. The main benefit of the communities has been the increasing of awareness and knowledge about the conservation of biodiversity in general and the

conservation of Yucatan wren and its habitat in particular.

5. Are there any plans to continue this work?

We plan to continue research to evaluate the use that *C. yucatanicus* individuals make of areas with different types of disturbance. In the future, we intend to carry out an environmental education campaign and a training campaign to teach local bird watchers, taking into account focal bird species like this one, if a new project is approved.

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

Our results have been presented to the staff of protected areas to contribute to the design of management plans and recovery strategy per Yucatan Wren and its habitat. In the other hand, results have been or are will presented in:

- I presented the doctoral thesis entitled "Estado de conservación de *Campylorhynchus yucatanicus* (Aves: Troglodytidae): distribución y relación de su diversidad genética con la fragmentación del habitat", with which I obtained honorable mention (Appendix 6A, 6B).
- Scientific article next to be sent to the refereed journal Biodiversity and Conservation: "Effect of anthropogenic habitat fragmentation on the genetic connectivity of the endemic *Campylorhynchus yucatanicus* (Aves, Troglodytidae)".
- Scientific article next to be sent to the refereed journal Neotropical Bird: "Cryptic dimorphism in an endemic and threatened species (*Campylorhynchus yucatanicus*: Troglodytidae): a simple method to determine sex".
- Report of results and recommendations for the conservation of biodiversity sent to the Celestún and Ría Lagartos Biosphere Reserves, and Dzilam protected natural areas.
- Preparation of a proposal document for the change of category from "almost threatened" to "endangered" according to IUCN.

7. Timescale: Over what period was The Rufford Foundation grant used? How does this compare to the anticipated or actual length of the project?

The Rufford Small Grant was used over 13 months from November 2017 to December 2018.

8. Budget: Please provide a breakdown of budgeted versus actual expenditure and the reasons for any differences. All figures should be in £ sterling, indicating the local exchange rate used.

Item	Budgeted Amount	Actual Amount	Difference	Comments
Contingencies	200	358	+158	Prices have risen
Batteries and recharger	130	200	+70	Prices have risen
External hard drives and memory cards	100	95	-5	We reorganized the budget for price increases in some materials
Soundtrack reproducer	95	84	-11	We reorganized the budget for price increases in some materials
Headlamps	70	70		
Folding camp cot	100	90	-10	We reorganized the budget for price increases in some materials
Leg Bands	280	260	-20	We reorganized the budget for price increases in some materials
2 Mist Nets	200	225	+25	We reorganized the budget for price increases in some materials
Wing Rules, Banding Pliers & Openers, Calipers, Pesola	100	86	-14	We reorganized the budget for price increases in some materials
2 Binoculars	300	300		
Food	350	420	+70	Prices have risen
Gas	800	850	+50	Prices have risen
Travel	700	600	-100	We reorganized the budget for price increases in some materials
Lodging	600	600		
Hiking shoes and boots	100	100		
2 Backpack 50L	90	100	+10	Prices have risen
Printing & toners	180	265	+85	Prices have risen
Desktop Computer	600	420	-180	Prices have risen
Totals	4995	5123	+128	1£ ~ 18 Mexican Pesos (MXN).

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

The next step is to send a proposal to the representatives of IUCN and to relate Mexican entities, where the criteria by which we propose a change of category of risk of extinction of the species are exposed. Future research related to the use of these birds in areas with different degrees of anthropization is crucial for the conservation of Yucatan Wren and its habitat. This aspect is necessary to understand the risks to which the populations of *C. yucatanicus* on the northern coast of Yucatan are subject.

10. Did you use The Rufford Foundation logo in any materials produced in relation to this project? Did The Rufford Foundation receive any publicity during the course of your work?

We use the logo of the Rufford Foundation in collages, posters and presentations related to research (Annex x). The Rufford logos were present in all the environmental education materials made, such as t-shirts, stickers, etc. It was also used in the results reports for protected area managers and state and federal government authorities. The scientific articles sent and in preparation mentioned the organisations that financed the project, including the Rufford Foundation.

11. Please provide a full list of all the members of your team and briefly what was their role in the project.

Anay Serrano Rodríguez: Coordination, investigation, capacitation and ambient education

Griselda Escalona Segura: Investigation, capacitation

Eduardo Íñigo: Investigation, capacitation and ambient education

Alexis Plasencia Vazquez: Investigation, capacitation

Guillermo Castillo: Field technician for research

José España España: Field technician for research

Annery Serrano Rodríguez: Investigation, capacitation and ambient education

12. Any other comments?

I am very grateful to the Rufford Foundation for the support, without which the research could not be carried out, and the training and environmental education work that we developed.

Appendix 1. A: Use of playback sounds to capture Yucatan Wren individuals for extracting blood samples and georeferencing the birds capture point for spatial analysis. B: placement of mist nets for the capture of birds and taking of blood samples. C: Measurement of birds and blood sampling. D: Laboratory work to describe the genetic variability of the Yucatan wrens.



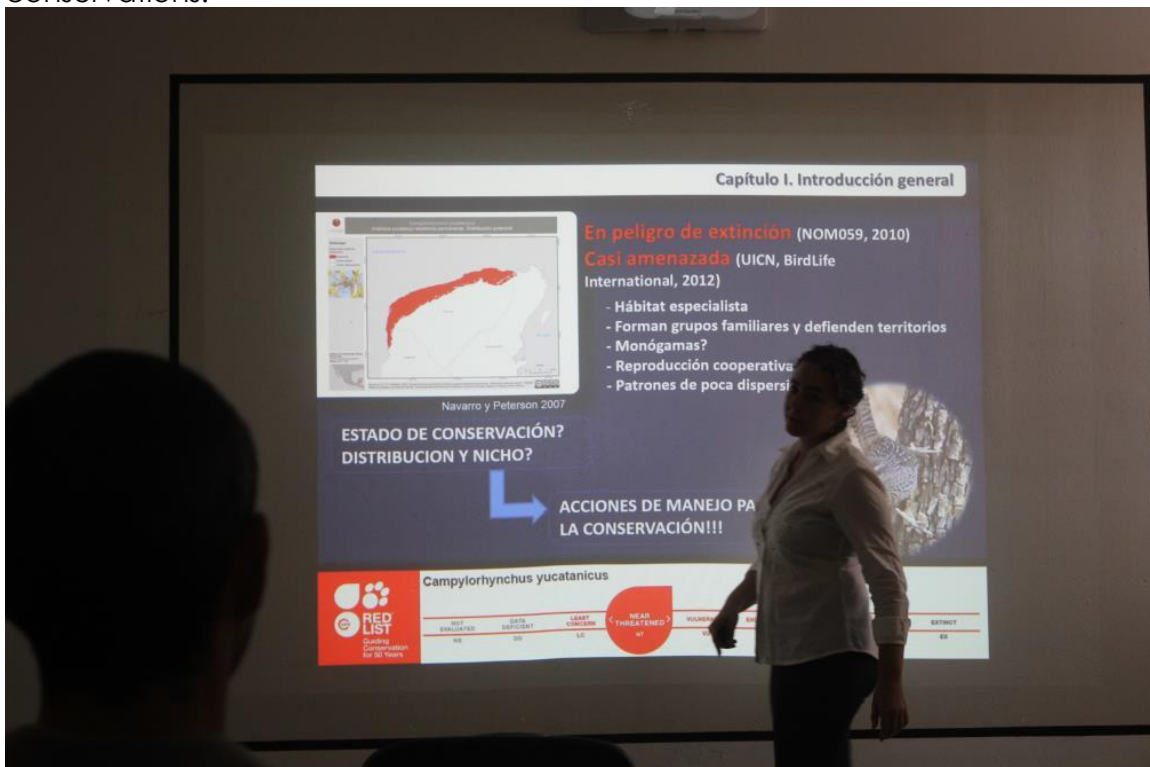
Appendix 2. Yucatecan Wren's individual were captured and ring marker by us and photographed by birdwatchers after.



Appendix 3A. Training to protected area staff in the management of birds and data collection.



Appendix 3B. Training protected area specialists on the importance of biodiversity conservations.



Appendix 4. Environmental education work about the characteristics of the birds and the importance of conserving their habitat with the children of the communities.



Appendix 5. Informative material on the ecology of *C. yucatanicus* to sensitize the people who live near the distribution of the bird and to the workers of the protected areas.

Los individuos de esta especie son territoriales, confeccionan nidos con forma globular y entrada lateral, donde depositan de 3 a 4 huevos. Se cree que es una especie monógama, que mantiene una pareja durante varios años, los cuales se pueden observar vocalizando en duetos durante casi todo el año. En algunas épocas pueden verse pequeños grupos familiares.



MATRACA YUCATECA

Campylorhynchus yucatanicus

Especie endémica, en peligro de extinción con distribución restringida a la costa norte de la Península de Yucatán en México

La distribución potencial de *C. yucatanicus* obtenida en MaxEnt es de aproximadamente 2 711 Km², 2% del área total de la Península de Yucatán.





"No se puede pasar un solo día sin tener un impacto en el mundo que nos rodea. Lo que hacemos marca la diferencia, y tenemos que decidir qué tipo de diferencia queremos hacer"
-Jane Goodall (1934-) primatóloga británica.

UNA JOYA NATURAL

La Matraca Yucateca pertenece a la Familia Troglodytidae y sus individuos se localizan en el matorral costero del complejo de vegetación de dunas en el norte de la Península de Yucatán. La situación para la especie es alarmante ya que se distribuye en uno de los ecosistemas más frágiles y raros de la región, el cual está siendo destruido por la influencia de las actividades humanas en la zona como la expansión de comunidades costeras, la construcción de casas de verano, la plantación de cocales, la explotación de sal, los incendios provocados y en general la pérdida de hábitat y la fragmentación de los mismos.

A pesar de que en la NOM-059-2010 la especie se encuentra catalogada como en peligro,

la IUCN la reporta como "casi amenazada", una categoría de menor riesgo. Recientes investigaciones han sugerido la existencia de cuatro poblaciones genéticas y su estructura sugiere que los asentamientos humanos en la costa representan barreras en determinado contexto geográfico.

- 1 Investigar y monitorear para definir una categoría de amenaza real en la IUCN.
- 2 Educar y promover una cultura de patios y jardines verdes que utilicen elementos propios de la vegetación original, en vez de suelos arenosos desnudos.
- 3 Incrementar la vigilancia en áreas naturales protegidas y restringir la explotación de recursos y uso de suelo por el humano a las actividades permitidas según su categoría de manejo y conservación.
- 4 Fomentar una ganadería amigable con el ambiente en la que se mantienen gran proporción de elementos del paisaje original.
- 5 Replantar los planes de manejo con vistas a mejorar la conectividad de los paisajes y mantener la funcionalidad de los ecosistemas y su diversidad en todos los niveles (dentro y fuera de las áreas protegidas).
- 6 Controlar especies introducidas que pueden afectar la supervivencia de *C. yucatanicus*
- 7 Impulsar programas de turismo de naturaleza en las comunidades, enfocados a la observación de aves y el senderismo.

Amenazas



Recomendaciones para la conservación



Appendix 6A. Presentation of results in the PhD thesis titled "Estado de conservación de *Campylorhynchus yucatanicus* (Aves: Troglodytidae): distribución y relación de su diversidad genética con la fragmentación del habitat".



Appendix 6B. PhD degree (above) obtained and document certifying the honorable mention (down) for the results in the research about conservation of *C. yucatanicus*.





ECOSUR

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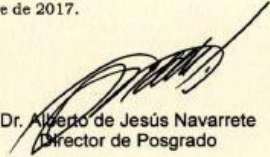
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Anay Serrano Rodríguez

por haberse distinguido en la obtención del grado de Doctorado en Ciencias en Ecología y Desarrollo Sustentable

Generación 2014-2017

San Cristóbal de Las Casas a 18 de diciembre de 2017.



Dr. Alberto de Jesús Navarrete
Director de Posgrado