Final Project Evaluation Report

Your Details	
Full Name	Emerenciano Rivera Rivera
Project Title	Non-traditional conservation schemes to protect pine-oak forests and habitats for endangered migratory and resident bird species in Chiapas Mexico
Application ID	24852-1
Grant Amount	£4925
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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
To assess golden-cheeked warbler and all flock member species responses (i.e., abundance and density,) to variation in forest stand structure and composition under different management schemes				For two winter sessions we carried out several field surveys in the five study sites to collect data. The information is now being processed and analysed to publish peer-reviewed articles aiming to divulge the current trends on golden-cheeked warbler occupancy and density within the entire study area. In this study, we were able to identify forest plots where the focal species and associated mixed flocks are more abundant and prefer to occupy throughout the winter season. Twenty-five flocks were located and followed in the five study sites to identify the occurrence of focal species as well as of other migrant and resident species that winters in the study sites. Mixed flocks occupy a range of environmental conditions, but they are more abundant and associated with forest stands where density of oak tree species is higher. Private protected areas are a significative component of wintering sites for both flock members and the focal species. In particular, the density of the focal species tends to be higher in private protected areas whereas abundance is lower in areas where density of oak tree species is lower. The focal species abundance is lower outside protected areas because disturbance (decreasing tree density and between patch distances) reduces the number of flocks and therefore occurrence of golden-cheeked warblers. It is possible that further work on mixed flock distribution and abundance across the study area could increase our knowledge of the

				focal species distribution in the Mesoamerican region.
To describe responses of the golden-cheeked warbler and other flock member species to variable degree of connectivity at the landscape scale				This component is being processed as GIS related information were obtained in collaboration with the local partner organisation, Pronatura Sur. One outcome from field surveys shows that mixed flock size (number of individuals) tends to be larger when tree density is lower (in disturbed areas), whereas flock size is smaller in areas where oaks reach higher densities. Although flock size is larger in disturbed areas, the number of flocks is lower compared to sites where forest patches are continuous. A minimum size of 100 ha is necessary to contain five flocks, as they occupy a territory area of 3 ha but needs to be separated by at least 1000 m in linear distance. Thus, territoriality between flocks and a minimum forest patch size requirement to flocks' occurrence were observed during the field surveys.
To identify the management scheme that best satisfy habitat requirements (e.g., roosting, food provisioning, nesting sites) for migratory and resident bird species				There is no significant difference between site abundance regarding the focal species occurrence. An important finding is that private protected areas and community-based managed areas (non-traditional management schemes) equal government-managed protected areas in terms of the focal species occurrence. However, presence of oak tree species within the three areas is perhaps the variable that best determines the occurrence of both, the focal species and mixed flocks.

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

We were able to obtain expected data from the five study sites but tracking radio-tagged birds to estimate home range area was limited in four of the study sites because of security conditions that weren't good enough to move across the entire area. However, tracking data at one study site (a private protected area) gave us information to describe the home range needed for golden-cheeked warbler individuals to fulfil their space requirements. Given that not all transmitters were assigned to the focal species of this study because of its low density, I decided to

track other flock members and use the information to complement our main results. This was useful to identify movement patters at local and landscape scales of some flock members that co-occur with the focal species. Thus, information may be used to propose conservation strategies for a group of species that share a patch of forest rather than just focusing on one species.

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

a) Identification of wintering grounds for the focal species as well as other migratory and resident bird species (members of mixed species flocks), including their estimates of density and occupancy in the five study sites. This also includes the occurrence of mixed flocks and its relationship with environmental variables (vegetation structure and composition and patch size) in a range of conditions (from disturbed to preserved habitat) and in different management schemes.

b) Radio-tagging of migratory birds, including the focal species to estimate winter home range in terms of foraging, roosting and overall occupancy in pine-oak forest woodlands. This is the first time an individual golden-cheeked warbler has been attached with a radio-transmitter in its wintering grounds. An important result is that focal species occupy forest patches on a daily basis and join flocks once they move across the species territory. This result highlights how site management strategies may be helpful to avoid any disturbance that may reduce habitat availability for the focal species. Attaching other flock members that co-occur with the focal species also allowed us to delineate shared habitat between the flock members as well as to estimate the minimum patch area (2 ha) necessary for the occurrence of a flock, while at the landscape scale we estimated how many flocks can be accommodated (or naturally occur) within a landscape.

c) We found that occupancy rates were higher in private and community-based protected areas (Moxviquil, Coapilla and Huitepec sites) where density of oaks seems to be an important winter habitat component for the golden-cheeked warbler and other flock members. This may prompt us to address more research in these areas as an increasing knowledge is relevant to halt decreasing trends on population size for the focal species. In the case of flocks, their size was bigger (more than 50 individuals of different species) but species richness was lower in disturbed (open) areas whereas in protected areas, flock size was lower and species richness was higher. Golden-cheeked warbler density was also higher in protected areas but it also occurred in disturbed sites that may require legal protection on the long term. However, this could depend on stakeholder's willingness and liaison work with several actors.

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

Given that local partner organisations such as Pronatura Sur are involved in this project as the focal study species is of a conservation concern for them, most of the

information collected during this work will be used to improve management strategies on habitat planning for mixed flocks and the golden-cheeked warbler. Planning strategies included workshops with local stakeholders (land owners), in order to detail participatory actions such as reforestation of degraded areas (e.g., secondary forests plots within previously burnt areas and within sites under forest management) as well as actions on wildlife monitoring, and educational activities with young people.

I hosted in addition some talks with graduate students at a local research centre (El Colegio de la Frontera Sur) to present my work and establish collaboration opportunities with students interested in avian conservation.

5. Are there any plans to continue this work?

Now that we have identified additional sites were the focal species occurs it is mandatory to continue monitoring activities in the short and long term. A step forward is to strengthen collaboration opportunities with stakeholders as they maintain relevant areas with high biodiversity. Basic research is needed to identify regional occurrence of the focal species and to increase our knowledge on the spatial distribution using modern technology such as GPS trackers which are being developed for species with smaller sizes.

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

All processed information is now being shared with local partners as this was an initial agreement, while peer-reviewed papers and a PhD dissertation are being written to publish them in the next few months.

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

The grant was used for two fieldwork seasons (2018-19, 2019-2020) as the project was extended due to university regulations involving an animal care protocol necessary to perform fieldwork. The fieldwork dates were adjusted to fulfil protocol regulations such as necessary training and health certifications.

8. Budget: 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. It is important that you retain the management accounts and all paid invoices relating to the project for at least 2 years as these may be required for inspection at our discretion.

Item	Budgeted Amount	Actual Amount	Difference	Comments
Accommodation in Coapilla and	189	189		

Montebello sites/four				
Alimentation for 3 persons/per 24 days/for two round trips to Coapilla and Montebello sites	472	472		
Gasoline for two round trips to Coapilla and Montebello	64	64		
Subsistence payment to field technician/payment for two	600	600		
Digital camera with 300mm lens	400	400		
Garmin eTrex ® 10 GPS	88	88		
Fiberglass 50m tape (1	28	28		
Mist nets (10) Avinet®	738		-738	Local partner organisation provided mist nets, and this allowed us to use the budgeted amount to buy more transmitters
Flagging tape (2)	5		-5	
Avian Nano-tag transmitters (10), Y antenna (1) and Receiver (1) Lotek®	2000	4049	+738	
Binoculars Nikon ®Monarch 7 8x42	341	250	+91	Cheaper but good quality binoculars were bought, and the remainder was used to complement costs on additional transmitters
TOTAL	**4925**	**6140**	**+1215**	Exhange rate: January 2018; 1 GBP=25.4 mexican pesos
Additional funding from the Neotropical Bird Club (1,500 USD)		1220	+1220	Additional funding was used to buy more transmitters

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

- GIS-based information on focal species presence-absence and spatial occurrence along with vegetation and landscape associations needs to be analysed through assessment of focal species potential distribution to increase information on regional occurrence.
- Monitoring activities in community-based conservation areas are necessary to identify trends on species occurrence. This may also include equipment provision to train more persons and to keep them involved in conservation activities.
- Local workshops to strength collaboration between NGOs, academic staff and government are also mandatory to improve public policies and restrictive measures to decrease harmful activities such as land clearing.

10. 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, we I used the Rufford Foundation logo in all activities such as workshops, academic talks and I plan to use it later on every publication that may result from this work.

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

Main researcher **Emerenciano Rivera MSc** (PhD student and Project Coordinator): principal manager in the project and responsible for data collection, analysis, facilitation of workshops, delivery talks and preparation of peer-reviewed papers and other publishable materials.

Brian McLaren PhD: academic advice on research objectives dissertation directions but not involved in fieldwork

Eric Hernandez BSc (Pronatura Avian Program Coordinator), involved in some field activities, provided expertise and recommendations on species assessment, field methods and conservation planning.

Pablo Chavarria (field technician, who provided experience, workforce and supported field activities) and who substituted Javier Gomez