

The Rufford Small Grants Foundation

Final Report

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

We ask all grant recipients to complete a Final Report Form that helps us to gauge the success of our grant giving. 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. 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	Fernando Díaz Segovia
Project title	Diademed Sandpiper Plover (<i>Phegornis mitchellii</i>): Conservation and Research of a Rare Andean Shorebird in Central Chile
RSG reference	12537-1
Reporting period	November 2012 - May 2013
Amount of grant	£6000
Your email address	fdiazsegovia@gmail.com
Date of this report	February 8th 2014

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
1. Provide key information on ecology and demography			X	We estimated apparent adult survival for three encounter periods (2010-2011, 2011-2012, and 2012-2013). This was possible because of the moderately high return rates of the 27 adults banded during 2010–2011 (74% were resighted in a subsequent year). Although results advance knowledge of <i>P. Mitchellii</i> demography, they are based on a low sample size and should only be considered as preliminary. Also in order to estimate juvenile survival we must expand our resighting efforts to include areas outside of our primary study area. Other important results related to this objective include: 1) determination of high mate and nest site fidelity, and 2) a more detailed description of the habitat affinities of <i>P. mitchellii</i> (see also Objective 3). Finally, our study benefited a new effort describing <i>P. mitchellii</i> vocalizations.
2. Identify and assess threats, including grazing pressure			X	We identified the main threats (trampling and browsing/grazing from livestock) and we assessed the influence from these factors in the <i>P. mitchellii</i> nesting success during 2012-2013 season (13 nests evaluated). However, in further research we should assess more number of threat factors and nests for significant results.
3. Create a detailed habitat classification that describes habitat affinities			X	An ecological land survey and classification in conjunction with land cover mapping was completed for the Yeso Valley, including the locations of <i>Phegornis</i> pairs and nests. This product will improve the ability of land managers, researchers, and conservationists to evaluate important habitat types and ecological characteristics critical to <i>Phegornis</i> . This GIS project and maps are available from F. Diaz.
4. Develop and implement standardised study methods that can be used in comparative studies			X	We developed and implemented standardised methods on capture and banding, nest and brood monitoring, and a resighting database. These protocols and database structure are available from F. Diaz.

5. Implement citizen science programme and provide training in the collection and management of research data			X	We are very glad and grateful for the over 50 people that were interested in helping and learning about this project allowing a great citizen science programme. Because of their valuable help we were able to accomplish much more than we anticipated. Many volunteers thanked us for the enriching experience and for the great opportunity of learning about this wonderful shorebird and its particular high Andean habitat. Also they were thankful for learning survey, capture, and banding techniques. This training is not widely available, even for university students. (Appendix 1 and 2).
6. Involve landowners in habitat protection decisions		X		Although there has been a meeting with the landowners for the project presentation and they are very interested in the protection of <i>P. mitchellii</i> we still must finally execute some conservation measures that are in process (e.g. signals).

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

One important unforeseen difficulty was the slide of the metal band from the upperpart of the tarsus over the colour band to the underpart of the tarsus remaining under the colour band (i.e. changing the colour band combination). We solved this problem with a new colour band combination system: instead of banding with three colour bands and one metal band on the tarsus we started to band with four colour bands on the tarsus and the metal one on the tibia. For the implementation of this system we recaptured the individuals with the slid bands and changed the combination, as well as we applied the new combination system on the new individuals captured.

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

a) We estimated apparent adult survival for three encounter periods (2010-2011, 2011-2012, 2012-2013 nesting seasons) with no time effect (i.e., constant model) in Program MARK (White and Burnham 1999). Apparent adult survival estimate was moderately high ($\phi = 0.77$, SE = 0.10, 95% confidence intervals = 0.53–0.91, $n = 21$ adults) and comparable to adult survival for small, migratory shorebirds including *Calidris pusilla* and *C. mauri* ($\phi = 0.45$ –0.70; Sandercock 2003¹). The estimated detection probability was also moderately high ($p = 0.87$, SE = 0.11, 95% confidence intervals = 0.48–0.97), which indicates that our resighting effort was adequate. One of the most pressing information needs is to better understand the fate of juveniles. To date, we have resighted only one bird banded

¹Sandercock, B. K. (2003). Estimation of survival rates for wader populations: a review of mark-recapture methods. *BULLETIN-WADER STUDY GROUP*, 100, 163-174.

as a juvenile in an adjacent valley. Do all juveniles depart natal areas in the Yeso, or is there very low juvenile survival? We hope to clarify this during future efforts.

An additional benefit of the banded population of *P. mitchellii* in the Yeso (the only known to occur throughout the species' range), is the ability to track known individuals. For example, Dr Ted Miller, Professor of bioacoustics at Memorial University, Canada, began a multi-year study of *P. mitchellii* vocalisations during the 2013-2014 nesting season. We welcome and will help facilitate all additional researchers interested in studying this imperiled species.

b) In the 2012-2013 season we found 13 nests in total. In the 1 m radius plot (centered on nest) we identified that mean percent cover of livestock trampling and browsing/grazing were 29% and 30%, respectively; there was no road and mine disturbance. In 10 m radius plots, mean percent cover of trampling and coverage browsing/grazing were 46.15% and 47%, respectively; there was no evidence of roads or mining activity. From these data we assessed the influence from anthropogenic factors on the *P. mitchellii* nesting success. Through a *Test of mean's comparison* we determined that browsing/grazing within the 1 m radius plot had a non-significant negative effect (p -value= 0.08) on nest success. In the case of the plots with 10 m of ratio the browsing/grazing variable presented a negative influence (p -value= 0.06) on the presence of second nesting. The size of the sample that we used to the analysis was small ($n=13$) then every results only suggests that livestock has negative effects to the *P. mitchellii* nesting.

c) An ecological land survey and classification in conjunction with land cover mapping was completed for the Yeso Valley. Ecological conditions were sampled within major physiographic units, including riverine, lacustrine, upland alpine (termed "upland"), and wetland alpine (termed "alpine") areas from 2,370–3,550 m above sea level. Data were collected at nearly 1,000 locations, including 900 photo points and 100 ecological plots. All data collection locations were mapped and spatially archived within a GIS. Ecological data (vegetation, soil, water) were used to develop 30 preliminary habitat type classes (Appendix3, Figure 1). We acquired 1 m resolution georeferenced imagery from GeoEye IKONOS for the main Yeso Valley and smaller side valleys. This imagery was recorded during March-April 2007 and had <10% cloud cover. Within the 25 km² study area, 250 vegetated and non-vegetated polygons were digitised and assigned a habitat type designation (Appendix 3, Figure 2).

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

Over 50 people representing a diverse mixture of university students, birding enthusiasts, and the general public responded to our invitations advertised on the Red de Observadores de Chile website (www.redobservadores.cl). Not only were these participants introduced to one of Chile's most iconic bird species, first-hand experience of the breathtaking Andean habitats added to their excitement. Volunteers were given training in survey methods, resighting banded birds, and capturing/banding and then assisted project leaders to accomplish these tasks. Citizen science experiences that both connect participants with nature and provide valuable training are rare in Chile and it was clear that people really enjoyed and appreciated the opportunity. We plan to continue supporting citizen science, which clearly broadened community exposure to and interest in the conservation of *P. mitchellii* as well as helped enable us to more effectively complete our study objectives. It was a win-win experience for everyone.

5. Are there any plans to continue this work?

We hope to conduct this project for several more years and achieve new knowledge and conservation actions for the protection of *P. mitchellii* and its habitat at local as well as international levels. Specifically we hope to achieve the following outcomes during future work:

- a) Continue mark-recapture study to refine estimates of adult survival.
- b) Continue surveying and monitoring the Yeso Valley to determine population trend and identify potential factors regulating population size.
- c) Use remote cameras and data loggers to investigate environmental conditions during winter and whether adults remain in the valley (or migrate).
- d) Create a large-scale predictive habitat (and species) distribution model.
- e) Work with partners to complete a range-wide survey to determine the species' distribution and population size.
- f) Encourage or implement comparative studies at other sites where the species occurs.
- g) Work with partners to complete conservation genetics analyses.
- h) Work with partners to complete a species conservation plan.

We already started the field work of the 2013-2014 season and are excited to collaborate with a graduate student. This way we will generate adequate sample sizes when finalising four seasons of data collection for significant outcomes that can contribute for making better conservation decisions and management. This student will focus on the analyses of population demography and breeding phenology and a preliminary conservation plan for local population in the Yeso Valley.

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

We already presented an advance about the influence of anthropogenic factors on nesting in the Yeso Valley at the 5th Meeting of the Western Hemisphere Shorebird Group on September 2013, and we were invited to show the project in a scientific documentary prepared by the Ornithologists Union of Chile that will be publicly shown during 2014. Also, we will present the advance of the outcomes of the *P. mitchellii* research in the Yeso Valley at the monthly meeting of the NGO Red de Observadores de Aves y Vida Silvestre de Chile (ROC) on April 2014 and the XI Chilean Congress of Ornithology on October 2014. In addition we will prepare an article focused on breeding ecology and habitat use, and apparent survival to be published in scientific journals during 2015.

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

The actual length of the project was during the 2012-2013 breeding season, which finalised in May 2013.

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
Vehicle rental £44 / day x 33	1452	1309	143	This expenditure includes 22 rental days (£967.98) plus one vehicle repair due to

days				an accident in the field (£340.85) during the 2012-2013 breeding season. It does only include 22 days because the other days in the field we used borrowed vehicles from the volunteers.
Vehicle Fuel	268	848	(-) 580	This expenditure was far over the one expected due to the use of more than one vehicle when more volunteers helped in the field.
Food and supplies £13 / day x 33 days x 6 volunteers	429	1695	(-) 1266	This expenditure was far over the one expected because we received more volunteers and we bought some safety supplies to use for crossing a river (i.e. rope, harness, poles, and tools).
Satellite imagery £11 / km ² x 65 km ²	715	700	15	This expenditure was similar to the one expected.
Satellite imagery (Geo-processing)	318	0	318	Acquired imagery was geo-processed.
Salary (A. Contreras) £42.0 / day x 33 days for fieldwork	1386	755	630	The salary expenditure was less than the one expected because some field days were performed through turns between A. Contreras and F. Diaz, and this way we could cover the extra food and vehicle fuel expenses.
Salary (F. Díaz) £42 / day x 33 days for fieldwork	1386	840	546	The salary expenditure was less than the one expected because some field days were performed through turns between A. Contreras and F. Diaz, and this way we could cover the extra food and vehicle fuel expenses.
TOTAL	5954	6148	(-) 194	Since we spent more than we expected we covered this surplus with the extra money that Rufford generously provided (£6000) and from personal funds.

*Local exchange rate: 1 GBP = 733.47CLP

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

The important next steps include: 1) mark additional adults (and juveniles) so they are available for resighting and inclusion in adult survival estimates; 2) continue survey and monitoring efforts to assess changes in territory occupancy and population size (trends); 3) continue the citizen science programme to educate volunteers about field techniques and conservation issues; 4) apply new habitat classification to enable a more detailed understanding of habitat requirements of adults and chicks (see also #8); 5) investigate migratory behaviour of *P. mitchellii* to determine where individuals go during the non-breeding season (do they remain in the Yeso or leave?); 6) increase outreach by sharing results of our work in public presentations and scientific journals, and websites;

7) support collaborative and comparative studies throughout the species' range; 8) work with partners to complete a range-wide survey to determine the species' distribution and population size; and 9) work with partners to complete both local (Yeso) and a range-wide species conservation plans.

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

We used the RSGF logo in the oral presentation for the 5th Meeting of the Western Hemisphere Shorebird Group on September 2013. The name of the presentation was "The influence of anthropogenic factors on nesting of the Diademed Sandpiper Plover (*Phegornis mitchellii*) in the Yeso Valley, Central Andes of Chile", being the principal author Andrea Contreras-Sepúlveda (Appendix4).

11. Any other comments?

First we would like to express our great gratitude to Rufford Small Grants for all the support and trust during the project. Without this help we wouldn't be able to continue this important study of the diademed sandpiper plover. With this funding it was possible to obtain a large knowledge of many aspects of the life history of this species. We hope to continue this study and use the new information for conservation management, with the involvement of the local community, landowners, students and birdwatchers for the creation of important alliances.

Annex 1: Volunteer's Letters

a) Letter N° 1:

Este año 2013 tuve la oportunidad de participar en el proyecto Chorlito cordillerano por el día en Mayo. Fuimos a buscar a estas maravillosas aves en la cordillera de los Andes. Para mí fue bastante difícil encontrarlas en este ecosistema, ya que son relativamente pequeñas y se confunden con el paisaje. Por lo que cuando me enteré de que en verano se iban a hacer campañas de anillamiento inmediatamente me ofrecí como voluntaria. Así que en noviembre se realizó una campaña de anillamiento y tuve la oportunidad de participar. Estuve una semana acampando en la cordillera, específicamente en las Termas del Plomo.

Para mi dormir en carpa no es ningún problema y fue una muy buena experiencia estar en la cordillera tantos días desconectado de todo. La única preocupación era buscar los nidos de los chorlitos y buscar a sus pollitos, tarea que resultó bien difícil por el camuflaje que tienen estos mismos. Todos los días eran un pequeño desafío cruzando ríos heladísimos, caminando con botas y el equipo para buscar a las aves y a eso sumado, en algunos momentos, un calor horrible o un frío que calaba los huesos. Sin embargo esta ha sido una de las mejores experiencias que he tenido en terreno y me alegra mucho haber sido parte del proyecto chorlito cordillerano.

El grupo humano que se formó esos días fue muy entretenido y tuve la oportunidad de aprender otras metodologías que se pueden aplicar en terreno, lo cual fue muy enriquecedor ya que yo soy licenciada en biología marina, sin embargo me gusta trabajar en todos los ecosistemas no solo marinos.

Espero poder continuar ayudando en el proyecto para aportar en el conocimiento de esta misteriosa ave y también aumentar mis conocimientos en flora y fauna de la cordillera.

Quisiera agradecer a todas las personas que hacen que este proyecto siga funcionando en especial a Fernando Díaz y a la ROC por su motivación, constancia y siempre buena disposición a las millones de preguntas que hice.

*Carolina Yáñez
Biólogo Marino*

b) Letter N° 2:

Mi nombre es Paulina Arce, soy Médico veterinario de profesión y siempre me han interesado las aves. En diciembre del 2010 fue mi primera experiencia con chorlito cordillerano, desde esa fecha he asistido a cuatro campañas en tres temporadas reproductivas sucesivas.

Lo que se aprende en estas campañas es muy valioso, tanto para la especie como para las personas que asisten. Por asistir a más campañas me ha tocado participar en todas las actividades que se han realizado, desde el monitoreo de parejas y nidos hasta el anillamiento de pollos, juveniles y adultos.

Por el clima de montaña, es importante manejar y administrar muy bien los tiempos en los que se trabaja en cada actividad, Andrea Contreras y Fernando Díaz son excelentes líderes, transmiten su experiencia y conocimientos de manera cordial y amistosa y nos alientan a seguir y hacer lo que más nos guste.

Mi experiencia como voluntaria ha sido enriquecedora en todos los ámbitos. He aprendido mucho sobre la especie, información que sólo pueden saber las personas que investigan de cerca al chorlito, el tipo de hábitat dónde se puede encontrar, cómo encontrar un nido, cómo monitorear a distancia sin perturbarlos, diferencias de plumajes de los diferentes estadios, entre otros. También me he acercado más al tipo de anillamiento para aves playeras, los diferentes tipos de anillos usados y cómo se nombran y se leen para poder reconocer a un individuo. Por otro lado, he conocido a muchos profesionales y aficionados a las aves, permitiendo el intercambio de ideas, generando nuevas redes y también nuevas amistades.

Estas campañas han sido el mejor voluntariado al que he asistido. Para muchas personas que nos gustan las aves pero no que tenemos las oportunidades suficientes para que nos paguen por ello, este tipo de proyectos nos da la oportunidad de seguir aprendiendo y creciendo. Un detalle no menor, es que no se paga para ir a las salidas y que todos los gastos son cubiertos por el proyecto, por lo que cualquier persona que esté interesada, tenga los recursos necesarios o no, puede asistir y maravillarse con esta hermosa y desconocida especie.

*Paulina Arce Escobar
Médico Veterinario*

c) Letter N° 3:

Tuve la oportunidad de participar en una de las campañas del chorlito cordillerano el pasado verano específicamente en febrero de este año.

La experiencia fue excelente en todo sentido, yo soy bióloga de profesión y en la actualidad realizo un magister en conservación de la naturaleza, por lo cual el terreno para estudiar al chorlito cordillerano revistió de especial interés para mí.

En primer lugar y en términos académicos, poder integrar el grupo de estudio del chorlito significó aprender sobre los ecosistemas de montaña y sus características y fauna asociada. Es un tipo de ecosistema interesante por lo extremo de sus condiciones y además, las

especies de aves que habitan este tipo de ecosistemas tienen también características particulares que las hacen únicas en términos de biodiversidad.

Durante la salida aprendí a conocer e identificar al chorlito cordillerano, conocí su canto, su tipo de nido, los lugares que frecuenta y además pude participar del rastreo de la zona en busca de parejas anidando. Además, tuve la gran oportunidad de colaborar en el anillamiento de un pequeño polluelo de chorlito manejando instrumentos y asistiendo al entrenador con los implementos para llevar a cabo la labor.

También durante la salida pude conocer y observar otras aves del lugar lo cual fue sumamente enriquecedor para conocer la biodiversidad de la zona.

En otros términos, la experiencia fue enriquecedora como persona ya que tuve la oportunidad de conocer a otros profesionales de las ciencias y compartir conocimientos y experiencias personales en distintos ámbitos.

Esta salida a terreno también fue una oportunidad para aprender sobre las exigencias que presenta un terreno como este en un ecosistema tan extremo: aprendí qué cosas son necesarias para acampar en un clima frío como este, cómo mantener la temperatura corporal, qué ítems son indispensables y cuáles no, pues usualmente he recorrido ecosistemas de bosque a menores altitudes, pero nunca un ecosistema cordillerano.

Agradezco la oportunidad recibida y espero poder seguir asistiendo a este tipo de campañas con el grupo ROC para seguir aprendiendo en la materia y colaborando en la protección de la biodiversidad y fomentando el cuidado por el medioambiente.

Sandra Figueroa

Bióloga

Magister de Áreas Silvestre y Conservación de la Naturaleza (en curso)

Annex 2: Land cover Classification

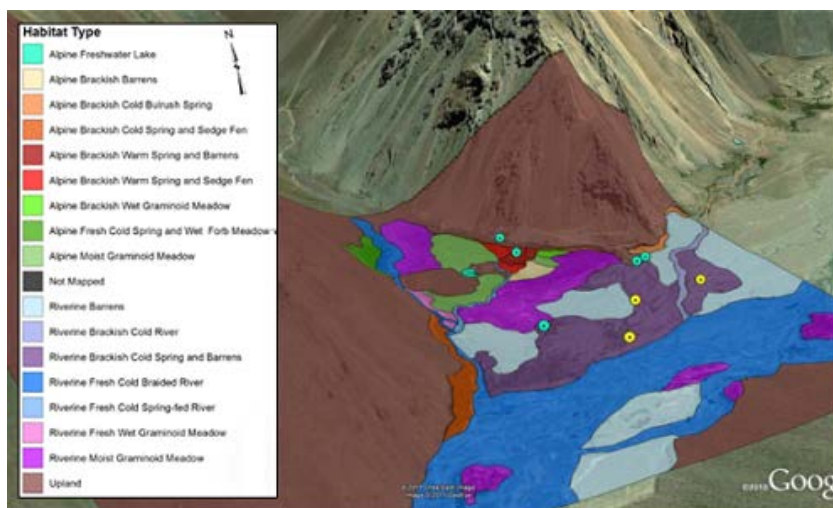


Figure 1. Example of land cover classification and mapping for the lower Yeso Valley, Chile. Blue and yellow dots indicate locations of *Phegornis* pairs and nests, respectively.

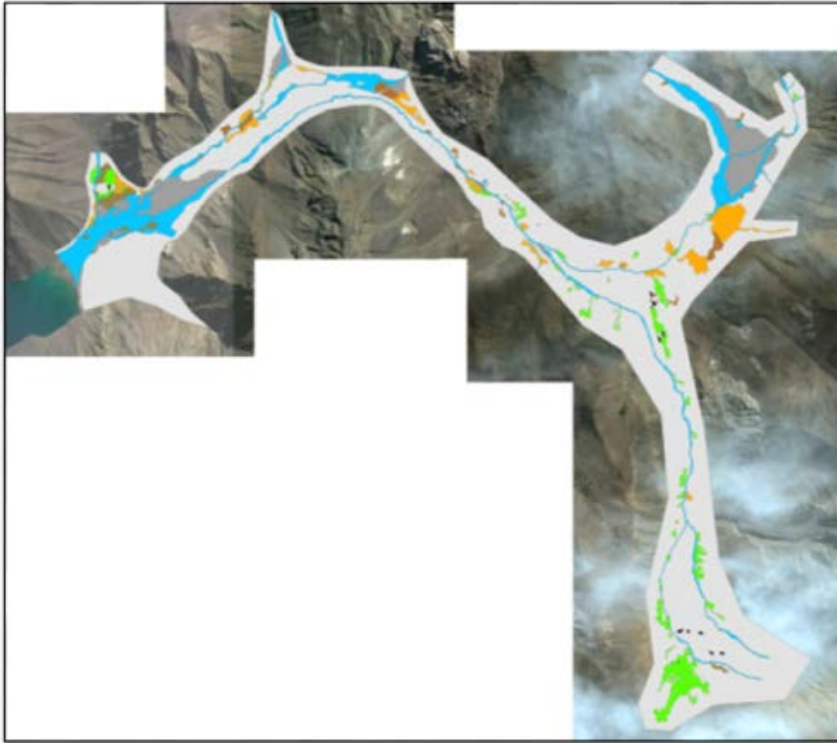


Figure 2. Land cover classification and mapping of the Yeso Valley, Chile. Light gray areas are upland alpine, and colored areas are riverine, lacustrine, or wetland alpine habitat types.

