

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	Dalia Carolina Barragán Barrera
Project title	Studying genetic structure and boat disturbance on individual behaviour of an isolated coastal population of bottlenose dolphins in Bocas del Toro, Panama.
RSG reference	15129-2
Reporting period	
Amount of grant	£6000
Your email address	daliac.barraganbarrera@gmail.com
Date of this report	May 15th 2015

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
Provide public forums for discussion about research activities and engage local stakeholders in management steps.				Several talks and workshops were conducted successfully with local communities.
Determine genetic status of bottlenose dolphins from Bocas del Toro.				In total we have collected 25 samples from different individuals in different localities of Bocas del Toro. Genetic data (using mitochondrial and nuclear markers) show this population is isolated from others in the Caribbean, and there are few migrants from Bocas del Toro (Panama) to Gandoca-Manzanillo (Costa Rica) but not in the other direction. It is possible these two populations are connected and could comprise one genetic stock, but more samples are needed from intermediate areas between Panama and Costa Rica as well as from individuals in Gandoca-Manzanillo to test this hypothesis.
Quantify the energetic costs of tour boat disturbance by studying individual activity budgets and physiological data to further our understanding of how boat traffic impacts individual animals.				We conducted 31 surveys to follow dolphins in Dolphin Bay and surrounding areas to measure the effect of dolphin-watching boats on individual dolphin activity patterns. 74.9 hours of behavioural data were collected from a total of 79 focal animals. We found that tour boats significantly

				affect transitions in dolphin behavioural states, activity budgets and impact the foraging activity of females with dependent calves.
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2. Please explain any unforeseen difficulties that arose during the project and how these were tackled (if relevant).

We encountered several problems in the field while collecting data. First, due to the stormy weather conditions in July 2014 we were not able to go to the field as frequently as we had planned. For the same reasons, individual behavioural data collection was low in July, as the weather made it even more difficult to recognise individual animals in the field. On the other hand, we only could collect a few tissue samples due to some unforeseen issues that arose with the bodies and tails of the darts. Probably as a result of cumulative salt water and photo damage, all darts deteriorated in the field simultaneously. As we were in the field, we were not able to get new darts on time to collect more biopsy samples. To avoid this problem from recurring in the future, we plan to purchase extra darts to store for emergency situations while in the field. Consequently, we conducted extra community outreach activities during days we were not able to go into the field.

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

a) Community outreach. We successfully organised a well-attended stakeholder forum to discuss results of this study and to develop strategies for dolphin conservation and sustainable dolphin-watching tourism. The participants included specialists, biologists, legal agencies, tourists, expatriates and local tourism business representatives and tour boat operators. We also implemented, successful outreach activities with local communities and tourists to demonstrate the results of this study and the importance of dolphin conservation in Bocas del Toro.

b) Presentation of genetic results at the 2015 Annual Meeting of the Scientific Committee of the International Whaling Commission (IWC) (19th May – 3rd June 2014) and publication of these results in the Annual report of the International Whaling Commission. Genetic results confirm the high isolation level of this population from others in the Caribbean, and they show the importance of conducting genetic analyses in adjacent areas such as Costa Rica to confirm that there is no connection between populations of bottlenose dolphins from both areas. We are going to present these results during the IWC meeting in an effort to convince them to provide stronger recommendations to the Panamanian government for bottlenose dolphin conservation in Bocas del Toro.

c) We assessed the effect of multiple boats on the individual activity budgets of focal dolphins using Markov chain analyses. Our results show that tour boats significantly affect transitions in dolphin behavioural states, activity budgets and impact the foraging activity of

females with dependent calves in Dolphin Bay. Because this area may be an important calving and nursery ground, these are important outcomes for conservation. These results provide more evidence needed for local authorities to begin strict regulation of the number of boats interacting with dolphins, and thus help protect this dolphin population into the future. We are also going to present a short report during the IWC meeting in an effort to convince them to provide stronger recommendations to the Panamanian government for bottlenose dolphin conservation in Bocas del Toro.

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

The local communities depend on dolphin-watching tourism, which is the most important source of income in the region. For this reason, their participation in our project is essential for bottlenose dolphin conservation in Bocas del Toro. We conducted many activities with the local community and tourists in which we presented our preliminary results in order to raise awareness about the impacts of dolphin-watching activities. Outreach activities included our participation in the "Open House" at the Smithsonian Institute, visits to various local schools like "Buena Esperanza", and organisation of an open forum to discuss the status of dolphin-watching activities in the archipelago with area stakeholders. This particular forum had a positive outcome, since many boat operators are also concerned about the tour boat situation in Dolphin Bay, and some of them are willing to conduct best practices to when taking tourists to view dolphins. In particular, the forum was a positive approach with the community, because it revealed to us that there are a number of local boat operators who are interested in cooperating with our project to improve the dolphin watching industry practices in Bocas del Toro, primarily because they themselves are aware that it is becoming increasingly difficult to find dolphins in the archipelago.

5. Are there any plans to continue this work?

Yes. Our long-term goal is convincing the IUCN to change the categorisation for this population of bottlenose dolphins from "Least Concern" to "Endangered". For this reason, it is necessary to conduct a long-term monitoring programme in order to obtain data that demonstrates vulnerability of this population. To date, we have established a monitoring programme involving not only the local community but also local researchers, but our future plan includes the creation of a group of dedicated and responsible locals who can upload the data directly from Bocas del Toro autonomously. For this, training activities will be conducted within the next few years. In addition, we want to continue working with schools in order to incorporate dolphin conservation into their educational curriculums.

Simultaneously, it is necessary to gather genetic information from neighbouring populations of bottlenose dolphins in order to confirm if the Bocas del Toro population is in fact completely isolated from others in the Caribbean or if there is some degree of gene flow. Although we have collaborated with Valentina Islas and Susana Caballero, who have provided us with genetic information of other populations of bottlenose dolphins in the

Caribbean, there still is a gap of information in Central America. By now, because our results show that only a few individuals from Bocas del Toro migrate to Gandoca-Manzanillo (Costa Rica), it is very important to start genetic studies there and in intermediate areas (e.g. Changuinola) in order to determine if these both populations are connected and comprise a management unit differentiated from others in the Caribbean. We also need more ecological and population data from dolphins that demonstrate their vulnerability to human activities.

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

Our main interest is involving the local community in a participatory research action plan. For this reason, we created a press release in the local newspaper as well as several posts on our social media outlets (Facebook and Twitter). We also posted a short catalogue with the most recognisable dolphins on Facebook in order for local people and tourists to begin helping us to identify these animals when we are not in the field. On the other hand, we are also preparing two manuscripts to be published in peer reviews scientific journals. Additionally, we are preparing two reports for consideration into the scientific committee of the International Whaling Commission in San Diego, CA during 2015.

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 funds from RSG were expected to be used during one field collection in a period of a year (during 12 weeks in 2014). Due to higher than anticipated expenses in the field, we had to shorten our field season to 10 weeks.

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
Flight from Colombia - Panama (roundtrip – one person).	359	406,344	47,344	This value describes airplane tickets for one researcher in her visit to the study area. The differences in the values are due to changes in prices of air tickets. RSG spent = £406,344
Flight from USA-Panama (roundtrip-one person). Flight from USA-Costa Rica (roundtrip-one person)	1196	430,85 + 141,25 = 572,1	623,9	This value describes airplane tickets for two researchers in their visit to the study area. The differences in the values are due to changes in prices of air tickets.

				RSG spent = £572,1
In-country air travel (Panama-Bocas del Toro, roundtrip– two people). Transportation from Costa Rica to Bocas del Toro (one person).	359	357,2 71,92 429,12	+ = 70,12	This value describes airplane tickets for two researchers in their visit to the study area. The other researcher came by bus from Costa Rica. The differences in the values are due to changes in prices of air tickets. RSG spent = £429,12
Weekly transport to STRI in Bocas del Toro (three people by one month and one person by three months).	179	116,63	62,37	This value describes daily transportation from Smithsonian Institute to downtown (roundtrip) in Bocas del Toro. RSG spent = £116,63
Lodging at Bocas del Toro.	2171	3533,42	1362,42	This value describes accommodation for the researchers during 31 days. The differences in the values are because we save money in a cheaper accommodation in downtown for one researcher. RSG spent = £1356,38
Meals.	910	700,41	209,59	This value describes food expenses for the researchers. The differences in the values are because we save money cooking in the field. RSG spent = £700,41
Boat operator	1005	929,26	75,74	This value describes the payment of boat operator during the fieldtrip. The differences in the values are because we worked in the field by 41 days. RSG spent = £929,26
Research boat and gasoline.	3446	1613,35	1832,65	In this item we include boat and gasoline because we did one payment to STRI for all. The differences in the values

				<p>are because we worked in the field for 41 days and also because we save money using cheaper and smaller boats.</p> <p>RSG spent = £513,56</p>
STRI Admin and Bench fee (three people).	407	690,31	283,31	<p>This value describes the Smithsonian (STRI) registration fee. The differences in the values are because STRI rates increased.</p> <p>RSG spent = £690,31</p>
Travel Insurance (three people).	538	63,38	474,62	<p>This value describes the travel insurance for the researchers and the boat operator. We only paid for two researchers and the boat operator, because one researcher had the travel insurance. STRI provide us a cheaper insurance because we were going to stay in the station by more than 30 days.</p> <p>RSG spent = £ 63,38</p>
Research permits	96	96	0	<p>This value describes the fee of permits for research. We did not pay this with the Rufford grant.</p> <p>RSG spent = £ 0</p>
GPS Navigator	120	120	0	<p>These values describe the equipment we used during fieldtrips. We did not pay this with the Rufford grant.</p> <p>RSG spent = £ 0</p>
Binoculars w/ Range Finder	90	90	0	
Digital Camera with Zoom Lens 75-300mm	1496	1496	0	
DNA extraction	250	194,38	55,62	<p>This value describes DNA extraction kit.</p> <p>RSG spent = £194,38</p>
PCR (including sequencing expenses)	250	206,12	43,88	<p>This value describes laboratory material such as gloves, PCR tubes and tips used to prepare PCR mix. In</p>

				addition, we include sequencing expenses which was paid with the Rufford grant. PCR materials did not pay with the Rufford grant. RSG spent = £ 35,69
Microsatellites	1500	1500	0	This value describes the cost of each microsatellite marking and material required to read them. We did not pay this with the 2 nd Rufford grant. RSG spent = £ 0
Total	14372	12756,824	5141,564	RSG spent = £ 6007,564

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

Currently, we have important results to be considered when making decisions for dolphin conservation in Bocas del Toro. However, our results demonstrate the high vulnerability of these animals to disease-related morbidity or mortality, anthropogenic activities and climate change. Because these dolphins are genetically isolated, it is necessary to conduct genetic analyses in the Major Histocompatibility Complex in order to establish if the animals have an immune system which may respond to diseases. The results to be obtained from these analyses could be decisive in protecting this population of bottlenose dolphins. On the other hand, it is necessary to get more samples from adjacent areas between Bocas del Toro and Gandoca-Manzanillo (Costa Rica) in order to establish the real genetic status of these both populations in the Caribbean.

In addition, it is paramount that we continue with the long-term monitoring programme, as well as involvement of more community members in the data collection process. It is also important to train more Panamanian students to conduct research in this region to build local scientific capacity. We also aim to maintain our presence in the community by regularly offering talks and workshops to tour operators and schools, in order to contribute to a self-regulated dolphin-watching industry.

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

The RSGF logo was displayed in the materials we presented and distributed during outreach activities with the Bocas del Toro community. In addition, the logo was posted on our webpage, Facebook and Twitter accounts. The logo was also displayed in presentations during the 16th Working Meeting of Experts on Marine Mammals in South America -

SOLAMAC 10th Congress (Cartagena, Colombia). Also, the logo will be displayed in our presentation for The Rufford Foundation Conference Sudamérica, 2015.

Additionally, the RSGF was mentioned in the acknowledgment sections of the paper "Dolphin changes in whistle structure with watercraft activity depends on their behavioural state", published by Shakira Quiñones in collaboration with Laura May-Collado. Also, the RSGF has been mentioned in the reports presented in 2013 and 2014 IWC meetings. Similarly, RSG will be mentioned in the reports that we will present during the 2015 IWC meeting and in the paper discussing our results that we are preparing.

11. Any other comments?

The most important outcomes for conservation of bottlenose dolphins in Bocas del Toro was achieved by the Rufford Small Grants funding. For this reason, we would like to thank the board committee for their invaluable support. With your financial support, you are not only contributing to the conservation of a possibly endangered small dolphin population, but you are also empowering young Latin Americans to pursue their careers in science, and engage in important conservation issues in their countries of origin. Thank you for your continued support.