

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	Natalia Botero Acosta
Project title	Using satellite telemetry to determine the role of escorts joining mother and calf pairs of humpback whales in the Colombian Pacific
RSG reference	18134B
Reporting period	July 2015-April 2017
Amount of grant	£10,000
Your email address	greenheart777@gmail.com
Date of this report	April 24 th , 2017.

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
<p>A. Characterise the duration and stability of the association between cows and escorts in the Gulf of Tribugá during the breeding season.</p>				<p>Originally we intended to complete this goal by implanting tagging devices. In 2015 this was not possible due to unusually long processing times from the tag manufacturer in relation to a transition between models. In 2016 tagging efforts were unsuccessful after the team encountered few target groups (mother, calf and escort) during the time period designated for tagging (August 5th-19th). Additionally, researchers faced severe weather and oceanographic conditions that prevented a successful completion of tagging. Therefore, the association between cows and escorts was examined with photo-ID and behavioural sampling methods.</p>
<p>B. Describe the patterns of spatial distribution of groups with calves of humpback whales in the Gulf of Tribugá.</p>				<p>This goal was less impacted by the difficulties faced in the field. Since each sighting was associated with a series of coordinates, we were able to map the distribution of whales according to group type.</p>
<p>C. Provide estimates on genetic diversity and maternal lineages of humpback whales in the Gulf of Tribugá.</p>				<p>Remote biopsy efforts were only partially successful since several of the plastic darts broke upon deployment. Nonetheless, this methodology was complemented by opportunistic collection of sloughed skin after the execution of surface-active behaviours.</p>

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

While elevated rainfall is a known condition for the Gulf of Tribugá, because of “La Niña” phenomenon we experienced unusually harsh conditions in the field during the 2016 season. On 10 boat trips, navigation had to be suspended because conditions were not favourable to detect or follow groups of whales. Furthermore, during the time that Dr Héctor Guzmán visited the area to deploy tagging devices (August 5th-19th) we only encountered two groups of mother, calf and escort. On one of those cases there was a severe thunderstorm in the area where the whales were, forcing us to go back to shore. The second group was followed by two whale-watching vessels, which prevented us the closely approach necessary to deploy tags. Additionally, some of the darts that we purchased to complete remote biopsy broke after deployment but before retrieval of the tissue sample. Finally, the structure of the habitat, with a narrow continental shelf and deep waters relatively close to the coast, made tagging difficult, as the whales would have a bigger column of water to dive in, which resulted in whales surfacing far away from the boat, making it difficult for our boat captain to quickly and closely approach.

While we had little control over the weather conditions, the structure of the habitat, and the presence of whale watching trips, we tried different adjustments to the distance and power of the rifle, which allowed us to collect more biopsy samples. Considering that we were not going to be able to deploy tags during the 2016 season, the research team decided to examine the topic of the association between cows and escorts using existing data, including photo-identification records, behavioural frequencies. Additionally, spatial distribution data was used to examine presumed differences in patterns of habitat use between group types. While valuable outcomes resulted from these analyses, the research team still plans to deploy tagging devices during the 2017 field season.

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

- A. Photographs of the ventral side of the caudal fin were taken in 2010 and between 2013-2016. Photo-identification comparisons resulted in a catalogue that now includes 540 individuals. While a total of 15 re-sightings (of individuals reported as members of a MCE group) were recorded, there was no evidence of long-term association between cows and escorts. Furthermore, in four cases, individuals classified as escorts were also identified as members of competitive groups, suggesting that males would alternate between these two mating strategies.
- B. According to the analysis of behavioural frequencies, recorded between 2013 and 2016, the association with multiple escorts had a significant impact on the behavioural frequencies of mother-calf pairs. Whales in groups with multiple escorts (McME) spent significantly more time traveling, executing surface-active behaviours, and engaging in social/agonistic conducts when compared to mother-calf (Mc) pairs. Additionally, mother-calf (Mc) pairs spent less time diving and resting when compared to McME groups. This findings are particularly important for the whale-watching operators since

they illustrate how group composition have an effect on behaviour which, in turn, might suggest differential impacts from the approach of tourism vessels.

- C. Spatial distribution analyses indicated no significant differences in depth and distance to the coastline between group types (Mc, McE, McME). Since habitat segregation by mother-calf pairs seems to be the most common scenario for other breeding locations, it seems that the spatial configuration of the Gulf of Tribugá reduces the effectiveness of such behavioural strategy. This finding is extremely relevant in terms of conservation and management for the Gulf of Tribugá, because it illustrates how the structure of the habitat can significantly impact behaviour and habitat use patterns for a migratory species like the humpback whale.

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

The General Community Counsel (Los Riscuales) has always been informed of our scientific research and environmental activities in the area. We met with them on June 30th (2017) to socialise the tagging/remote biopsy methods. They expressed their support for the project. Additionally, in 2017, we met with officials from the Ensenada Utría National Park. This particular meeting was very beneficial since the project tackles one of the research and management priorities for the park. The research team will visit the area during the first week of May to complete a preliminary sampling for an independent project, giving us the opportunity to contact the General Community Council and the park officials to arrange for a meeting where we can share our results. Each member of the board represents a community within the gulf. The ideal situation will be that such talk will be replicated on each of the communities along the Gulf of Tribugá.

5. Are there any plans to continue this work?

Yes. Funds from the Rufford Booster Grants as well as resources from other funding sources allowed us to purchase a total of eight tags. The research team is currently evaluating options for deployment of those tags during the 2017 season. Ultimately, Macuáticos Colombia Foundation is very committed to continuing the monitoring of humpback whales and other aquatic mammals in Colombia. We are particularly interested in complementing traditional methods (behavioural sampling, GIS, and photo-identification) with novel sampling tools including crossbows (for tissue collection) and drones (photogrammetric, behavioural sampling, tissue collection, detection).

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

First we will hold meetings and workshops with the Community General Counsel and the local counsels within each of the communities that make up the Gulf of Tribugá. The research team intends to reach key audiences within local communities including fishermen, whale watching guides, school teachers. Similarly, officials from the Utría National Park will be contacted to share our results, and hopefully this will include efforts to design an environmental education strategy targeting the park's

visitors. The research team plans to submit a report to the International Whaling Commission. Although these reports are not peer-reviewed, we consider them to be very important. More so now that Macuáticos Colombia Foundation is part of a regional collaboration to produce a new abundance estimate of the G stock based on photo-identification data. Each component of the study of the association between cows and escorts (photo-identification, behavioural and GIS data) will be the focus of papers that will be submitted to peer-review journals.

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

Funds were sent to us on July of 2015. As previously mentioned, tagging and remote biopsy efforts were scheduled for the 2015 field season. However, due to an unforeseen increased processing time for the tag orders (due to the transition between models) tagging was postponed for the 2016 season. A total of eight transmitters were delivered to us in May of 2016. Remote biopsy points and darts (10 in total) were also purchased at that time. Tissue collection, through remote biopsy and opportunistic collection of sloughed skin occurred throughout the field season (June 27th-October 14th). Furthermore, between August 5th-19th Dr. Héctor Guzmán visited the area to deploy tags. Unfortunately those efforts were unsuccessful and we are currently evaluating options to deploy tags during the 2017 field season. In this way, the duration of the project, and therefore the use of the funds given to us by Rufford, was considerably longer than what we presumed originally.

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.

Exchange rates are based on conversion from Colombian Pesos (COP) to £ sterling calculated from www.xe.com on April 25th, 2017 (1 £ = 3,725 COP).

Item	Budgeted Amount	Actual Amount	Difference	Comments
Office supplies (water-resistant paper, pens, DSLR camera, Zoom Lenses, UV Filter, Video Camera, Pelican Case).	£329	£329		The only items purchased by the research team within this category were the water resistant pens and papers. Macuáticos Colombia owns all other items and values in the budget reflected 10% of their value.
Satellite Tags	£ 15,000	£14,400	£600	The projected expenditure on tags was originally £15,000

				(£9,000 from Rufford funds) based on an approximate cost of £1,500/tag. The final purchase value was £1,800/tag. Since we were only able to secure £5,000 from other sources, we bought 8 transmitters instead of 10.
Fieldwork (Plane Tickets, Fuel, Boat Rental, Housing, Groceries, Food preparation)	£ 5,550	£ 6,100	£550	Since we had limited success with remote biopsy and could not implant tags, more effort, and funds, were put into boat trips.
Laboratory	£ 1,415	£ 1,745	£ 330	We collected over 70 skin samples we had to invest a bit more on the DNA extraction kits. Other lab costs including sequencing and materials were pretty close to the original budget.

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

While we are excited regarding all the possible research opportunities we think the most important thing is trying to guarantee the funding resources for our long-term monitoring. One of the possibilities being considered is to develop some sort of whale-watching operation. Additionally, we want to strengthen our existing collaborations with civil and environmental authorities, so our results not only remedy the information gaps existing in the scientific literature, but also serve as a tool for conservation and management actions.

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?

Yes. We produced t-shirts for researchers and boat captain to wear during boat surveys. They included the Rufford Foundation Logo. Furthermore, the logo was displayed in all presentations and information given to the Community Counsels and authorities from Utría's National Park. Rufford's contribution to Macuáticos' research was also acknowledged in three pending publications (references included below). Finally, as we include a summary of each research project on our website, Rufford is also named as a contributor, including the logo.

Zapetis, M., Samuelson, M., **Botero-Acosta, N.**, Kuczaj, S. Integrating behavioral research with whale-watching to maximize conservation efforts in the Gulf of Tribugá, Colombia. *International Journal of Comparative Psychology*. In press.

Acevedo, J., Aguayo-Lobo, A., Allen, J., **Botero-Acosta, N.**, Castro, C., Dalla Rosa, L., Denkinger, J., Félix, F., Flórez-González, L., Garita, F., Guzmán, H.M., Haase, B., Kaufman, G., Llano, M., Olavarría, C., Pacheco, A.S., Pastene, L.A., Plana, J., Rasmussen, K., Scheidat, M., Secchi, E., Silva, S., & Stevick, P.T. Migratory connectivity of humpback whales between feeding and breeding grounds in the eastern South Pacific. *Marine Mammal Science*. In press.

Perazio, C.E., Zapetis, M.E., Roberson, D., **Botero-Acosta, N.**, Kuczaj, S. Humpback whale, *Megaptera novaeangliae*, song during the breeding season in Tribugá's Gulf, Colombian Pacific. *Madagascar Conservation & Development*. In press.

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

- A. Dr Héctor Guzmán: Héctor visited the Gulf of Tribugá in August to complete remote biopsy and tagging.
- B. Dr Fernando Félix: Fernando assisted photo-identification comparisons as well as statistical testing for GIS and behavioural data.
- C. Dr Susana Caballero: Susana processed all tissue samples, completing DNA extraction, molecular sexing and sequencing.
- D. Dalia Barragán: Dalia assisted on remote biopsy and behavioural data collection.
- E. Rocío Lancheros: Rocío assisted with monitoring of spatial distribution and behavioural data collection.
- F. Federico Riet: Federico Riet assisted with remote biopsy procedures.
- G. Andrés Cañas: Andrés assisted with photo-identification and behavioural data collection.

12. Any other comments?

Thank you very much for your trust and patience with the difficulties faced in the field!