

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. 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	Courtney Cox
Project title	Effectiveness of new fisheries regulations in Belize of restoring grazer populations and coral reef resilience
RSG reference	7835-1
Reporting period	July 8, 2010 – July 10, 2011
Amount of grant	£6000
Your email address	cecox@unc.edu
Date of this report	July 10, 2011

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
Measure direct effects of fishing ban on herbivorous fish populations		X		Completed 15 of 19 sites due to inclement weather and equipment problems.
Measure indirect effects of fishing ban on coral and macroalgal cover		X		Completed 15 of 19 sites due to inclement weather and equipment problems.
Measure level of herbivorous fish harvesting			X	

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

My schedule was very ambitious considering the amount of area that I wanted to cover in the time I had available. The time we spent conducting surveys was dependent on the amount of funding that I received and that amount did not allow for days to repeat sites in case of problems and complete all of the sites. Inclement weather prevented us from completing three sites. On our first day of the surveys, a storm came in when we were on the water and the boat that we were on capsized. We lost all of our survey equipment, but everyone was safe. Thankfully, the boat owners retrieved most of our equipment and we were able to purchase replacements for the lost items. My team was pretty rattled by this accident, but we persevered and continued with the trip. In addition, dive equipment problems prevented us from completing one additional site. I chose to continue the trip and move on to other sites instead of repeating the uncompleted sites in order to maintain adequate coverage of the entire barrier reef.

In addition, every vendor did not sell fillet during each sampling period. Fishermen did not have scheduled times when they would deliver fish to the markets and their catch depended on the time of year and would change from day to day. Therefore, I was not able to collect fillet from each town during each sampling period. I bought available fillet during my visits to the market and returned on another day if fillet was not available. If fillet was not available during any of my visits, I bought whole fish to use as controls when developing a phylogenetic tree, which will be my main figure showing the genetic relationship between samples. Although I was not able to collect samples from each vendor at each sampling period, I was able to collect enough samples to show that illegal harvesting is occurring in certain markets. My methodology included purchasing fillet and taking a very small sample for DNA analysis. This left me with quite a bit of unused fish and I had to determine ways to use all of the fish that I had bought so not to waste this resource. Solutions to this problem included cooking the fish, eating it and giving it to locals near the hotel where we were staying, giving the fillet to my lab mate's mother who lives in Belize, and giving the fillet to our boat captain and his family.

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

1. I found an increase in herbivorous fish populations on the reef and a decrease of herbivorous fish being sold in markets from 2009 to 2010, which is the goal of the fish ban and is very encouraging. I hope to find the same trend in future years and I hope to see an increase in coral resilience as well.

2. I was able to establish important relationships with local non-profit organizations, tourist companies, and government officials such as the Southern Environmental Association (SEA), The Toledo Institute for Development and Environment (TIDE), Healthy Reefs for Healthy People (Healthy Reefs), the Wildlife Conservation Society (WCS), Belize Fisheries Department, Hol Chan Marine Reserve, and Turneffe Flats Resort. I intend to maintain these relationships and continue to work with these organizations in the next few years.

3. I was able to share my results with the local community through local television stations and newspapers. There was a very good public response to my project. Particularly my findings that fish vendors are selling other species as snapper.

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

SEA, TIDE and Healthy Reefs have been involved with the project planning since the projects' inception. I presented my results to these organisations and they are interested in continuing to work with me and using my results for future conservation planning. In June 2011, I shared my results with the local media and asked the public to donate fillet samples to me for analyse. I received a good response and many Belizeans had been skeptical about fillet and wanted to have the fish that they had purchased analysed. I am in the process of analysing samples and will provide a report identifying the actual species that they purchased to those that donated a sample.

5. Are there any plans to continue this work?

Yes, I plan to continue the reef monitoring for two more years and develop a new project based on my findings from 2009 to 2011 which will study population structure and connectivity of herbivorous fish.

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

I have shared my results with the local media in Belize and have been interviewed on two television stations and a local newspaper. The University of North Carolina at Chapel Hill has also written an article about my work in Endeavours magazine, the campus research magazine. I provided a written report or formal presentation summarising my results to the Belize Fisheries Department, SEA, TIDE, and Healthy Reefs. I plan to publish my findings in a peer-reviewed journal and present my results at the 12th International Coral Reef Symposium. Finally, in collaboration with SEA, TIDE, and Healthy Reefs I plan to hold workshops with fishing communities to provide the results of the study and solicit feedback.

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

The RSG funds were used from June 2010 to June 2011. The project began in May 2009 and will continue through 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
Boat Rental	4291	4291	0	N/A
Food	581	675	94	Cost of meals in restaurants was more than expected
Tank rental and fill	613	1005	392	Cost for tank fills was more than expected
Genetic supplies	515	668	153	Additional reagents used to troubleshoot samples that did not amplify properly
Total	6000	6639	639	

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

I feel that it is important to continue to survey my sites in the next few years to document the change in herbivore density, coral cover, and fish assemblage over time. In addition, it is important to characterise the population structure and connectivity of herbivores and other key species to better understand the measures that are necessary to conserve these fish populations and the health of the reef.

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?

I used the RSGF logo on presentations given to organisations in Belize and at UNC. RSGF was recognised as the funding source in newspaper and television interviews in Belize as well as a magazine article at UNC.

11. Any other comments?

I am very excited about the work that I am doing and I hope to continue to make a positive contribution to the reef conservation effort in Belize.