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	Tracking the Effectiveness of a Fishing Ban in Belize
RSG reference	10711-2
Reporting period	March 26th 2012 – January 18th 2013
Amount of grant	£6000
Your email address	cecox@unc.edu
Date of this report	January 18th 2013

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 16 of 16 sites.
Measure indirect effects of fishing ban on coral and macroalgal cover			X	Completed 16 of 16 sites.

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

Since this was my third summer managing this research trip, I did not experience many unforeseen difficulties. I was prepared for the difficulties that were unavoidable. We experienced bad weather, which delayed our fieldwork. I scheduled an extra day in case of inclement weather; therefore, we were able to complete surveys at all sites despite the weather. In addition, we were not able to fill SCUBA tanks at one of the planned sites because the compressor was broken. I was able to locate a resort at a neighbouring island with a compressor and they were able to fill our tanks.

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

1. Preliminary data analysis suggests no *general* increase in herbivore biomass over time. However, herbivore density has increased at 13 out of 16 sites. The observed increases in density were only detected in small and medium sizes classes (0-30 cm).

2. I found a slight decrease in benthic macroalgae cover from 2009 to 2012 at 10 of 15 sites. However, I have not yet detected a general increase in coral recruitment or coral cover.

3. I performed non-metric multidimensional scaling (NMS) ordinations to detect the difference and trajectory of community structure (size class and species) between 2009 and 2012. The size class structure and species composition of parrotfish and surgeonfish was significantly different between years. Striped parrotfish (*Scarus iseri*), princess parrotfish (*Scarus taeniopterus*), and stoplight parrotfish (*Sparisoma viride*) are driving the shift in species composition. The small (0-10 cm) and medium (11-30 cm) size classes are driving the shift in size class structure. An increase in medium size (mature) females is potentially a result of reduced fishing pressure. An increase in mature females would explain the increase in juveniles assuming that these populations are self-sustaining. Alternatively, if the juveniles are not locally retained, the observed increase could be a result of regional scale variability in population structure.

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

I was able to meet with my contacts at the Southern Environmental Association (SEA), The Toledo Institute for Development and Environment (TIDE), Healthy Reefs for Healthy People (Healthy Reefs), Belize Fisheries Department, and Turneffe Flats Resort to share my results and future plans. I intend to maintain these relationships and continue to work with these organisations in the next few years. SEA, TIDE and Healthy Reefs have been involved with the project planning since the projects'

inception. They are interested in continuing to work with me and using my results for future conservation planning.

5. Are there any plans to continue this work?

Yes, I plan to continue the reef monitoring for the foreseeable future and develop a new project based on my findings from 2009 to 2012, which will study population structure and connectivity of herbivorous fish.

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

My work funded by my first Rufford grant, which assessed the level of parrotfish harvesting in Belize through molecular analysis of fish fillets, was published in Conservation Letters in September 2012 (Cox et al. 2012). I plan to publish my findings from the reef surveys (2009 – 2012) in a peer-reviewed journal. I will provide a written report or formal presentation summarising my results to the Belize Fisheries Department, SEA, TIDE, and Healthy Reefs. I presented results that included data collected under this grant at the Western Society of Naturalists Annual Conference in November 2012. I plan to present the data at the Benthic Ecology meeting in March 2013. 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.

Cox, C.E., C.D. Jones, J.P. Wares, K.D. Castillo, M.D. McField, and J.F. Bruno. 2012. Genetic testing reveals some mislabelling but general compliance with a ban on herbivorous fish harvesting in Belize. Conservation Letters. DOI: 10.1111/j.1755-263X.2012.00286.x

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 May 2012 to June 2012. 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	4640	4640	0	N/A
Food	902	960	58	Cost of meals in restaurants was more than expected
Tank rental	360	360	0	N/A
Tank Fill	98	147	49	Cost for tank fills was more than expected
Total	6000	**6107**	107	

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 an undergraduate Marine Ecology course at UNC and at an ecological conference in California. RSGF was recognised as the funding source in a presentation given at the Western Society of Naturalists Annual Conference in November 2012 and in my paper published in Conservation Letters (Cox et al. 2012).

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.