

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	Genetic Structure of Stoplight Parrotfish across the Mesoamerican Barrier Reef
RSG reference	13318-B
Reporting period	April 12, 2013 – April 12, 2014
Amount of grant	£12,000
Your email address	cecox@unc.edu
Date of this report	May 12th 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
Measure direct effects of fishing ban on herbivorous fish populations		X		Completed 15 of 16 sites.
Measure indirect effects of fishing ban on coral and macroalgal cover		X		Completed 15 of 16 sites.
Collect fin clips at 10 sites along the Mesoamerican Barrier Reef			X	Collected fin clips from six sites in Belize and four sites in Honduras
Develop microsattellites for <i>Sparisoma viride</i>			X	Developed 10 microsattelite markers

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

We experienced bad weather, which delayed our monitoring fieldwork by 3 days and forced us to miss one site. We were not able to secure permits in Mexico to collect fin clips. I am aware now that permitting in Mexico requires at least a year and will submit permit applications a year in advance for future work in Mexico. Although we were not able to collect fin clips in Mexico, we were able to collect samples from 10 sites as proposed. We will be able to assess connectivity between parrotfish populations in Honduras and Belize.

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

1. Over the 5-year monitoring period, parrotfish density increased for the large size class (21-50 cm) of the most targeted parrotfish species (*Sparisoma viride*) as well as smaller class sizes of three other parrotfish species that are susceptible to fish traps.

2. I have not yet detected a general decrease in macroalgal cover or increase in coral recruitment or coral cover.

3. Linear mixed effects models revealed that each year following implementation of the harvesting ban had a positive effect on total parrotfish density ($p < 0.02$ for each year) and a positive effect on parrotfish biomass in 2013. Wave exposure had a negative effect on both parrotfish density and biomass, human population density and macroalgal cover had a weak negative effect on parrotfish biomass, and predator biomass had a weak positive effect on parrotfish biomass (Fig. 2, $p < 0.001$, $p = 0.04$, $p = 0.04$, and $p = 0.02$, respectively). Parrotfish density increased at 12 out of 16 sites, but protection status had no effect on parrotfish density or biomass.

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

I was able to meet with existing and new contacts including the Southern Environmental Association (SEA), The Toledo Institute for Development and Environment (TIDE), Healthy Reefs for Healthy People (Healthy Reefs), the Roatan Marine Park, the Bay Islands Conservation Association, Utila Centre for Marine Ecology, University of Belize, and the Belize Fisheries Department 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. These organisations are interested in continuing to work with me and using my results for future conservation planning. I worked closely with the Utila Centre for Marine Ecology and the Smithsonian Institute to develop the microsatellite markers. I plan to present the monitoring work and more importantly the genetic work to the University of Belize and engage them in the upcoming analysis using microsatellite markers to assess larval connectivity.

5. Are there any plans to continue this work?

Yes, I plan to continue the reef monitoring for the foreseeable future and use the microsatellite markers to assess population structure and connectivity of herbivorous fishes.

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

I plan to submit papers assessing parrotfish population recovery and its impact on the benthic community structure over the 5-year monitoring period to Ecological Applications and Coral Reefs in June 2014. I will provide a written report or formal presentation summarising my results to the Belize Fisheries Department, Roatan Marine Park, Utila Centre for Marine Ecology, the Bay Islands Conservation Association, University of Belize, SEA, TIDE, and Healthy Reefs. I will present my results at the International Marine Conservation Conference in August 2014. 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 May 2013 to April 2014. The project began in May 2009 and will continue through 2015.

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	2233	2233	0	N/A
Airfare	2400	2400	0	N/A
Tank rental	748	748	0	N/A
Tank Fill	288	412	124	Tank fills were more expensive than anticipated at two fill sites
Hotel	1266	1266	0	N/A
Genetic Supplies	1583	1583	0	N/A

Microsatellite development	3165	3165	0	N/A
Permits	317	317	0	N/A
Total	12000	12000	0	

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

I feel that it is important to continue to monitoring the sites in Belize over the next few years to document the change in herbivore density, coral cover, and fish assemblage over time. I would also like to expand our monitoring to Honduras and Mexico. 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 at three graduate seminars at UNC, an undergraduate course at UNC, and a presentation at the Smithsonian Institute. I recognized RSGF as the funding source of my work to all collaborators. RSGF will be recognized as the funding source in a presentation given at the International Marine Conservation Conference and in my upcoming papers to be published in Ecological Applications and Coral Reefs or comparable journals.

11. Any other comments?

I feel that this work will directly benefit local conservation managers and contribute to their ability to restore this valuable natural resource. I am continually grateful for the opportunity to be involved in conservation in the Caribbean and hope to make this my life long career.