

Project Update: March 2016

- 120+ SCUBA dives (252 herbivorous fish censuses, 200 remote camera placements, and 64 algal tiles installed).
- 11 weeks of catch surveys.
- 100+ questionnaires and in-depth interviews with fishermen:
 - at 21 sites in 8 villages on 4 islands (including 6 locally-managed marine protected areas);
 - over 26 weeks, 8 of which spent living in villages with some of the most generous and welcoming people I've met.

The grant awarded to me by the Rufford Foundation was (and continues to be) a key catalyst to this fieldwork's overachieving success. I cannot be grateful enough for the opportunity it provided to investigate reef-fish herbivory and spearfishing across so many villages, islands, and weeks. Because of the 6-month duration, geographic spread, and collaborative projects, the dataset provided is certainly one-of-a-kind.

We have integrated with the University of the South Pacific, Fijian Ministry of Fisheries and Forestry, Wildlife Conservation Society - Fiji, the Fijian Locally-Managed Marine Areas Network, and several independent researchers in-country. This collaboration will be even more important during the analysis and write-up of data.

The next stages will certainly keep me busy over the next few months. Here's a run-down of what I expect to happen over the next few months:

- Investigation of how herbivorous fishes play a role in coral bleaching recovery.

Using GoPros provided by the Rufford Foundation grant, a collaborative researcher will observe changes in herbivore activity and behaviour during coral bleaching that is happening now. This will enable us to infer their role in recovery of corals after the bleaching event.

- Continued laboratory analysis of samples obtained from algal growth tiles.

In different habitats, tiles were placed inside and outside of cages to infer what happens to bare reef space in absence and presence of herbivores, and what that could mean for the resilience of coral reefs. Some of the tiles grew quite a bit of algae and collected more than a little sediment, which is now being processed in the lab at the ZMT in Bremen.

- Analysis of remote camera footage, herbivore census data, and published literature. This is will be written up as a chapter in my M.Sc. thesis and likely evolve into a scientific paper, with a title to the tune of "Functional importance and plasticity of herbivorous fishes in the Fiji Islands." This information will also contribute to a colleague's paper on the effectiveness of Fijian locally-managed marine areas to protect coral reefs.

- Analysis of market survey, questionnaire, fisher interview data, and application of the previous paper's data over areas with different fishing pressure and nutrient input. This will be written up as another chapter in my thesis, and likely another paper "Influence of nutrient input and fishing on coral reef fish herbivory in Fiji."

Towards the end of the analysis and write up, I will be disseminating copies of my thesis to each village (including a more site-specific and personalised summary for each) and collaborating institution/NGOs. Each chapter of the thesis is intended to be published in the scientific literature, open-access if possible, to make information I have learned available to the global scientific and managerial community. Additionally, the Fijian Fisheries Ministry has expressed quite a bit of anticipated interest in my findings, which could be used in their preparation of a new inshore fisheries decree.

I expect to be able to generally discuss trends and findings of the data by mid-June 2016, and fully by August 2016 (when my thesis is due). Finalising papers may take well into next year before they are published. Of course, I will keep you updated as that progresses (including with the final report).

Last month, I submitted an abstract ("Functional plasticity of herbivorous fish function in response to fisheries and water quality in Fiji," attached) for consideration to present at the International Coral Reef Symposium in Honolulu, Hawaii. I am exalted to tell you that it was accepted, and I invited to present at the biggest gathering of influential coral reef scientists in the world during the symposium in June! Unfortunately, my status as a master's student (unlike a PhD) leaves me with few financial options for attending the symposium. My presenting would give invaluable exposure to an under-investigated but pan-tropically applicable issue.

Abstract submission to ICRS 2016

Plasticity of herbivorous fish function in response to fisheries and water quality in Fiji
R.S. McAndrews, S. Bejarano, A.K. Ford, A. Eich, S.C.A. Ferse

Human impacts can interact with ecosystem functions in complex ways, investigation of which necessitates multivariate perspectives. Using underwater visual census and remote cameras, this study identified functionally important herbivorous fishes based on behavioural feeding traits and quantified trait plasticity across different levels of water quality and fishing effort in Fiji. Catch surveys and interviews with fishermen elucidated consistent morphological and aesthetic traits responsible for a fishes' vulnerability to coral reef fisheries throughout the archipelago. Feeding observations illuminated functional plasticity driven by the nature and magnitude of anthropogenic influence where reefs with poor water quality and highest fishing effort exhibited functional niches not occupied by resident herbivore assemblages. Comparing data sets compiled from camera footage and catch surveys provided a novel insight on the impact of fishing and other anthropogenic influences to herbivorous function in the region. Functionally important fishes observed on more pristine reefs were virtually absent from reefs near more heavily fished areas, while some ubiquitous fishes surprisingly occupied narrower functional niches on impacted reefs. High sediment input is likely responsible for niche compression in such areas. The synergy of poor water quality and inshore fisheries' selectivity for key herbivores could lead to undermined reef resilience near densely populated areas.