

## The Rufford Foundation

### Final Report

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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](mailto:jane@rufford.org).

Thank you for your help.

**Josh Cole, Grants Director**

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Grant Recipient Details	
Your name	Manuela Funes
Project title	Fishing impacts on the feeding habits of temperate reef-fishes
RSG reference	20709-1
Reporting period	Final report (15 months)
Amount of grant	£2550
Your email address	manuelafunes@yahoo.com.ar
Date of this report	30 August 2018

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
Sampling at three sites				Campaigns at trawled areas and at artisanal fished areas were successfully performed. Efforts were duplicated and 2 years of analysis, instead of 1, were performed. However, fishing at no-take areas was unsuccessful. Despite conducting two different campaigns in that area, no fish were caught.
Sampling three species				The sand perch and the sea bass were successfully captured at the two sites, in 2 years and from an overlapping size range of more than 50% of total length. Nevertheless, no specimen of the red rocky fish was captured at trawled areas, then, it was removed from the study.
Sampling benthic and pelagic baseline				Pelagic baseline was obtained at all sites; but we were not able to acquire benthic baseline organisms at trawled areas.
Measuring size and weight				Individuals were sized but not weighed at trawled areas, then body-condition comparison was removed from the study.
Community talks				Information on the general ecology and sensibility of the two species was presented at the fishing tournament. Specific questions and other concerns were discussed with the public during one entire afternoon at the event.

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

We experienced one main unforeseen difficulty with several consequences: fishing effort was shifted spatially. As a result, we sampled another fishery; instead of the big "tangoneros" fishery we sampled smaller freezer-vessels fishery. Freezer-vessels fishery take place approximately 200 km north to the non-trawled sample site.

Communities are comparable, except for *Sebastes oculatus*, which is relatively uncommon as a bycatch item of that fishery.

Sampling benthic baseline and the weight of the individuals was not possible at the Freezer-vessel fishery because we had no infrastructure to collect samples by ourselves. Pelagic baseline was obtained at a scientific cruise that sample same sites but a few months later. It was not possible to construct the body-condition index without weight data.

On other hand, one site remained unstudied because no capture was obtained at non-trawled areas.

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

First of all, present study allowed a characterization of the diet of both species at both sites using stable isotope analysis. This constitutes novel baseline information which is an important input for several applied studies, on the main term, on conservation biology.

Although some difficulties (described above) precluded the development of a more complete diagnosis on the state of the reefs fishes at the two areas, we did find trophodynamic differences between environments, and our studies enable the description of at least some basic ones: at trawled areas trophic levels were higher, and isotopic niches were wider and less overlapped, consistently throughout the species and years studied (Table 1, Figure 1). In addition, the sand perch showed their common behaviour of trophic level increase with body development only at non-trawled areas (Figure 2). Trawled environments seem to be offering a slightly different set of prey, were higher trophic values suggest a possible use of discards, being hake (*Merluccius hubbsi*) the main bycatch item. As part of the framework, we conducted a metanalysis assessing trophic level changes induced by bottom trawling activities (Funes et al, in prep.). Our case of study resulted as one of the few examples were theoretical changes on this field are actually measured.

Apart from this, the project sponsored 1 year of the programme that monitors total capture (species composition and size) of the national sport fishing tournament. Such a consistency is important to maintain our presence in the local community of Bahía Camarones, where several other small conservation and social studies are being developed, to fill in the information on the temporal trend, allowing long term studies, and to keep the link with several local authorities, with whom we actively interact giving and receiving help in the marine park.

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

During the fishing tournament, the community was actively involved. Through the events, we accompanied the local authority on the regulation process, we shared meetings with the fisherman, and in the first year we went to the school to meet the students, presented ourselves and our project, and visit their facilities (it is a fishery orientated school with aquariums, processing plant, etc.), and the following year we presented banners on the weighing event. Banners compiled all curious facts about the local biology of the sea bass and the sand perch, willing to strength empathy for

these species. Banners contain information generated by our laboratory and colleagues, which is actual local information. Also, banners reflected the vulnerability of this species of fishes. On that occasion we spend the afternoon discussing with people more questions and concerns regarding the information presented.

Now that all results have been analysed we took the commitment to return to share with them at the school and at the community centre of Bahía Camarones.

## **5. Are there any plans to continue this work?**

We are willing to conduct a compound specific analysis to the same set of samples, to gain a better understanding regarding the main sources on the diet of each population (amino acid  $\delta^{13}\text{C}$  values) and a cross-reference for trophic level (amino acid  $\delta^{15}\text{N}$  values).

In another hand, we are constructing a mixing model with prey values from bibliography and simulations to evaluate the importance of discards in the diet of impacted populations. Trophic web reconstruction and impact modelling are also part of my PhD thesis as well as interviews to trawl captains, compiling folk knowledge about changes on the capture though time. On the interview I assess, among other things, changes in the species composition and abundance of reef fishes at the capture, over the last 30 years.

The programme that has been monitoring the capture of the national fishing tournament will continue. Trends on the relative abundance, size-distribution and species composition are been used as other indicators of the health of the reef.

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

Preliminary results were shared at the "Stable Isotope Summer School<sup>1</sup> 018, Konstanz, Germany" for which I received a grant to attend.

Formal communication was presented as poster in the "11st International Conference on the Applications of Stable Isotope Techniques to Ecological Studies"-Viña del Mar, Chile. For which I also obtained a scholarship to participate. And I also presented at a regional scientific meeting at my research centre ("V Seminario Golfo San Jorge" Puerto Madryn, Argentina).

Scientific article is almost ready to be send to Journal Isotopes in Environmental and Health Studies in September 2018.

Finally, as mentioned before, we are organizing a talk at the school and the community centre of Bahía Camarones.

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<sup>1</sup>[https://www.facebook.com/permalink.php?story\\_fbid=1403050276441409&id=236632783083170](https://www.facebook.com/permalink.php?story_fbid=1403050276441409&id=236632783083170)

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

The grant was executed from May 2017 to July 2018. The schedule presented on the application was initially respected. However, as we were able to duplicate the sampling effort, we got slightly delayed on the second sampling determination process.

**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
Stable isotope determination	1050	1668	-618	This is because we duplicated campaign efforts
Campaign	1500	1000	+500	This was possible given the depreciation of Argentine currency in the past year
Materials	0	250	-250	Laboratory and campaign supplies were needed given the effort was duplicated

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

Apart from the steps I am already executing using all available information (see N°5: compound specific analysis to the samples, literature review to reconstruct the trophic structure and model different impact scenarios & folk knowledge research) It would be important to study other impacts of trawling activity on reef fishes life story, like the shift on size of the maturity length. There are several features apart from diet that appeared to be affected by bottom trawling impacts, and at the freezer vessel fishery is currently growing in the amount of vessels and activity.

In other hand, the previously fished area has recently been closed to fish for shrimp for the next five years (decree CFP N° 7/2018, Federal Fisheries Council). As part of my PhD thesis, we initiated the formalities to have to prospection data in order to assess the ecosystem recovery on that area.

**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, Rufford logo was used several times in my products: in our social media platform when the grant was received<sup>1</sup> and when the second campaign was performed<sup>2</sup>. It was printed on the banners, and was used at the talk of the workshop, at the posters of the international conference and at regional meeting, acknowledged as main subsidy of the study.

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

**Manuela Funes** - Project director. I designed and executed the campaign, performed sampling at non-trawled areas, the laboratory work, analyzed, wrote the products and presented them.

**David Galván** – Helped on the study designed, assisted with fieldwork and revised all products.

**Cristian Marinao** - is the onboard observed that sampled at trawled areas and helped on the discussion and product preparation.

**Leo Venerus** - is the director of the reef monitoring program, which provided background information and helped at the fieldwork at non-trawled areas.

**Oscar Iribarne** - is the reviewer of study design, analysis and products.

**12. Any other comments?**

To clarify, plans were modified because of the spatial shift of the fishery and because of currency depreciation. Spatial sampling was affected by the shift on the fishery while duplicated sampling effort was possible because of currency depreciation.

Table 1: Trophic levels of (SB) and the sand perch (SP) between trawled (T) and non-trawled (NT) environments in 2017 and 2018. Estimates were constructing using meso-zooplankton as baseline organisms and following Post et al. 2002.

	2017	2018
T	4.48	4.17
NT	4.11	3.94
T	4.23	4.27
NT	4.20	4.07

<sup>2</sup><https://www.facebook.com/236632783083170/photos/pcb.1635595396520228/1635594839853617/?type=3&theater>

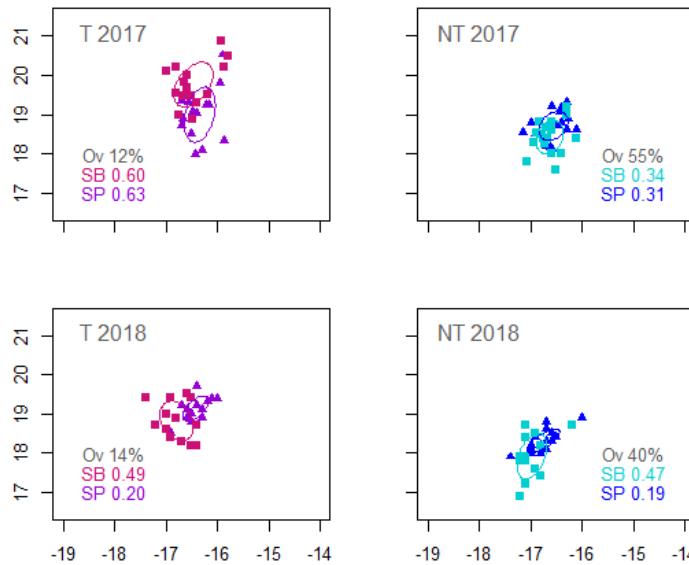


Figure 1: Ellipses areas of the sea bass (SB) and the sand perch (SP) between trawled (T) and non-trawled (NT) environments in 2017 and 2018. Overlap (Ov) between ellipses are expressed as the mean percentage for both ellipses.

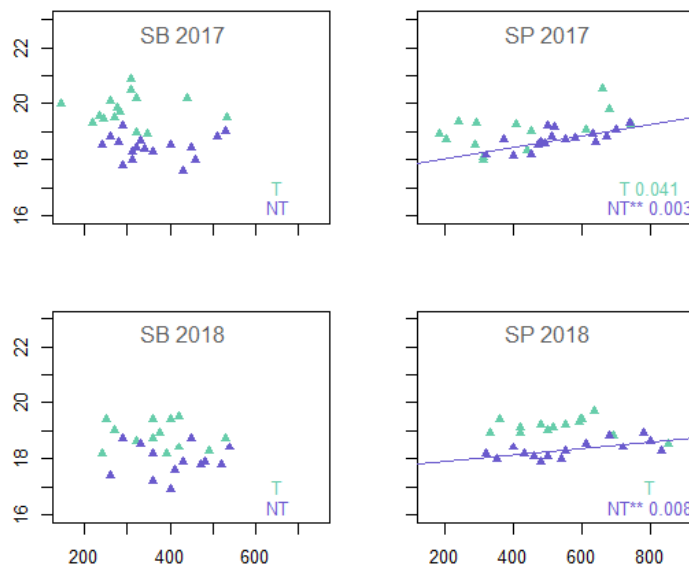


Figure 2:  $\delta^{15}\text{N}$  values vs size (mm) for the sea bass (SB) and the sand perch (SP) between trawled (T) and non-trawled (NT) environments in 2017 and 2018.