The Rufford Foundation
Final Report

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.

Thank you for your help.

Josh Cole, Grants Director

Grant Recipient Details	
Your name	Lauren De Vos
Project title	False Bay on Film: Optimising the effectiveness of biodiversity monitoring and conservation planning using stereo-BRUV technology in False Bay, South Africa.
RSG reference	14932-1
Reporting period	2016
Amount of grant	£6000
Your email address	laurendv01@gmail.com
Date of this report	7 February 2017

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
Use stereo-BRUVs and jump cameras to survey the relative abundance and diversity of invertebrates in False Bay. This will be used as a method-development phase for coastal invertebrate monitoring and will represent the first photographic/film record of benthic animals in False Bay.				This has been successfully achieved. For the first underwater image-based invertebrate survey in False Bay, 400 seafloor photographs along eight transects across False Bay using a jump camera recorded 57 species of benthic, macro-invertebrates in eight phyla. All fieldwork is complete, photographs have been analysed and will form part of Chapter 2 of my PhD. As part of the first underwater video-based fish survey in False Bay, 96 stereo-BRUVs deployments and 264 mono-BRUVs deployments have, to date, recorded 19 species of chondrichthyans and 37 species of teleosts. Fieldwork for both sections is complete. This methods-testing phase of the project also contributed to the South African Underwater Imagery workshop in December 2016. This brought together over 45 BRUVs scientists from around the country to chart a standardised methodology and monitoring plan for the country. A BRUVs and image-based survey working group was formed out of this, and will guide scientific monitoring efforts for South Africa going forward.
Use stereo-BRUVs to survey				This has been successfully

the relative abundance, diversity and size measures of fish in False Bay.				achieved. 96 stereo-BRUVs deployments across False Bay and within the Table Mountain National Park marine protected area successfully recorded size measures for exploited fish species such as *Chrysoblephus laticeps* and species of particular conservation concern such as *Petrus rupestris* (IUCN Redlist Endangered). The relative abundance and diversity of chondrichthyan (shark, ray and skate) species that are seldom recorded as frequently or effectively using other monitoring techniques were also detected. Notable were the *Triakis megalopterus* and *Mustelus mustelus*. This information forms part of Chapter 3 of my PhD which is due for hand-in this year (2017), will be presented at the Southern African Marine Science Symposium (SAMSS) in July 2017 and is part of a scientific publication aimed for submission and publication in 2018. Additionally, training in stereo-BRUVs deployment and analysis was provided for the scientific staff and rangers at South African National Parks board, who currently manage the MPA. Mono and stereo-BRUVs field efficacy could be compared for the sake of long-term monitoring and MPA management in South Africa.
Establish biotopes for False Bay based on invertebrate and ichthyofauna data, and determine the relevance of these				This forms part of Chapter 4 of my PhD, which will also be submitted as a scientific publication by the end of 2017. Its completion was possible as a result of significant

biotopes as a proxy for biodiversity monitoring.				fieldwork and data collection (detailed above) to obtain up-to-date biodiversity information for False Bay. However, its true importance lies hopefully in its eventual contribution to the South African National Biodiversity Assessment for 2018. This is a national-scale scientific assessment of the state of South Africa's ecosystems. Details can be found here: https://www.sanbi.org/nba.
Establish the extent to which fishing activity and anthropogenic pressures on biodiversity correlate with biotopes of conservation importance.				This has been an on-going part of the project, with anecdotal findings from 2014 now being correlated with historical fishing data and a potential new MSc project that will investigate the topic fully. The outcomes of this phase will continue to emerge through 2017. Significant interaction with the concerned public(s) and local conservation champions within the False Bay community on this issue has led to us forming a key working group to engage with the South African government departments (Department of Agriculture, Forestry's and Fisheries) and the National Parks board (SANParks)
Use stereo-BRUVs data in a regional conservation plan to establish management and conservation scenarios for False Bay.				This is a long-term goal, with short-term outcomes expected by the end of 2017 to include as part of a final chapter of my PhD. A workshop led by Professor Hugh Possingham was attended in order to gain proficiency in the latest conservation planning software developments using MARXAN and MARZONE programmes. This, in conjunction with the identification

				of areas of potential biological interest (through the biotopes detailed in point 3) and regions of potential or current conservation conflict (detailed in point 4) forms part of the on-going investigation into MPA efficacy, design and enforcement in the region. The addition of stereo-BRUVs sampled focused on the Table Mountain National Park MPA collected in 2016 now adds data to this section.

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

1. Suitable ocean conditions and safe seafaring weather are always a primary concern during field-based projects. This project consisted of intensive field-based data collection in a temperate, upwelling region that is known for its winter storms with big ocean swell, and its summer onshore winds that can blow up to 40 knots for weeks at a time. While not totally unforeseen, managing time in the field was challenging as a result of particularly difficult ocean conditions in 2015/2016. Repeated red tide events (phytoplankton blooms that cloud the water and reduce visibility for camera deployment) significantly hindered the speed at which data could be collected and required additional sampling days to achieve project goals. This particular challenge was managed by consultation with numerous partners in the region, from dive charters to the National Sea Rescue Institute (NSRI) to obtain the latest reports from the water. In most cases, for the safety of the crew, foul weather days simply had to delay field data collection. This experience can be factored into advice for MPA management and long-term monitoring efforts in the region. Suitable conditions, upper limits for safe working conditions, minimum visibility required for successful camera deployments and recommended seasons for efficient sampling (winter in False Bay) are all factors that have now been tested and compiled into a fieldwork report that can be used to make future monitoring sustainable and efficient.
2. Nationwide student political protests and unrest at universities across South Africa resulted in the total shutdown of several campuses, including the University of Cape Town, during parts of 2015 and in the latter half of 2016. Students and the university managed the unrest. International media covered the scale of these protests and details are available on request. This slowed the progress of data collection. This was a challenge that simply had to be factored in as best as possible, and fieldwork was still completed in a reasonable timeframe.

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

1. The first large-scale deployment of jump camera invertebrate sampling and stereo-BRUVs fish sampling in False Bay, South Africa. The main outcome is an updated underwater camera-monitoring manual aimed at conservation PR actioners that will keep methods in this survey technique standardised across the coastline so that results can be compared and contrasted. This phase of the project effectively trialled novel techniques for non-extractive marine biodiversity monitoring in South Africa. The result is a significant body of work that can now be used as a reference for further development and the rollout of these methods as part of sustainable, long-term monitoring of important marine populations on the South African coast.
2. An updated record of the marine biodiversity of False Bay. Previous surveys were conducted in the 1960s (invertebrates) and 1990s (fish). This project significantly updates records of biodiversity: its diversity, relative abundance and distribution. This is essential to the contemporary management of the marine protected area in False Bay. These visual data records also provides an archive of footage that forms part of a national-scale biodiversity assessment, as well as a repository for public awareness efforts.
3. Public awareness, outreach and engagement with local authorities. Throughout the duration of this project, numerous public talks, magazine articles, newspaper reports and online video inserts, as well as broadcasts on national television on both the national evening news programme and a South African conservation programme have meant that the progress and emerging results of the project were communicated to the public. This resulted in two successful outcomes: conservation management and government departments could see the value of this as a monitoring technique, and the public could buy-in to support the project and its aims. The result is a component of the monitoring manual that focuses on simple ways for conservation practitioners to turn their data into content for public awareness.

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

False Bay is located in a highly urbanised environment in the City of Cape Town, so the involvement of local communities is aimed at various levels, from local residents who are able to lend their support to conservation initiatives and act as conservation champions, to local schools and regions around the Bay that have previously been excluded in city planning and opportunities. This requires an approach that targets various income levels, languages and vastly differing access

to the ocean. Significant involvement in local law enforcement and conservation management has also been important.

1. Training opportunities provided for South African National Parks (SANParks) Table Mountain National Park scientific services and interns. Relevant scientific managers and interns accompanied project leaders in the field to gain BRUVs and jump camera skills, and Lauren provided BRUVs designs, manuals, procurement advice, camera specifications and manufacturing advice to SANParks and to government scientists and interns at the Department of Agriculture, Forestry and Fisheries (DAFF) and the Department of Environmental Affairs (DAFF).
2. Education around reef fish and shark vulnerability and fisheries sustainability to local residents in False Bay through public talks, publications and social media.
3. Inclusion of local residents in discussions looking to create a working group to tackle issues of public awareness of regulations (i.e. MPA boundaries, rules) and support for enforcement of conservation management by the relevant authorities.
4. Scientific findings and conservation planning translated and fed to local education and outreach organisations such as the I Am Water Ocean Conservation Trust (for which Lauren is the scientific advisor), the Save our Seas Shark Education Centre (where Lauren has been the scientist-in-residence) and local dive initiatives.

5. Are there any plans to continue this work?

Yes. Further student projects and a coordinated scientific approach through the major review of past and current work in False Bay will continue scientific data collection in the region. A handover of information and a monitoring manual to conservation monitoring agency, South African National Parks (SANParks) will equip the managers with skills and knowledge to take over the annual, long-term monitoring of the Table Mountain National Park MPA. The newly formed Underwater Image Survey working group, of which Lauren is now a part, will coordinate monitoring of marine populations outside formally designated MPAs so that the equipment can be shared across regions and rolled out on a national scale. Additionally, Lauren will continue to advise as part of the working group on the turning scientific data from the underwater camera monitoring into videos and content for public awareness.

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

1. Scientific publication in peer-reviewed journals
    - Two publications aimed for submission in 2017, with two more aimed at submission in the first half of 2018.

2. Popular science and conservation articles
    - See a first example online here: http://features.saveourseas.com/false-bay/

3. Video features
    - See examples online here: https://vimeo.com/173869003

4. Social media (@lauren_de_vos on Twitter).

5. Public talks, seminars and events (on-going).

6. Meetings and workshops with rangers and managers of marine protected areas.

7. Workshops and meetings of the SA Underwater Imagery Survey working group

8. Presentation at scientific conferences
    - Southern African Marine Science Symposium (SAMSS) in July 2017.
    - Southern African Shark & Ray Symposium in September 2017.
    - Ezemvelo KZN-Wildlife Symposium of Contemporary Conservation Practice in November 2017.

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 Rufford Foundation grant was used over a 3-year time period. This is in keeping with the anticipated length of the project, in spite of fieldwork challenges and delays. According to the original application: "I intend to start my PhD project in 2014, which will run for 3 years. This period will serve to address several key conservation issues, but it will also allow me to continue my awareness work and expand on my education projects" (*excerpt from original application*).

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
Awareness	300	325.82	-25.82	This line item contributed to laptop / software functionality, attendance at symposia where results were presented and training at workshops. This falls under 2016 expenditure.
Data storage	1300	479.15	+820.85	Spending remained the same from 2104/2015 into 2016 for this line item. Additional data storage required was acquired through another grant from the Save our Seas Foundation. Outstanding (unspent) funds allocated to this line item were used to make up the shortfall in other fieldwork-related line items that required additional expenditure in 2016 (indicated with a negative value in the "difference" column.
Fieldwork expendables	400	491.45	-91.45	This value increased in this line item due to additional field sampling that was required to account for foul weather days where resources were used at sea, but data collected weren't usable, so additional sea days were required.
Fieldwork	4000	4384.40	-384.40	As explained above, additional sea days and field-based data collection was required to achieve the required sampling output in spite of poor ocean conditions. This accounts for the re-allocation of funds here.

Total	6000	5680.82	+319.18	The £319.18 indicated here has been spent, but this falls under 2017 spending and does not yet reflect on the audited university finance print out that was used to compile this budget report. This funding has been allocated to remaining subsistence, administration and equipment costs.

Based on exchange rate at 1GBP = 16.79 ZAR as at 8 February 2017.

These figures are based on the last update from the University of Cape Town finance records obtained from the departmental secretary and approved by the academic supervisor and departmental directors. An audited financial statement is available on request and comes directly from the finance office. Please e-mail me (laurendv01@gmail.com) if an official statement is required. An additional waiting period is required for the processing of such a statement, before delivery, once a request has been lodged.

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

1. The dissemination of the updated monitoring manual to relevant scientific agencies and conservation authorities through the Underwater Image working group.
2. Publication of PhD thesis chapters in peer-reviewed scientific journals.
3. Development of the smaller working group which includes members of the interested public(s) to address issues of enforcement of the Table Mountain National Park MPA, which will draw on my work to substantiate the biodiversity assessment section.

10. Did you use The Rufford Foundation logo in any materials produced in relation to this project? Did the RSGF receive any publicity during the course of your work?

The Rufford Foundation logo was used on all presentations in PPT format, on both the title and final slide, for all work related to this project that was directly funded by the RGS. Additionally, the Rufford Foundation was thanked at all public and scientific video screenings, and listed on printed outputs. Details of presentations given can be found below:

Conference presentations:

- DE VOS L, GÖTZ A, BERNARD ATF, ATTWOOD CG. 2016. A survey of marine

biodiversity in False Bay: using remote camera technology to assess relative abundance and distribution of benthic macro-invertebrates and ichthyofauna. *Symposium of Contemporary Conservation Practice*, Howick, Kwa-Zulu Natal, 31 October - 4 November 2016.

- DE VOS L, GÖTZ A, BERNARD ATF, ATTWOOD CG. 2015. Mapping biodiversity in False Bay: integrating underwater camera technology into marine spatial planning for chondrichthyan populations. *Southern African Shark and Ray Symposium*, Simonstown, Cape Town, 7 – 9 September 2015.
- YELD-HUTCHINGS E, DE VOS L, EHRLICH P, SCHULTZ J AND BOONZAIER L. 2015. Science Communication Workshop. *Southern African Shark and Ray Symposium*, Simonstown, Cape Town, 7 – 9 September 2015.
- DE VOS L, GÖTZ A, BERNARD ATF, ATTWOOD CG. 2015. Mapping biodiversity in False Bay: integrating underwater camera technology into marine spatial planning. *Rufford Small Grants Conferences Southern African Conference*, Kirstenbosch National Botanical Gardens, Cape Town, 16-17 April 2015.
- DE VOS L, WATSON R, SANGUINETTI C, GÖTZ A, ATTWOOD CG. 2014. Baited remote underwater video system (BRUVs) survey of the relative abundance and seasonal diversity of ichthyofauna in False Bay. *15th South African Marine Science Symposium*, Western Cape, South Africa, 15-18 July 2014.
- DE VOS L, WATSON R, GÖTZ A, ATTWOOD CG. 2014. A first baited remote underwater video system (BRUVs) survey of the seasonal diversity and relative abundance of chondrichthyans in False Bay, South Africa. *Sharks International Symposium*, Kwa-Zulu Natal, South Africa, 2-6 June 2014.
- DE VOS L, ATTWOOD CG, GÖTZ A, BERNARD ATF, WINKER H, PARKER D. 2014. Cameras for conservation: using BRUVs for a new sea view. *Aliwal Shoal Marine Protected Area Forum*, Kwa-Zulu Natal, South Africa, 11th – 14th Feb 2014.

Public scientific and conservation presentations:

- DE VOS L. False Bay on Film. IBRO-Simons Computational Neuroscience Imbizo 2017, Muizenberg, South Africa, 11 January 2017.
- DE VOS L. False Bay Yacht Club, Simonstown, 12 November 2015.
- DE VOS L. I Love False Bay speaker series, Southern African Shark and Ray Symposium, Muizenberg, 7 September 2015.
- DE VOS L. Probus retired business professionals, Westlake Golf Club, 9 March 2015.
- DE VOS L. The Life Aquatic. SciFest Africa National Science Festival Lecture Series, 1820s Settlers National Monument, Grahamstown, South Africa, 13th March 2014.

Academic and outreach lectures:

- Faculty Field Project lecturer, rock pool ecology, The Organisation for Tropical Studies, De Hoop nature reserve, 19-22 February 2015.
- South African rocky shores lecture, The Organisation for Tropical Studies, De Hoop nature reserve, 19 February 2015.

- False Bay on Film lecture, The Organisation for Tropical Studies, De Hoop nature reserve, 20 February 2015.
- MSc Conservation Biology Restoration and Disturbance Ecology lecturer, False Bay, 22-26 June 2015.
- SASC Elasmobranch Research and Field Ecology course lecturer, Hermanus, 11 August 2015.
- Faculty Field Project lecturer, rock pool ecology, The Organisation for Tropical Studies, De Hoop nature reserve, 9-13 October 2015.
- South African rocky shores lecture, The Organisation for Tropical Studies, De Hoop nature reserve 9 October 2015.
- False Bay on Film lecture, The Organisation for Tropical Studies, De Hoop nature reserve, 10 October 2015.
- False Bay on Film lecture, The Organisation for Tropical Studies, De Hoop nature reserve, 26 October 2015.
- Coastal Biodiversity and Science Lecturer, Youth Ocean Apprenticeship, Save our Seas Foundation, Kalk Bay, 12-15 December 2015.

Printed outputs:

- BRUVs monitoring manual for conservation practitioners
- Jump camera monitoring manual for conservation practitioners

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

1. Associate Professor Colin Attwood (University of Cape Town Department of Biological Sciences): primary academic supervisor.
   Role in project: project design & advice, statistical input & publication editing.
2. Dr Albrecht Götz (South African Environmental Observation Network): co-supervisor
   Role in project: equipment procurement & advice, thesis advice & publication editing
3. Dr Anthony Bernard (South African Institute for Aquatic Biodiversity): co-supervisor
   Role in project: equipment procurement & management, thesis advice & publication editing.

12. Any other comments?

This project has been challenging, but a highly valuable and novel addition to the South African marine conservation landscape. The funding of the Rufford Foundation has played a significant role in allowing the researchers involved to achieve not only the scientific outputs as a result of funding the fieldwork, but to expand their project to include significant management and public awareness

engagement and value that could unfold simultaneously with the fieldwork component. This has been highly valuable: local partner organisation could be brought on-board and public transparency (and therefore, support) could be worked on while fieldwork unfolded. In a conservation landscape, where scientific turnaround times are necessarily slow (for instance, through the peer-review publication process), but conservation imperatives are urgent, there is value in being able to relay relevant information and results (i.e. fieldwork skills, equipment development, methods-testing) as they unfold. In South Africa, particularly in the marine conservation field, resources are limited and there is a culture of collaboration and skills sharing. The funding from the Foundation allowed my project to contribute significantly to this with a novel technique that has now been adopted by the major government and conservation agencies in the country, as well as all major marine consultancies, science-based NGOs and monitoring organisations.

The efficiency of the Foundation, as well as the level of interest in the technique shown at the acceptance of the grant, has been heartening. Finally, the Foundation will be thanked in all scientific publications that are the result of this project in coming years. If you would like to receive notification of this, as well as a copy of the publications for the Foundation's records, please let me know on laurendv01@gmail.com.