Applicant: **Simpson, Tiffany**
Organisation: **Ascension Island Government Conservation and Fisheries Directorate**
Funding Sought: **£35,160.00**

DPLR4\1042

Robots and Photogrammetry: Monitoring the Deep in Ascension Island MPA

This project aims at using images acquired by a Remotely Operated Vehicle for generating photogrammetry 3D models of mesophotic habitats around Ascension Island Marine Protected Area. Habitat complexity indices capable of being used to compare and monitor these habitats in time will then be calculated. This will allow the assessment of habitat health, changes in sessile species cover and migration of species from shallow areas. A long-term monitoring programme of these habitats will be the main outcome of the project.

DPLR4\1042

Robots and Photogrammetry: Monitoring the Deep in Ascension Island MPA

Section 1 - Project Title & Contact Details

Q1. Project Title

Robots and Photogrammetry: Monitoring the Deep in Ascension Island MPA

Q2. Please select whether you are applying as an organisation or as an individual **(Guidance section 3 and Guidance Glossary)**

⦿ Organisation

PRIMARY APPLICANT DETAILS

Title	Dr
Name	Tiffany
Surname	Simpson
Tel (Work)	[redacted]
Email (Work)	[redacted]
Address	[redacted]

GMS ORGANISATION

Type	**Organisation**
Name	Ascension Island Government Conservation and Fisheries Directorate
Phone (Work)	[redacted]
Email (Work)	[redacted]
Address	[redacted]

Section 2 - Overseas Territory(ies)

Q3. Please state whether the same (or similar) project proposal has previously been submitted to the UK Government for funding, including through Darwin Plus Local, Defra's other Darwin Plus grant schemes or other UK Government funding mechanisms. Failure to do so may result in the application being ineligible.

⦿ No

Q4. Overseas Territory (Guidance section 1.3):

Which UK Overseas Territory(ies) will your project be working in? Please note that in case of a non-permanent resident population you need to demonstrate a clear, meaningful, long-term link to the territory.

☑ St Helena, Ascension and Tristan da Cunha*

*** if you have indicated a territory group with an asterisk, please give detail on which territories you are working on here:**

Ascension Island

In addition to the UKOT(s) you have indicated, will your project directly benefit any other UK OT(s) or country(ies)?

⦿ Yes

Please list these here and describe how they will benefit:

- St Helena: Ascension and its "sister island", St Helena, have very similar shallow water ecosystems, with many species being present in both, including endemic ones. However, both islands lack information on their deeper habitats (below 50 m). Because of the similarities between their shallow ecosystems and geological processes of island formation, it is expected that their deeper habitats will also present characteristics in common. Therefore, the ecosystem characterisation to be obtained in this project, together with the methods applied, will serve as a baseline which St Helena can study and apply in their own territory.

Section 3 - Project Partners

Q5. Project partners (Guidance section 3.2)

In this section, please give details of all the partners involved (including the Lead Organisation) and provide a summary of their roles.

Project Leader name (Guidance section 3.1):	Marcos Agiani Tieppo Junior
Lead Organisation name (if applying as an organisation; Guidance section 3.1):	Ascension Island Government Conservation and Fisheries Directorate

Lead Organisation Website (if applicable):	*No Response*
Is the Lead Organisation based in a UKOT where the project is working (Guidance section 3.1)?	⦿ Yes

List other partners involved and where are they based:	None.
Summary of roles and responsibilities of each partner in the project:	Project Leader: Will coordinate the project and be responsible for the field activities and data analysis, including the 3D modelling and complexity indices calculation. Will also train Ascension Island Government Conservation and Fisheries Directorate (AIGCFD) team members on ROV operation and photogrammetry techniques, so as to guarantee the long-term monitoring programme will be implemented. Lead Organisation: Will make sure all the infrastructure necessary for the field activities is available. AIGCFD team members will help on field activities also and, after the project is finished, will maintain a long-term monitoring programme of the areas of interest defined during the project.
I confirm that all listed partners are aware of this application and have indicated support:	Checked

Attach a Cover Letter for your application (Guidance section 4.2).

cover_letter
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Section 4 - Project Summary & Description

Q6. Project Summary (Guidance section 3.8)

Please provide a brief summary of your project. This may be used in communication activities and/or published online, if your application is successful.

This project aims at using images acquired by a Remotely Operated Vehicle for generating photogrammetry 3D models of mesophotic habitats around Ascension Island Marine Protected Area. Habitat complexity indices capable of being used to compare and monitor these habitats in time will then be calculated. This will allow the assessment of habitat health, changes in sessile species cover and migration of species from shallow areas. A long-term monitoring programme of these habitats will be the main outcome of the project.

Q7a. Description (Guidance section 2.1 and 6)

Please provide a description of your project, including:

- **the overall objective**
- **the current situation and the problem the project is trying to address**
- **what success will look like and how you will measure it.**

Please be as specific as possible when describing the project, using quantified data and evidence where available. You may wish to consider: what are the specific threats to the environment that the project will attempt to address, and what should we know about these threats? What does your successful project look like? And how will you demonstrate whether and how your project has been successful?

Marine ecosystems are threatened by phenomena such as overfishing, pollution and climate change. Shallow ecosystems are the most studied ones, due to the difficulties involved in reaching deeper zones. Habitats in the mesophotic zone inside the Ascension Island Marine Protected Area (MPA) are almost completely unknown. These ecosystems must be studied, so the effects they may suffer from the mentioned threats can also be predicted and possibly mitigated. Furthermore, the probable connectivity between these ecosystems and shallow ones, with key species depending on both of them, highlights even more the importance of increasing our knowledge and monitoring capability regarding the mesophotic ecosystems around Ascension Island (AI).

Habitat complexity appears as one of the key environmental features that influences local biodiversity and ecological relations, especially in reef ecosystems (Graham and Nash, 2013). Different methods have been used to measure the complexity of habitats, such as "chain and tape" and LIDAR. As an alternative to those methods, for having a much lower cost, being non-destructive and producing accurate results, Structure-from-Motion photogrammetry (SfM) is now among the most used techniques to analyse the complexity of reef structures (Guo et al., 2016; Leon et al., 2015) and also to estimate sessile benthic organisms growth rates (Bennecke et al., 2016; Olinger et al., 2019).

Project DPR12S2\1019 plans to deliver baseline oceanographic and biological data on the mesophotic ecosystems around AI. This project, which will complement the one mentioned, aims at generating SfM photogrammetry 3D models of four mesophotic habitats around AI (Figure 1), and calculating complexity indices capable of being used to compare and monitor these habitats in time.

By using a Remotely Operated Vehicle (ROV) capable of reaching a depth of 300 m, the images necessary for building the model will be acquired. A lawnmower pattern will be followed by the ROV while still shots are taken with a 1080p camera attached. An 80/70% overlap between consecutive pictures/transects will be adopted to guarantee an accurate alignment during the post-processing stage. To guarantee repeatability over time and accurate trajectories, the ROV will be equipped with a Doppler Velocity Profiler (DVL) for stabilisation, and a USBL (ultra-short baseline) system for underwater real-time GPS positioning. Following that, the images will be imported to Agisoft Metashape®, which will align them using both the GPS metadata of each file and image analysis. After the alignment is complete, the software will build the point cloud and a 3D mesh of each area. The final 3D models will represent both the topography of the bottom and the sessile organisms present, allowing for the calculation of different habitat complexity indices, such as rugosity (Figure 2) and fractal dimension (Figure 3). This will be carried out using Rhino 3D® and the methods described in Tieppo M. (2021).

These indices, together with the biodiversity registered on camera, will allow for comparisons between habitats, and be used for monitoring changes as part of a long-term programme, which will be an outcome of the project. The same procedure can also be replicated in other areas around the island as deemed necessary. This will allow several characteristics of the ecosystems to be assessed, such as habitat health, changes in sessile species cover and migration of species from shallow areas, which is a possible effect of climate change.

Q7b. Long-term sustainability (Guidance section 2.1 and 6)

Please describe the long-term benefits of the project and the change it will bring about. How will the outcomes of the project be sustained after the funding is finished?

The potential findings regarding the connectivity between mesophotic and shallow ecosystems will be essential for the management of the MPA, especially in relation to the Rock hind grouper life cycle. This species is the main target of local recreational fisheries, and a key part of islanders life style. Individuals from this species have been caught on zones as deep as 200 m, and their life cycle may depend on these areas, which are currently not being monitored.
The monitoring programme will be the main long-term outcome of the project, being a key part of the MPA management plan for the future. The transects will be periodically repeated in different mesophotic areas around the island (the four original ones and any other that is deemed necessary). Ascension Island Government Conservation and Fisheries Directorate (AIGCFD) will be responsible for the programme, using its own boat and trained personnel for the surveys, besides the ROV and its attachments, which will remain as permanent equipment of AIGCFD. The ROV has several other potential applications, and will definitely be a valuable asset for other local projects. Therefore, AIGCFD will have the resources for maintaining the monitoring programme.

(Optional) Please upload any additional and supporting materials or files (such as maps of project sites, etc) below. Maximum of 5 sides of A4, and is combined as a single PDF:

supporting_material
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pdf 515.48 KB

Section 5 - Project Outcome(s)

Q8. Project Outcome(s) (Guidance section 1.2)

Successful Darwin Plus Local projects must demonstrate measurable outcomes in at least one of the themes of Darwin Plus with a clear focus on biodiversity and the natural environment, either by the end of the project or soon after through a credible plan.

Please note: Any proposals including research or monitoring are required to demonstrate a clear link to tangible outcomes for conservation of biodiversity and the natural environment. Please explain how any new research will be applied to drive environmental outcomes on the ground.

Please confirm that your project has a clear focus on biodiversity and the natural environment.

Checked	**Biodiversity: improving and conserving biodiversity, and slowing or reversing biodiversity loss and degradation;**

Please tick which additional theme(s) of Darwin Plus your project contributes to (if relevant):

Checked	**Climate change: responding to, mitigating and adapting to climate change and its effects on the natural environment and local communities;**

Unchecked	**Environmental quality: improving the condition and protection of the natural environment**
Checked	**Capability and capacity building: enhancing the capacity within OTs, including through community engagement and awareness, to support the environment in the short- and long-term.**

Please justify your selection. Please use quantitative information where possible here.

Areas deeper than 30 m comprise 99% of the Ascension Island MPA. However, the ecosystems located on this depth range are almost unknown, with only the local seamounts being mapped by the Discovery Cruise back in 2022. Biodiversity of mesophotic areas around AI must be monitored in the long-term, with the aim of detecting changes caused by climate change, especially considering shallow species which are conservation priorities and depend on these habitats, such as the Rock hind grouper. An ROV will bring the necessary capacity for AIGCFD to do this and to understand local connectivity and migrations between habitats.

Section 6 - Workplan

Q9. Workplan (Guidance section 2.2)

Please provide anticipated dates for the start and end of your planned project here. Please use the Darwin Plus Local Project Workplan (available at: https://darwinplus.org.uk/apply/local-applications/**) to provide a list of the individual activities you have planned for this project, a brief description of what each activity entails, and the months in which the activities will be carried out. If the project involves only one activity (e.g. a purchase), please still provide project start and end dates (noting estimated times for procurement). Please note that your project must start after 1 October 2024 and be completed by 31 March 2025.**

Start date:	End date:	Duration (e.g. 3 months):
01 October 2024	31 March 2025	6 months

Please upload the completed Darwin Plus Local Project Workplan with your proposed project activities here

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17/06/2024
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pdf 45.91 KB

Section 7 - Costs

Q10. Costs (Guidance section 2.2 and please read the Finance Guidance)

Please provide a breakdown of costs to be funded through Darwin Plus Local (in GBP).

Are you seeking any matched funding for this project?

⦿ Yes

How much matched funding are you seeking and where from?

£720.00 (Staff costs) - Blue Belt Programme

Budget line	Explanation	Cost in GBP
Staff costs:	None	£0.00
Consultancy costs:	None	£0.00
Overhead costs:	None	£0.00
Travel & subsistence costs:	None	£0.00
Operating costs:	- Fuel will be used for all the field activities with the boat: £[redacted] - Shipment of all the equipment from the UK will be done through Richard James International, and have charges for customs in the UK, processing and the shipment itself: £[redacted]	£[redacted]
Capital equipment:	- ROV (BlueROV2) equipped with a heavy-configuration add-on, 300 m tether and spool, and an Xbox wireless controller (standard operating controller): £[redacted] - DVL (Doppler Velocity Logger) for accurate navigation: £[redacted] - USBL (Underwater GPS) for more accurate navigation and real-time positioning: £[redacted] - USB GPS module: £[redacted] - Tough book type laptop for operation in the boat: £[redacted] - Underwater housings for GoPros rated for 250 m: £[redacted] - Tool set: £[redacted]	£[redacted]
Other Costs	License for the software Agisoft Metashape for building the 3D models: $[redacted] (£[redacted] License for the software Rhino3D for manipulating the 3D models and calculating habitat complexity indices: £[redacted] Large box for storage and transport of the ROV and the spool with the tether: £[redacted]	£[redacted]
Total:		35,160.00

This section provides more information on the budget to help evaluators understand how you will use the funds you are requesting. You do not need to list all costs, but please list and detail costs of more than £1,000 per item below, under the appropriate budget line.

Details of staff costs over £1,000 (if relevant)

No Response

Details of overhead costs over £1,000 (if relevant):

No Response

Details of travel and subsistence costs over £1,000 (if relevant):

No Response

Details of operating costs over £1,000 (if relevant):

- Fuel will be used for all the field activities with the boat: £[redacted]

- Shipment of all the equipment from the UK will be done through Richard James International, and have charges for customs in the UK, processing and the shipment itself: £[redacted]

Details of capital equipment costs over £1,000 (if relevant):

- ROV (BlueROV2) equipped with a heavy-configuration add-on, 300 m tether and spool, and an Xbox wireless controller (standard operating controller): £[redacted]

- DVL (Doppler Velocity Logger) for accurate navigation: £[redacted]

- USBL (Underwater GPS) for more accurate navigation and real-time positioning: £[redacted]

- USB GPS module: £[redacted]

- Tough book type laptop for operation in the boat: £[redacted]

- Underwater housings for GoPros rated for 250 m: £[redacted]

- Tool set: £[redacted]

Details of consultancy costs over £1,000 (if relevant):

No Response

Details of other costs over £1,000 (if relevant)

License for the software Agisoft Metashape for building the 3D models: $[redacted] (£[redacted]

License for the software Rhino3D for manipulating the 3D models and calculating habitat complexity indices: £[redacted]

Large box for storage and transport of the ROV and the spool with the tether: £[redacted]

If your project budget was prepared in another currency and converted to GBP, please provide the exchange rate, its source, and the date it was accessed:

Other currency:	Exchange rate:	Source of this exchange rate:	Date exchange rate accessed:
USD	0.79	Google	17 June 2024

Darwin Plus Local has been created to build capacity and contribute to local economies in-territory.

What % of the total will be spent in the OTs?	[redacted]

If less than 80% of the total project spend is to be spent within the OT(s), please explain why.

All the equipment to be used is only available from UK companies or resellers. The only money to be spent inside the OT is the one allocated for the fuel to be used in the boat.

Section 8 - Local and National Priorities

Q11. Local and national priorities

Please explain how this project aligns with local and national priorities? You may wish to consider the project in the context of national environmental laws, objectives, strategies, territory specific agreements, action plans or policies.

Considering the probable importance of mesophotic habitats around AI, not only for local species, but also for shallow water ones which depend on them, this project will contribute, by filling knowledge gaps on mesophotic ecosystems, to several operational objectives of the AI MPA Management Plan, such as:
- 1c. No loss of species and no reduction of species abundance or ecosystem complexity in inshore areas;
- 1e. Maintain the size distribution and age at maturity of species in inshore areas;
- 1g. No reduction in the extent or condition of key habitats.

The Monitoring, Evaluation and Research Strategy document establishes that ROV surveys should be carried out to help deliver a baseline for mesophotic communities. Furthermore, "Ambient monitoring", defined as "monitoring the background health of biological systems to detect any trends", should be carried out. Both are covered by the scope of this project, especially considering the long-term monitoring plan that will be produced and put into practice after the project ends.

Finally, this project will help the UK to achieve its part on the goal of effective conservation and management of at least 30% of the world's oceans by 2030, established on the Convention on Biological Diversity.

Will the project take place on Government owned land or water or involve biocontrol, invasive alien species control or eradication?

◉ Yes

Please attach evidence that you have Government support for this project i.e. a Letter of Support. Applications which indicate that they do not take place on Government land or water, but which propose work that appears to the reviewers would be difficult/impossible to carry out without working on government land or waters may be ineligible if no Letter of Support is provided.

AIG Letter of support - Darwin Local R4
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Section 9 - Project Risks

Q12. Project Risks

Please demonstrate your consideration of any risks involved in this project and how you intend to manage them. Please note the importance of health and safety and environmental risk assessment in the design of your project. If there is any possibility that your project may have negative impacts on the environment or human health, it is important that you provide a comprehensive analysis of potential environmental and human health risks, and the prevention measures you will take to ensure the work does not cause harm.

Depending on your project, you may wish to consider:

- **Biosecurity risks – particularly for projects involving external equipment.**
- **Safeguarding risks – particularly for projects involving vulnerable groups such as children, older people or people with disabilities.**

Risk	Mitigation
Being an isolated island, we occasionally face difficulties regarding equipment deliveries, which could delay the project.	Only one supplier will be used for buying the ROV and its accessories, which already decreases risks of delays. Even before knowing if the project will be approved, we will make sure to contact the supplier and make sure everything will be available in time for the project. However, the amount of time necessary for acquiring images and for data analysis is not long, and the planning is taking into account a possible delay on equipment arrival.
Injuries during field work on the boat.	AIGCFD team is well trained and very experienced on local sea conditions and on the research vessel. Furthermore, a new risk assessment will be written specifically for this project and for operating the ROV, which will be studied by all members of the crew.
Equipment malfunction and technical issues	The Project Leader has experience in working with the exact ROV model and listed software, which significantly reduces the chances of having technical issues that cannot be rapidly solved. Moreover, there will be support from the ROV supplier and from other contacts outside the OT.

Do you require more fields?

⦿ No

Section 10 - Terms & Conditions

Q12. Terms and conditions (Guidance section 3.10)

By applying for Darwin Plus Local you are adhering in full to the grant Terms and Conditions in full (available at: Darwin Plus website **and as referenced in the Guidance at section 3.10). For information, the Terms and Conditions include requirements for all applicants to (amongst other requirements as per the full Terms and Conditions):**

- **Uphold a zero tolerance for inaction approach to tackling sexual exploitation, abuse, and harassment.**
- **Where appropriate, make all reasonable and adequate efforts to address gender inequality and other power imbalances.**
- **Notify all cases of fraud and theft (whether proven or suspected) relating to the project to the Grant Administrator as soon as they identified.**

Please indicate you have read, and understood, and will adhere to the Terms and Conditions.

Checked

Supporting documents list (please have these ready to attach with application)

- **Cover Letter of no more than two A4 pages. (Guidance section: 4.2 has information on what this cover letter should include).**
- **If the project takes place on public land or water or is addressing invasive alien species, a Letter of support from OT Government.**
- **Project Workplan in the template provided for Darwin Plus Local (available at: https://darwinplus.org.uk/apply/local-applications/).**
- **Map and additional information (optional) maximum five additional pages.**

If your application is successful

If your project application is successful, the Fund Administrator (NIRAS) will ask you to provide some financial evidence for due diligence checks before you receive your project grant. (Please see section 3.3 of the Darwin Plus Local Finance Guidance). Please be ready to provide this evidence promptly.

- **Financial evidence for organisations: Year-end financial statements, the latest management accounts or audited accounts (if you have these).**
- **Financial evidence for individuals: Proof of identity such as a passport, ID card or driving licence and solvency (such as bank statements) and a police check.**

Section 11 - Certification

Certification

I certify that, to the best of my knowledge and belief, the statements made in this application are true and the information provided is correct.

Checked

I have the authority to submit an application on behalf of my organisation.

Checked

Name:	Cuen Muller
Position in the organisation: (if applicable)	Marine Team Leader
Signature (please upload e-signature)	Muller Signature 21/06/2024 16:50:27 jpg 51.17 KB
Date:	21 June 2024

Section 12 - Submission Checklist

Checklist for submission

	Check
I have read the Guidance **documents, including the "Darwin Plus Local Guidance" and the "Darwin Plus Local Finance Guidance".**	Checked
If my proposed project takes place on public lands or water or is addressing alien invasive species, I have uploaded a Letter of Support from Government.	Checked
I have uploaded a cover letter that details the information requested in the guidance (Guidance section 4.2 has information on what this cover letter should include).	Checked
I have read, and can meet, the current Terms and Conditions **for this fund (found at:** https://darwinplus.org.uk/apply/local-applications/**) for this fund.**	Checked
I have provided actual start and end dates **for my project that fit this Round.**	Checked
I have provided my summary budget based on UK government financial years **i.e. 1 April – 31 March and in GBP in the application form.**	Checked
I have uploaded my project workplan using the specific template provided (available at: https://darwinplus.org.uk/apply/local-applications/**).**	Checked
I have uploaded all supplementary documents if I have any.	Checked
(If copying and pasting into Flexi-Grant) I have checked that all my responses have been successfully copied into the online application form.	Checked
The application has been signed by a suitably authorised individual **(clear electronic or scanned signatures are acceptable).**	Checked
I have checked the Darwin Plus website **immediately prior to submission to ensure there are no late updates.**	Checked
I have read and understood the Privacy Notice on the Darwin Plus website**.**	Checked

We would like to keep in touch!

Please check this box if you would be happy for the lead applicant (Flexi-Grant Account Holder) and project leader (if different) to be added to our mailing list. Through our mailing list we share updates on upcoming and current application rounds under Darwin Plus. We also provide occasional updates on other UK Government activities related to biodiversity conservation and share project news. You are free to unsubscribe at any time.

Unchecked

Data protection and use of personal data

Information supplied in the application form, including personal data, will be used by Defra as set out in the **Privacy Notice**, available from the Forms and Guidance Portal.

This **Privacy Notice must be provided to all individuals** whose personal data is supplied in the application form. Some information may be used when publicising Darwin Plus including project details (usually title, lead partner, project leader, location, and total grant value).

Darwin Plus Local

Provide a **Project Implementation Timetable** that shows the key milestones in project activities. Complete the following table as appropriate to describe the intended workplan for your project. Round 4 is for a **maximum of 6 months** with activities starting from 1 October 2024. All activities must be completed by 31 March 2025.

Please add/remove columns to reflect the length of your project. For each activity (add/remove rows as appropriate) indicate the number of months it will last, and shade only the months in which an activity will be carried out. The workplan can span multiple pages if necessary.

Activity #	Description (max 25 words)	No. of months	UK Financial Year 2024/25					
			Calendar Year 2024			Calendar Year 2025		
			Oct	Nov	Dec	Jan	Feb	Mar
1	Purchase of the ROV and its add-ons: They will be purchased and shipped to Ascension, being delivered by the end of 2024.	3						
2	Assemblage of the ROV: The ROV and all its components and add-ons will be assembled and tested.	1						
3	Equipment trials: One week will be used for testing the equipment and making sure the underwater GPS and the DVL systems are working properly.	1						
4	Field activities for image acquisition: At least four field trips	2						

Project Title: *Robots and Photogrammetry: Monitoring the Deep in Ascension Island MPA*

Activity #	Description (max 25 words)	No. of months	UK Financial Year 2024/25					
			Calendar Year 2024			Calendar Year 2025		
			Oct	Nov	Dec	Jan	Feb	Mar
	will be done for acquiring the necessary images.							
5	Building of the 3D models: The SfM models will be built from the acquired images using the Agisoft Metashape software.	1						
6	Calculation of the complexity indices: Habitat complexity indices will be calculated using Rhino 3D, and subsequent comparisons between habitats' complexities and biodiversities will be done.	2						
7	Report writing: The final report of the project, together with the long-term monitoring plan for mesophotic areas around Ascension Island, will be written.	1						