



## Darwin Initiative/Darwin Plus Projects Half Year Report (due 31<sup>st</sup> October 2021)

<b>Project reference</b>	DPLUS113
<b>Project title</b>	CRACAB – Climate Resilience and Conservation of Ascension’s Biodiversity
<b>Country(ies)/territory(ies)</b>	Ascension Island
<b>Lead organisation</b>	Ascension Island Government Conservation & Fisheries Directorate (AIGCFD)
<b>Partner(s)</b>	University of Exeter (UoE); French Institute for Agricultural Research (INRA)
<b>Project leader</b>	Dr Diane Baum
<b>Report date and number (e.g. HYR1)</b>	HYR2
<b>Project website/blog/social media</b>	<a href="http://www.ascension-climate.org">www.ascension-climate.org</a>

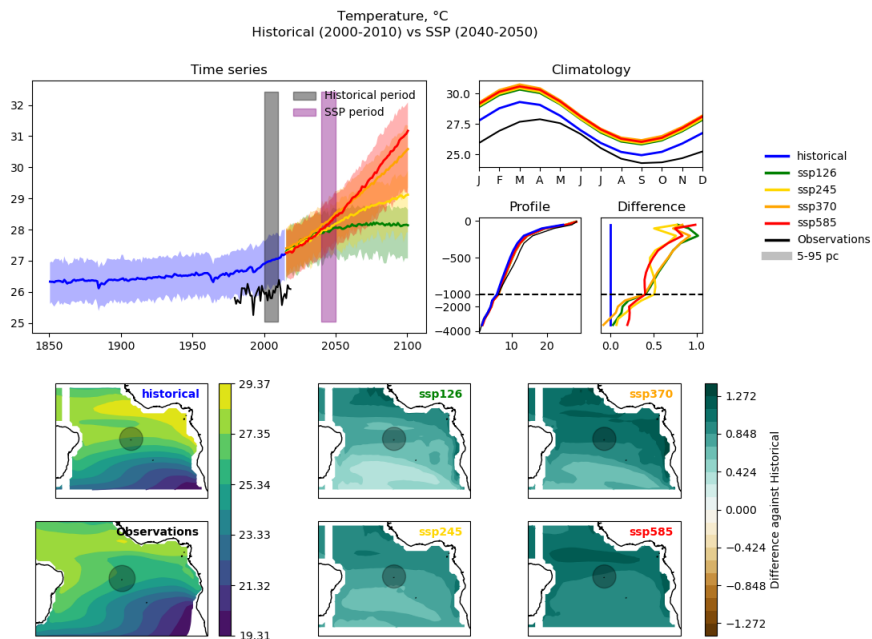
**1. Outline progress over the last 6 months (April – Sept) against the agreed project implementation timetable (if your project has started less than 6 months ago, please report on the period since start up to end September).**

***Output 1.1 Creation of climate model for Ascension capable of predicting temperature and rainfall changes with measured degree of certainty.***

A 100-year temperature and precipitation timeseries for Ascension Island has now been constructed and published in the [peer reviewed literature](#). All raw data have also been openly available online (<https://crudata.uea.ac.uk/cru/data/ascension/>). The timeseries shows an observed warming of 0.4 °C since 1979 and will serve as a baseline for validating outputs of global circulation models and generating climate projections for the next 100 years. Progress on developing projections has been slightly delayed while we await the publication of the latest IPCC Climate Atlas from the Sixth Assessment Report (AR6). However, we fully expect this output will be completed by the end of Y2.

***Output 1.3 Creation of oceanographic model for Ascension EEZ produced predicting future changes in current and upwelling systems.***

Progress on this output is now well underway, led by a team of marine ecosystem modellers at Plymouth Marine Laboratory (PML) appointed following a competitive tender process. Two main oceanographic analyses have been undertaken to date: a circulation and Atlantic Equatorial Undercurrent (AEU) analysis led by Dr Giovanni Galli, focussing on changes in the dominant current systems affecting the Ascension Island maritime zone; and a bulk properties analysis, led by Dr Lee de Mora, developing projections for key oceanographic variables such as temperature, pH, and primary productivity. Both analyses have been based on the latest IPCC model ensemble (CMIP6) and have been used to project changes in Ascension’s oceanography up to 2100 under four different emissions scenarios (or “shared socio-economic pathways”; SSPs). Summary reports for each variable have been produced, similar to the figure shown below for temperature.



Work on this output was due to be completed by Y2Q2 under the original implementation timetable, but this was extended until Y2Q4 in the Terms of Reference (ToR) for the modelling contract to allow time for the successful bidder to undertake the necessary analyses. Work on fine-tuning the analysis is expected to be completed by Y2Q3 with a final report available by Y2Q4.

**2.1 Production of response curves relating temperature to green turtle sex ratios, and soil moisture content to stress levels in an endemic plant species (*Euphorbia organoides*) from experimental data**

Temperature response curves for green turtle sex ratio and hatching success have been largely completed, with some fine tuning still required to account for the impacts of nest flooding on both temperature and embryo survival. Once local temperature projections for Ascension Island are completed (Output 1.1), these will be merged with thermal response curve to generate long term predictions of green turtle demographic rates. Response curves relating soil moisture content to stress levels in *Euphorbia organoides* have been delayed by COVID-19. As explained in Section 2, INRA researchers have been unable to visit Ascension due to the pandemic. However, soil moisture probes have been deployed at the main *Euphorbia* sites on the island, and at promising translocation sites, to generate an ongoing data series for this study. Preliminary results confirm that the species faces a very challenging moisture regime at current wild sites.

**2.3 Production of maps predicting future availability of turtle nesting habitat produced from swell height data collected adjacent to turtle nesting beaches combined with output 2.2**

Not due to commence until Y3Q1

**2.4 Analysis of correlation between seabird productivity and ocean state variables completed and used to assess feasibility of using seabirds as indicators of ocean health.**

Analyses have now been largely completed for one priority seabird species (the Ascension frigatebird) and nesting productivity data have been compiled for a second species (masked booby). Progress on this output is slightly behind schedule due to work and fieldwork commitments on other projects that were delayed by the COVID-19 pandemic, and have

therefore overrun into the current financial year. The lead researcher on this output (Dr Sam Weber) was also recently appointed to a core-funded academic position with additional responsibilities, which has further delayed progress (see Section 2a). We are in the process of appointing a replacement and envisage that this work will be completed by the end of Y2Q4, or Y3Q1 at the latest.

### ***3.1 Trials of turtle nest shading, endemic plant shading and fog-catching irrigation systems carried out***

Trials of turtle nest shading will begin with the next turtle nesting season in January 2022 (Y2Q4). Endemic plant shading trials will likewise commence in January 2022 when insolation is highest. Construction aspects of the project began behind schedule due to shipping delays from COVID as explained below. Nonetheless, two designs of fog catchers have now been trialed in restoration sites on Green Mountain. The first drips water directly down onto the bank below it. At this site, initial clearance of the heavy cover of invasive plants inevitably damaged the existing bryophyte community, yet new growth is visible across the irrigated bank. Ongoing monitoring protocols have been established to allow the long-term impact on bryophyte communities to be recorded. The second fog catcher feeds water into storage tanks. The system is functioning well and yields 7.5 L of water /m<sup>2</sup>/day during peak fog periods. Irrigation systems will be run from these at the end of October 2021 (Y2Q3) ready to deliver water to the endemic communities throughout the drier summer months. Monitoring protocols have been established at these sites to assess the impact of the irrigation: these include establishing permanent quadrats to evaluate vegetation changes, and deploying humidity probes to study the ecohydrology of the plant community. The target endemic communities have been extensively weeded and scrub cleared from the surrounding area.

### ***3.3 Sites on Ascension that have suitable climate conditions for *Euphorbia organoides* identified. Transplant nursery grown stock to these areas and monitor success.***

Based on soil moisture data, invasive plant distribution and soil characteristics, three sites have been selected for *Euphorbia* translocation spanning a moisture and elevation gradient. These sites have been fenced against herbivores and cleared of invasive vegetation. Rain catchers have been constructed to supply irrigation water. The project team have reduced pest invasions in the nursery by installing ant traps around benches, and have constructed a hardening bench where the first batch of *Euphorbia* is currently being acclimatized ready for planting. Almost all of the nursery upgrade work has been conducted with scavenged materials at no cost to the project.

### ***4.1 Creation of project website setting out scope of project and updated with project outputs***

Additional updates on project progress during the past six months have been posted to the project website. The website will be promoted during a social media campaign planned by AIGCFD to coincide with COP26.

### ***4.2 Public meetings held on Ascension to initially outline the objectives of the project and later to showcase results of the project and illustrate climate scenarios for the island***

A public meeting will be held on 26<sup>th</sup> October 2021 (Y2Q3) to capitalise on the interest in climate change generated by the lead in to COP26. This meeting will summarise the aims of the project and outline the work currently underway. A second meeting is planned for March 2022 (Y2Q4) to showcase the initial results of the project.

### ***4.3 Creation of animated films of future scenarios as visual tools for stakeholder engagement***

Scheduled for Q4 of Y2.

#### **4.4 Presentation of results at international conference to showcase how Ascension is addressing a major threat to its biodiversity**

This output is not scheduled until Y2Q3. However, a proposal for an oral presentation has been submitted to the fifth International Marine Protected Areas Congress (IMPAC5) which will be held in Vancouver, Canada in September 2022. The presentation will look broadly at the challenges faced by the Ascension Island MPA, including climate change, and will summarise key findings from the CRACAB project relating to marine biodiversity. IMPAC5 has been repeatedly delayed due to the COVID pandemic so this output will now be completed later than planned in Y3Q2. A formal change request will be submitted if and when the IMPAC5 proposal is accepted.

#### **2a. Give details of any notable problems or unexpected developments/lessons learnt that the project has encountered over the last 6 months (for COVID-19 specific delays/problems, please use 2b). Explain what impact these could have on the project and whether the changes will affect the budget and timetable of project activities.**

Currently, the largest population of *Euphorbia origanoides* occurs at Mars Bay, the part of Ascension Island leased by the United States Air Force (USAF). After changes of command in USAF, permission for the planned restoration trial and moisture monitoring in this area was refused. The project team are liaising with USAF to allow sufficient soil moisture monitoring to inform restoration, but there is little likelihood of permission for a full-scale trial. Though not ideal, we have had to switch the trial to Cross Hill, a site without *Euphorbia* but with conditions probably similar to Mars Bay. This has resulted in some slippage of the schedule.

Recording accurate soil moisture readings at depth has been challenging in Ascension's rocky volcanic soils. Abundant rocks and air pockets interfere with readings, while layers of basalt below the surface prevent deployment of probes. Moisture probes are now in place with sufficient replication at each site to account for measurement errors, but one candidate restoration site could not be accurately monitored.

Project Manager and lead researcher on marine turtle and seabird outputs, Dr Sam Weber, was recently appointed to a permanent academic position at the University of Exeter, which will require a reallocation of responsibilities and salary. The Darwin Secretariat at LTS International have been informed of this development and have advised that a formal change request should be submitted once a suitably qualified replacement has been identified. The post will be advertised by the University of Exeter to commence in Y2Q4 under the supervision of Dr Weber and Professor Annette Broderick. This will inevitably result in a short delay in progress on some outputs planned for Y2Q3 while the recruitment process is completed, but will ensure that a dedicated project officer is in place for the crucial final 15 months of the project.

#### **2b. Please outline any specific issues which your project has encountered as a result of COVID-19. Where you have adapted your project activities in response to the pandemic, please briefly outline how you have done so here. Explain what residual impact there may be on your project and whether the changes will affect the budget and timetable of project activities.**

Although we are developing soil moisture profiles at various sites across the island, an understanding of how *Euphorbia origanoides* responds to the changes is critical to predict success. The planned visit to Ascension from researchers at INRA to undertake cavitation studies has been repeatedly delayed due to travel disruption associated with COVID-19 pandemic and may have to be cancelled. Alternative means of undertaking this work such as cultivating *Euphorbia* plants at INRA in a range of moisture conditions are being considered. The pandemic has also caused delays to deliveries of goods within the UK, resulting in stock shortages of some materials required to complete construction of irrigation systems, shading and enclosures. These delays have been further compounded by the long intervals between ships currently visiting Ascension, meaning materials have often arrived many months later than planned. Nonetheless, the project team expect to complete the remaining infrastructure by the end of 2021 (Y2Q3).

**2c. Have any of these issues been discussed with LTS International and if so, have changes been made to the original agreement?**

Discussed with LTS: Yes

Formal change request submitted: No

Received confirmation of change acceptance No

**3a. Do you currently expect to have any significant (e.g. more than £5,000) underspend in your budget for this year?**

Yes  No  Estimated underspend:

**3b. If yes, then you need to consider your project budget needs carefully.** Please remember that any funds agreed for this financial year are only available to the project in this financial year.

**If you anticipate a significant underspend because of justifiable changes within the project, please submit a rebudget Change Request as soon as possible. There is no guarantee that Defra will agree a rebudget so please ensure you have enough time to make appropriate changes if necessary. Please DO NOT send these in the same email as your report.**

**4. Are there any other issues you wish to raise relating to the project or to Darwin's management, monitoring, or financial procedures?**

If you were asked to provide a response to this year's annual report review with your next half year report, please attach your response to this document.

Please note: Any planned modifications to your project schedule/workplan can be discussed in this report but **should also** be raised with LTS International through a Change Request. **Please DO NOT send these in the same email.**

Please send your **completed report by email** to [Darwin-Projects@ltsi.co.uk](mailto:Darwin-Projects@ltsi.co.uk). The report should be between 2-3 pages maximum. **Please state your project reference number in the header of your email message e.g. Subject: 25-001 Darwin Half Year Report**

