

## Darwin Plus: Overseas Territories Environment and Climate Fund Annual Report

To be completed with reference to the "Writing a Darwin/IWT Report" Information Note: (<https://dplus.darwininitiative.org.uk/resources/reporting-forms-change-request-forms-and-terms-and-conditions/>). It is expected that this report will be a maximum of 20 pages in length, excluding annexes)

**Submission Deadline: 30<sup>th</sup> April 2021**

### Darwin Plus Project Information

Project reference	DPLUS122
Project title	Biodiversity discovery and the future of South Georgia's seaweed habitats
Territory(ies)	South Georgia & the South Sandwich Islands (SGSSI)
Lead organisation	The Natural History Museum (NHM)
Partner institutions	South Atlantic Environmental Research Institute (SAERI), Shallow Marine Surveys Group (SMSG), British Antarctic Survey (BAS), Tritonia Scientific Ltd.
Grant value	£245,841.00
Start/end dates of project	01.03.2021 – 28.02.2023
Reporting period (e.g. Apr 2020-Mar 2021) and number (e.g. Annual Report 1, 2)	Annual Report 1
Project Leader name	Professor Juliet Brodie
Project website/blog/social media	Twitter: @Juliet_Seaweeds @SAERI_FI @Shallow_marine @BAS_News
Report author(s) and date	Juliet Brodie, 17 May 2021

### 1. Project summary

Seaweeds constitute a huge proportion of South Georgia's unique and charismatic marine biodiversity but are highly vulnerable to environmental change. Although South Georgia is far from many human impacts, its marine biodiversity faces threats from rapid climate change (ocean warming and acidification), invasive species (including seaweeds), tourism and fishing activities (e.g. pollution). Seaweeds, many on the edge of their distribution range, are indicators of environmental change and their responses can resonate throughout entire ecosystems, with knock-on effects for fisheries and tourism.

To fill critical gaps in knowledge of inshore seaweed-dominated habitats, the aim of this project is to generate baseline seaweed diversity knowledge for South Georgia (South Atlantic Ocean, sub-Antarctic, Fig. 1.). It integrates innovative molecular techniques with two centuries of specimen data and involves the first major field expedition to understand seaweed diversity and distribution around South Georgia. This is important because the South Georgia and South Sandwich Islands Marine Protected Area (SGSSI-MPA) is one of the world's largest MPAs. This wealth of knowledge will be transformed into tools with which to build capacity for monitoring and decision-making in order to protect these vital marine habitats around the territory. It will also facilitate knowledge transfer among stakeholders and raise public awareness of South Georgia's marine environmental importance.



Fig. 1. Location of South Georgia in the South Atlantic



Fig. 2. South Georgia with seaweed hotspots.

## 2. Project stakeholders/partners

### Engagement

As a consequence of COVID-19, we have had to delay the start of the project which has only run so far for one month (March 2021). However, we have been able to engage virtually or by correspondence with our key project stakeholders: marine managers/policy-makers Government of South Georgia & the South Sandwich Islands (GSGSSI), researchers (BAS, SAERI, SMSG) and tour operators

All formal partners, i.e. Juliet Brodie and Jonathan Gabriel (NHM), Paul Brickle (SAERI), Paul Brewin (SMSG), Pete Convey (BAS) and Martin Sayer (Tritonia Scientific Ltd.), have held a series of pre-project meetings in 2020 (May, June x2) to develop the project, led and chaired by the PI (Appendix 1, meetings notes).

In terms of our engagement with the GSGSSI, the PI has had correspondence with the CE (see Appendix 2) and Paul Brickle has been negotiating with GSGSSI for the fieldwork expedition and has held a series of meetings with Juliet to work on the logistics for this trip.

A meeting also took place in August 2021 with Amanda Lynnes, a stakeholder, from the International Association of Antarctic Tour Operators (IAATO) to begin the development of the citizen science part of the project (Appendix 3, notes from meeting).

### Achievements

Whilst the partners know each other and in various combinations have worked together on a number of projects, the opportunity to hold a series of pre-projects meetings has helped to build the team, put a framework in place and iron out any problems ahead of time.

As a result of the change of dates for this project due to COVID-19, Rob Mrowicki, the project officer, was not able to start at the beginning of the project in March. Working with SAERI, we have been able to employ PhD researcher Amy Guest for the first two months of the project. In the spirit of Darwin Plus, Amy is from the Falkland Islands.

### Challenges

The main challenges have been linked with the impact of COVID-19 and having to delay the start of the project by c. 7 months. However, we have been able to make use of the time to work with our stakeholders as outlined above.

### 3. Project progress

#### 3.1 Progress in carrying out project Activities

During the one month of activities, work has concentrated on **Output 1 Enhanced baseline knowledge of seaweed diversity and distribution in South Georgia** with some input into **Output 2 Tools for monitoring, managing and researching South Georgia's inshore marine environment, founded upon baseline biodiversity knowledge**.

As Amy had to work remotely, it was only possible to partly complete **activity 1.1** (databasing 200 historical and 300 contemporary herbarium specimens), because this requires physical access to the NHM algal herbarium. However, many of these specimens were located and marked up during DPLUS068 "Building foundations to monitor and conserve Falklands marine forest habitats" and additions more recently by the PI. This should speed up completion of this activity once it is possible to physically access the collections. A separate collection of 155 contemporary specimens (collections from the South Georgia subtidal and intertidal survey in 2010) were imaged by the PI and databased (Excel file: Catalogue\_AG), using the information from the images, by Amy with guidance from Jo Wilbraham, Senior Algal Curator, to ensure that the format is suitable for the NHM data portal in due course.

Work has also concentrated on **activity 1.2** (identifying c. 160 contemporary specimens through DNA sequence analysis). It was originally planned that Amy would come to the museum for 2 consecutive months (March and April) and undertake the molecular part of this activity but because of the lockdown and restricted access to labs and facilities at the NHM, the second month has been postponed until 21 June 2021. In the meantime, c. 46 specimens have been chosen for molecular work (Appendix 4) that Amy will undertake in June-July. Activities 1.1 and 1.2 will now be completed by October (Q3Y2), prior to the main field expedition, once Rob Mrowicki joins the project in September (start date brought forward by 1 month, subject to pending change request – see Section 12 and Annex 2).

The production by Amy of a GIS map to identify seaweed diversity hotspots (Fig. 2) based on numbers of species collected at each site in 2010 (Appendix 5) will contribute to **activity 2.1** (identifying potential inshore biodiversity hotspots). It will also serve as a useful reference for the South Georgia field trip (Nov-Dec 2021). Amy has also put together an initial list of 75 species and images (Word file: South Georgia rough species guide May 2021) which will be a useful resource for the field trip and contributes to **activities 1.5** and **2.4** (inventorying seaweed diversity and production of species ID guide). It has also highlighted the extent of taxonomic work that needs to be done as the identity of many of these species is uncertain or unknown.

#### 3.2 Progress towards project Outputs

Given the impact of COVID-19 and that during the one month of work undertaken so far, we are making good progress towards the project Outputs at this stage of the project as evidenced in section 3.1. With the proviso that the pandemic does not prevent further work, we are confident that we will achieve the Outputs by close.

**Output 1** Enhanced baseline knowledge of seaweed diversity and distribution in South Georgia.

- By digitising, georeferencing and imaging 155 seaweed specimens, we have partially achieved activity 1.2. The data for the digitised specimens is in the format for the NHM data portal where the information will be freely available. **Evidence:** Excel file: Catalogue\_AG.
- Samples for molecular work have been selected, and technical support and kit for this work is in place at the NHM for June-July. **Evidence:** Appendix 4. PI has corresponded with the molecular laboratory team.

**Output 2** Tools for monitoring, managing and researching South Georgia's inshore marine environment, founded upon baseline biodiversity knowledge.

- We have developed the basis of two of six tools which contribute to activities 1.5 and 2.4. **Evidence:** Fig. 2., Appendix 5, Word file South Georgia rough species guide May 2021.

**Output 3** Strengthened capacity for marine environmental protection and research in South Georgia, through training, knowledge transfer and public awareness raising.

- Amy Guest, who is based at SAERI in the Falkland Islands, has been able to become familiar with the seaweeds of South Georgia which contributes to activity 3.4, capacity building in seaweed ecology and identification. **Evidence:** Excel file: Catalogue\_AG, Word file South Georgia rough species guide May 2021.
- Initial planning has been initiated for the citizen science project. **Evidence:** Appendix 3.

### 3.3 Progress towards the project Outcome

**Outcome indicators** Inshore marine biodiversity conservation is strengthened because environmental policymakers, managers and researchers are using previously unavailable tools and data generated through a major advance in seaweed diversity baseline knowledge.

By:

- digitising, georeferencing and imaging 155 seaweed specimens, we are c. 1/3<sup>rd</sup> way towards the outcome of databasing c. 500 historical and contemporary species databased (indicator 0.1).
- starting the development of two tools to contribute to biodiversity knowledge and support long term monitoring (species ID guide and biodiversity hotspot maps) we are making progress towards the six tools (indicator 0.2).
- providing the opportunity for training in South Georgia seaweeds through 0.1 and 0.2, and planning for citizen science, we have started laying the foundations for capacity building (indicator 0.3).

At this early stage, we consider that the indicators are adequate and realistic for measuring achievement of the project Outcome. However, we will review this again once Amy has completed her second month and regularly once Rob Mrowicki begins in September 2021 and adjust the indicators accordingly. For example, once we have digitised all the collections and undertaken molecular work, we will have a better idea of the numbers of specimens and species we are dealing with. This will enable us to update numbers in the logframe accordingly. Once we have gathered more data, we will also be able to confirm whether six tools are suitable or whether we need to combine or develop more.

### 3.4 Monitoring of assumptions

The risks identified in the project proposal still hold true. The following assumptions cover some of the more critical risks identified:

Assumption 1: That the NHM continues to manage the budget and ensure financial security for the duration of the project.

Comments: The NHM is a long-established, internationally recognised institution.

Assumption 2: There will be no cuts to the Darwin Plus budget that affects the project in its lifetime.

Comments: There is no evidence that this but given the impact of COVID-19 on the economy, and the recent impact of cuts to UKRI projects supported by ODA funding, there is a potential risk that funding will be withdrawn from government-funded projects. Should this occur, the impact would depend on the level of cuts and stage in the project. The PI would be able to use her experience here for a UKRI-funded project to steer this through.

Assumption 3: That the project team remain available, particularly for the field work component when specialist knowledge and experience is required.

Comments: There is no evidence of this at present but contingencies will be raised by the PI once logistics of the field work are in place in the coming weeks.

Assumption 4: That COVID-19 does not impact further on the project.

Comments: This was a risk that was not anticipated in the proposal but it has had the biggest impact on the project. It is fortunate that we have been able to re-arrange everything and still run the project within the time-frame available, but we need to be mindful of the potential for further disruption and consider how we might have to adapt the project if the pandemic sets up new obstacles. The PI will develop contingencies with the team when they next meet.

#### **4. Project support to environmental and/or climate outcomes in the UKOTs**

As covered in the proposal, in summary here, this work directly addresses Objective 5 of the SGSSI Biodiversity Action Plan 2016–2020, i.e. “enhance knowledge of biodiversity and habitats” and “establishment of scientific baselines” and improving understanding of flora. The project contributes to the SGSSI Environment Charter. It also aligns with the SGSSI MPA and Monitoring Plan (RMP; DPLUS069 workshop). Results will support the UK Government’s Blue Belt programme, through “improved understanding of the biodiversity of the marine environment”, relevant to SGSSI’s sustainable fisheries. Results will contribute to Aichi Biodiversity Targets 9–11 and 19 (<https://www.cbd.int/sp/targets/>).

Whilst it is early days for the project the work that has been described above has already begun to enhance knowledge of biodiversity, establish a scientific baseline and improve understanding for the seaweed flora. We have also started the development of tools that can be applied in management of the South Georgia marine habitats.

#### **5. OPTIONAL: Consideration of gender equality issues**

Everything still holds that we wrote in the original proposal. We continue to be mindful of gender in this project and do our very best not to increase inequality. We are a small team of predominantly men, but the project is led by a woman. We have also been able to employ another woman, Amy Guest, and we hope that she will continue to take an interest in work beyond both her contract and the formal project.

#### **6. Monitoring and evaluation**

The PL (NHM) is responsible for the M&E work. The monitoring and evaluation of this year as it has been so short has been led primarily by the PL with assistance from Jonathan Gabriel (NHM research and consulting office) on the financial side and input from Rob Mrowicki and Paul Brickle on developing the field work logistics side. Once Rob Mrowicki joins the project in September 2021, monitoring and evaluation will be undertaken as outlined in the proposal and he will work with the PL on this. We will continue to have meetings of what is effectively the Project Management Group (PMG) as per before the start of the project with the pre-project meetings, which includes the project team plus members of SAERI directorate.

Evidence that Outputs and Activities are already contributing to the project Outcome have been outlined in detail in section 3 above and indicators of achievement supplied in appendices and attached files.

There have been no changes made to the M&E plan over the reporting period.

#### **7. Lessons learnt**

Again because of the shortness of the project so far, this is difficult to fully comment on. However, despite the impact of COVID-19, we have been able to restructure the project to ensure that it can run successfully. What worked well was that all the team came together outside the project and worked to make sure that the project could go ahead as originally

envisioned. There was also excellent cooperation from the Darwin team who helped us with this process. The NHM have also provided excellent support with us on these changes and in recruitment.

If we had to do it again, we would consider a greater range of risks that are out of our control (e.g. new pandemics, government cuts to research funding).

We would recommend that others doing similar projects do not get put off by obstacles in their way and that people keep the vision of their goals, to be ambitious with what they want to achieve but make sure there are tangible products that can stand as evidence for that. It is also important to not become too risk averse.

We will build this learning into the project by making sure that there is more attention paid to potential risks all the way through and to undertake more contingency planning. Such items can be built into meeting agendas so that they are kept in mind and considered at frequent intervals. For future plans, we would tackle risks and contingencies from the start of the planning and brainstorm with the team as many eventualities as possible.

## **8. Actions taken in response to previous reviews (if applicable)**

Not applicable.

## **9. Other comments on progress not covered elsewhere**

Nothing additional to add here that has not been covered elsewhere.

## **10. Sustainability and legacy**

With recent commencement of the project, we have put the news out on twitter about the project and that it has started. As well as anticipated social media exposure from all project partners, there are further activities in place later in the project to promote the work, notably a public talk, TV/radio interview and museum exhibits in the Falkland Islands (activity 3.1). Further, the knowledge transfer and dissemination activities planned for the final stages of the project (3.2-3.6), supported by the development of at least six management tools for stakeholders, are all still valid and will ensure the legacy of this project.

## **11. Darwin identity**

The Darwin Initiative has been promoted in and logo displayed at the 12<sup>th</sup> International Phycological Congress (IPC12). The PL gave a talk (co-author Rob Mrowicki) entitled: Taxonomic impediment or opportunity: documenting the Falkland Islands seaweed diversity as a case history. It was primarily based on the results of the DPLUS068 "Building foundations to monitor and conserve Falklands marine forest habitats"

The PL also raised setting up focus groups to work on tackling these taxonomic issues and this feeds into the development of a South Atlantic seaweed science group as mentioned in this South Georgia Darwin Plus proposal. Originally, it had been intended that Juliet would set up a workshop at IPC12 (activity 3.2) but as a result of COVID-19, the conference was held virtually, and it was not possible to organise the workshop at the time.

The GSGSSI and people associated with the territory (Falkland Islands in particular) are very familiar with the Darwin Initiative.

The partner organisations have effective Twitter accounts and @Darwin\_Defra are tagged in all posts for this project.

This grant and the Darwin Initiative is listed at <https://www.nhm.ac.uk/our-science/departments-and-staff/staff-directory/juliet-brodie.html>. We have also acknowledged funding by Darwin Plus grants DPLUS005 and DPLUS068 in our recent seaweed paper: Brodie, J., Melbourne, L.,

Mrowicki, R.J., Brickle, P., Russell, S., Scott, S. (2021). Biodiversity of *Corallina* species from Tristan da Cunha and the Falkland Islands: implications for South Atlantic biogeography. *European Journal of Phycology*, 56: 94-101 TEJP20 #10.1080/09670262.2020.1780635

## 12. Impact of COVID-19 on project delivery

The main impact on our project of COVID-19 has been a delay for the fieldwork. This was planned originally for December 2020. However, the territory was effectively closed to all work during that season. We therefore needed to delay the fieldwork by almost a year to November 2021. As a consequence, we had to shift the start date of the project from August 2020 to March 2021. This was covered in a Change Request form in June 2020.

As a consequence, the project officer Rob Mrowicki, was no longer able to take up the post until October 2021, which meant that we needed to employ another person (Amy Guest) to cover the two months that Rob could not do at the start of the project. Amy Guest is based in the Falkland Islands and it was therefore deemed not practical for her to come to the NHM during lockdown in March 2021. She therefore completed the first month remotely. She was due to complete the second month in April but as this involves the use of the NHM molecular labs, Amy will come to the UK to complete the second month from 21 June to 16 July. Rob will now start in September as the fieldwork expedition has had to be brought forward by a few weeks (subject of a Change Request, submitted 18<sup>th</sup> May 2021 – see also amended log frame, Annex 2).

We do not anticipate any further delays unless there are further restrictions that will affect the project as a result of the Indian COVID variant.

For health and safety, the NHM has put in place a wide range of measures to ensure that staff working on the premises are as safe as possible. All the information relating to this is available on the NHM intranet. This will primarily affect Amy Guest when she comes to work in the museum in June. As part of Amy's induction, she will be made fully aware of this. It is mandatory that she will also undergo health and safety training when she is working in the molecular labs and other areas of the museum. She will have had both vaccinations before travelling to the UK. The same will apply to Rob when he returns to the museum in September. The situation for the fieldwork in South Georgia will be assessed nearer the time and appropriate training/induction will be undertaken for the project partners that this will apply to.

It is not foreseen that any of our project outcomes or impacts will assist with the response to COVID-19 or reduce the risk of future pandemics. We do anticipate discovering new seaweed species in this project and there is the possibility that they or their associated microbiome may contain useful properties against viruses.

We had always planned to have virtual meetings because the project partners cover such a wide geographical area (Falkland Islands to Scotland) and we developed this way of working before for DPLUS068 "Building foundations to monitor and conserve Falklands marine forest habitats". It has enabled us to employ Amy remotely and whilst we do not anticipate this scenario arising in the course of this project, we would consider this again where possible. When we travel for fieldwork via the Falklands Islands, we maximise that time and plan training and outreach in addition to South Georgia. We will continue to meet virtually during the rest of the project. The NHM is introducing flexible working which also means that we will potentially not have to travel so much for work (although not sure how much difference this makes in the big scheme of things if using public transport or running houses).

## 13. Safeguarding

There have been no safeguarding violations during this financial year.

We note that when we wrote the original grant application, we were unable to check ***We have a safeguarding policy, which includes a statement of your commitment to safeguarding***

**and a zero tolerance statement on bullying, harassment and sexual exploitation and abuse.** The NHM has since reviewed its Bullying and Harassment policy and made some changes. On 18<sup>th</sup> May 2021 it was announced that a new policy will be rolled out to all staff: **Behaviour and Respect at Work – Policy and Procedure.** The PI will now inform the project team of this policy and it will be followed in practice for the project from now on. We will continue to be mindful of our safeguarding responsibilities throughout the project in order to fully protect vulnerable people and provide a safe and trusted environment as outlined below.

#### 14. Project expenditure

**Table 1: Project expenditure during the reporting period (1 April 2020 – 31 March 2021)**

<b>Project spend (indicative) in this financial year</b>	<b>2020/21 D+ Grant (£)</b>	<b>2020/21 Total actual D+ Costs (£)</b>	<b>Variance %</b>	<b>Comments (please explain significant variances)</b>
Staff costs				
Consultancy costs				
Overhead Costs				
Travel and subsistence				
Operating Costs				
Capital items				
Others (Please specify)				
<b>TOTAL</b>				



**Annex 1: Report of progress and achievements against Logical Framework for Financial Year 2020-2021 – if applicable**

Project summary	Measurable Indicators	Progress and Achievements April 2020 - March 2021	Actions required/planned for next period
<p><b>Impact</b></p> <p>South Georgia is recognised globally as a model for large-scale marine management, with robust long-term strategies founded upon rigorous scientific evidence, protecting unique ecosystems while sustaining fisheries, tourism and research.</p>		<p>At this very early stage, progress has been made towards laying the scientific foundations for the rest of the project – in particular, highlighting key taxonomic issues and indicating likely biodiversity hotspots on which to focus upcoming work.</p>	
<p><b>Outcome</b></p> <p>Inshore marine biodiversity conservation is strengthened because environmental policymakers, managers and researchers are using previously unavailable tools and data generated through a major advance in seaweed diversity baseline knowledge.</p>	<p>0.1. Major knowledge gaps filled for diversity and taxonomy of South Georgia seaweeds, with anticipated 100% increase in documented species, c. 500 historical and contemporary museum specimens databased, and reference collection of c. 1500 specimens established by end of project.</p> <p>0.2 At least 6 tools to support long-term monitoring and management of South Georgia's inshore marine environment, founded upon baseline seaweed biodiversity knowledge, developed by end of project.</p> <p>0.3 Management recommendations delivered to policymakers, scientists trained in seaweed identification, establishment of citizen science programme for visitors, increased public awareness of the importance of South Georgia's inshore marine biodiversity.</p>	<p>0.1 c. 155 contemporary specimens databased; main taxonomic inconsistencies flagged, and specimens selected for molecular analysis.</p> <p>0.2 Development of 2 tools (specimen database and species ID guide) initiated.</p> <p>0.3 South Atlantic seaweeds working group discussed with relevant colleagues and presented by PI during the IPC12 conference. However, establishment delayed due to IPC12 disruption.</p>	<p>0.1 Database c. 350 remaining specimens and resolve taxonomy through molecular analysis; establish new reference collection and obtain baseline scientific data on diversity and distribution during Nov-Dec 2021 field expedition.</p> <p>0.2 Continue development of specimen database and species ID guide/check-list; begin development of remaining tools (species distribution and habitat maps, indicator species report, electronic identification keys, Red Data and Important Seaweed Area assessments).</p> <p>0.3 Conduct outreach activities in the Falklands; liaise with partners, stakeholders and researchers to prepare policymakers handbook, ID training course, citizen science programme and academic papers.</p>
<p><b>Output 1.</b></p>	<p>1.1 C. 200 historical and 300 contemporary NHM South Georgia herbarium specimens digitised,</p>	<p>1.1 c. 30% of existing specimens databased (evidence: Excel file: Catalogue_AG, Appendix 5; section 3.2), remaining specimens marked up during previous Falklands project.</p>	

Project summary	Measurable Indicators	Progress and Achievements April 2020 - March 2021	Actions required/planned for next period
<b>Enhanced baseline knowledge of seaweed diversity and distribution in South Georgia.</b>	<p>georeferenced and imaged by Q4Y1 (Q2Y2 pending change request).</p> <p>1.2 Contemporary specimens (c. 160, collected 2011) identified through DNA sequencing to develop a taxonomic framework by Q1Y2 (Q3Y2 pending change request).</p> <p>1.3 Current distributions of at least 5 ecologically important seaweed species surveyed at &gt;30 sites around South Georgia by Q3Y2.</p> <p>1.4 Reference collection of South Georgia seaweeds (estimated 1500 specimens) established and databased by Q4Y2.</p> <p>1.5 Overall seaweed diversity inventoried and taxonomy of problematic groups resolved, likely increasing the number of known species in South Georgia to c. 227 by Q4Y3.</p>	<p>1.2 Specimens selected for molecular analysis based on taxonomic uncertainty and representativeness (evidence: Appendix 4; section 3.2).</p> <p>1.3 (Species distribution data to be collected during Q3Y2 field expedition.)</p> <p>1.4 (Reference collection specimens to be collected during Q3Y2 field expedition.)</p> <p>1.5 Specimen database has contributed to the preliminary species check-list (Appendix 4); known number of species is still expected to increase to c. 227 following field expedition and analysis of new specimens.</p>	
Activity 1.1 Database existing historical and contemporary herbarium specimens		c. 155 contemporary specimens databased and photographed.	Database remaining c. 350 specimens when access to herbarium is reinstated; collate data and format for NHM Data Portal submission.
Activity 1.2 DNA analysis of recent specimens; produce initial checklist and guide		c. 46 specimens (representatives from the initial database) selected for DNA extraction and sequencing.	Molecular work to commence in Q1Y2 (Amy Guest) and preliminary analysis finalised by Q3Y2 (Rob Mrowicki), prior to field expedition.
Activity 1.3 Survey distribution and abundance of seaweed and faunal species			Baseline data collection during field expedition in Q3Y2.

Project summary	Measurable Indicators	Progress and Achievements April 2020 - March 2021	Actions required/planned for next period
Activity 1.4 Identify, label and database new specimens; establish reference collection			Specimen collection during field expedition in Q3Y2, databased during Q4Y2.
Activity 1.5 Inventory seaweed diversity via molecular assisted taxonomy of new specimens			Cataloguing and molecular analysis of new specimens following field expedition in Q4Y2.
<b>Output 2.</b> <b>Tools for monitoring, managing and researching South Georgia's inshore marine environment, founded upon baseline biodiversity knowledge.</b>	<p>2.1 Potential inshore biodiversity hotspots and vulnerable habitats are identified, based on surveys at &gt;30 sites around South Georgia by Q2Y3.</p> <p>2.2 Maps of key seaweed-dominated habitats (e.g. kelp forests and coralline reefs) developed via ground-truthing existing fine-scale coastal maps for South Georgia by Q3Y3.</p> <p>2.3 Short- (10 yrs) and long-term (200 yrs) trends in seaweed diversity and distribution analysed to reveal species introductions, range contractions/expansions and shifts in community structure by Q3Y3.</p> <p>2.4 South Georgia seaweed species ID guide (including at least 150 key species) for researchers, managers and visitors, highlighting indicator and non-native species, published by Q4Y3.</p> <p>2.5 Electronic identification keys to common and conspicuous seaweed species developed for managers and citizen scientists by Q4Y3.</p> <p>2.6 Red Data List/Important Seaweed Area assessments and priority lists identifying potentially vulnerable and</p>	<p>2.1 Preliminary species density map produced from 2010 survey data (evidence: Figure 2).</p> <p>2.2 (Subtidal habitat survey data to be collected during Q3Y2 field expedition.)</p> <p>2.3 (Historical specimens to be databased during Q2Y2, contemporary species survey data to be collected during Q3Y2 field expedition.)</p> <p>2.4 Initial species list and images compiled (Word file: South Georgia rough species guide May 2021; section 3.2).</p> <p>2.5 (Electronic identification keys to be developed during Y3.)</p> <p>2.6 (Red Data, Important Seaweed Area and invasive species assessments to be developed during Y3.)</p> <p>2.7 Preliminary specimen database has been formatted for NHM Data Portal (evidence: Excel file: Catalogue_AG, Appendix 5; section 3.2).</p>	

Project summary	Measurable Indicators	Progress and Achievements April 2020 - March 2021	Actions required/planned for next period
	invasive species presented to managers and policy-makers by Q4Y3. 2.7 All data and reports made publicly available through open access repositories by end of project.		
Activity 2.1. Identify inshore biodiversity hotspots and vulnerable habitats		Preliminary species density map provides a basis for survey planning and spatial data collection.	Baseline species distribution and habitat data collection during field expedition in Q3Y2, analysed from Q4Y2.
Activity 2.2. Map seaweed-dominated habitats (kelp forests and coralline reefs)			Baseline data collection during field expedition in Q3Y2.
Activity 2.3 Analyse temporal trends in seaweed diversity and distribution			Database remaining specimens in Q2Y2, analyse temporal data from Q4Y2 onwards.
Activity 2.4 Write and publish ID guide for South Georgia seaweeds		Initial list of 75 species and images prepared using databased specimens.	Produce preliminary ID guide through molecular analysis in Q3Y2, conduct detailed molecular analysis and develop ID guide from Q4Y2 onwards.
Activity 2.5 Develop electronic identification keys to common and conspicuous seaweeds			Develop electronic identification keys from Q2Y3 onwards.
Activity 2.6 Conduct Red List and ISA assessments; produce species/site priority lists			Conduct Red List and Important Seaweed Area assessments from Q2Y3 onward.
Activity 2.7 Upload data and reports to open access repositories		Pre-formatting of specimen data for NHM Data Portal completed.	Submit project data to repositories in Q4Y3.
<b>Output 3. Strengthened capacity for marine environmental protection and research in South Georgia, through</b>	3.1 Raised public awareness of the importance of seaweeds, via a public talk (>15 attendees), TV/radio interviews and museum exhibition in the Falklands during Q3Y2.	3.1 (Outreach activities to be conducted in Q3Y2.) 3.2 PI has liaised with potential members of the science working group. 3.3 (Information synthesis to be done in Y3.) 3.4 (Training course and policy workshop to take place in Y3.)	

Project summary	Measurable Indicators	Progress and Achievements April 2020 - March 2021	Actions required/planned for next period
<b>training, knowledge transfer and public awareness raising.</b>	<p>3.2 South Atlantic seaweed science working group established remotely during the course of the project via remote workshops commencing prior to start of project.</p> <p>3.3 Seaweed biodiversity information synthesised and disseminated to stakeholders by Q3Y3.</p> <p>3.4 GSGSSI, BAS and SMSG staff and other stakeholders trained in seaweed ecology and identification coupled with policy-orientated workshop, attended by at least 10 government and non-government stakeholders, held in the UK during Q3Y3</p> <p>3.5 Scientific results disseminated via at least two open access peer-reviewed articles and presentations at one UK and one international phycology conference by Q3Y3.</p> <p>3.6 Citizen science programme developed for visitors, delivered through tour operators and cruise companies, and taken up by at least one tour company by end of project.</p>	<p>3.5 (Scientific articles and conference presentations to be prepared in Y3.)</p> <p>3.6 The first planning meeting for citizen science programme with IAATO has taken place (evidence: Appendix 3; Section 3.2).</p>	
Activity 3.1 Public talk and TV/radio interviews; set up museum exhibition			Outreach activities will be organised prior to the field expedition in Q3Y2.
Activity 3.2 Establish South Atlantic seaweed science working group			PI will liaise further with international phycologists to outline proposed work programmes in Y2.
Activity 3.3 Synthesise and disseminate biodiversity information to stakeholders			Stakeholder handbook developed from Q2Y3 onwards.

Project summary	Measurable Indicators	Progress and Achievements April 2020 - March 2021	Actions required/planned for next period
Activity 3.4 Conduct ID training and policy-orientated workshop with stakeholders			Training course and workshop held in Q3Y2.
Activity 3.5 Disseminate scientific results via peer-reviewed articles and conference presentations			Presentation at BPS UK meeting in Q4Y2, coinciding with preparation of first journal article.
Activity 3.6 Develop and implement citizen science programme			Further citizen science planning with IAATO in Y2.

## Annex 2: Project's full current logframe as presented in the application form (unless changes have been agreed) - if applicable

*N.B. if your application's logframe is presented in a different format in your application, please transpose into the below template. Please feel free to contact [Darwin-Projects@ltsi.co.uk](mailto:Darwin-Projects@ltsi.co.uk) if you have any questions regarding this.*

### 15. Logframe template for submission with Change Request Form

Please present your latest agreed logframe in this format and make **all** suggested changes in tracked changes. If the logframe has gone through multiple rounds of internal review, please create a new version with final changes marked as clearly as possible.

Project summary	Measurable Indicators	Means of verification	Important Assumptions
<b>Impact:</b> South Georgia is recognised globally as a model for large-scale marine management, with robust long-term strategies founded upon rigorous scientific evidence, protecting unique ecosystems while sustaining fisheries, tourism and research.			
<p>Outcome: (Max 30 words)</p> <p>Inshore marine biodiversity conservation is strengthened because environmental policymakers, managers and researchers are using previously unavailable tools and data generated through a major advance in seaweed diversity baseline knowledge.</p>	<p>0.1. Major knowledge gaps filled for diversity and taxonomy of South Georgia seaweeds, with anticipated 100% increase in documented species, c. 500 historical and contemporary museum specimens databased, and reference collection of c. 1500 specimens established by end of project.</p> <p>0.2 At least 6 tools to support long-term monitoring and management of South Georgia's inshore marine environment, founded upon baseline seaweed biodiversity knowledge, developed by end of project.</p> <p>0.3 Management recommendations delivered to policymakers, scientists trained in seaweed identification, establishment of citizen science programme for visitors, increased public awareness of the importance of South Georgia's inshore marine biodiversity.</p>	<p>0.1 Specimen database records and photographs ('virtual herbarium' and DNA archive); comprehensive species checklists; new species descriptions in scientific literature.</p> <p>0.2 Illustrated species ID guide; priority species keys and information pamphlet; seaweed habitat and biodiversity hotspot maps, ISA site descriptions, Red Data List and indicator/non-native species guide; open access data repository records.</p> <p>0.3 Handbook for environmental managers and policymakers; knowledge transfer workshop proceedings; citizen science programme materials and data records; films, radio broadcasts and other media used for public outreach.</p>	<p>Project partner institutions remain centres of excellence for organismal biology and South Atlantic marine environmental research.</p> <p>Key project personnel remain in post for duration of project, and science and management staff are available.</p> <p>Travel and field-based activities are not restricted by weather, logistical issues, or ongoing impact of COVID-19, and relevant visiting and research permits are granted.</p> <p>Public engagement activities are taken up, and local capacity is maintained long-term via staff continuity and/or knowledge transfer.</p> <p>Online data repositories continue to be freely accessible.</p>

<p><b>Output 1</b></p> <p><b>Enhanced baseline knowledge of seaweed diversity and distribution in South Georgia.</b></p>	<p>1.1 C. 200 historical and 300 contemporary NHM South Georgia herbarium specimens digitised, georeferenced and imaged by Q4Y1 Q2Y2.</p> <p>1.2 Contemporary specimens (c. 160, collected 2011) identified through DNA sequencing to develop a taxonomic framework by Q4Y2 Q3Y2.</p> <p>1.3 Current distributions of at least 5 ecologically important seaweed species surveyed at &gt;30 sites around South Georgia by Q3Y2.</p> <p>1.4 Reference collection of South Georgia seaweeds (estimated 1500 specimens) established and databased by Q4Y2.</p> <p>1.5 Overall seaweed diversity inventoried and taxonomy of problematic groups resolved, likely increasing the number of known species in South Georgia to c. 227 by Q4Y3.</p>	<p>1.1 NHM Data Portal records and photographs.</p> <p>1.2 Molecular analysis results; initial species checklist and identification guide based on current taxonomy.</p> <p>1.3 Species distribution maps.</p> <p>1.4 Labelled NHM herbarium specimens; NHM Data Portal records and photographs ('virtual herbarium').</p> <p>1.5 Report containing phylogenetic trees and DNA barcoding results; full species checklist highlighting previously undocumented taxa; scientific journal article containing descriptions of new species.</p>	<p>DNA extraction and sequencing methods are successful for a representative range of novel taxa.</p> <p>NHM herbarium and molecular lab technical support staff remain available and that there is sufficient lab time due to COVID-19 restrictions on access.</p> <p>Travel to South Georgia (via the Falklands) is not prevented by political, logistical issues or ongoing COVID-19 impacts.</p> <p>Access to field sites and completion of survey activities are not restricted by weather conditions or impact of COVID-19.</p>
<p><b>Output 2</b></p> <p><b>Tools for monitoring, managing and researching South Georgia's inshore marine environment, founded upon baseline biodiversity knowledge.</b></p>	<p>2.1 Potential inshore biodiversity hotspots and vulnerable habitats are identified, based on surveys at &gt;30 sites around South Georgia by Q2Y3.</p> <p>2.2 Maps of key seaweed-dominated habitats (e.g. kelp forests and coralline reefs) developed via ground-truthing existing fine-scale coastal maps for South Georgia by Q3Y3.</p> <p>2.3 Short- (10 yrs) and long-term (200 yrs) trends in seaweed diversity and distribution analysed to reveal species introductions, range</p>	<p>2.1 GIS consensus maps of seaweed and faunal diversity and community structure; field expedition report and survey data.</p> <p>2.2 Refined habitat maps for kelp forests and coralline reefs; WebGIS spatial data layers (SAERI IMS-GIS Data Centre and BAS South Georgia GIS).</p> <p>2.3 Contemporary and historical species distribution maps; report summarising indicator species.</p>	<p>Quantity and reliability of identity/locality data associated with historical specimens are sufficient for robust temporal and spatial analyses.</p> <p>Suitably-trained SMSG volunteers provide the required capacity for combining specimen collection with detailed quantitative surveys.</p> <p>Tools including printed and electronic seaweed identification guides, Red Data List, Important Seaweed Areas, non-native species list are all</p>



	<p>contractions/expansions and shifts in community structure by Q3Y3.</p> <p>2.4 South Georgia seaweed species ID guide (including at least 150 key species) for researchers, managers and visitors, highlighting indicator and non-native species, published by Q4Y3.</p> <p>2.5 Electronic identification keys to common and conspicuous seaweed species developed for managers and citizen scientists by Q4Y3.</p> <p>2.6 Red Data List/Important Seaweed Area assessments and priority lists identifying potentially vulnerable and invasive species presented to managers and policy-makers by Q4Y3.</p> <p>2.7 All data and reports made publicly available through open access repositories by end of project.</p>	<p>2.4 Published ID guide.</p> <p>2.5 Electronic keys published via website and mobile app.</p> <p>2.6 Management recommendations report with details of priority species and sites.</p> <p>2.7 NHM Data Portal and SAERI IMS-GIS Data Centre uploads; BAS South Georgia GIS spatial data layers; GenBank accession numbers; data portal download requests.</p>	<p>dependent on the checklist based on the most up to date taxonomy.</p>
<p><b>Output 3</b></p> <p><b>Strengthened capacity for marine environmental protection and research in South Georgia, through training, knowledge transfer and public awareness raising.</b></p>	<p>3.1 Raised public awareness of the importance of seaweeds, via a public talk (&gt;15 attendees), TV/radio interviews and museum exhibition in the Falklands during Q3Y2.</p> <p>3.2 South Atlantic seaweed science working group established remotely during the course of the project via remote workshops commencing prior to start of project.</p> <p>3.3 Seaweed biodiversity information synthesised and disseminated to stakeholders by Q3Y3.</p> <p>3.4 GSGSSI, BAS and SMSG staff and other stakeholders trained in seaweed</p>	<p>3.1 Presentation slides; recorded FITV/Falklands Radio broadcasts; display specimens at Falkland Islands Museum.</p> <p>3.2 Remote workshop attendance list; meeting minutes and proceedings; document outlining proposed work programmes.</p> <p>3.3 Handbook for stakeholders, including biodiversity metrics (e.g. proportions of endemics vs. non-natives, species shared with other territories).</p> <p>3.4 Presentation slides; course attendance list; participant feedback</p>	<p>There is sufficient interest among stakeholders (researchers, managers and visitors) for uptake of training activities and public engagement.</p> <p>International stakeholders and government representatives are available for a joint meeting.</p> <p>Information on biodiversity and status of seaweed habitats is recognised as an important contribution to future spatial management strategies.</p> <p>All stakeholders have long-term access to data repositories, which will be maintained into the future.</p>

	<p>ecology and identification coupled with policy-orientated workshop, attended by at least 10 government and non-government stakeholders, held in the UK during Q3Y3</p> <p>3.5 Scientific results disseminated via at least two open access peer-reviewed articles and presentations at one UK and one international phycology conference by Q3Y3.</p> <p>3.6 Citizen science programme developed for visitors, delivered through tour operators and cruise companies, and taken up by at least one tour company by end of project.</p>	<p>forms; workshop meeting minutes and outcome report.</p> <p>3.5 Submitted manuscript(s) for peer-reviewed articles; online article access/sharing metrics; presentation slides; conference proceedings and abstract booklets.</p> <p>3.6 Letter of commitment by tour company; species ID leaflet and accompanying video; uploaded data records; blogs and social media posts.</p>	
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**Activities** (each activity is numbered according to the output that it will contribute towards, for example, 1.1, 1.2 and 1.3 are contributing to Output 1)

- 1.1 Database existing historical and contemporary herbarium specimens
- 1.2 DNA analysis of recent specimens; produce initial checklist and guide
- 1.3 Survey distribution and abundance of seaweed and faunal species
- 1.4 Identify, label and database new specimens; establish reference collection
- 1.5 Inventory seaweed diversity via molecular assisted taxonomy of new specimens
  
- 2.1 Identify inshore biodiversity hotspots and vulnerable habitats
- 2.2 Map seaweed-dominated habitats (kelp forests and coralline reefs)
- 2.3 Analyse temporal trends in seaweed diversity and distribution
- 2.4 Write and publish ID guide for South Georgia seaweeds
- 2.5 Develop electronic identification keys to common and conspicuous seaweeds
- 2.6 Conduct Red List and ISA assessments; produce species/site priority lists
- 2.7 Upload data and reports to open access repositories
  
- 3.1 Public talk and TV/radio interviews; set up museum exhibition
- 3.2 Establish South Atlantic seaweed science working group
- 3.3 Synthesise and disseminate biodiversity information to stakeholders
- 3.4 Conduct ID training and policy-orientated workshop with stakeholders
- 3.5 Disseminate scientific results via peer-reviewed articles and conference presentations
- 3.6 Develop and implement citizen science programme

## Checklist for submission

	Check
<b>Is the report less than 10MB?</b> If so, please email to <a href="mailto:Darwin-Projects@ltsi.co.uk">Darwin-Projects@ltsi.co.uk</a> putting the project number in the Subject line.	Yes
<b>Is your report more than 10MB?</b> If so, please discuss with <a href="mailto:Darwin-Projects@ltsi.co.uk">Darwin-Projects@ltsi.co.uk</a> about the best way to deliver the report, putting the project number in the Subject line.	No
<b>Have you included means of verification?</b> You should not submit every project document, but the main outputs and a selection of the others would strengthen the report.	Yes
<b>Do you have hard copies of material you need to submit with the report?</b> If so, please make this clear in the covering email and ensure all material is marked with the project number. However, we would expect that most material will now be electronic.	No
Have you involved your partners in preparation of the report and named the main contributors	Yes
Have you completed the Project Expenditure table fully?	Yes
Do not include claim forms or other communications with this report.	