Darwin Plus:
Overseas Territories Environment and Climate Fund

Final Report

*To be completed with reference to the "Writing a Darwin Report" guidance: (http://www.darwininitiative.org.uk/resources-for-projects/reporting-forms). It is expected that this report will be a **maximum** of 20 pages in length, excluding annexes)*

Darwin Project Information

Project reference	DPLUS065
Project title	Mapping Falklands and South Georgia coastal margins for spatial planning
Territory(ies)	Falkland Islands, South Georgia
Lead organisation	SAERI
Partner institutions	Oregon State University, Joint Nature Conservation Committee, Shallow Marine Surveys Group Ltd, Falkland Islands Government, Government of South Georgia & the South Sandwich Islands.
Grant value	£278,696
Start/end date of project	April 2017 – November 2019
Project leader name	Dr Paul Brickle
Project website/Twitter/blog etc.	http://www.south-atlantic-research.org/research/terrestrial-science/coastal-mapping-project/ #SouthAtlanticCoastalMapping @SAERI_FI (Twitter) @S4ERI (Facebook)
Report author(s) and date	Neil Golding & Bran Black, November 2019.

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1 Project Overview

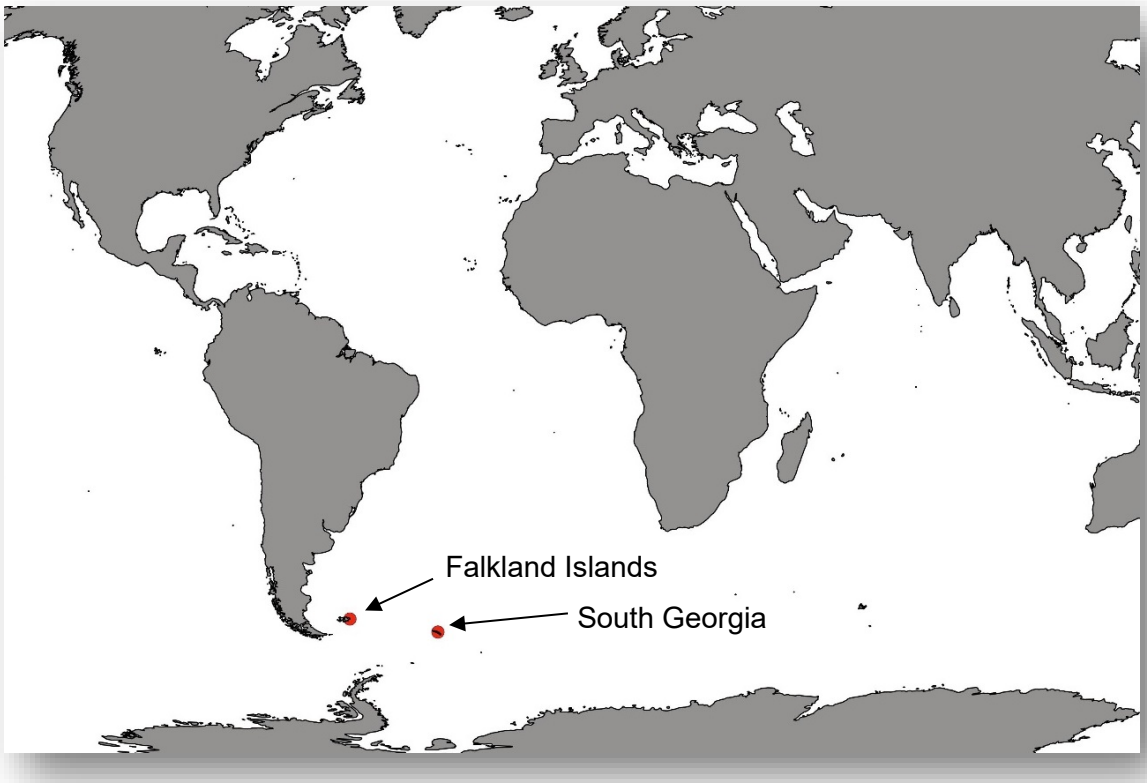

Figure 1.1: Location of the Falkland Islands and South Georgia in the South Atlantic. Map projection World Robinson

The DPLUS065 Coastal Habitat Mapping project focussed on two United Kingdom Overseas Territories (UKOTs); the Falkland Islands and South Georgia (**Figure 1.1**). The Falkland Islands are an archipelago consisting of two main Islands (East and West Falkland) and 778 smaller islands, with a total land area of approximately 4,700 sq. m. (12,173 sq. km), just over half the size of Wales in the UK. The capital is called Stanley, and is home to three quarters of the population (**Figure 1.2**). Everything outside of Stanley is known locally as “Camp”, and is home to numerous farms and settlements spread across the archipelago. The islands are administered by the Falkland Islands Government (FIG), and is the largest employer in the islands.

South Georgia is approximately 900 miles to the east of the Falkland Islands. First discovered by Captain James Cook in 1775, there is no permanent human population on the island, due to its remote location and inhospitable environment. Nevertheless, a year round presence is maintained by the Government of South Georgia & the South Sandwich Islands (GSGSSI) and the British Antarctic Survey (BAS). Two research stations operate on South Georgia located at King Edward Point (KEP), in the island’s centre and on Bird Island, lying off the north-west tip of South Georgia (**Figure 1.3**). KEP is the base for the islands administration and applied fisheries research, while on Bird Island scientists and support staff focus on research into bird and seal biology. South Georgia is a haven for a vast array of wildlife. As you can see from the image, South Georgia is extensively covered in glaciers and snow. Its polar climate gives it short and very cold summers, and long, freezing and overcast winters. The rugged landscapes of the island are often said to leave visitors in awe, with two mountain ranges dominating - the Allardyce towards the middle of the island and Salvesen in the south.

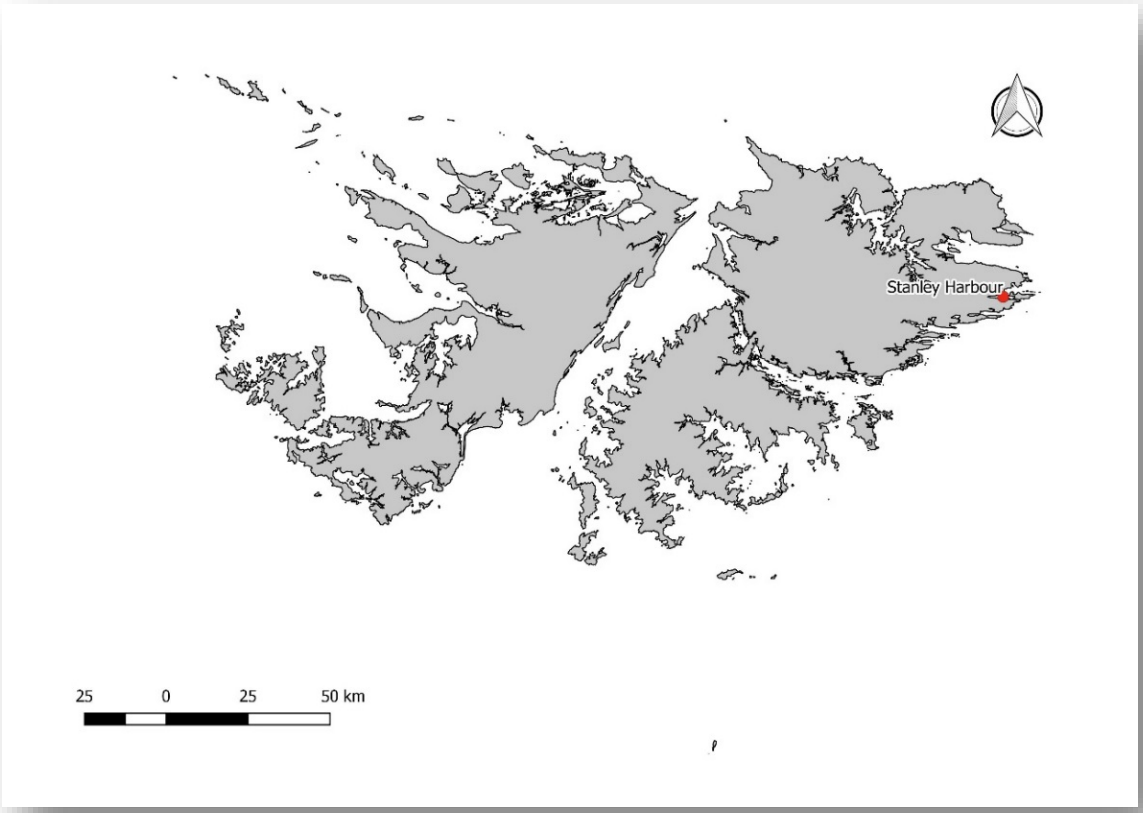

Figure 1.2: Falkland Islands, South Atlantic. The location of Stanley is indicated with a red dot. Map projection WGS84 UTM 21S

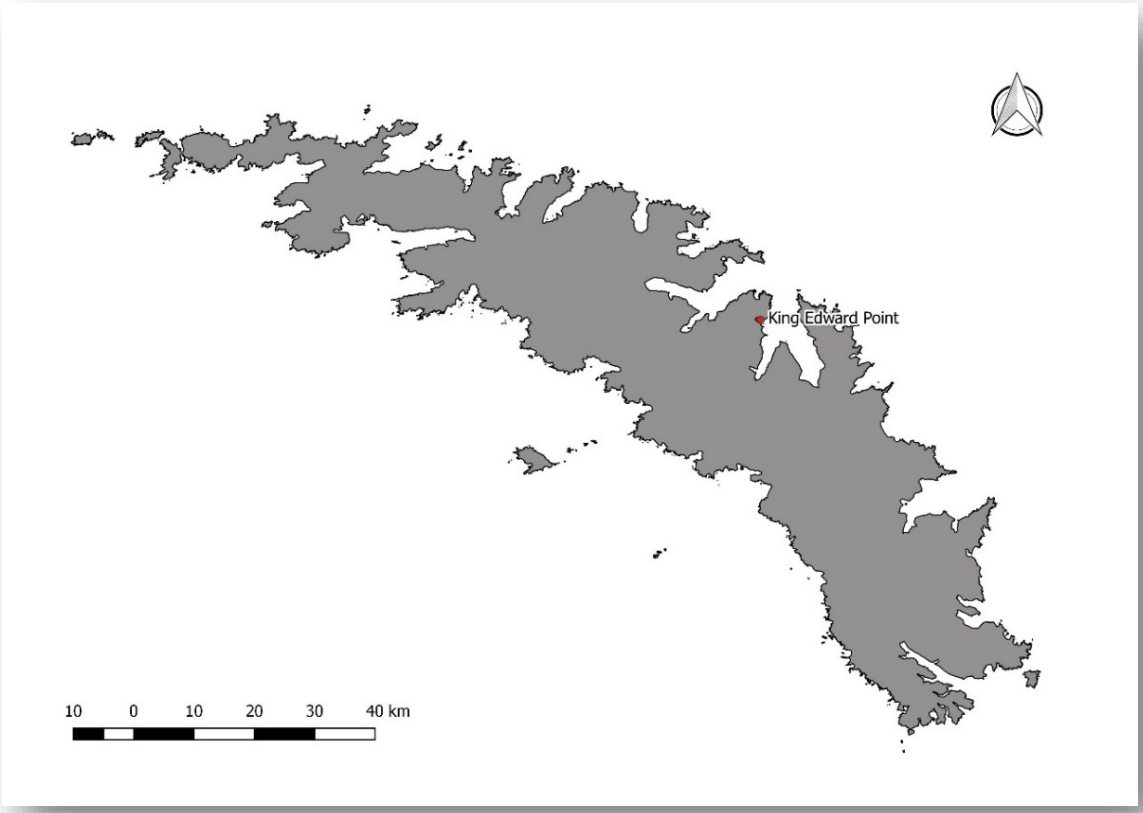

Figure 1.3: South Georgia, South Atlantic. The location of King Edward Point research station is indicated with a red dot. Map projection WGS84 South Georgia Lambert

The coastal and inshore marine ecosystems and resources of the Falkland Islands and South Georgia play an important role in these two UKOTs. From their historical role as a safe harbour, source of food, and forage for livestock, to their present importance for fishing and wildlife-based tourism revenues, the diverse range of ecosystem services provided by the coast and the sea, among other things, defines these islands. Knowledge of these coastal environments is essential for their effective conservation and management, and yet they have been subject to little in-depth study. In summary, comprehensive broad-scale and fine-scale coastal habitat maps, which would form an important baseline (from which to measure future change for example), are lacking.

The challenge for this project was to fill this critical gap in coastal knowledge. The challenge was relevant to both FIG and the GSGSSI, demonstrated by the various plans and policies in place to try to address this lack of coastal environmental knowledge. These include the Islands Plan 2014-2018 (FIG), the Falkland Islands Biodiversity framework (FIG) and the Biodiversity Action Plan for SGSSI 2016-2020 (GSGSSI).

To deal with this challenge, the project sought to use freely available Earth Observation (EO) data (primarily in the form of Sentinel-2 medium resolution satellite imagery) along with other relevant data layers to develop broad-scale (Stage 1) coastal habitat (land cover) models/maps, using machine-learning techniques on the Google Earth Engine platform. Where there were significant uncertainties in habitat classifications, or where stakeholders deemed it a priority (from a spatial and/or temporal perspective), fine-scale (Stage 2) coastal habitat models/maps were developed. These were based on very high-resolution satellite imagery (e.g. WorldView 2-4) or very high resolution aerial imagery gathered using drone technology.

As a result of the project, these ‘satellite-derived’, island-wide broad-scale habitat maps, a ‘first’ for both the Falkland Islands and South Georgia, supplemented with nested, fine-scale habitat maps in specific locations, now form an effective baseline against which to monitor change, providing a sound basis for planning, decision making and future monitoring. They also enhance the evidence-base available for decisions around systematic conservation planning and sustainable use of the terrestrial and marine habitats that support the ecology and economy of the Falkland Islands and South Georgia.

The project has also established frameworks and systems for the Islands to allow these maps to be updated in years to come, as well as dealing and resolving the challenge of needing to manipulate and analyse large satellite datasets in Territories with notoriously poor and expensive internet connectivity. This was tackled by utilising cloud-computing technology, negating the need to transfer large satellite imagery files.

The new information generated by this project will feed into the Marine Spatial Planning process that was established on the Falkland Islands through DPLUS027. The legacy of these established modelling and mapping frameworks and systems will improve the ability to manage the remote coastal margin areas in the Falklands and South Georgia, through using satellite and drone imagery to detect changes over time, and identify areas under threat.

2 Project Stakeholders/Partners

Falkland Islands Government (FIG) was a primary stakeholder, and project partner, for the Falkland Islands, through their responsibilities defined in their Biodiversity Framework 2016-2030 (BioFrame), research permitting and spatial planning policies. FIG were involved at the initial project planning conception and phase to ensure that the project outputs delivered their requirements. This engagement and involvement was critical to the success of the project, and its legacy.

The **Government of South Georgia & the South Sandwich Islands (GSGSSI)** was a primary stakeholder, and project partner for South Georgia. They were also involved at the project conception and planning phase, and in light of their responsibilities under their Biodiversity Action Plan for SGSSI: 2016-2020, they had key priorities they required the project to focus on – again having their engagement at this early stage ensured that the project could deliver exactly what was required for the GSGSSI.

The remaining project partners (**Oregon State University (OSU), Shallow Marine Surveys Group (SMSG) and Joint Nature Conservation Committee (JNCC)**) were all involved during the project conception and planning process. These off-island partners have been important to the project, bringing technical guidance as well as links to new and emerging technology.

All project partners (**SAERI, Oregon State University (OSU), Falkland Islands Government (FIG), Government of South Georgia & the South Sandwich Islands (GSGSSI), Shallow Marine Surveys Group (SMSG) and Joint Nature Conservation Committee (JNCC)**) form the Project Management Group (PMG). The PMG met quarterly to monitor and steer the project, take decisions on the project direction and ensure it aligned with the project proposal document, provided technical advice, and to ensure it delivered its outputs on time, and on budget. Over the course of the project, there were nine PMG meetings. The PMG had an agreed Terms of Reference, which along with the Approved Minutes from the meetings, are available to download from the project webpage, under the Document Download Area[1].

As mentioned above, since the project conception, the UKOT governments i.e. **Falkland Islands Government (FIG)** and the **Government of South Georgia & the South Sandwich Islands (GSGSSI)**, both primary stakeholders who will be key users of the final project outputs have been heavily involved; their support, both financial and in-kind, proved invaluable to the success of the project. The project received financial support through the **FIG** Environmental Studies Budget for each of the three financial years. **GSGSSI** supported the project through provision of a berth on the *FPV Pharos SG* for the 2017 South Georgia field expedition. They also supported the 2019 South Georgia field expedition, facilitating with the permitting process to enable drones to be used on South Georgia to collect very high-resolution aerial imagery in visitor and non-visitor sites and waiving visitor landing fees for the project participants during the expedition.

From a legacy perspective, having the Governments from both Territories actively engaged in the conceptualising, planning and management of the project was critical to the project's success. In addition, through integrating both Governments into the "*From Satellites to Drones: Earth Observation & Habitat Mapping Training Workshop*" that was run in the last year of the project (they built institutional knowledge and capacity, and will be able to provide leadership into the future to ensure that the tools and frameworks developed through the project can be utilised after the close of the project.

Stakeholder engagement has been important in raising awareness of the project. Stakeholder gatherings were held throughout the duration of the project; a dedicated Project Stakeholder Group (PSG) was established, complete with its own terms of reference. These were in addition to the quarterly PMG meetings. These stakeholder gatherings either took the form of round table meetings or workshop format; minutes, presentations and workshop reports are available on the

[1] https://www.south-atlantic-research.org/research/terrestrial-science/coastal-mapping-project/coastal-mapping-project-download-area/

project website[2]. Workshops for both the Falkland Islands and South Georgia stakeholders formed a critical part of the fine-scale mapping prioritisation process. The "*From Satellites to Drones: Earth Observation & Habitat Mapping Training Workshop*" was also a very successful way to engage the wider stakeholder community, whilst also building on the project legacy. These workshops are discussed in more detail in Section

Stakeholders were involved and informed, prior to the planning stage, through a concept note highlighting data gaps, issues and solutions. Stakeholder feedback ensured that the project design was a locally-led, iterative process. Falklands Conservation (FC), a key Falklands stakeholder, provided a letter of support for the project. FC along with the FIG Fisheries Department formed part of the PSG. Individuals on-island who were interested in learning about remote sensing and its application to developing long-term monitoring programmes were also an important stakeholder group. These individuals were identified during the course of the project, with many taking part in both the Shackleton Scholar fortnight of drone events and the training workshops.

In summary, the project had an exceptional level of stakeholder engagement, which resulted in a significant amount of stakeholder support, opportunities to identify synergies, and discuss and implement unique collaborations (a good example being the minefield mapping collaboration with **SafeLane Global** and the **UK Foreign & Commonwealth Office**).

The project has been extremely effective at drawing on expertise and collaborating with partners, reaching out to the wider stakeholder network outside of the Project Stakeholder Group to include local Falkland Island landowners, farm managers as well as regional and international groups linked to both UK Overseas Territories.

Details of notable engagement with (non-partner) stakeholders are provided and included Falklands Conservation, British Antarctic Survey, International Association of Antarctica Tour Operators, UN Environment World Conservation Monitoring Centre, UK Foreign & Commonwealth Office, SafeLane Global, South Georgia Association, Cambridge University: Cambridge Archaeological Unit, Wildlife Conservation Society, South Georgia Heritage Trust, SpringCreek Conservation, Iridium Communications, Falkland Islands Government Department of Agriculture, Falkland Islands Fire & Rescue Service and a wide range of Falkland Islands landowners. Evidence is provided/referenced in where relevant.

2.1 Links with other Darwin projects (and other work)

Throughout the duration of the project, the Project Manager has fostered links with a number of other Darwin Initiative funded projects (and other relevant projects), both within and outside the Falkland Islands and South Georgia in order to share ideas, knowledge, experience and data. These included the Darwin+ projects DPLUS071, DPLUS083, DPLUS068 & DPLUS080 as well as a PhD student based at the University of Oxford. These are listed in

2.2 Key achievements, lessons & challenges when engaging with the stakeholders?

Over the course of the project, one key achievement has been the sheer scale of the Falklands community engagement; the project has taken every opportunity to engage with the wider public in the Falkland Islands. Some specific examples are:

- **Shackleton Scholarship Fund: two week programme of events** – The PM was successful in his application to the Shackleton Scholarship Fund application to get a drone expert down to the Falklands. The PM was successful in securing of grant funds. The PM and Shackleton Scholar worked together within the community to promote how drones, when used safely, can really benefit science, education and more. The resulting

[2] https://www.south-atlantic-research.org/research/terrestrial-science/coastal-mapping-project/coastal-mapping-project-download-area/

series of events run by Nicole Durfee and the PM jointly was well received and well attended by the wider public. Further information can be found in

- **Falkland Girl Guides** – The PM wrote a letter of support to the **Falkland Islands Government** in support of their Environmental Studies Budget application to visit Bleaker Island to undertake some conservation orientated activities. As part of this visit, the Girl Guides collected ground validation data from Bleaker Island for inclusion in the Falklands broad-scale habitat model/map.
- **Infant & Junior School (IJS), Stanley** – The PM visited IJS in July 2018 as part of their Science Week and with his colleague, made an informative presentation on marine forests (kelp forests) which are a vitally important marine habitat around the Falklands coastline, and one of the habitats being mapped as part of DPLUS065. As part of this session, the PM was able to provide some background to the Darwin + Coastal Habitat Mapping project (see **Figure 2.1**)

Figure 2.1: Getting involved with Science Week at Stanley Infant & Junior School.

- **Chamber of Commerce public talk** – The PM gave a public talk about the DPLUS065 project at the Chamber of Commerce on 27th November 2018, and there was very good attendance, despite it being a warm, sunny evening, which usually leads to reduced participation in such events. (**Figure 2.2)**

Figure 2.2: Public Talk - presenting an update on the DPLUS065 Coastal Habitat Mapping project at the Chamber of Commerce.

- **South Georgia from the air, land and sea, Harbour Lights Cinema, Stanley -** On the evening of 30th September 2019, the PM gave the inaugural public talk at the new cinema, which had recently opened in Stanley. The presentation covered the project's expedition to South Georgia in February/March 2019. The event was a resounding success, with all 54 seats in the cinema booked. The Governor of the Falkland Islands, and Commissioner of South Georgia, His Excellency Nigel Phillips CBE also attended (**Figure 2.3**)

Figure 2.3: South Georgia from the air, land and sea. A public talk at the Harbour Lights Cinema, Stanley.

- **Falklands Conservation Ball auction prize – September 2019**

The project team donated a mounted acrylic print of a Sentinel-2 satellite image (**Figure 2.4**), used as the basis for the South Georgia broad-scale habitat map developed under, for a charity auction organised by Falklands Conservation. The image contained modified Copernicus Sentinel data (2018), processed by ESA, CC BY-SA 3.0 IGO. The image was on display in a local hotel with other artwork for over a week before the auction, and was accompanied by a short text describing how it had been used as part of the Darwin DPLUS065 Coastal Habitat Mapping project. Therefore, the project received a significant amount of public exposure through this process.

Figure 2.4: South Georgia from space: a mounted Sentinel-2 satellite image, used as the basis for the South Georgia broad-scale habitat map (Output 3) donated by the project team for a charity auction in Stanley in September 2019.

- **Falkland Islands Museum Trust – October 2019**

The project team also donated a duplicate of this mounted acrylic print of a Sentinel-2 satellite image used as the basis for the South Georgia broad-scale habitat map developed under to the Falkland Islands Museum Trust. The image is now on permanent display at the museum in Stanley (**Figure 2.5**), complete with a short piece of text describing how it had been used as part of the Darwin DPLUS065 Coastal Habitat Mapping project. Even after the project has finished, this image will leave a lasting legacy to the Darwin project as well as being seen by many visitors to the museum over the coming years.

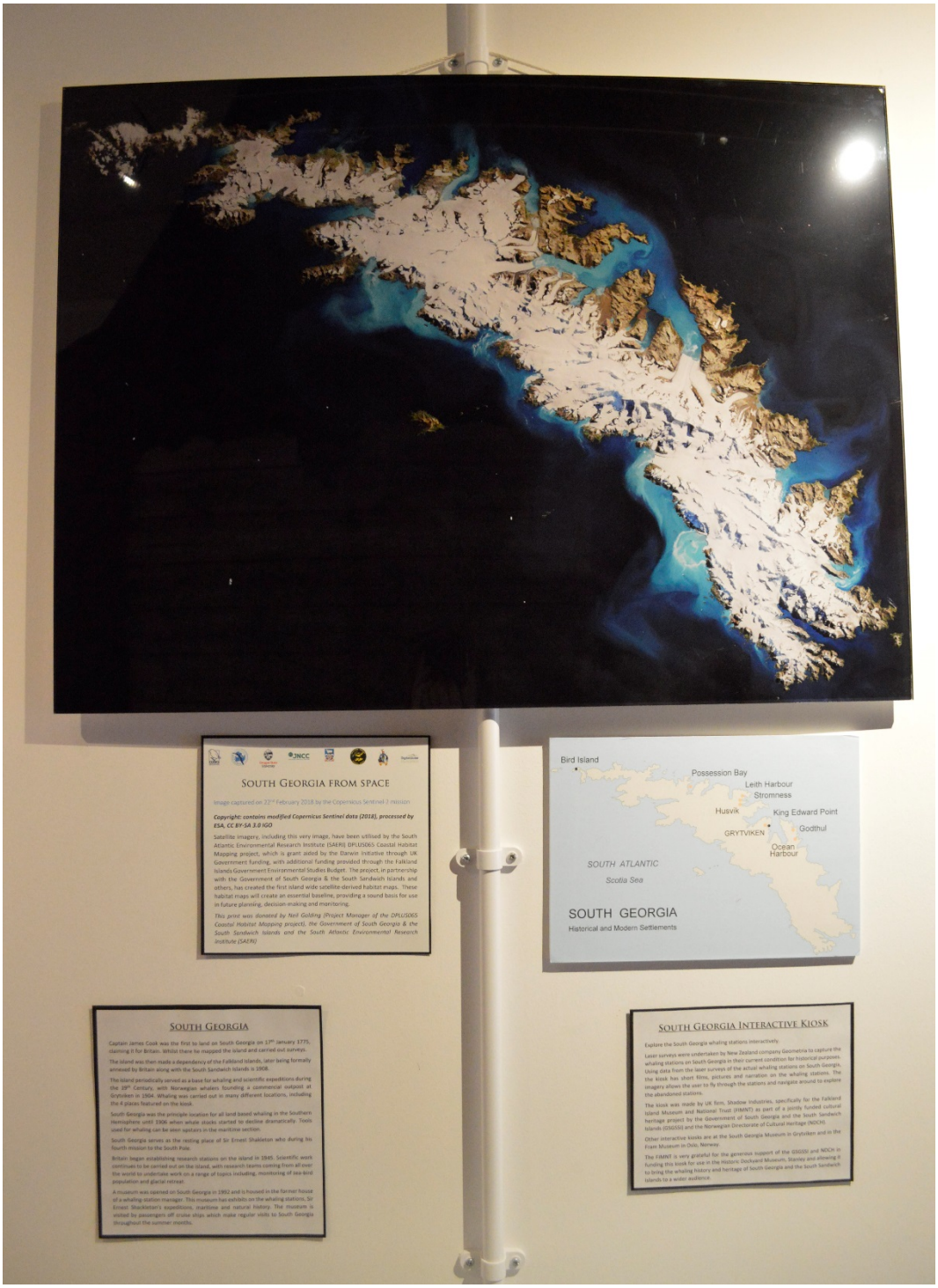

Figure 2.5: South Georgia from space: a mounted Sentinel-2 satellite image, donated by the project and now on permanent display at the *Historic Dockyard Museum, Stanley. This imagery was the basis for the South Georgia broad-scale habitat map (Output 3).*

One of the key project achievements from a specific stakeholder engagement perspective has to be the minefield mapping collaboration. Through collaborating with SafeLane Global and the UK Foreign & Commonwealth Office, the end result was far greater than the sum of its parts, with a superior product being produced. Through working with SafeLane to fly drone-mapping missions with Ground Control Points deployed in the minefields by SafeLane surveyors, the outputs were of value to SafeLane, the project and Falkland Islands Government.

An interesting development, sparked during discussions at the *From Satellites to Drones: Earth Observation & Habitat Mapping Training Workshop,* was the use of the broad-scale habitat maps to assist the Falkland Islands Fire & Rescue Service in fire-risk mapping (see Section 18.13). A

subsequent meeting with the Director of Falkland Islands Government Emergency Services has been held (Thursday 19th December 2019), and future collaboration looks extremely likely.

One of the most challenging aspects of stakeholder engagement for the Project Manager (PM) has been due to staff rotation within Government Departments, and in particular the Ministry of Defence/Mount Pleasant Military Complex (MPC). Mare Harbour (a military port associated with MPC) was identified as a stakeholder priority for fine-scale modelling/mapping, and while early engagement with the relevant persons at Mount Pleasant was promising, the fact that during the life of the project, there were three staff changes in relation to managing environmental work down at Mare Harbour was ultimately its downfall, meaning that work could not be sensibly progressed in this area, despite the best efforts of the PM.

Staff turn-over in Falkland Islands Government can also be a challenge at times; a number of staff are on two year contracts, which can result in reduced retention of corporate history.

3 Project Achievements

3.1 Outputs

3.1.1 Output 1

Output 1 involved establishing a project management structure and communication tools, not present at the project conception; **Output 1** was completed successfully. The baseline was that none of the project management structures were in place at the start of the project. At the completion of the project, **a robust project management system** was in place, and all indicators (**Indicators 1.1, 1.2, 1.3, 1.4, 1.5 & 1.6**) were met. A PM had been recruited (**Indicator 1.1**). An MoU had been signed by all project partners (**Indicator 1.2**). The Project Management Group (PMG) met approximately every quarter, evidenced with minutes from PMG meetings available (**Indicator 1.3**). The Project Stakeholder Group (PSG) and wider stakeholders met approximately every six months; this was a combination or round table meetings or workshops. This is evidenced with meeting minutes/workshop reports available (**Indicator 1.4**). The project webpage has been updated regularly and maintained, as evidenced by the '*Latest News*' section (**Indicator 1.5**). The final project report has been drafted (evidenced by the fact that you are reading this)(**Indicator 1.6**).

No problems were encountered by the project in the completion of this Output. During the day to day running of the project, various project management tools were used to ensure that project outputs were achieved, assessed against measurable indicators, and delivered on budget. These include the use of TRELLO, an online (cloud-based) project management tool to ensure all members of the PMG had secure access to relevant documents, irrespective of their location In addition, an Issues Log was maintained () to track various issues that arose during the project, and which may have impacted delivery. A project risk register was also owned by the PMG, and was maintained for the duration of the project (A Monitoring and evaluation (M&E) plan was drawn up by the PM and owned by the PMG, a copy can be found.

3.1.2 Output 2

Output 2 dealt with geo-referencing 1956 aerial imagery for the Falklands – the baseline was that this imagery was not geo-referenced. At the end of the project, a digital map of this 1956 aerial imagery was available on the DPLUS065 Coastal Habitat Mapping webGIS, evidenced (*please ensure the 1956 Aerial Imagery box is checked*). Achievement of **Output 2** was not without its challenges. While the original assumption held true that the 1956 aerial imagery was of sufficient quality to justify geo-referencing, this fact presented its own issues; the large files size posed a challenge and required significant computing power to mosaic and geo-reference the images.

Despite these challenges, through collaborative working between SAERI, it's IMS-GIS data centre and Oregon State University, the project delivered a digital map of 1956 aerial imagery for the Falkland Islands. This output was achieved by using innovative techniques developed by the SAERI IMS data centre, who wrote a script to automate the image geo-referencing process; the script is run for each aerial image (loaded on the WebGIS) when requested by an end user. On the webGIS, you can see the extent of every 1956 black and white aerial image. Both **Indicator 2.1** and **Indicator 2.2** were met.

The newly accessible 1956 imagery has been explored and it is now going to be used as part of a sister Darwin project underway within SAERI (*DPLUS083 - Soil map and online database as climate change mitigation tools*) to look at erosion risk mapping.

3.1.3 Output 3

Output 3 considers the development of broad-scale (Stage 1) coastal habitat maps for the Falklands and South Georgia. The baseline was that there was no detailed, systematic (satellite-derived) coastal habitat mapping before for either the Falkland Islands or South Georgia. At the end of the project, the Output was achieved, and two new, modelled broad-scale habitat mapping products were available to the end user, one for the Falkland Islands and one for South Georgia. The broad-scale (Stage 1) habitat map for the Falkland Islands was made available on the DPLUS065 Coastal Habitat Mapping webGIS, evidenced (*ensure the broad-scale habitat box is checked*) (**Indicator 3.1**). This output is also available for download from the same location. The project exceeded its delivery target by not just creating a broad-scale habitat map of the Falklands coastal margin, but by delivering an island-wide broad-scale habitat map, delivering 'added value' through the project. This dataset can be downloaded from the IMS-GIS Data Centre (). The first, satellite-derived, coastal broad-scale (Stage 1) habitat map was also created for South Georgia, and made available on the SG GIS, evidenced (*please ensure the SAERI Coastal Habitat Mapping project box is checked under Management>Terrestrial)* (**Indicator 3.2 & Indicator 3.3**). This dataset is also available for download under the **y**). The project also exceeded its delivery target with respect to South Georgia, as an island-wide broad-scale habitat map was created, rather than one limited to the coastal margin, again delivering 'added value' through the project.

No problems were experienced delivering this project Output, and the assumptions remained relevant throughout the project delivery phase. Cloud-based habitat modelling solutions were employed successfully, in the form of Google Earth Engine. A framework has been developed in order to allow easy updates to the broad-scale habitat maps in future years, and this was covered in detail with stakeholders during the "*From Satellites to Drones: Earth Observation & Habitat Mapping Training Workshop*".

3.1.4 Output 4

Output 4 deals with the identification, prioritisation and fulfilment of information data needs for the systematic conservation and planning of the coastal margin for the Falkland Islands and South Georgia. The baseline at project conception was that there was no clear strategy for identifying and prioritising where fine-scale mapping should be undertaken to deliver clear conservation and management gains through the project. Following the start of the project, a stakeholder engagement plan was developed to illicit clear direction from the stakeholder community on where the greatest need for new information was. This directed both the fieldwork effort and where additional high-resolution drone imagery should be collected to supplement the high resolution WorldView imagery provided through a Digital Globe Foundation grant secured by project partner Oregon State University. Two successful workshops, preceded by Project Stakeholder Group meetings, which sparked interest in the project, ensured that a clear steer was provided by Falkland Islands and South Georgia stakeholders to identify priority locations for fine-scale (Stage 2) geospatial data products to be created (**Indicator 4.1**), evidenced by two workshop reports found on the project website, , and also in .

The collection of groundtruthing data was critical for the success of the habitat modelling element of the project. A significant amount of ground validation data was collected from South Georgia, during the 2017 and 2019 expeditions (**Figure 3.1**). A large amount of ground validation data

was also collected for the Falklands, in addition to those ground validation points created through the use of WorldView, other satellite imagery sources such as Google Earth, and drone imagery. **Indicator 4.2** has been met, evidenced through the mapping products produced, and the high levels of confidence associated with many habitat classes that have been modelled through the broad-scale and fine-scale modelling.

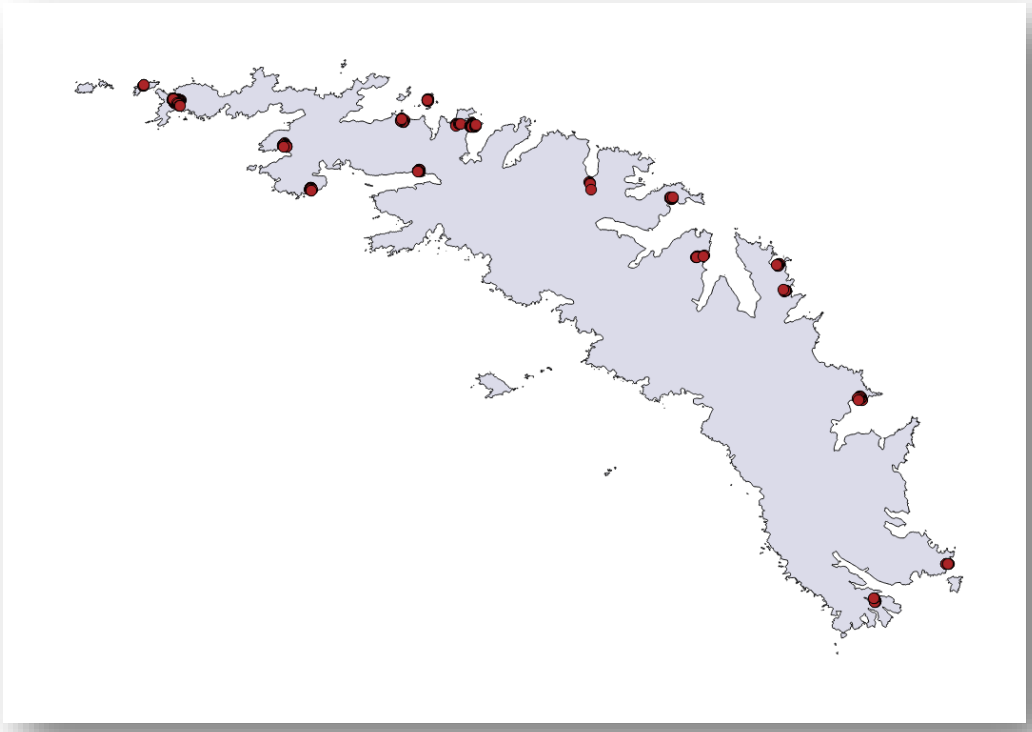

Figure 3.1: 241 ground validation points collected on the 2019 South Georgia expedition.

The collection of high quality and robust ground validation data was facilitated through the development of a bespoke field recording form by the IMS-GIS data centre, within SAERI, in the form of an Android smartphone app, based on Open Data Kit (ODK) (**Figure 3.2**).

Stakeholders prioritised four areas within the Falkland Islands (Stanley Common & Cape Pembroke, Steeple Jason, Minefield 7 (Cape Pembroke) and Port Sussex) and four areas within South Georgia for fine-scale mapping (Fortuna Bay, Gold Head, Grytviken and Jason Harbour). **Indicator 4.3** has been achieved as evidenced in the two webGIS systems, where these maps are available to the public. In addition, the final fine-scale habitat maps for the Falkland Islands and South Georgia are respectively.

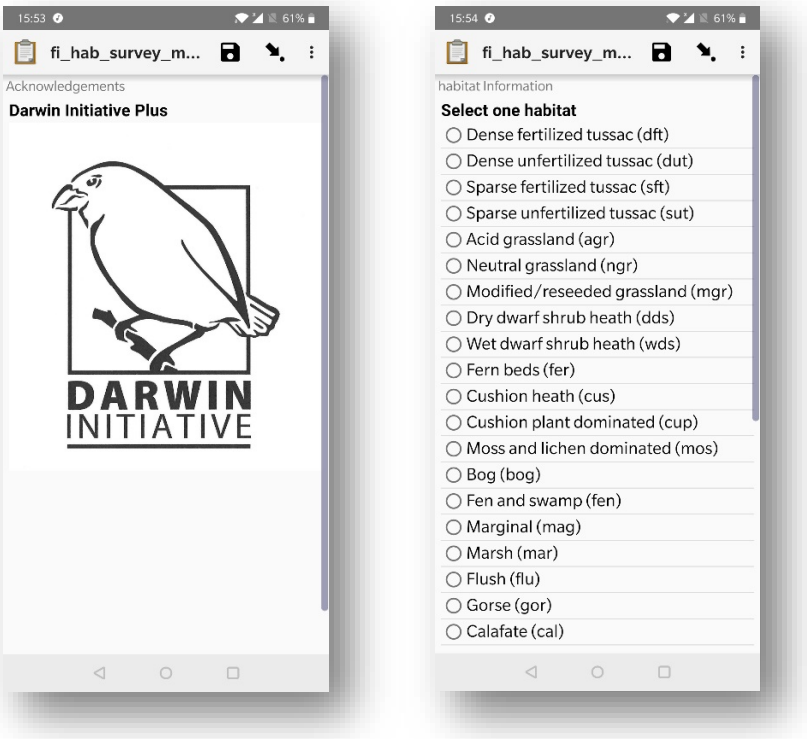

Figure 3.2: The SAERI ODK field recording app

Data collection also focussed in the subtidal as well as the intertidal. Drop camera surveys and side-scan sonar surveys (**Figure 3.3**) around Stanley were used to pilot an integrated fine-scale habitat map around Cochon Island, Kidney Island and the Murrell Peninsula. This integrated map is also evidenced in the Falklands webGIS system and in.

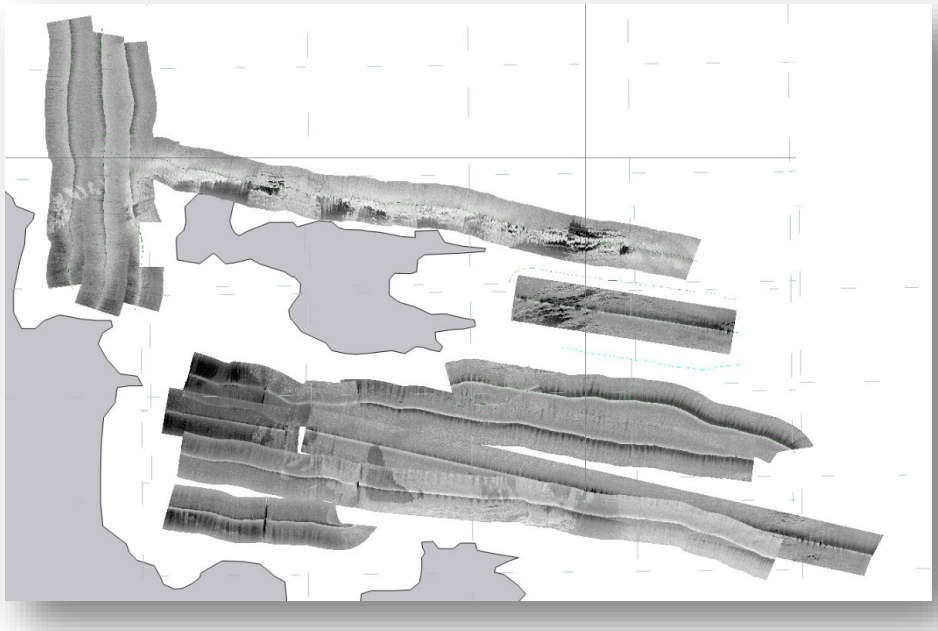

Figure 3.3: Sidescan data collected from around Kidney Island, which contributed to the fine-scale integrated habitat map for this area.

At the end of the project, **Output 4** was achieved. While not a specific problem, it was noted that the models based on the very high-resolution drone imagery took significantly longer to process

than the high-resolution WorldView satellite data. A specific issue (recorded in the Issues Log) was that during the photogrammetry processing for the drone imagery, this was taking too much system resource whilst running on the PMs computer. This was resolved by establishing a temporary photogrammetry server which could be used independently to the PMs computer. A dedicated, high specification photogrammetry workstation was also purchased towards the end of the project, following approval of a change request. A lesson learned would be to ensure that any complex computer processing be run on an independent computer system, and this should be factored into initial project budgets. No other problems were experienced delivering **Output 4**, and the assumptions remained relevant throughout the project delivery phase.

3.1.5 Output 5

Output 5 involved the prioritisation of ongoing planning, protection and monitoring of the coastal margin; this Output was focussed around delivering a legacy for the project. The baseline at project conception was that there was no future legacy for long-term monitoring of the coastal margin within the Falklands Islands and South Georgia, and notably, no baseline for the coastal margin from which to detect change, and the direction of change. **Indicator 5.1** and **Indicator 5.2** were achieved; evidenced by a long-term monitoring manual for both the Falkland Islands and South Georgia available on the project website[3] for download. This document received contributions from PMG members. **Indicator 5.3** has been achieved; a very successful and well attended "*From Satellites to Drones: Earth Observation & Habitat Mapping Training Workshop*" was run in July 2019, evidenced by the workshop report available on the project website[4], and. A series of training workshop videos were also created, and are available on the project website[5]. At the end of the project, **Output 5** was achieved; there was significant momentum behind the project for the work to continue after the end date, and how this might be achieved. Discussions with stakeholders and Government representatives from both territories about the project legacy, and who could take this long-term coastal monitoring forward were facilitated by dedicated sessions in two project workshops; the last day of the training workshop and the end of project workshop (**Figure 3.4**). No problems were experienced delivering this project Output, and the assumptions remained relevant throughout the project delivery phase.

3.1.6 Output 6

Output 6 deals with the integration of project outputs with existing and emerging initiatives. The The baseline at the start of the project was that there were many existing and some emerging geo-spatial data initiatives underway within the Falkland Islands and South Georgia, but a coordinated and coherent understanding was absent, and how the Coastal Habitat Mapping geo-spatial data products would integrate within these was unknown.

Indicator 6.1 was achieved, evidenced by a report considering the existing geo-spatial data initiatives in both territories, and the integration of DPLUS065 geo-spatial products with these initiatives, available on the project website[6], and in **Indicator 6.2** was achieved, evidenced by an 'end of project' "*Spatial tools for conservation planning in remote spaces*" workshop hosted by project partner JNCC in November 2019. This workshop considered how the outputs of the Coastal Habitat Mapping project could be taken forward into the future, and new ideas and concepts were discussed to build on these project outputs. A summary workshop report is available on the project website[7], and in.

[3] https://www.south-atlantic-research.org/wp-content/uploads/2019/12/DPLUS065_MonitoringHandbook_Final.pdf
[4] https://www.south-atlantic-research.org/wp-content/uploads/2019/12/2019_07_08_FromSatellitesToDrones_TrainingWorkshopReport_Final.pdf
[5] https://www.youtube.com/playlist?list=PLkfKiNCRZY0VIV9NW5Di8Oi2W7-8sNZLW
[6] https://www.south-atlantic-research.org/wp-content/uploads/2019/04/19_03_A_review_of_existing_data_management_initiatives_in_Falklands_SouthGeorgia_FINAL.pdf
[7] https://www.south-atlantic-research.org/wp-content/uploads/2019/12/2019_11_12_DPLUS065_FinalProjectWorkshopReport_FINAL.pdf

By the end of the project, the Output was achieved and the assumptions remained relevant throughout the project delivery phase.

Figure 3.4: A successful end of project workshop was run in November 2019, where dedicated sessions to discuss maximising the projects legacy and developing new concepts to take forward were explored with participants.

3.1.7 Output 7

Output 7 considers the monitoring and evaluation (M&E) of the project. The baseline at the start of the project was that there was no M&E plan in place for the project. By the end of the project, both **Indicator 7.1** and **Indicator 7.2** were achieved, evidenced by the latest version of the M&E plan available on the project website **here**. The M&E plan was owned by the PMG, and was a standing item on the PMG agenda; updates were provided by the PM every quarter. By the end of the project, the Output was achieved and the assumptions remained relevant throughout the project delivery phase.

3.2 Outcome

The project fully achieved its Outcome "mapping generated from this cost-effective and innovative remote-sensing will underpin and enhance spatial and conservation planning in the remote Falkland Islands and South Georgia and allow for efficient, effective monitoring". The baseline at the start of the project was that there was an environmental evidence gap in coastal margin for both the Falkland Islands and South Georgia, with neither Territories having habitat maps of the coastal margin. At the close of the project, this gap had been filled with geo-spatial data products. In addition, the framework and were in place for these geo-spatial outputs to be easily updatable into the future. Both **Indicator 0.1** and **Indicator 0.2** have been achieved, evidenced by the island-wide broad-scale (stage 1) habitat maps that have been developed for both Territories). These products have a more extensive coverage than the original project proposal (are island-wide rather than restricted to the coastal margin) and so have delivered added-value.

3.3 Long-term strategic outcome(s)

While the project has achieved its Outcome, it has also delivered a lasting legacy to both the Government and stakeholders of the Falkland Islands and South Georgia, providing the knowledge and the tools to replicate the habitat mapping in years to come. It will enable them to truly monitor their coastal margins; to detect change, but also that direction of change. With the coastal environments of both Territories set to come under increasing pressure from human activities into the future, this project has filled a critical gap, present before the project commenced, by enhancing the environmental evidence baseline (a snapshot), to allow an understanding of the impacts this increasing pressure may cause.

Helen Havercroft, CEO of the Government of South Georgia & the South Sandwich Islands (GSGSSI) provided an excellent summary of how the project has helped GSGSSI deliver its long-term management strategy when she said:

> *"The Coastal Habitat Mapping Project has provided a valuable snapshot of what South Georgia looks like today and may provide clues to the stresses it is under, but perhaps even more exciting than this glimpse into the South Georgia of today, is the ability to repeat and expand this work over time, so that GSGSSI can begin to understand temporal changes and use this knowledge to inform management decisions to better protect South Georgia."*

Through demonstrating the use of novel technologies including Earth Observation data (from satellites to drones) and cloud-based modelling in this project, which had not been used extensively before in these two UK Overseas Territories, both Governments and stakeholders alike now have a better understanding, both through the project training workshops and stakeholder/public liaison, how emerging EO technologies could be used to help them tackle future environmental challenges and to assist with decision making. Feedback from participants on the drone workshops provided through the Shackleton Scholarship Grant fortnight of events was excellent. There was also general agreement by all at the end of the training workshop that re-running a EO training event on an annual basis, to take account of staff turnover in the Territories, as well as a refresher for existing staff, would be an extremely valuable and worthwhile undertaking. There was also discussion around where the role of future long-term coastal habitat monitoring may sit, with a broad agreement that the OT Governments should undertake a lead coordination role, although may not necessarily be the ones undertaking the actual monitoring.

Following a review of data initiatives (**report available here**), the project has made excellent use of existing data sharing infrastructure; the project has taken a strategic view and adapted existing dissemination systems rather than invent new ones. Project data generated for the Falkland Islands can be viewed from the **DPLUS065 Coastal Habitat Mapping webGIS system** and downloaded the **IMS data portal** (search for DPLUS069 in the portal search bar). Project data generated for South Georgia is available to view and download from the **South Georgia webGIS**

system. Therefore, project generated data is easily accessible and downloadable into the future, beyond the end of the project.

The project outputs have already shown themselves to be of great benefit to the territories, for example the use of the broad-scale habitat maps in fire-risk mapping for the Falklands Fire & Rescue Service (identified through discussions sparked during the Coastal Habitat Mapping training workshop). The minefield mapping work (which assisted both SafeLane Global and the UK Foreign & Commonwealth Office) provided added-value to existing work already underway by the project, and highlighted the benefits of collaboration and partnership working.

The social media outreach generated through the project has created a much greater awareness of the natural environment of the Falklands and South Georgia, both locally and internationally. Local community members around Stanley but also the outlying islands have commented to the project manager on work being carried out by the project, with attention being drawn through Facebook posts and on Twitter.

Looking to the future, the end of project workshop hosted by JNCC in November 2019 provided a forum for the discussion of ideas around future concepts, building on the tools and frameworks established by this project. During this workshop, representatives from the two OT Governments highlighted how the project had made major contributions towards helping the Falkland Islands Government (FIG) and the GSGSSI deliver their long-term strategic goals for conservation and management of the natural environment, as evidenced in the final project workshop report.

4 Sustainability and Legacy

The project has generated a significant amount of momentum around the subject of coastal habitat mapping and Earth Observation (EO) technologies, both in the Falklands and South Georgia. There is a keenness from both Falkland Islands Government (FIG) and the Government of South Georgia & the South Sandwich Islands (GSGSSI) to sustain and update the broad-scale (Stage 1) and specific fine-scale (stage 2) habitat mapping outputs created during the project, including updating these maps using the tools developed. Good participation from Government departments, wider stakeholders and other interested island-based individuals in a number of workshops, including the Shackleton Scholarship fund fortnight of events, and the "*From Satellites to Drones: Earth Observation (EO) & Habitat Mapping Training Workshop*" ensured that a wide audience understood the developments in EO technology, and raised its awareness with respect to its utility for cost-effective use in remote island territories. At this latter workshop, there were two younger attendees, who specifically requested special leave from their school for the three days to attend this event.

A set of training videos were created as a key legacy output from the training workshop; these feature the presentations made during the various sessions of the workshop, and will be available into the future beyond the end of the project. They can be found on the project website **here**.

As a consequence of the project and the Shackleton Scholarship grant associated with it. There is a much greater understanding and awareness of drone technologies, which are not yet widely used on the islands. Workshops and events hosted by the PM and Shackleton Scholar in November 2018 shared knowledge and experience of using drone technology for habitat mapping and other uses. The PM project developed a drone Operations Manual as part of the project, an industry standard for the safe planning and operation of remotely piloted aircraft. This was based on best practice, focussed on habitat mapping, and is available for use by stakeholders and the wider public into future **here**.

The projects **long-term coastal habitat mapping monitoring manual,** one of the final outputs of the project, will be an excellent reference source going forward after the end of the project, and will enable readers to replicate the methods and update the map **series** into the future.

The FIG Department of Agriculture was keen to explore the use of drones to model and map the invasive weed, calafate (*Berberis microphylla*). A pilot study using a drone-mounted multispectral camera to map calafate performed well, and this may be explored further into the future. This is in addition to further studies, which may utilise the multi-spectral camera equipped drone which have also been discussed.

The project has delivered a new resource, in the form of geo-referenced 1956 Falkland Islands aerial imagery, which is now available for all. While the project milestone was just the geo-referencing of this imagery, into the future, this new resource could be used for a number of reasons, including understanding changes in the extent of erosion since the 1950s and potentially to investigate changes in land-use.

The project secured a powerful photogrammetry processing workstation, which will available for use in the Falkland Islands to undertake photogrammetry tasks and support future work and projects requiring drone imagery processing.

All data products created through the project for the Falkland Islands are available to the wider public on the **DPLUS065 Coastal Habitat Mapping webGIS**. Similarly, data products from South Georgia are available on the **South Georgia webGIS** system.

The PM was employed solely for delivering the DPLUS065 Coastal Habitat Mapping project, so as this project comes to an end, so will the contract of the PM. However, during their tenure as PM, they have shared their experience of seabed habitat mapping which they brought to the post with Government employees and stakeholders alike, as well as the new skills developed during the project, such as aerial mapping using drones.

While an important assumption identified under the broader project Outcome through the project management process was that SAERI continues to *"retain relevant skilled staff"*, this point is also important from a wider project sustainability and legacy perspective, in that a critical part of the project has been the upskilling of relevant people on the islands, so they can continue the work long after this project has finished. The training workshop was one way that this was undertaken. Inviting volunteers from the wider community to participate in fieldwork. Other ways included running the Shackleton Scholarship fund fortnight of activities focussed around drone use, and visiting the local schools as part of their "marine week", in a bid to raise awareness and transfer knowledge.

5 Lessons learned

While the DPLUS065 Coastal Habitat Mapping project was a success, and it's Outcome and Outputs were fully achieved, there are some lessons learned that can be drawn out for consideration by the wider Darwin community which are highlighted below.

Creating an info sheet with all social media #hashtags and handles for all project partners was extremely useful. One was created for the project, and share with the PMG, while a modified version was created for the 2019 South Georgia expedition, which had multiple partners tweeting and sharing content via Facebook. This info sheet ensured that all partners and collaborators had the right information to maximise social media outreach.

The success of the project can be attributed in-part to the high project partner enthusiasm, which can be attributed to the pre-project submission dialogue and buy-in with partners. This has been carried through the project by the Project Manager (PM), and has generated a real momentum that has increased as the project has reached its conclusion. This momentum has been transferred onto project stakeholders, who could see the real benefits of the project outputs. This is evidenced by the ideas that were generated during the end of project final workshop (really building on the legacy that the project has delivered. Partner and stakeholder enthusiasm is key, and it is recommended that future Darwin projects replicate this model; this "buy-in" means that the outputs being developed are more likely to be used after the end of the project for conservation planning. The partners have also worked together to bring added-value to the project, such as the Digital Globe Foundation grant submission, which was successful.

A particular success of the project has been its outreach and communication strategy. Ensuring that sufficient time and resource was allocated to project promotion and outreach within the community paid dividends, and is worthy of note. The communication and outreach strategy was an integral part of the project design and championed by the PM, not an afterthought. This has really elevated the knowledge of the project, and the Darwin Initiative, within the Territories.

Outreach has taken place through social media (Facebook & Twitter posts) as well as local radio station interviews, public presentations at the Chamber of Commerce and the newly opened cinema, running special sessions at the local infant and junior school as well as attendance at local events such as the Rural Business Association show. Promotion of the project through the successful award of a Shackleton Scholarship Fund focussing on drone technologies with the Falklands allowed the PM to share knowledge and experience of the technology being used by DPLUS065 to undertake the fine-scale mapping (). The power of social media in small island territories, particularly in the Falklands which has a heavy reliance on Facebook (dating back to when two-metre radio sets were the chief form of communication) as a key form of communication should not be underestimated. Internationally, awareness of the project has been raised by the activities of all project partners, for example, GSGSSI staff presented an update of the project at the IAATO Annual Meeting, JNCC staff presented project updates at key South Georgia stakeholder events in the UK, and the PM presented project updates at a variety of international meetings and workshops (such as the **DPLUS069** workshop).

The project has built many new partnerships, which have meaningfully enhanced the opportunities and support for the project. These include partnerships with:

- SafeLane Global and the Falklands Demining Programme
- Falklands Conservation, through the Watch Group but also through working with the Habitat Restoration project
- Land/Farm owners such as Bleaker Island, Elephant Beach Farm and Fitzroy to name a few.

In addition, the value of stakeholder engagement cannot be underestimated, opening up opportunities in terms of other complimentary activities and projects taking place. For example, collaborating with SGHT on the South Georgia Archaeological expedition, and building a partnership with Iridium Communications. This shows the importance of working with other organisations to find out about these types of projects and then how integration and cooperation can benefit both parties.

As mentioned in **Section 2.2**, staff turn-over in Overseas Territories governments, such as Falkland Islands Government, should be taken into account by future Darwin projects. This was at times challenge for this project, and especially impacted work that was planned for Mare Harbour/East Cove, a military port associated with Mount Pleasant Complex (MPC). Short (two year) contracts mean that sometimes corporate history and knowledge is not fully retained when staff move on, and highlights the importance of regularly (annually) running training workshops such as the one run by the Coastal Habitat Mapping project.

Finally, one of the key elements of success in this project has been the fact that the lead organisation (SAERI) and the PM are based in-territory; this brings value through benefiting from existing and strong local partnerships with stakeholders, as well as helping to understand the local issues “on the ground” and ensure that any outputs are tailored to local stakeholder needs as a far as possible.

5.1 Monitoring and evaluation

A **Monitoring and Evaluation plan** (was developed for the project, and was owned by the Project Management Group (PMG); the latest version is available on the project website[8].
There were no significant changes to project design, and the M&E plan was found to be an extremely valuable document for the PMG to monitor and review at the regular (quarterly) PMG meetings that were held (minutes here). Having all project partners sign a separate **Memorandum of Understanding** (MoU) at the start of the project reinforced their responsibilities, and was found to be a useful document to focus partners thoughts. An online project management tool, **Trello**[9], was found to be extremely useful to securely share documents – particularly as partners where based in the UK, USA and the Falklands.

All project reports were evaluated by the PMG prior to circulation to stakeholders; for example the stakeholder workshop report and the training workshop report. PMG feedback was extremely valuable, and ensured that reports underwent quality assurance before being circulated. This review process also gave project partners a further valuable opportunity to contribute to project outputs.

5.2 Actions taken in response to annual report reviews

All reviewer comments from AR1 and AR2 were discussed at the relevant Project Management Group (PMG) meetings. There were no outstanding issues from AR1. PMG feedback from reviewer comments in AR2 are provided below:

AR2 Reviewer comments	Feedback from PMG on Reviewer comments
GeoNode (http://geonode.org/), or other platforms, may be a useful way of accessing and downloading data layers. A subscription free webGIS, compared to LIZ3 (with some data cost implications). Data access / availability / sharing is also not fully discussed, beyond "Data generated through the project will be made available for future initiatives, through the IMS-GIS Database", and GeoNode could be a solution to this. More detail around dissemination of data would be greatly appreciated.	Lizmap (3Liz) was a platform already being used by the SAERI IMS-GIS data centre, with the skills in-house to develop a webGIS data dissemination system for the DPLUS065 Coastal Habitat Mapping project. GeoNode may be an open source system, but would still require resource to get the data onto the platform. There have been no issues with stakeholders accessing the current 3Liz webGIS architecture. Following a review of data initiatives (report available here), the project has made excellent use of existing data sharing infrastructure; the project has taken a strategic view and adapted existing dissemination systems rather than invent new ones. Project data generated for the Falkland Islands can be viewed from the DPLUS065 Coastal Habitat Mapping webGIS system and downloaded the IMS data portal. Project data generated for South Georgia is available to view and download from the South Georgia webGIS system. Therefore, project generated data is easily accessible and downloadable into the future, beyond the end of the project.
The 1956 Aerial looks like a very interesting and potentially useful dataset/resource to show habitat changes, and there is real value in digitising this data. It is, however, not clear how this data will be used within the project to assist the Outcome in establishing	The PMG agree that the 1956 aerial imagery that has been geo-referenced by the DPLUS065 project is a tremendous resource, with real potential for future use. The newly accessible 1956 imagery has been explored and it is now going to be used as part of a sister Darwin project underway within SAERI (*DPLUS083 - Soil map and online database as climate change mitigation tools*) to look at erosion risk mapping.

[8] https://www.south-atlantic-research.org/wp-content/uploads/2019/04/DPLUS065_ME_Plan_Final_Updated.pdf
[9] https://trello.com/b/ISipUNL0/dplus065-coastal-mapping-project-management

AR2 Reviewer comments	Feedback from PMG on Reviewer comments
coastal habitat maps, particularly in its current format.	
Discussions to identify where the future long-term monitoring role would sit for both islands should be a priority for the coming year to help identify where the responsibility of project activities lay, beyond project timings & budget.	The PMG concur that discussions around where the role of future long-term monitoring are critical to the future legacy beyond the end of the project. This was always scheduled for the final year of the project, so it is reassuring to see that the reviewer shares the PMGs view of its importance. Discussions about the role of long-term monitoring were held during the stakeholder training workshop in July 2019 and at the final project workshop in November 2019. At the latter event, concepts were also developed to build on the existing project outputs. The outcomes of these discussions were fed back to the Territory Government representatives through the workshop reports and through PMG discussions.

6 Darwin Identity

Throughout the duration of the project, the project has followed Clause 21 of the Darwin Terms and Conditions, and has used the Darwin logo where possible and achievable.

The project has gone to significant efforts to publicise the project, and the Darwin Initiative. A #hashtag was devised for the project *(#SouthAtlanticCoastalMapping*), and used wherever news items or events were communicated on social media. The table shown i lists the various publications, reports and outreach events that the project has utilised. The table shown in provides a summary of the DPLUS065 project top tweets, along with impressions and total engagements.

Outreach and publicity has not just been limited to using social media. The project has published blogs, reports, run workshops, given public talks at big local events such as Farmers Week and at the local cinema and chamber of commerce.

Due to the efforts of the DPLUS065 Coastal Habitat Mapping project, and other Darwin projects in currently underway within SAERI, the Darwin Initiative certainly receives a significant amount of publicity in the Falkland Islands, and is familiar as a funding body to many of the local stakeholders.

7 Finance and administration

7.1 Project expenditure

Project spend (indicative) since last annual report	2019/20 Grant (£)	2019/20 Total actual Darwin Costs (£)	Variance %	Comments (please explain significant variances)
Staff costs				
Consultancy costs				
Overhead Costs				
Travel and subsistence				
Operating Costs				
Capital items				
Others				
TOTAL				

Staff employed (Name and position)	Cost (£)
Neil Golding (Project Manager)	
Paul Brickle (Project Leader)	
Tara Pelembe (Deputy Director: Innovation)	
Teresa Bowers (Deputy Director; Business)	
iLaria Marengo (Data Manager)	
Paul Robinson (EO Applications Manager, JNCC)	
Gwawr Jones (Earth Observation Specialist, JNCC)	
Chris Goldfinger (Director, Active Tectonics and Seafloor Mapping Lab, OSU)	
Jamon Van Den Hoek (Assistant Professor, OSU)	
Robert Kennedy (Assistant Professor, OSU)	
TOTAL	

Consultancy – description and breakdown of costs	Other items – cost (£)
TOTAL	0

Capital items – description	Capital items – cost (£)
Photogrammetry workstation	
TOTAL	

Other items – description	Other items – cost (£)
Consumables (OSU) Monitoring & Evaluation Workstation shipping and insurance	
TOTAL	

7.2 Additional funds or in-kind contributions secured

Source of funding for project lifetime	Total (£)
Falkland Islands Government Environmental Studies Budget	
Shackleton Scholarship Fund	
Digital Globe Foundation satellite imagery grant	
Iridium satellite data donation for South Georgia expedition	
In-kind staff costs across project partners	
In-kind contribution of vessel berths on *Pharos SG* by GSGSSI for 2017 South Georgia expedition	
In-kind contribution of fieldwork operating costs (SMSG)	
TOTAL	

Source of funding for additional work after project lifetime	Total (£)
TOTAL	**0**

7.3 Value for Money

Significant added-value has been realised throughout the delivery of this project, and a number of examples have been selected to demonstrate this:

- The project secured a Digital Globe Foundation grant, which provided very high resolution WorldView satellite imagery for the fine-scale modelling/mapping element of the project (**Output 4**). The purchase of this imagery was out of scope for the original project, valued at c.£200,000, and with island-wide imagery made available through this grant for the Falkland Islands and South Georgia, it allowed a full range of geographic options to be explored when stakeholders determined which priority areas should be mapped/modelled at a fine-scale. In turn, this added-value was realised by releasing project funding that had been reserved for satellite imagery purchase for other uses of benefit to the project, including the provision of training and certification for safe drone-flying to the PM, and the acquisition of aerial/subtidal remote sensing data. This was submitted to LTS as a change request on 11th May 2018 and approved by Defra on 21st May 2018.

- Added value was delivered through the broad-scale mapping undertaken for the Falklands (). Rather than focussing on the coastal margin, which was the original scope of the project, and in light of available data, it seemed feasible to extend the broad-scale modelling across both East and West Falkland. This was partly due to extensive ground validation data available through a previous Natural Capital project[10] (Marengo, 2018). It was also more efficient for project partner JNCC to process Sentinel imagery for the entire Falklands extent rather than just the coastal margin. As a result, a more useful and versatile output has been produced, which has wider utility for landowners, the Falkland Islands Government Agriculture department and others.

- The project collaborated with the South Georgia Heritage Trust through the South Georgia Archaeological Project; an expedition to South Georgia in February/March 2019. Through a relatively small contribution to the project, the PM was able to join the expedition and support the archaeological project through the collection of aerial drone

[10] https://www.south-atlantic-research.org/wp-content/uploads/2018/06/FINCA_habitat_mapping_report_May_29.pdf

imagery, while at the same time collect both ground validation information and very high-resolution aerial imagery in areas identified through the South Georgia stakeholder prioritisation workshop. This collaboration alone delivered significant value for money, when you consider the cost of a month-long research expedition to South Georgia. The information gathered during the expedition was of great value to the project, and especially for GSGSSI, and has allowed highly resolution fine-scale habitat models to be developed for specific areas of stakeholder interest on South Georgia. Without this collaboration, collecting such a wealth of data at such little cost to the project would not have been possibleThe PM was also instrumental in ensuring that a significant amount of outreach and awareness was generated through social media, both during and after this expedition.

- The PM facilitated a contribution worth c, from Iridium Communications, in the form of 4GB of satellite data, in order to assist with drone mission planning and modification whilst aboard the expedition vessel at South Georgia[11]. The PM was able to develop a strong relationship with Iridium Communications and their partners, MailASail, and generate significant support for the project. In addition, Iridium provided three handsets (with complimentary calls) and three trackers for the expedition to use whilst on South Georgia.

- The PM was successful in bidding for additional funds (£2,714) from the Shackleton Scholarship Fund. These funds allowed a drone expert to visit the Falklands, and work alongside the PM to widen the communities knowledge about drones, how to use them safely, and how they can really benefit science, education and more. A fortnight of events were run by the PM and Nicole Durfee; these were well received and well attended by the public

[11] https://www.youtube.com/watch?time_continue=5&v=u6I2Us32w3U&feature=emb_title

8 Annex 1: Project's full current logframe as presented in the application form (unless changes have been agreed)

Project summary	Measurable Indicators	Means of verification	Important Assumptions
Impact: Environmental evidence-base for decision-making on the FI and SG is significantly enhanced by the provision of baseline data in a thematic area that is a current gap i.e. coastal margin.			
Outcome: The mapping generated from this cost-effective and innovative remote-sensing will underpin and enhance spatial and conservation planning in the remote FI and SG and allow for efficient, effective monitoring.	0.1 The coastal habitats of the Falkland Islands are broadly classified and visualized via digital outputs (e.g. maps, GIS layers) at a spatial and temporal scale sufficient for spatial planning and decision making, by the end of March 2020. 0.2 The coastal habitats of South Georgia are broadly classified and visualized via digital outputs (e.g. maps, GIS layers) at a spatial and temporal scale sufficient for spatial planning and decision making, by the end of March 2020.	0.1 FI MSP Web GIS portal 0.2 SG webGIS portal 0.3 SAERI project webpages.	SAERI's IMS-GIS Centre continues to retain relevant skilled staff
Outputs: **1**. Project Management structure, and communications tools established	1.1 Project Manager recruited by end Quarter 3 FY 17/18. 1.2 An MoU agreed and signed by all partners by end Quarter 4 FY 17/18. 1.3 A Project Management Group (PMG) meeting held every 3 months starting October 2017. 1.4 A Project Stakeholders group (PSG) meeting held every 6 months starting Quarter 4 FY 17/18. 1.5 At least 1 project webpage created by end Quarter 4 FY 17/18, and at least	1.1 Project Manager employment contract signed 1.2 MOU signed by all parties 1.3 PMG meeting notes available online 1.4 PSG meeting notes available online. 1.5 Project webpage available for viewing online	PM with the relevant skills can be recruited.

Project summary	Measurable Indicators	Means of verification	Important Assumptions
	1 update to the page made every month. 1.6 Final project report produced by March 2020.		
2. Work Package 1 WP1: Digitised 50 year old aerial imagery (FI only)	2.1 1 Commence geo-referencing of 1954 aerial imagery by Quarter 4 FY 17/18. 2.2 Complete geo-referencing of 1954 aerial imagery to create a digital map by end Quarter 2 FY 18/19	2.1 1954 FI aerial imagery digital map available via MSP GIS portal	Aerial imagery is of sufficient quality to be able to be digitised. Preliminary checks suggest this is the case.
3. Work package 2 (WP2): Object based image analysis and habitat modelling of the coastal margin (FI and SG)	3.1 Stage I habitat modelling and classification complete for the Falklands by September 2018. 3.2 Stage I habitat modelling and classification (terrestrial and intertidal) complete for South Georgia by end March 2018. 3.3 Stage I habitat modelling and classification (subtidal) complete for South Georgia, and integration with terrestrial and intertidal habitat maps (3.2) by end July 2018	3.1 FI coastal margin (Stage I) habitat map available online via MSP GIS portal 3.2 SG coastal margin (Stage I) habitat map available online via South Georgia GIS portal	Satellite imagery at useful resolution and without cloud cover is obtainable. Preliminary checks suggest several options and suitable imagery will be available. Satellite imagery and derived products are open access. Preliminary enquiries and expert opinion suggest this is feasible.
4. Work Package 3 (WP3): Identification, prioritisation and fulfilment of information data needs for the systematic conservation and planning of the coastal margin for the FI and for SG	4.1 At least 1 FI (Q3 FY 18/19) and 1 SG (Q3 FY 18/19) stakeholder workshop held to identify and prioritise data needs for the coastal margin 4.2 Ground truthing of satellite imagery analysis on SG (Quarter 3 FY 17/18 & Quarter 4 FY 18/19) and the FI (Quarter 1 – Quarter 4 FY 18/19)	4.1 FI and SG stakeholder workshop report on the project page website 4.2 FI coastal margin fine scale (Stage II) maps available online via FI MSP GIS portal.	Satellite imagery at useful resolution and without cloud cover is obtainable. Preliminary checks suggest several options and suitable imagery will be available. Permissions to access study areas approved by landowners (where required).

Project summary	Measurable Indicators	Means of verification	Important Assumptions
	4.3 Stage II geospatial data products reflecting prioritized information needs utilizing high res imagery to reduce uncertainty in habitat models/classifications and address spatial and temporal data priority needs expressed by stakeholders – for both the FI and SG by Quarter 1 FY 19/20	4.3 SG coastal margin fine scale (Stage II) maps available online via SG GIS portal	
5. Work Package 4 (WP4): Prioritisation of ongoing planning, protection and monitoring of the coastal margin	5.1 A monitoring manual produced for long-term monitoring of coastal margin for the Falklands by end Quarter 3 FY 19/20 5.2 A monitoring manual produced for long-term monitoring of coastal margin for South Georgia by end Quarter 3 FY 19/20 5.3 At least 1 face-to-face training workshop in implementing monitoring undertaken by end Quarter 2 FY 19/20	5.1 FI monitoring manual available on the project page website 5.2 SG monitoring manual available on the project page website. 5.3 Training workshop report available on project page website 5.4 Televised training available online on project page website.	There are in-territory staff who are well-positioned to undertake the training. Discussions to identify where the future long-term monitoring role would sit for both islands are underway.
6. Work Package 5 (WP 5) All outputs integrated with existing and emerging initiatives	6.1 New geospatial products maximally informed and integrated with existing FI and SG geo-spatial data initiatives 6.2 End of project synthesis workshop for FI and SG held by end Synthesis workshop held by end Quarter 3 FY 19/20 to decide how findings will contribute to systematic conservation planning	6.1 Report on integration with other initiatives on the FI published on the project webpage. 6.2 Report on integration with other initiatives on the SG published on the project webpage.	Owners and co-ordinators of existing initiatives are willing to collaborate and explore these opportunities as well. The support of the project partnership brings on board key leaders in these areas.
7. Monitoring and evaluation	7.1 Detailed Monitoring and evaluation plan produced by end Quarter 4 FY 17/18	7.1 Detailed M&E Plan available on project webpage 7.2 M&E updates available on project webpage	PM has skills to deliver M&E plan This will be built into the Job description of the PM and

Project summary	Measurable Indicators	Means of verification	Important Assumptions
	7.2 6-monthly updates on implementation of M&E Plan provided to PMG		

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 Advertise, interview and recruit PM
1.2 Draft and sign Project Partners MoU
1.3 Quarterly PMG meetings
1.4 6 monthly PSG meetings
1.5 Monthly Webpage updates
1.6 Complete various project management activities
1.7 Final project report and publicity

2.1 Explore development of a workflow to aid the geo-referencing 1954 aerial imagery
2.2 Complete the geo-referencing of 1954 aerial imagery along the coastal margin
2.3 Produce a digital map of the 1954 aerial imagery showing the coastal margin
2.4 Upload the 1950's coastal margin (aerial imagery) map onto the MSP GIS portal and a copy of the associated metadata onto the South Atlantic metadata catalogue

3.1 Source the Satellite imagery for the Falklands and South Georgia
3.2 Pre-processing of satellite imagery to prepare for analysis
3.3 Undertake Analysis of the satellite imagery and habitat modelling
3.4 Produce a Coastal Margin habitat map for South Georgia and the Falklands
3.5 Upload the Coastal Margin habitat map onto the MSP GIS portal (for the Falklands) and supply SG map to GSGSSI (for upload to GSGSSI web portal); upload a copy of the associated metadata onto the South Atlantic metadata catalogue.

4.1 Confirm Stakeholder workshop (to identify and prioritise spatial and temporal data priority needs expressed by Stakeholders) date, venue, and participants for the Falklands and South Georgia
4.2 Confirm Stakeholder workshop programme, speakers and facilitators through consultations via the PMG and PSG for the Falklands and South Georgia
4.3 Host the Stakeholder workshop for the Falklands and South Georgia

Project summary	Measurable Indicators	Means of verification	Important Assumptions
4.4 Produce the Stakeholder workshop report for the Falklands and South Georgia and upload onto the project webpage 4.5 Acquire very high resolution satellite imagery (e.g. WorldView) and/or undertake drone missions to acquire high resolution imagery for priority areas requiring fine-scale mapping in South Georgia and the Falklands 4.6 Pre-process the imagery to prepare for analysis 4.7 Undertake analysis of the imagery. 4.8 Undertake ground-validation of analysed data on the Falklands and South Georgia 4.9 Produce detailed (Stage II) Coastal Margin habitat maps for priority areas for South Georgia and for the Falklands 4.10 Upload the detailed (Stage II) Coastal Margin habitat map onto the MSP GIS portal (for the Falklands) and supply to GSGSSI for upload onto the GSGSSI web portal. Upload a copy of the associated metadata onto the South Atlantic metadata catalogue. 5.1 Draft a long-term coastal mapping/monitoring manual for the Falklands and South Georgia and upload onto the project webpage 5.2 Confirm date, venue, and participants for the Falklands and South Georgia coastal mapping/monitoring training workshop 5.3 Undertake coastal mapping/monitoring training workshop 5.4 Record videos of training sessions and upload online onto the project webpage 6.1 Review all of the existing (relevant) stakeholder groups and data creation and management initiatives and protocols. 6.2 Produce a report on the review demonstrating how this initiative links to and builds on the existing and emerging work, and publish on the project webpage. 6.3 Prepare for and host ‘end of project’ synthesis workshop to decide how outputs will be fed into planning 7.1 Prepare monitoring and evaluation (M and E) plan 7.2 Prepare and present 6 monthly M and E updates 7.3 Upload M and E plan and updates onto webpages			

9 Annex 2: Report of progress and achievements against final project logframe for the life of the project (if your project has a logframe)

Project summary	Measurable Indicators	Progress and Achievements for the life of the project
Impact: Environmental evidence-base for decision-making on the Falkland Islands (FI) and South Georgia (SG) is significantly enhanced by the provision of baseline data in a thematic area that is a current gap i.e. coastal margin.		The project has plugged a critical gap in each Territories environmental baseline data, **delivering added-value**, with wider coverage than just the coastal margin. This new environmental evidence-base allows the FI & SG Governments to better understand habitat distribution across their Territories. In addition, this project has delivered the tools, frameworks and training to allow the current state of biodiversity to be assessed, and change to this state monitored into the future. The project has demonstrated to the two UK Overseas Territories the cost-effectiveness of using recent advances in Ear Observation technologies, from satellites to drones, and how they can be used successfully to monitor biodiversity in remote island territories.
Outcome The mapping generated from this cost-effective and innovative remote-sensing will underpin and enhance spatial and conservation planning in the remote FI and SG and allow for efficient, effective monitoring.	0.1 The coastal habitats of the Falkland Islands are broadly classified and visualized via digital outputs (e.g. maps, GIS layers) at a spatial and temporal scale sufficient for spatial planning and decision making, by the end of March 2020. 0.2 The coastal habitats of South Georgia are broadly classified and visualized via digital outputs (e.g. maps, GIS layers) at a spatial and temporal scale sufficient for spatial planning and decision making, by the end of March 2020.	The project has delivered island-wide, satellite derived, broad-scale habitat maps (at 10m resolution) for the FI and the **first** island-wide, satellite derived, broad-scale habitat maps for SG, plugging a critical gap in each Territories environmental baseline data, delivering added value, with wider coverage than just the coastal margin. High resolution, fine-scale coastal margin habitat maps have been delivered in select areas determined by stakeholders. Tools and frameworks have been developed, and training has been delivered, to empower and enable the FI and SG to update these maps into the future for utilisation in effective, efficient monitoring. Project outputs have been disseminated through bespoke and existing spatial data sharing platforms. Opportunities to add value to the project were sought and have delivered significant gains.
Output 1. Project Management structure, and communications tools established	1.1 Project Manager recruited by end Quarter 3 FY 17/18 1.2 An MoU agreed and signed by all partners by end Quarter 4 FY 17/18.	*1.1 PM recruited for two years (until 30th November 2019). Indicator is appropriate. This is evidenced by the successful completion of the project – further evidence of PM contract is available on request from SAERI.* *1.2 The MoU was approved and signed by project partners in Q1 of FY 18/19. The text of the MoU is available on the project website https://www.south-atlantic-research.org/wp-content/uploads/2019/04/MoU_DPLUS065_CoastalMapping_Final.pdf . A copy*

Project summary	Measurable Indicators	Progress and Achievements for the life of the project
	1.3 A Project Management Group (PMG) meeting held every 3 months starting October 2017. 1.4 A Project Stakeholders group (PSG) meeting held every 6 months starting Quarter 4 FY 17/18. 1.5 At least 1 project webpage created by end Quarter 4 FY 17/18, and at least 1 update to the page made every month. 1.6 Final project report produced by March 2020	*of the signatories to this MoU is shown in Annex 6 of this report. Indicator was appropriate.* *1.3 Complete. Quarterly PMG meetings held & approved minutes available here: https://www.south-atlantic-research.org/research/terrestrial-science/coastal-mapping-project/coastal-mapping-project-download-area/ Indicator was appropriate.* *1.4 Complete – Bi-annual stakeholder groups were held; a combination of meetings and workshops. Approved minutes and presentations available here: https://www.south-atlantic-research.org/research/terrestrial-science/coastal-mapping-project/coastal-mapping-project-download-area/ . Workshop reports are available in **Annex 10** for the Falkland Islands and South Georgia respectively (and on the project website). The indicator was appropriate.* *1.5 Complete – The project website has run well, and has been updated regularly https://www.south-atlantic-research.org/research/terrestrial-science/coastal-mapping-project . Note the 'Latest News' section where regular updates on project news were posted. The indicator was appropriate.* *1.6 Report complete – Evidenced by this report. Publicity in the form of direct contact with stakeholders and use of social media is planned. The indicator is appropriate.*
Activity 1.1: Advertise, interview and recruit PM		*Completed*
Activity 1.2: Draft and sign Project Partners MoU		*Completed*
Activity 1.3: Quarterly PMG meetings		*Completed*
Activity 1.4: 6 monthly PSG meetings		*Completed*
Activity 1.5: Monthly Webpage updates		*Completed*
Activity 1.6: Complete various project management activities		*Completed*
Activity 1.7: Final project report and publicity		*Final report completed and publicity planned*

Project summary	Measurable Indicators	Progress and Achievements for the life of the project
Output 2. Work Package 1 (WP1): Digitised 50 year old aerial imagery (FI only)	2.1 Commence geo-referencing of 1954 aerial imagery by Quarter 4 FY 17/18. 2.2 Complete geo-referencing of 1954 aerial imagery to create a digital map by end Quarter 2 FY 18/19	*2.1 Progress was satisfactory; a workflow was devised to take this work forward in FY 18/19 of the project. The indicator was appropriate.* *2.2 Completed in FY 18/19. Using innovative techniques, the SAERI IMS data centre developed a script to automate the image geo-referencing process. A digital map of the Falklands 1956 aerial imagery is now available on the DPLUS065 Coastal Habitat Mapping webGIS: https://data.saeri.org/falklands_habitat.html – The indicator was appropriate (**PLEASE TICK THE 1956 AERIAL IMAGERY BOX ON THE LEGEND ON THE LEFT HAND SIDE)***
Activity 2.1: Explore development of a workflow to aid the geo-referencing 1954 aerial imagery		*Completed*
Activity 2.2: Complete the geo-referencing of 1954 aerial imagery along the coastal margin		*Completed*
Activity 2.3: Produce a digital map of the 1954 aerial imagery showing the coastal margin		*Completed*
Activity 2.4: Upload the 1950's coastal margin (aerial imagery) map onto the SAERI GIS portal and a copy of the associated metadata onto the South Atlantic metadata catalogue		*Completed*
Output 3. Object based image analysis and habitat modelling of the coastal margin (FI and SG)	3.1 Stage I habitat modelling and classification complete for the Falklands by September 2018. 3.2 Stage I habitat modelling and classification (terrestrial and intertidal) complete for South Georgia by end March 2018. 3.3 Stage I habitat modelling and classification (subtidal) complete for South Georgia, and integration with terrestrial and intertidal habitat maps (3.2) by end July 2018	*3.1 This was completed in FY 18/19. The resulting broad-scale habitat map for the Falklands can be seen on the webGIS. https://data.saeri.org/falklands_habitat.html. Value was added to this output through creation of a Falklands wide habitat model product, not just focussed on the coastal margin. The indicator was appropriate.* *3.2 This was completed in FY 17/18. The indicator was appropriate* *3.3 This was completed in FY 18/19 delivering the **FIRST** satellite-derived, island-wide broad-scale habitat map for South Georgia. The resulting broad-scale habitat map for South Georgia can be seen on the South Georgia GIS: https://www.sggis.gov.gs/ (**On the left hand side, please expand 'Management', 'Terrestrial' and then tick the SAERI Coastal Habitat Mapping box).** The indicator was appropriate.*
Activity 3.1: Source the Satellite imagery for the Falklands and South Georgia		*Completed*

Project summary	Measurable Indicators	Progress and Achievements for the life of the project
Activity 3.2: Pre-processing of satellite imagery to prepare for analysis		*Completed*
Activity 3.3: Undertake Analysis of the satellite imagery and habitat modelling		*Completed*
Activity 3.4: Produce a Coastal Margin habitat map for South Georgia and the Falklands		*Completed*
Activity 3.5: Upload the Coastal Margin habitat map onto the MSP GIS portal (for the Falklands) and supply SG map to GSGSSI (for upload to GSGSSI web portal); upload a copy of the associated metadata onto the South Atlantic metadata catalogue.		*Completed*
Output 4. Work Package 3 (WP3): Identification, prioritisation and fulfilment of information data needs for the systematic conservation and planning of the coastal margin for the FI and for SG.	4.1 At least 1 FI (Q3 FY 18/19) and 1 SG (Q3 FY 18/19) stakeholder workshop held to identify and prioritise data needs for the coastal margin 4.2 Ground truthing of satellite imagery analysis on SG (Q3 FY 17/18 & Q4 FY 18/19) and the FI (Q1 – Q4 FY 18/19) 4.3 Stage II geospatial data products reflecting prioritized information needs utilizing high res imagery to reduce uncertainty in habitat models/classifications and address spatial and temporal data priority needs expressed by stakeholders – for both the FI and SG by Quarter 1 FY 19/20	*4.1 Two successful fine-scale mapping stakeholder prioritisation workshops were held on the 8th & 9th July 2018 for the Falkland Islands and South Georgia respectively. Workshop presentations and reports can be found here: https://www.south-atlantic-research.org/research/terrestrial-science/coastal-mapping-project/coastal-mapping-project-download-area/. Indicator was appropriate.* *4.2 Successful ground validation campaigns were completed on South Georgia in Q4 FY 18/19- see section 3.14 (see Penguin News article: https://www.south-atlantic-research.org/wp-content/uploads/2019/04/pn11.pdf, Added value through supporting South Georgia Archaeological Project – see Section 2.6.* *Successful ground validation campaigns were carried out in the Falklands right through FY 18/19. See Section 3.14. Indicator was appropriate* *4.3: Fine-scale (Stage 2) habitat mapping complete for all priority areas agreed with Stakeholders at the above workshops. South Georgia fine-scale habitat maps can on the South Georgia GIS: https://www.sggis.gov.gs/ (**On the left hand side, please expand 'Management', 'Terrestrial' and then tick the SAERI Coastal Habitat Mapping box).** Falklands fine-scale habitat maps are available on the project webGIS. https://data.saeri.org/falklands_habitat.html. The indicator was appropriate.*

Project summary	Measurable Indicators	Progress and Achievements for the life of the project
Activity 4.1: Confirm Stakeholder workshop (to identify and prioritise spatial and temporal data priority needs expressed by Stakeholders) date, venue, and participants for the Falklands and South Georgia		*Completed*
Activity 4.2: Confirm Stakeholder workshop programme, speakers and facilitators through consultations via the PMG and PSG for the Falklands and South Georgia		*Completed*
Activity 4.3: Host the Stakeholder workshop for the Falklands and South Georgia		*Completed*
Activity 4.4: Produce the Stakeholder workshop report for the Falklands and South Georgia and upload onto the project webpage		*Completed*
Activity 4.5: Acquire very high resolution satellite imagery (e.g. WorldView) and/or undertake drone missions to acquire high resolution imagery for priority areas requiring fine-scale mapping in South Georgia and the Falklands		*Completed*
Activity 4.6: Pre-process the imagery to prepare for analysis		*Completed*
Activity 4.7: Undertake analysis of the imagery.		*Completed*
Activity 4.8: Undertake ground-validation of analysed data on the Falklands and South Georgia		*Completed*
Activity 4.9: Produce detailed (Stage II) Coastal Margin habitat maps for priority areas for South Georgia and for the Falklands		*Completed*
Activity 4.10: Upload the detailed (Stage II) Coastal Margin habitat map onto the MSP GIS portal (for the Falklands) and supply to GSGSSI for upload onto the GSGSSI web portal. Upload a copy of the associated metadata onto the South Atlantic metadata catalogue.		*Completed*
Output 5. Work Package 4 (WP4): Prioritisation of ongoing planning, protection and monitoring of the coastal margin	5.1 A monitoring manual produced for long-term monitoring of coastal margin for the Falklands by end Quarter 3 FY 19/20 5.2 A monitoring manual produced for long-term monitoring of coastal margin	*5.1: Following a decision taken by the PMG, a single "Long-term coastal habitat mapping & monitoring handbook: examples based on work undertaken in the Falkland Islands and South Georgia." has been produced. Falklands & South Georgia were merged. Available to download on the project website[12]. Indicator was appropriate.*

[12] https://www.south-atlantic-research.org/wp-content/uploads/2019/12/DPLUS065_MonitoringHandbook_Final.pdf

Project summary	Measurable Indicators	Progress and Achievements for the life of the project
	for South Georgia by end Quarter 3 FY 19/20 5.3 At least 1 face-to-face training workshop in implementing monitoring undertaken by end Quarter 2 FY 19/20	*5.2: Following a decision taken by the PMG, a single "Long-term coastal habitat mapping & monitoring handbook: examples based on work undertaken in the Falkland Islands and South Georgia." has been produced. Falklands & South Georgia were merged. Available to download on the project website[20]. Indicator was appropriate.* *5.3: A successful three day Coastal Habitat Mapping training workshop was held for project partners, stakeholders and the local community. The report from the workshop can be viewed here[13]. The workshop was recorded and a series of videos from the workshop have been published on SAERI YouTube channel[14]. Further training on the use of drones for Coastal Habitat Mapping was carried out as part of the Shackleton Scholarship Fund fortnight of activities in November 2018 (**Annex 15**). Indicator was appropriate.*
Activity 5.1: Draft a long-term coastal mapping/monitoring manual for the Falklands and South Georgia and upload onto the project webpage		*Completed*
Activity 5.2: Confirm date, venue, and participants for the Falklands and South Georgia coastal mapping/monitoring training workshop		*Completed*
Activity 5.3: Undertake coastal mapping/monitoring training workshop		*Completed*
Activity 5.4: Record videos of training sessions and upload online onto the project webpage		*Completed*
Output 6. Work Package 5 (WP 5) All outputs integrated with existing and emerging initiatives	6.1 New geospatial products maximally informed and integrated with existing FI and SG geo-spatial data initiatives	*6.1 Review of stakeholder and data initiatives within the Falklands and South Georgia was completed in FY 18/19. The short report from which can be seen in **Annex 9**, and has been uploaded onto the project website for wider dissemination[15].*

[13] https://www.south-atlantic-research.org/wp-content/uploads/2019/12/2019_07_08_FromSatellitesToDrones_TrainingWorkshopReport_Final.pdf
[14] https://www.youtube.com/playlist?list=PLkfKiNCRZY0VlV9NW5Di8Oi2W7-8sNZLW
[15] https://www.south-atlantic-research.org/wp-content/uploads/2019/04/19_03_A_review_of_existing_data_management_initiatives_in_Falklands_SouthGeorgia_FINAL.pdf

Project summary	Measurable Indicators	Progress and Achievements for the life of the project
	6.2 End of project synthesis workshop for FI and SG held by end Synthesis workshop held by end Quarter 3 FY 19/20 to decide how findings will contribute to systematic conservation planning	*6.2 A successful end of project synthesis workshop, involving key stakeholders from the Project Stakeholder Group and others, was held in November 2019. The workshop titled "Spatial tools for conservation planning in remote spaces" had dedicated sessions on project legacy and delivering through collaboration – looking at future opportunities which could utilise and build on the tools and frameworks developed through DPLUS065. The workshop report can be found in*
Activity 6.1: Review all of the existing (relevant) stakeholder groups and data creation and management initiatives and protocols.		*Completed*
Activity 6.2: Produce a report on the review demonstrating how this initiative links to and builds on the existing and emerging work, and publish on the project webpage.		*Completed*
Activity 6.3: Prepare for and host 'end of project' synthesis workshop to decide how outputs will be fed into planning		*Completed*
Output 7. Monitoring & evaluation	7.1 Detailed Monitoring and evaluation plan produced by end Q4 FY 17/18 7.2 6-monthly updates on implementation of M&E Plan provided to PMG	*7.1 Completed - M& E plan produced in Q4 FY 17/18 – available from the project website here: https://www.south-atlantic-research.org/wp-content/uploads/2019/04/DPLUS065_ME_Plan_Final_Updated.pdf Indicator was appropriate.* *7.2 Regular updates on implementation of the M&E plan have been given to PMG. Trello online project management tool was used to share PMG documentation. Review of the M&E plan was a standing agenda item on the quarterly PMG meetings. M&E plan can be seen here: https://www.south-atlantic-research.org/wp-content/uploads/2019/04/DPLUS065_ME_Plan_Final_Updated.pdf. Indicator was appropriate.*
Activity 7.1: Prepare monitoring and evaluation (M and E) plan		*Completed*
Activity 7.2: Prepare and present 6 monthly M and E updates		*Completed*
Activity 7.3: Upload M and E plan and updates onto webpages		*Completed*

10 Annex 3: Standard Measures

Code	Description	Totals (plus additional detail as required)
Training Measures		
1	Number of (i) students from the UKOTs; and (ii) other students to receive training (including PhD, masters and other training and receiving a qualification or certificate)	(i) 2 x Male (Falklands) (ii) 1 x Female (Chile) *Theme of training – Earth Observation and Habitat Mapping*
2	Number of (i) people in UKOTs; and (ii) other people receiving other forms of long-term (>1yr) training not leading to formal qualification	(i) 0 (ii) 0
3a	Number of (i) people in UKOTs; and (ii) other people receiving other forms of short-term education/training (i.e. not categories 1-5 above)	(i) 11 x Male, 8 x Female (ii) 0 *Theme of training – Earth Observation and Habitat Mapping*
3b	Number of training weeks (i) in UKOTs; (ii) outside UKOTs not leading to formal qualification	(i) 1 week (ii) 0
4	Number of types of training materials produced. Were these materials made available for use by UKOTs?	• Training videos – made available via the project website and on YouTube • Coastal Habitat Mapping & Monitoring handbook – made available via project website
5	Number of UKOT citizens who have increased capacity to manage natural resources as a result of the project	22
Research Measures		
9	Number of species/habitat management plans/ strategies (or action plans) produced for/by Governments, public authorities or other implementing agencies in the UKOTs	0
10	Number of formal documents produced to assist work in UKOTs related to species identification, classification and recording.	3 Long-term coastal habitat mapping & monitoring handbook: examples based on work undertaken in the Falkland Islands & South Georgia. Smartphone application for recording habitat observations for ground validation

Code	Description	Totals (plus additional detail as required)
		Flight operations manual for drone mapping surveys
11a	Number of papers published or accepted for publication in peer reviewed journals written by (i) UKOT authors; and (ii) other authors	(i) 0 (ii) 0
11b	Number of papers published or accepted for publication elsewhere written by (i) UKOT authors; and (ii) other authors	(i) 0 (ii) 0
12b	Number of computer-based databases enhanced (containing species/genetic information). Were these databases made available for use by UKOTs?	1 x Spatial database (displayed via webGIS), hosted by SAERI IMS-GIS data centre, holding habitat modelling ground validation data for Falkland Islands and South Georgia.
13a	Number of species reference collections established. Were these collections handed over to UKOTs?	0 – none within scope
13b	Number of species reference collections enhanced. Were these collections handed over to UKOTs?	0 – none within scope
Dissemination Measures		
14a	Number of conferences/seminars/workshops/stakeholder meetings organised to present/disseminate findings from UKOT's Darwin project work	10 x conferences/seminars/ workshops/stakeholder meetings organised to present/disseminate findings from DPLUS065 project. 3 x workshops around using drones for habitat mapping, organised and run 2 x Project Stakeholder Group meetings, in addition to other stakeholder training and fine-scale mapping prioritisation workshops 1 x public talk at the Chamber of Commerce about the DPLUS065 Coastal Habitat Mapping project 2 x DPLUS065 fine-scale mapping stakeholder prioritisation workshops 1 x public talk at the Stanley Cinema about the DPLUS065 South Georgia expedition 1 x end of project synthesis workshop,

Code	Description	Totals (plus additional detail as required)
14b	Number of conferences/seminars/ workshops/stakeholder meetings attended at which findings from the Darwin Plus project work will be presented/ disseminated	6 x conferences/seminars/ workshops/stakeholder meetings attended where findings from the DPLUS065 project were presented. 2 x Farmers Week presentations made in 2018 & 2019. 2 X Environment Committee presentations made in 2018 & 2019. 1 x Presentation at DPLUS069 Darwin project workshop hosted by British Antarctic Survey. 1 x presentation made on expedition vessel to citizen scientists during South Georgia expedition.
Physical Measures		
20	Estimated value (£s) of physical assets handed over to UKOT(s)	£
21	Number of permanent educational/training/research facilities or organisation established in UKOTs	n/a
22	Number of permanent field plots established in UKOTs	n/a
23	Value of resources raised from other sources (e.g., in addition to Darwin funding) for project work	Falkland Islands Government Environmental Studies Budget £ Shackleton Scholarship Fund £ Digital Globe Foundation satellite imagery grant c. £ Iridium satellite data donation for South Georgia expedition £

11 Annex 4: Publications

Type * (e.g. journals, manual, CDs)	Detail (title, author, year)	Nationality of lead author	Nationality of institution of lead author	Gender of lead author	Publishers (name, city)	Available from (e.g. weblink, contact address, annex etc)
Journal (in prep)	Google Earth Engine as a Platform for Long Term Island Level Landcover Classification. Black., B *et al,* 2020	American	American	female	TBC	In preparation
Manual	SAERI Commercial & Research Flight Operations Manual, Golding, N. 2019	British	Falkland Islands	Male	SAERI, Falkland Islands	https://www.south-atlantic-research.org/wp-content/uploads/2019/12/026a-SAERI-Commercial-Research-Flight-Operations-Policy_v1_5.pdf
Manual	Golding, N., Black, B., Blake, D., Brewin, P., Harte, M., Havercroft, H., James, R., Jones, G. 2019. **Long-term coastal habitat mapping & monitoring handbook. Examples based on work undertaken in the Falkland Islands & South Georgia.** DPLUS065 Coastal Habitat Mapping project. 56pp.	British	Falkland Islands	Male	SAERI, Falkland Islands	https://www.south-atlantic-research.org/wp-content/uploads/2019/12/DPLUS065_MonitoringHandbook_Final.pdf

Type * (e.g. journals, manual, CDs)	Detail (title, author, year)	Nationality of lead author	Nationality of institution of lead author	Gender of lead author	Publishers (name, city)	Available from (e.g. weblink, contact address, annex etc)
Workshop report	Golding, N., & Jones, G. 2019. **Report of the Final Project Workshop: Spatial Tools for Conservation Planning in Remote Spaces**: DPLUS065 Coastal Habitat Mapping project, 12th – 13th November 2019. 16pp.	British	Falkland Islands	Male	SAERI, Falkland Islands	https://www.south-atlantic-research.org/wp-content/uploads/2019/12/2019_11_12_DPLUS065_FinalProjectWorkshopReport_FINAL.pdf
Workshop report	Golding, N., Jones, G. & Black, B. 2019**. From Satellites to Drones: Earth Observation and Habitat Mapping Training Workshop Report.** DPLUS065 Coastal Habitat Mapping project 8th – 10th July 2019. 16pp.	British	Falkland Islands	Male	SAERI, Falkland Islands	https://www.south-atlantic-research.org/wp-content/uploads/2019/12/2019_07_08_FromSatellitesToDrones_TrainingWorkshopReport_Final.pdf
Training videos	An important component of the Coastal Habitat Mapping project's legacy was the transfer of this knowledge to relevant individuals in both Territories, and a dedicated workshop	n/a	Falkland Islands	n/a	SAERI, Falkland Islands	https://www.youtube.com/playlist?list=PLkfKiNCRZY0VIV9NW5Di8Oi2W7-8sNZLW

Type * (e.g. journals, manual, CDs)	Detail (title, author, year)	Nationality of lead author	Nationality of institution of lead author	Gender of lead author	Publishers (name, city)	Available from (e.g. weblink, contact address, annex etc)
	facilitated this transfer. This series of videos was created as part of the workshop, and covers the various topics that were discussed.					
Newspaper article	**Using drones to map South Georgia's coastal habitats**. Neil Golding. 2019	British	Falkland Islands	Male	Penguin News, Falkland Islands	https://www.south-atlantic-research.org/wp-content/uploads/2019/04/pn11.pdf
Technical Report	**Kelp & Bathymetry Modelling in the Falkland Islands**. Sam Pike & Katie Medcalf. 2019	British	British	Male	Environment Systems, UK	https://www.south-atlantic-research.org/wp-content/uploads/2019/12/DPLUS065_Report_Technical_KelpBathymetryModelling.pdf
Newspaper Article	**Using drones to create fine-scale models of minefields**. Neil Golding. 2019	British	Falkland Islands	Male	Penguin News, Falkland Islands	https://www.south-atlantic-research.org/wp-content/uploads/2019/02/20190215-11.pdf
Newsletter article	**A new aerial perspective on South Georgia's coastal habitats**. Neil Golding, 2019	British	Falkland Islands	Male	South Georgia Association Newsletter, UK	https://www.south-atlantic-research.org/research/terrestrial-science/coastal-mapping-project/coastal-mapping-project-latest-news/
Newsletter article	**Mapping South Georgia's dynamic**	British	Falkland Islands	Male	South Georgia Association	http://southgeorgiaassociation.org/sga-legacy/documents/2018_nl_34.pdf

Type * (e.g. journals, manual, CDs)	Detail (title, author, year)	Nationality of lead author	Nationality of institution of lead author	Gender of lead author	Publishers (name, city)	Available from (e.g. weblink, contact address, annex etc)
	coastal margin. Neil Golding, 2018				Newsletter, UK	
Workshop report	Golding, N. 2018. **Report of the Workshop on Fine-scale Mapping Stakeholder Prioritisation for South Georgia:** DPLUS065 Coastal Habitat Mapping project, 9th August 2018. 23pp.	British	Falkland Islands	Male	SAERI, Falkland Islands	https://www.south-atlantic-research.org/wp-content/uploads/2019/02/2018_08_09_StakeholderPrioritisation_SouthGeorgia_WorkshopReport_0_3.pdf
Workshop report	Golding, N. 2018. **Report of the Workshop on Fine-scale Mapping Stakeholder Prioritisation for the Falkland Islands:** DPLUS065 Coastal Habitat Mapping project, 8th August 2018. 26pp.	British	Falkland Islands	Male	SAERI, Falkland Islands	https://www.south-atlantic-research.org/wp-content/uploads/2019/02/2018_08_08_Falklands_StakeholderPrioritisation_WorkshopReport_0_3-1.pdf

12 Annex 5: Darwin Contacts

Ref No	DPLUS065
Project Title	Mapping Falklands and South Georgia coastal margins for spatial planning
Project Leader Details	
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Annex 6: DPLUS065 Memorandum of UnderstandingChecklist for submission

	Check
Is the report less than 10MB? If so, please email to Darwin-Projects@ltsi.co.uk putting the project number in the Subject line.	No
Is your report more than 10MB? If so, please discuss with Darwin-Projects@ltsi.co.uk about the best way to deliver the report, putting the project number in the Subject line.	Yes
Have you included means of verification? You need not submit every project document, but the main outputs and a selection of the others would strengthen the report.	Yes
Do you have hard copies of material you want to submit with the report? 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.	