



# DPLUS065 Coastal Habitat Mapping

## Final Project Workshop

12<sup>th</sup>-13<sup>th</sup> November 2019

JNCC, Peterborough

# Spatial tools for conservation planning in remote spaces



### Version Control Table

Version	Date	Author	Comments
0.1	22/11/19	NG	First draft
1.0	17/12/19	NG	Draft following comments from Paul Brickle & Tara Pelembe (SAERI)
FINAL	20/12/19	NG	Final version issued following comments from workshop participants.

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**Cover image:** *Satellite imagery courtesy of Digital Globe Foundation. Panchromatic image of Grytviken, South Georgia.*

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## 2. Background

Historically, and to this day, the coastal and inshore marine ecosystems (and their constituent habitats within) and resources of the Falklands and South Georgia have played an important role from an environmental, social and economic perspective. The coastal ecosystems around South Georgia for example, provide an essential habitat for globally important populations of birds and marine mammals. Knowledge of these coastal environments is essential for their management, yet comprehensive island-wide broad-scale and fine-scale coastal habitat maps are lacking. Comprehensive mapping could fill a critical evidence gap, and provide an important baseline from which to measure future change, habitat restoration success or human impact.

Habitat maps are a fundamental element for understanding the distribution and extent of features across the landscape, and can facilitate better management practices, natural capital accounting, ecosystem service mapping, interpreting and targeting biodiversity monitoring and delivering policies. Both the Falkland Island Government (FIG) and the Government of South Georgia & the South Sandwich Islands (GSGSSI) have environmental policies and strategies where a baseline knowledge and understanding of the coastal margin will enhance any related policy decisions.

The Darwin (DPLUS065) Coastal Habitat Mapping project, grant aided by the Darwin Initiative through UK Government funding, created the first broad-scale satellite-derived coastal habitat maps for both these UK Overseas Territories, using medium resolution satellite imagery alongside other spatial data and local expert knowledge. This three-year project brought together experts from [SAERI](#), [Oregon State University](#), [Shallow Marine Surveys Group](#), the UK [Joint Nature Conservation Committee](#), [Falkland Islands Government](#) and the [Government of South Georgia & the South Sandwich Islands](#). Where there was significant uncertainty in these broad-scale maps, or in response to specific priorities from stakeholders, fine scale habitat maps utilising very high-resolution satellite imagery (via the Digital Globe Foundation grant) or bespoke imagery captured using aerial drones were developed. Together, these broad and fine-scale habitat maps have created a baseline for the Falkland Islands and South Georgia, providing a sound basis for use in future planning, decision-making and monitoring.

### 3. Workshop aims

The aims of this final project workshop were three-fold, to:

- provide an overview of the DPLUS065 Coastal Habitat Mapping project and reflect on its key outputs.
- fulfil the projects legacy objective, by exploring ideas for the practical future application of spatial tools and frameworks developed through the project.
- provide a dedicated horizon scanning session to facilitate the development of future project concepts which use and build on the project outputs, including identifying lead organisations, drafting objectives and considering potential funding sources.

The workshop agenda can be found in [Annex 1](#).

### 4. Opening of the workshop

Following round table introductions (*Figure 1*), Marcus Yeo, the CEO of the JNCC, opened the workshop, held at JNCCs headquarters (UK). In attendance were representatives from the following organisations (attendance list in [Annex 2](#)):

- South Atlantic Environmental Research Institute (SAERI)
- Joint Nature Conservation Committee (JNCC)
- Falkland Islands Government (FIG)
- Government of South Georgia & the South Sandwich Islands (GSGSSI)
- Oregon State University
- Royal Botanical Gardens (Kew)
- Cambridge University (Cambridge Archaeological Unit)
- Shallow Marine Surveys Group
- British Antarctic Survey
- UK Foreign & Commonwealth Office
- British Indian Ocean Territories
- International Association of Antarctica Tour Operators (IAATO)
- South Georgia Heritage Trust (SGHT)
- South Georgia Association
- Marine Management Organisation (MMO)
- Government of Tristan da Cunha,

Neil Golding, the DPLUS065 Coastal Habitat Mapping project manager presented an overview of the project and a summary of its key outputs. The presentation can be found on the project website [here](#).

The Governments of the two UK Overseas Territories where the project was based then provided a summary of why the Coastal Habitat Mapping project was so important for them. Mark Belchier, Director of Fisheries and Environment for the Government of South Georgia & the South Sandwich

Islands presented a South Georgia perspective ([available here](#)) while Denise Blake, Environmental Officer and Policy Advisor for Falkland Islands Government presented a Falkland Islands perspective ([available here](#)).



Figure 1: Tara Pelembe and Neil Golding from SAERI getting the workshop underway.

Gwawr Jones reflected on the *From Satellites to Drones: Earth Observation and Habitat Mapping Training Workshop Coastal Habitat*, which was an important event to help establish a legacy for future monitoring of the coastal margin using a variety of earth observation tools. The event was well-attended by a wide range of project stakeholders. Her presentation is available [here](#).

In the final part of this opening session, Neil Golding presented a summary of the projects communications and engagement success stories, reflecting on some of the exciting collaborations which were realised during the completion of the Coastal Habitat Mapping project. His presentation is available [here](#).

## 5. Delivering through collaboration – future collaborative opportunities in the UK Overseas Territories (Part 1)

In Part 1 of this workshop session, selected participants were invited to speak about potential future collaborative opportunities in the UKOTs, focusing on areas or issues of relevance to them. These ideas were then to be considered in Part 2 of the session on Wednesday 13<sup>th</sup> November when project concepts were expanded and drafted. The series of presentations are listed below; presentations can be viewed by clicking the hyperlinks:

- [Alexander Arkhipkin from the Department of Natural Resources, Falkland Islands Government \(FIG\)](#)
- [Mark Belchier from the Government of South Georgia & the South Sandwich Islands \(GSGSSI\) \(see Figure 2\)](#)
- [Rosemary Newton from the Royal Botanic Gardens, Kew](#)
- [Marcus Brittain from the University of Cambridge: Cambridge Archaeological Unit](#)
- [Paul Brewin from the Shallow Marine Surveys Group](#)
- [Susie Grant from the British Antarctic Survey](#)
- [Gwawr Jones, on behalf of Amanda Gregory from the Joint Nature Conservation Committee](#)
- [Michael Harte from Oregon State University](#)
- [Paul Brickle, on behalf of Tara Pelembe from the South Atlantic Environmental Research Institute \(SAERI\)](#)
- [Alison Neil from the South Georgia Heritage Trust.](#)



*Figure 2: Mark Belchier from GSGSSI presenting ideas for future collaborative opportunities in the UK Overseas Territories, from a South Georgia perspective.*

## 6. Project legacy discussion session

During this workshop session, participants broke into smaller sub-groups and tackled three questions, before coming back into plenary to discuss. The three questions were:

*Q1 - This workshop is part of the legacy development for the project. Looking ahead, where do you feel the future long-term monitoring role could sit for both Falklands and South Georgia – to help identify where these responsibilities may lie? How can we maintain the momentum this project has generated?*

*Q2. - Given the intended legacy of the project, with maps to be updated in the future, how can we best integrate opportunistic data collection into the process? For example, data collection from 'citizen scientists' (e.g. tourists or cruise ship staff), asking other science projects to collect data whilst working at rarely visited sites etc.*

*Q3. - What other ideas/real world applications do you have for use of the project outputs (broad-scale and fine-scale habitat maps)?*

The compiled results for each of three questions from the sub-groups is shown below in Section 6.1 to 6.3 respectively. The key points raised in plenary for each question are also highlighted in blue boxes under each section.

**6.1. Question 1: This workshop is part of the legacy development for the project. Looking ahead, where do you feel the future long-term monitoring role could sit for both Falklands and South Georgia – to help identify where these responsibilities may lie? How can we maintain the momentum this project has generated?**

- More money for project work
- Long-term funding – is it a barrier? e.g. GIS data portals don't exist everywhere or are not fully supported full-time; lack of resource & funding in OTs in the longer term
- Collaboration driven by bottom up approaches (e.g. research organisations, NGOs, people interested in delivering the work)
- Co-ordination driven by top down approaches (e.g. Governments)
- Need to avoid duplication of project work in OTs
- Data exists but capacity to do something with it doesn't in OTs
- Continue momentum of project through "mechanism" (if that exists) – JNCC? Collaboration driven?
- Co-ordination & ownership needs to be by OT governments, but work could be carried out as a service by others

Coordination (and ownership) needs to be undertaken by the Governments of the Falkland Islands and South Georgia. However, the work itself can be completed by others.

Long-term, strategic funding sources need to be identified and utilised to undertake long-term monitoring programmes.

**6.2. Question 2: Given the intended legacy of the project, with maps to be updated in the future, how can we best integrate opportunistic data collection into the process? For example, data collection from ‘citizen scientists’ (e.g. tourists or cruise ship staff), asking other science projects to collect data whilst working at rarely visited sites etc.**

- Quality of data from citizen scientists need to be considered:
  - Targeted
  - Training of volunteers?
- The use of novel technologies such as smartphone apps (iNaturalist) to streamline data collection.
- Opportunities may be limited for citizen science in some OTs e.g. Tristan de Cunha
- Needs to be focussed on visitor/citizen experience also to maintain momentum
- Citizen science is great, but we also need expert field surveys
- Can we ask the ‘right’ questions to make the most of the citizen science data?
- Opportunistic data collection from scientists on cruise ships may be better
- Other scientists who are not experts need to be considered carefully also e.g. other scientists from different fields might not have the expertise, or motivation (if time & resources limited) to add other data collection to their work load.
- Data storage from citizen science programmes presents its own challenges
- Some horizon scanning, to understand what citizen science is happening with EO data.

Use of new technologies such as smartphone apps (as used by the DPLUS065 project) to streamline data collection and storage.

Needs to be the right balance between citizen science data collection and bona fide expert-led field surveys

Asking the right questions of citizen scientists is key!

**6.3. Question 3: What other ideas/real world applications do you have for use of the project outputs (broad-scale and fine-scale habitat maps)?**

- Management / planning / decision-making
- Storm preparedness
- Geospatial database – quickly analyse what is already available before asking ‘do we need more data?’; – ‘value of information’ analyses
- Target data collection where there are data gaps

- Standardisation of data needs ownership from Governments – interoperability of datasets temporally and spatially
- Dynamic of kelp beds – e.g. harvesting, where and how much?
- Biomass estimations for kelp, maerl & diddle dee
- Prioritise low confidence classes from the existing DPLUS065 habitat mapping outputs for further groundtruthing to improve confidence.

Management, planning & decision-making

Prioritise collection of additional ground-truthing for low confidence mapping classes in existing maps

Biomass estimates for a variety of habitats

## 7. Delivering through collaboration – future collaborative opportunities in the UK Overseas Territories (Part 2)

This session was designed to facilitate the development of project concepts, some of which may have been introduced by participants in Part 1 earlier in the workshop. Participants were split into groups and discussed novel project concepts, building on the tools, frameworks and relationships developed by the DPLUS065 Coastal Habitat Mapping project. Once back in plenary, ideas were discussed; summary paragraphs for each proposal are listed below (in no particular order). Detailed project concepts will be circulated around the group following the workshop to enable them to be progressed into the future, further building on the legacy of the DPLUS065 Coastal Habitat Mapping project.

### 7.1. Proposal 1: Applying EO in remote, resource poor OTs to effectively monitor changes, focusing on the use of proxies which can be monitored using EO

How do we utilise EO for effective, repeatable, cost effective monitoring solutions? UK OTs are remote and resource poor, yet they need a robust mechanism to monitor change in their marine environments. Using EO technologies, we could monitor a series of environmental changes (including the use of proxies, which can be monitored using EO), indicators of marine health and responses to management interventions. As a proof of concept with specific case studies, this could then be rolled out and applied to other locations and territories.

## **7.2. Proposal 2: Natural Capital of kelp in the South Atlantic**

Kelp provides a number of ecosystem services that support the economy, biodiversity and marine and coastal management in different UK overseas territories (and in Namibia and Chile). Kelp forests are also a good indicator of ecosystem health and wider climate change trajectories (resilience). This proposal will seek to determine the value that kelp provides as an ecosystem service.

## **7.3. Proposal 3: Test Earth Observation technologies for identifying areas/locations of invasive species, as well as the probability of invasive species entering a Territory**

Testing EO technology for identifying areas or location of invasive species & probability of invasives coming in. Create a list of species where EO is suitable for detection, and which species are not detected by any EO technology (yet). Looking at using drones for detection, but could they also be used to manage (eradicate) species when detected? Once identified invasive species would need to be considered individually, with their characteristics and habitat suitability recorded.

## **7.4. Proposal 4: Weddell Seal population monitoring**

There is a small population in Larsen Harbour, South Georgia, but we have no idea how many are breeding. From the small amount of data collected, there seems to have been a decline in population numbers over the last 30 or so years, but we don't know why as we know very little about these seals including what they eat. It is very difficult to get to the location in early summer when the pups are born. Satellites may have difficulty identifying Weddell seals from other species of seal and seeing them on a snow-free background, so may not be feasible. A preliminary trial has shown that drones can aid counting for routine monitoring of the species, and this trial needs to be expanded

## **7.5. Proposal 5: Using drones to count burrowing seabirds (petrel focus)**

Monitoring nesting sites to see if birds return to areas following the rat eradication programme. Using thermal or infrared sensors as birds have nocturnal activity. Need to consider the impact of drones on bird behaviour e.g. drones easily disturb gulls so GSGSSI has in the past restricted drone work to minimise disturbance. The project could also look at longer-term impact of bird populations on fisheries and by-catch.

## **7.6. Proposal 6: Storm damage preparedness**

Considering the preparedness of people to storm damage, and its link to climate change. Also consider climate change risk on likelihood of invasive species. Disaster Risk Reduction work, looking at erosion and land slides due to high rainfall concentrations of recent storms (getting worse due to climate change). The locals have noticed that the weather has changed and are very aware of climate change. Need a system to be able to forecast storms and hazards. Project can look at areas at most risk and recommend mitigation actions to

build islanders' resilience to storms and invasive species. We could use EO from space for creating DEMs and mapping landslides after events, and drones for invasives work. [2 projects here, people & species].

### 7.7. Proposal 7: Cataloguing heritage assets on the Falklands and South Georgia.

In the Falkland Islands, to create a heritage catalogue (possibly using the SG one as a model), making the local population aware of it, creating a local database and asking landowners for access to heritage sites. Using citizen science to populate it. Could be an educational resource. Falkland Island people are proud of their heritage and would want to contribute. Maritime sealing and whaling heritage need further work in the Falkland Islands. Military history would be a rich source and would be relevant to both F.I and SG.

On South Georgia, link to the existing catalogue with the geospatial habitat mapping and through the app encourage tourists to help populate information for other sites/artefacts. Increase tourist awareness of heritage sites and what they can look for. Engagement process would need to be kept simple.

## 8. Closing remarks

Following the plenary session, participants commented that some of the projects were actually very complimentary, for example the storm damage preparedness and Natural Capital proposals, and could be run in tandem.

Alison Neil (SGHT) highlighted the collaboration between SAERI, SGHT, CAU and others, which resulted in a very successful South Georgia Archaeological Project. There was a keenness to repeat this, and potentially expand to the Falkland Islands. Neil Golding echoed this point, and highlighted that using vessels of opportunities and collecting data for multiples uses was an extremely valuable lesson to remember for future projects.

Neil Golding, the DPLUS065 Project Manager closed the workshop, by thanking all the participants for their valuable input throughout the workshop, building on what the project has delivered to date, and developing a legacy for the project with new concepts and ideas.

## 9. Annex I:

**Tuesday 12<sup>th</sup> November 2019**

<b>Time</b>	<b>Details</b>	<b>Responsible person</b>
09:00	<i>Tea/Coffee</i>	
09:30	<i>Housekeeping</i>	GJ
09:35	<i>Welcome &amp; introductions</i>	Marcus Yeo (JNCC)
09:45	<i>DPLUS065 Coastal Habitat Mapping – an overview and summary of key outputs</i>	NG
10:30	<i>“Why is coastal habitat mapping so important for us”? A Falklands and South Georgia perspective</i>	GSGSSI (Mark Belchier) & FIG (Alexander Arkhipkin/Denise Blake)
<b>10:50</b>	<b><i>Smoko</i></b>	
11:05	<i>Establishing a legacy for future monitoring &amp; empowering local stakeholders – reflecting on the Coastal Habitat Mapping EO Training Workshop</i>	GJ
<b>12:00</b>	<b><i>Lunch</i></b>	
13:00	<i>Our project communications &amp; engagement success</i>	NG
13:30	<p><b><i>Delivering through collaboration - future collaborative opportunities in the UKOTs – Part 1</i></b></p> <p><i>10 minutes presentation &amp; 5 mins discussion</i></p> <ul style="list-style-type: none"> <li>• <i>Falkland Islands Government (FIG) (Alexander Arkhipkin – Fisheries Dept)</i></li> <li>• <i>Government of South Georgia &amp; the South Sandwich Islands (GSGSSI) (Mark Belchier/Jen Black)</i></li> <li>• <i>Kew (Colin Clubbe/Rosemary Newton)</i></li> <li>• <i>Cambridge Archaeological Unit (Marcus Brittain)</i></li> <li>• <i>Shallow Marine Surveys Group (Paul Brewin)</i></li> <li>• <i>British Antarctic Survey (Susie Grant)</i></li> </ul>	ALL

15:00	<b>Smoko</b>	
15:15	<p><b><i>Delivering through collaboration - future collaborative opportunities in the UKOTs: Part 2</i></b></p> <ul style="list-style-type: none"> <li>• <i>JNCC (Amanda Gregory)</i></li> <li>• <i>Oregon State University (Michael Harte)</i></li> <li>• <i>SAERI (Tara Pelembe)</i></li> <li>• <i>South Georgia Heritage Trust (Alison Neil)</i></li> </ul>	ALL
16:15	<p><b><i>Project legacy discussion session:</i></b></p> <p><i>Breakout groups and plenary session</i></p> <p><i>Q1 - This workshop is part of the legacy development for the project. Looking ahead, where do you feel the future long-term monitoring role could sit for both Falklands and South Georgia – to help identify where these responsibilities may lie? How can we maintain the momentum this project has generated?</i></p> <p><i>Q2. - Given the intended legacy of the project, with maps to be updated in the future, how can we best integrate opportunistic data collection into the process? For example, data collection from ‘citizen scientists’ (e.g. tourists or cruise ship staff), asking other science projects to collect data whilst working at rarely visited sites etc.</i></p> <p><i>Q3. - What other ideas/real world applications do you have for use of the project outputs (broad-scale and fine-scale habitat maps)?</i></p> <p><b><i>Rapporteurs will feedback in plenary</i></b></p>	ALL
17:15	<i>Concluding thoughts from the floor</i>	ALL
17:30	<i>Close</i>	
19:00	<i>Workshop dinner</i>	<i>Peterborough</i>

Wednesday 13<sup>th</sup> November 2019

Time	Details	Responsible person
09:00	<i>Tea/Coffee</i>	
09:15	<p><b><i>Delivering through collaboration - future collaborative opportunities in the UKOTs: Part 3</i></b></p> <p><b><i>Session chaired by Tara Pelembe (SAERI)</i></b></p> <p><i>Ideas for using existing and innovating new spatial tools for conservation planning and land management in remote areas.</i></p> <p><i>This session is designed to facilitate the development of project concepts, detailing who, identifying leads and drafting a few lines summarising objectives and highlighting potential funding sources:</i></p> <p><i>Participants will be split into relevant themes (groups) including:</i></p> <ol style="list-style-type: none"> <li><i>1. Archaeology and heritage</i></li> <li><i>2. Terrestrial monitoring and management</i></li> <li><i>3. Shallow marine &amp; coastal</i></li> </ol> <p><i>Rapporteurs will feedback concepts in plenary after smoko</i></p>	ALL
10:45	<b><i>Smoko</i></b>	
11:00	<p><i>Plenary feedback session and discussion</i></p> <p><b><i>Session chaired by Tara Pelembe (SAERI)</i></b></p> <p><i>Outputs will be a suite of drafted project concepts to take forward.</i></p>	ALL
12:00	<i>Closing remarks &amp; end of workshop.</i>	

## 10. Annex 2:

<b>Attendee</b>	<b>Affiliation</b>
Tom Chance	UK Foreign & Commonwealth Office
Nadine Atchison-Balmond	British Indian Ocean Territories
Hayley Collings	International Association of Antarctica Tour Operators (IAATO)
Alison Neil	South Georgia Heritage Trust (SGHT)
Susie Grant	British Antarctic Survey (BAS)
Rosemary Newton	Royal Botanic Gardens, Kew
Robert Burton	South Georgia Association
Alexander Arkhipkin	Falkland Islands Government (FIG)
Amanda Gregory	Joint Nature Conservation Committee (JNCC)
Paul Brewin	Shallow Marine Surveys Group (SMSG)
Mark Belchier	Government of South Georgia & the South Sandwich Islands (GSGSSI)
Tara Pelembe	South Atlantic Environmental Research Institute (SAERI)
Stephanie Martin	Government of Tristan da Cunha
Michael Harte	Oregon State University (OSU)
Ness Smith	Marine Management Organisation (MMO)
Marcus Brittain	University of Cambridge
Denise Blake	Falkland Islands Government (FIG)
Neil Golding	South Atlantic Environmental Research Institute (SAERI)
Gwawr Jones	Joint Nature Conservation Committee (JNCC)