Applicant: **Bamford, Connor**
Organisation: **British Antarctic Survey**
Funding Sought: **£432,459.00**

# DPR12S2\1020

**Southwest Atlantic Elephant Seal Population Assessment (SAESPA)**

Southern elephant seal population data in the southwest Atlantic is limited, and at South Georgia is 30-years out-of-date. Consequently, our understanding of how these marine predators are faring, particularly given the impact of climate change, is lacking. Using satellite imagery, along with unmanned aerial vehicle (UAV) surveys, we plan to census breeding populations on South Georgia, the South Orkney and the South Shetland Islands. This will establish modern baselines and investigate possible southward shifts in populations since the 1990s.

## PRIMARY APPLICANT DETAILS

**Title**            Dr
**Name**            Connor
**Surname**            Bamford
**Organisation**            British Antarctic Survey
**Website (Work)**            ███████████████

███████████████

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**Tel (Work)**            ███████████████
**Email (Work)**            ███████████████

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# DPR12S2\1020

Southwest Atlantic Elephant Seal Population Assessment (SAESPA)

## Section 1 - Contact Details

### PRIMARY APPLICANT DETAILS

| | |
|---|---|
| **Title** | Dr |
| **Name** | Connor |
| **Surname** | Bamford |
| **Organisation** | British Antarctic Survey |
| **Website (Work)** | ███████████████ |
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| **Address** | ███████ |
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### GMS ORGANISATION

| Type | Organisation |
|---|---|
| **Name** | British Antarctic Survey |
| **Phone (Fax)** | ████ |
| **Email (Work)** | █████ |
| **Address** | ██████ |
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## Section 2 - Title & Summary

### Q3. Title:

Southwest Atlantic Elephant Seal Population Assessment (SAESPA)

### What was your Stage 1 reference number? e.g. DPR12S1\1123

DPR12S1\1049

# Please attach a cover letter as a PDF document.

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  🕑 17:09:34
  📄 pdf 177.15 KB

## Q4. Summary of project

**Please provide a brief non-technical summary of your project: the problem/need it is trying to address, its aims, and the key activities you plan on undertaking.**

**Successful Darwin Plus Main projects must demonstrate substantial measurable outcomes in <u>at least one</u> of the themes of Darwin Plus either by the end of the project's implementation or via evidenced mechanisms for post-project delivery.**

**<u>Preference will be given to discrete projects implementing existing identified environmental solutions on the ground.</u>**

**The broad themes of Darwin Plus Main are:**

- **Biodiversity:** improving and conserving biodiversity, and slowing or reversing biodiversity loss and degradation;
- **Climate change:** responding to, mitigating and adapting to climate change and its effects on the natural environment and local communities;
- **Environmental quality:** improving the condition and protection of the natural environment;
- **Capability and capacity building:** enhancing the capacity within UKOTs to support the environment in the short- and long-term.

Southern elephant seal population data in the southwest Atlantic is limited, and at South Georgia is 30-years out-of-date. Consequently, our understanding of how these marine predators are faring, particularly given the impact of climate change, is lacking. Using satellite imagery, along with unmanned aerial vehicle (UAV) surveys, we plan to census breeding populations on South Georgia, the South Orkney and the South Shetland Islands. This will establish modern baselines and investigate possible southward shifts in populations since the 1990s.

# Section 3 - UKOT(s), Dates & Budget Summary

## Q5. UKOT(s)

**Which UK Overseas Territory(ies) will your project be working in?**

  ☑ British Antarctic Territory (BAT)
  ☑ South Georgia and The South Sandwich Islands (SGSSI)

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

*No Response*

**In addition to the UKOTs you have indicated, will your project directly benefit any other Territories or country(ies)?**

  ◉ No

**Q6. Project dates**

| Start date: | End date: | Duration (e.g. 2 years, 3 months): |
|---|---|---|
| 01 April 2024 | 31 March 2026 | 2 years |

**Q7. Budget summary**

| Year: | 2024/25 | 2025/26 | 2026/27 | Total request |
|---|---|---|---|---|
| Amount: | ███████ | ███████ | █████ | £ ████████ |

# Q8. Do you have matched funding arrangements?

⊙ Yes

Please ensure you clearly outline your matched funding arrangement in the budget.

# Q9. If you have a significant amount of unconfirmed matched funding, please clarify how you will fund the project if you don't manage to secure this?

N/A

# Q10. Have you received, applied for or plan to apply for any other UK Government funding for the proposed project or similar?

⊙ No

# Section 4 - Problem statement

## Q11. Problem the project is trying to address

**Please describe the problem your project is trying to address in the UKOTs, relating to at least one of the themes of Darwin Plus:**

**For example, what are the specific threats to the environment that the project will attempt to address? Why are they relevant, for whom? How did you identify the need for your project? Please <u>cite the evidence</u> you are using to support your assessment of the problem.**

Southern elephant seals (Mirounga leonina), hereafter SES, range widely throughout the Southern Ocean [1-3], and act as sentinel species for this ecosystem. When SES disperse after breeding, the traditional understanding of their diet suggests that they primarily target squid and fish [4-7]. However, more recent evidence suggests that krill-dependent myctophid fish species, which are rapidly digested and therefore frequently

underrepresented in dietary studies of SES may indeed be more prevalent than previously understood [8-10]. The ramifications of this are that SES could well be more tied into the krill-centric food web of the Southern Ocean than previously believed to be. Consequently, SES would be more vulnerable to observed shifts in krill distribution, particularly in the South Atlantic [11], alongside potential threats posed from increased fishery pressure [12-14].

As a sentinel species, SES offer an opportunity to gain an oversight into the structure and functioning of the ecosystem. However, key to this is the need to understand the status and trajectory of their populations. The southwest Atlantic is a highly significant breeding region for SES. South Georgia produces ~54% of global pup production [15]. However, the last SG census was conducted in 1995 [15]. Surveys on the South Orkney Islands have been irregular, and whilst populations on the South Shetlands Islands are surveyed more frequently [16-22], their estimates remain out of sync. The last census at South Georgia indicated at population stability [15]. However, recent local monitoring in Cumberland Bay indicates negative fluctuations, with 2022/23 being a particularly poor year (Figure 1, unpublished KEP data). However, we have no understanding of how this pattern translates to the whole island, and to other sub-Antarctic islands in the southwest Atlantic. Elsewhere in the Southern Ocean, SES populations have also decreased since the 1950s [23-29], although there are signs of populations rallying on some sub-Antarctic Islands [27, 30-32].

Our understanding of how the South Atlantic's regional population is faring, particularly given the impact of climate change, is being hampered by data deficiency. Explanations for observed population declines concluded that the likely drivers were interspecific competition and environmental change [29]. However, at South Georgia and within the BAT, we have no recent baseline from which to investigate this issue.

Worryingly, there is an inherent lag that occurs between climatic change and an induced response in a marine predator [33]. This decline in SES populations is concerning, and likely to continue if left unchecked. Currently, there is no scalable monitoring programme in place at South Georgia, or the sub-Antarctic islands within the BAT. This can, at least in part be explained by a lack of cost-effective or practical approach to gather data over the spatial scales required to monitor SES populations. Here we proposed to address this deficiency utilising the recent advances in AI and remotely sensed data. Consequently, the outcomes of this project will set the baseline for utilising the sentinel status of this species in the future.

# Section 5 - Environmental Conventions, Treaties and Agreements

## Q12. Environmental Conventions, Treaties and Agreements

**Please detail how your project will contribute to the aims of the national and/or international agreement(s) your project is targeting. What key UKOT Government priorities and themes will it address and how? <u>You should also consider local, territory specific agreements and action plans here</u>. Letters of support from UKOT Government partners/stakeholders should also make clear reference to the agreements/action plans your project is contributing towards.**

The project aligns with two priority themes of the GSGSSI MPA Research and Monitoring Plan [34]: Theme 3 focuses on understanding predator populations and breeding distributions beyond Bird Island, specifically in the southeast of the archipelago. Theme 9 aims to assess predator responses to climate change. By directly contributing to these objectives, the project supports the OT's goals. It will also aid in developing site monitoring plans for SGSSI Terrestrial Protected Area process [35]. GSGSSI emphasises the integration of new technologies and innovation for evidence-based decision making this proposal timely and relevant [36] (available here: https://www.gov.gs/docsarchive/Environment/SGSSI%20brochure%202022.pdf).

Furthermore, considering the emergence of recent evidence that shows that SES diets are more reliant on krill-dependent species than previously thought [8-10], there is an increased scope to factor data from this study into

CCAMLR's krill risk-assessment of sub-Area 48.3, and indeed more widely throughout CCAMLR's Southern Ocean remit.

The project will provide population data for elephant seals in British Antarctic Territories, contributing to the Convention for the Conservation of Antarctic Seals (CCAS, 1972), and informing global population assessments for this species. Data from this project will also inform the Research and Monitoring Plan of the South Orkney Marine Protected Area.

The recent designation of the Scotia Arc, including South Georgia, as an Important Marine Mammal Area by the IUCN underscores the need for updated population information to support region-specific conservation and management (https://www.marinemammalhabitat.org/portfolio-item/scotia-arc/).

# Section 6 - Method, Project Stakeholders, Gender, Change Expected, Pathway to Change & Exit Strategy

## Q13. Methodology

**Describe the methods and approach you will use to achieve your intended Outcome and contribute towards your Impact. Provide information on:**

- how you reflected on and incorporated **evidence and lessons learnt** from past and present similar activities and projects in the design of this project.
- the specific approach you are using, supported by **evidence** that it will be effective, and **justifying why you expect it will be successful** in this context.
- how you will undertake the work (activities, materials and methods).
- how the **main activities** will be and where these will take place.
- how you will **manage the work** (governance, roles and responsibilities, project management tools, risks etc.).

The team involved (including Project Partners, hereafter PP) brings a wealth of experience both in respect to the geographic area, proposed methodologies, and Darwin-orientated deliverables. Dr Bamford will lead and oversee all stages of the project and take responsibility for project M&E. Dr Fretwell provide guidance on the proposed methods and provide Darwin-specific M&E guidance. As the Marine Environment and Fisheries Manager at GSGSSI, Sue Gregory (PP) will provide input to this project and align its goals with the needs of GSGSSI. Professor Fedak (PP), Dr Hückstädt (PP) and Dr Guinet (collaborator) will provide input and advice to the overarching aims and objectives of this proposal, along with inputting species-specific expert guidance.

This proposal builds on the successful applications of Very-High-Resolution satellite imagery to SES populations elsewhere in the sub-Antarctic [22, 32, 37], this project aims to conduct and automate a population census over key islands in the south-Atlantic. Since 2012, BAS has spearheaded the regional application of this methodology. Efforts include two-active (DPLUS187 and DPLUS132) and one soon to be completed Darwin Plus Grant (DPLUS109). The cross-over of personnel and knowledge from these grants will be highly advantageous to the success of this project. In addition to BAS-led expertise, research efforts from other sub-Antarctic islands have established the efficacy of this approach [22, 32, 37] and have highlighted its strength of circumventing coastal access issues frequently encountered by traditional land-based census methods. This project is timely as new VHR satellite have recently been announced and will be available to this project; this will enhance the availability of cloud-free imagery for the three target sub-Antarctic Islands groups.

In this project we actively task imagery spanning three weeks either side of the known peak in SES breeding at the end of October [see Figure 1; 15, 38]. Image acquisitions will be targeted at known breeding locations around each of the three sub-Antarctic island's coasts, along with speculative acquisitions over areas of high interest to

regional management themes (see Q12). Whilst more expensive, active tasking will prioritise data collection during and will make the project less reliant on opportunistically acquired images, reducing the overall risk for the project. Once collected, a sub-set of these images will be counted manually, adapting protocols previously applied [39, 40]. These manual scans will generate a training dataset from which an AI approach will be developed by PP Dr Bowler utilising additional external collaborations with Dr Guinet at the Centre d'Etudes Biologiques de Chizé who has been involved in previously published, satellite-mediated, SES studies [i.e., 32]. We will likely implement a U-NET Convolutional Neural Network (CNN); a successful and flexible methodology that builds on previous work on seal detection in satellite imagery [41, 42]. This automation will vastly improve scalability of this method and will be made fully open-source and published upon completion.

To validate the population counts derived from the satellite imagery and to update the assessment of the peak in SES breeding, we will conduct ground-truthing surveys on South Georgia using a fixed-wing AgEagle eBeeX UAV system led by PP, Nathan Fenney. Here we will collect orthorectified image mosaics as close in time to the satellite imagery acquisition. Animals present in these mosaics will be counted manually and will inform any necessary statistical adjustments to the counts derived from the satellite imagery [30, 43]. As a platform, this UAV is highly capable, and we will implement lessons learned from DPLUS109 in respect to site selection, UAV deployment and field logistics. This proposal will also benefit from the continued use of data, equipment, and assets previously acquired under or involved with DPLUS109.

This proposal will use methods that provide unprecedented reach, an unmatched risk : reward ratio and are far less environmentally intrusive than traditional census methods. This proposal will developing an easily scalable method with longevity beyond this project's timeline. To achieve this, this project will combine three streams of data: (i) previously unpublished data (KEP records); (ii) existing data from DPLUS109 (UAV and VHR satellite imagery); and (iii) newly collected data to better understand regional SES populations. All outputs and data will be published in Open Access peer-reviewed journals by the end of the project, with these being fed into global SES population assessments. Outreach and the dissemination of project findings will benefit from existing relations with BAS' communications team and the additional exposure afforded to the project through their pre-existing reach over platforms such as Instagram and Twitter (>17,000 and 50,000 followers, respectively). This will enhance the impact of this study.

## Q14. Project Stakeholders

**Who are the stakeholders for this project and how have they been consulted (include local or host government support/engagement where relevant)? Briefly describe what support they will provide and how the project will engage with them**

Government of South Georgia and the South Sandwich Islands (GSGSSI) is the primary UKOT stakeholder. GSGSSI have been consulted on the project's plan and support the research objectives, which are in alignment with two priority themes of the MPA's Research and Monitoring Plan (Theme 3 and 9, see Q12) as well as aiding with the development of site monitoring plans for SGSSI Terrestrial Protected Area process (see letter of support). GSGSSI will support the project by providing fieldwork permits where needed and will aid in identification and dissemination of findings among identified partners. Regular communication will be maintained between the Project Lead (Connor Bamford) and GSGSSI, via PP Sue Gregory, and formal correspondence will be held at 6-monthly stakeholder meetings.

This proposal also includes regions of the British Antarctic Territories, and as such the Polar Regions Department of the Foreign, Commonwealth and Development Office (FCDO) are also stakeholders. As such, they will be updated on this project's progress and included in all formal correspondence, similar to GSGSSI above.

Other stakeholders include SCAR, CCAS, CCAMLR along with the wider scientific community, which will be engaged with through the publication and communication of findings through Open Access journals, and

conference presentations. This will enable the findings to inform the SGSSI MPA Management and Monitoring Plan, and where appropriate inform both national and international management and policy.

## Q15. Gender equality and social inclusion

**All applicants must consider whether and how their project will contribute to promoting equality between persons of different gender and social characteristics. <u>Explain your understanding</u> of how individuals may be excluded from equal participation within the context of your project, and <u>how you seek to address this</u>. You should consider how your project will <u>proactively contribute to ensuring individuals achieve equitable outcomes</u> and how you will engage participants in a meaningful way.**

We understand that discrimination and exclusion are systemic issues that can be introduced at any level of the research process. BAS is committed to Equality, Diversity, and Inclusion (https://www.bas.ac.uk/jobs/working-for-bas/our-cultural-values-equality-and-diversity/), and currently holds a Silver Athena Swan Award. Our project investigators are chosen based on their experience and subject knowledge. We represent a diverse group in terms of gender and neurodiversity, and all lead partner investigators will receive CPD training by BAS, which emphasises EDI. All developed methodologies and publications will available Open Source and Open Access, and through the Polar Data Centre and the GSGSSI MPA data portal, with inclusivity in mind. We recognise that scientific literature often adopts a complex writing style that is inaccessible to wider, diverse audiences. To actively strive for inclusivity during the dissemination phase of our research, we will (i) use accessible communication formats (from writing style to colour-blind friendly palettes) and (ii) engaging in public outreach. For example, we will publish our findings in Frontiers for Young Minds (https://kids.frontiersin.org/) and utilise social media (e.g., dedicated project Twitter and Instagram accounts). As the outcomes of this project will contribute directly to marine protection in the hope of mitigating impacts of climate change, it serves to benefit us all. We understand that climate change is disproportionately affecting disadvantaged areas, and hope that this project can be part of a wider movement to reverse this trend.

## Q16. Change expected

**Detail the expected changes this work will deliver. You should identify what will change and who will benefit a) in the <u>short-term</u> (i.e. during the life of the project) and b) in the <u>long-term</u> (after the project has ended). Please describe the changes for the environment and, where relevant, for people in the OTs, and how they are linked.**

**When talking about how people will benefit, please remember to give details of who will benefit, differences in benefits by gender or other layers of diversity within stakeholders, and the number of beneficiaries expected. The number of communities is insufficient detail – number of households should be the largest unit used.**

Sub-Antarctic islands are important breeding and rest sites for many marine predators. However, existing monitoring is inconsistent and not all species covered. At South Georgia, monitoring only exists at Bird Island (BAS) and at Maiviken (BAS/GSGSSI). However, elephant seal populations are not monitored at either site, despite this population being responsible for ~54% of global annual pup production [15]. Resent counts of elephant seals in Cumberland Bay have shown a decrease in breeding animals. However, whether this reflects a regional signal or not remains unknown as counts are outdated from adjacent sub-Antarctic islands. This is hampering our understanding of how this globally important population is fairing. Particularly in an era of rapid environmental change.

In the short term, the proposed work will update our understanding of elephant seal populations over the main population hubs in the southwest Atlantic, including the identification of breeding sites that may be present in the southeast of South Georgia. This directly addresses a high priority objective identified in the SGSSI MPA Research and Monitoring Plan (see Q12) and will also inform the Terrestrial Protected Area process [35] under

development by GSGSSI. For instance, data provided by this project will update our understanding of when the SES numbers peak on breeding beaches at South Georgia. This can inform permit issuing and provide recommendations on the permitted number of visitors to these areas to minimise disturbance from research/tourism during this crucial period. Furthermore, the island-wide nature of this survey will shed light on the distribution of the SES population at various scales. At a micro scale, our understanding of where SES haul out and form breeding hareems on specific beaches will be developed and can be translated into advice on where beach landings should be located. At a larger scale, data from this proposal can be used to identify future candidate monitoring sites, which could be incorporated into the long-term King Edward Point Science Strategy as well as providing the Terrestrial Protected Area process an updated picture of SES breeding locations.

Furthermore, the collected data will contribute towards CCAS monitoring and CCAMLR risk assessments. The provision of up-to-date data remains key in maintaining the commitment towards evidence-based management within the OT and BAT and remains key to both the UK Government's and GSGSSI's ability to justify its management actions at both national and international levels.

A long-term advantage of the proposed methodologies is that they are easily scalable and offer the flexibility to be conducted at more frequent intervals, and with far lower environmental costs than traditional methods of population censusing. After the life of this project, the updated population estimate will enhance our understanding of SES populations in the South Atlantic, and enable the conservation afforded to this species under the SGSSI MPA and Terrestrial management plans at South Georgia, alongside efforts within the BAT to be more targeted. These new population estimates will be fed into global assessments and will improve overall understanding of the environmental outlook for these sentinel species into the future.

## Q17. Pathway to change

**Please outline your project's expected pathway to change. This should be an overview of the overall project logic and outline <u>why and how</u> you expect your Outputs to contribute towards your overall Outcome and, in the longer term, your expected Impact.**

This project addresses key gaps in our understanding of South Atlantic SES populations, which will inform future sustainable monitoring. We will develop innovative AI-automation protocols (Output 1), which are scalable across the Southern Ocean, fostering collaboration among the OTs and improving global population monitoring and assessments. These AI-methods facilitate the spatial-scale of this proposal and the production of island-specific population estimates (Output 3). The method's accuracy will be validated by ground-truthing surveys (Output 2), which will inform any required statistical corrections that occur due to temporal mismatches in the data (see methods). To ensure that Outputs are translated into action (e.g., updating the SGSSI MPA Management and Monitoring Plan; informing the Terrestrial Protected Area process; informing species-specific mitigation guidelines for GSGSSI permitting; and identifying candidate future management sites), we will engage with management bodies (e.g., SCAR/CCAMLR), governments (GSGSSI) and conservation-conventions (CCAS) throughout, alongside reporting and publishing results in peer-reviewed, Open-Access journals, initiating online discussion (via social media), enhancing capacity in the OT, and presenting findings (Output 4). This proposal uses a multi-disciplinary team with subject-specific expertise and strong links to the OT's Government and international policy fora, ensuring that results feed directly into policy.

## Q18. Sustainable benefits

**How will the project reach a sustainable point and continue to deliver benefits post-funding? Will the activities require funding and support from other sources, or will they be mainstreamed in to "business as usual"? How will the required knowledge and skills remain available to sustain the benefits? If relevant, how will your approach be scaled? How will you ensure your data and evidence will be accessible to others?**

The aim of this project is to re-census SES populations over three sub-Antarctic Islands, and in doing so will develop a methodological approach and automated image scanning algorithm that can be applied to other regions, both in the Southern Ocean and globally. The use of remote sensing as the primary means of gathering data provides a cost-effective and low-carbon alternative to traditional methodologies. Overall, enhancing the sustainability of this proposal. Furthermore, respecting a sustainable ethos, this project plans to utilise both data, knowledge and assets collected and acquired during DPLUS109.

All findings, data and methodologies developed during the tenure of this grant will be published Open access and will be available to future researchers. Output data will published with one or more DOIs through the Polar Data Centre and will be made available through the GSGSSI MPA data portal (https://www.mpa-dataportal.gs, a Darwin Plus funded initiative), and the long-term interoperability of the UAV data will aided by an ongoing project run by the Polar Data Centre at BAS to improve UAV data storage. Resource would be required for future work to facilitate ongoing monitoring efforts. However, any future efforts will be able to implement the automated approaches developed by this study, and thus the requirement for resources will be substantially smaller. This will enhance the longevity of this project and its impacts post-funding. Indeed, we plan to enhance and build on relationships developed by DPLUS109 and DPLUS187, which aimed to increase the speculative acquisition of summer imagery at South Georgia (thus increase the availability of lower cost imagery), which will benefit both this proposed project and also those conducted in the future.

**If necessary, please provide supporting documentation e.g. maps, diagrams, references etc., as a PDF using the File Upload below:**

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# Section 7 - Risk Management

## Q19. Risk Management

**Please outline the 6 key risks to achievement of your Project Outcome and how these risks will be managed and mitigated, referring to the Risk Guidance. This should include at least one Fiduciary, one Safeguarding, and one Delivery Chain Risk.**

| Risk Description | Impact | Prob. | Inherent Risk | Mitigation | Residual Risk |
|---|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| **Fiduciary (Financial)**<br><br>Misuse of funds for expenditures that are not related to Darwin Plus or for personal gain. Corrupt purchasing of goods from non-competitive, favoured parties. Travel and subsistence (T&S) budget for international conferences and travel used inappropriately or claimed incorrectly by staff. | Moderate | Rare | Minor | BAS Finance Department will maintain oversight on all expenditure. These will be independently audited at the end of the project. BAS strictly adheres to UKRI's rules on open, competitive procurement. All T&S claims processed through NERC's SBS system, which requires invoices/receipts. All BAS staff will have received training on SBS. | Minor |
| **Safeguarding**<br><br>South Georgia, the South Orkney's and the South Shetlands have no indigenous populations. All work will be conducted by UK Government employees at a Government Institution and by collaborators. As such, we believe that there are minimal safeguarding risks. | Insignificant | Rare | Minor | All staff, whether BAS or collaborators, will be required to follow the relevant BAS or UKRI policies (outlined in Q29). Any issues will immediately be escalated to BAS HR by project staff as a precautionary measure. | Minor |
| **Delivery Chain**<br><br>Cloud cover inhibiting the acquisition of satellite imagery over the specifically identified breeding locations on the three sub-Antarctic Island study sites. | Moderate | Possible | Major | Imagery will be tasked for 3 weeks spanning the breeding peak, increasing the likelihood of collecting cloud-free imagery. A no-obligation purchase threshold (>15%) will be used. If clouds persist, credit will be rolled forward. We aim to target the 2024 season. However, there is scope to extend this into 2025. | Moderate |

| | | | | | |
|---|---|---|---|---|---|
| **Risk 4**<br>Fieldwork risks: Severe weather prevents the field team from carrying out the ground-truthing surveys impacting the temporal overlap with satellite acquisition. | Minor | Possible | Moderate | Reduced temporal overlap will lower the precision of the ground-truthing. However, counts from KEP (easily accessible), supplemented by data from DPLUS109 can be substituted, albeit with reduced scope. Lessons from DPLUS109 and staff familiarity with the UAV platform will aid identification of weather-windows and facilitate opportunistic data-collection. | Minor |
| **Risk 5**<br>Inability to conduct ground-truthing fieldwork in the 2024 season due to GSGSSI not issuing permits due to an outbreak of avian influenza on South Georgia. | Moderate | Possible | Major | Inherently, this does not prevent the satellite census from being conducted. However, it may interfere with ground truthing. Methodologies adhere to current guidelines, and involve remote operation, thus minimising transmission and associated permitting risk. Scope exists to delay the ground-truthing and some satellite tasking to 2025 enabling risk reassessment. | Moderate |
| **Risk 6**<br>Ineffective methodologies: this project proposes the use of methods novel to several of the proposed study sites. | Major | Unlikely | Minor | Existing studies have demonstrated the efficacy of this approach on other sub-Antarctic Islands. As such, we have no reason to doubt their applicability here. Additionally, if counts are unreliable, valuable distributional data pertinent to GSGSSI MPA Research & Monitoring Plans will be collected. | Minor |

# Q20. Project sensitivities

**Please indicate whether there are sensitivities associated with this project that need to be considered if details are published (detailed species location data that would increase threats, political sensitivities, prosecutions for illegal activities, security of staff etc.). Please note your response to this question won't influence the outcome of your application.**

⊙ No

# Section 8 - Workplan

## Q21. Workplan

**Provide a project workplan that shows the key milestones in project activities. Complete the Word template as appropriate to describe the intended workplan for your project.**

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# Section 9 - Monitoring and Evaluation (M&E)

## Q21. Monitoring and evaluation (M&E) plan

**Describe how the progress of the project will be monitored and evaluated, making reference to who is responsible for the project's M&E.**

**Darwin Plus projects will need to be adaptive and you should detail how the monitoring and evaluation will feed into the delivery of the project including its management. M&E is expected to be built into the project and not an 'add' on. It is as important to measure for negative impacts as it is for positive impact. Additionally, please indicate an approximate budget and level of effort (person days) to be spent on M&E (see Finance Guidance).**

The project leader (Connor Bamford) will be responsible for M&E and will be advised by the co-lead (Peter Fretwell). The projects timeline and logframe will be reviewed regularly by the project lead and co-lead at weekly meetings to monitor progress, manage risk and to ensure a smooth day-to-day running of the project. All project staff will be required to attend a monthly project meeting where progress updates will be given to the project lead and short to mid-term objectives will be set. Minutes will be taken and reviewed at the start of the following meeting. Twice yearly meetings will be held with all project partners and stakeholders; minutes of these meetings will be taken, written up and shared with all parties. At times in between regular, formal project meetings, where appropriate, stakeholders will be updated on project aims, objectives and plans either by email, online meetings or in person. Their feedback will be requested at all key stages to maintain alignment between project outputs and UKOT requirements.

All outputs of this project will be collated and finalised into reports to working groups at SCAR and to CCAS, or as publications to peer-reviewed journals. Output data will published with one or more DOIs through the Polar Data Centre and will be made available through the GSGSSI MPA data portal (https://www.mpa-dataportal.gs, a Darwin Plus funded initiative), and the long-term interoperability of the UAV data will be aided by an ongoing project run by the Polar Data Centre at BAS to improve UAV data storage. The results of this project will also be disseminated to the wider community through a social media presence (Twitter & Instagram), and via presentations at least one international conference.

Financial monitoring of the project's expenditure will be conducted by the BAS Finance Office, with audits being carried out in the final year. Overall, M&E costs are kept low due to all major project partners being largely based at BAS in the UK, and as such can be engaged through virtual or in-person meetings under a single roof.

| **Total project budget for M&E (£)** | |
| :--- | :--- |
| **(this may include Staff and Travel and Subsistence Costs)** | ███████ |
| **Total project budget for M&E (%)** | 3 |
| **Number of days planned for M&E** | 45 |

# Section 10 - Logical Framework

# Q23. Logical Framework (logframe)

**Darwin Plus projects will be required to monitor and report against their progress towards their Outputs and Outcome. This section sets out the expected Outputs and Outcome of your project, how you will measure progress against these and how we can verify this.**

&#9878; <u>1049_ST2_NEB2372_logframe_FINAL</u>
&#128197; 02/10/2023
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&#128459; pdf 220.35 KB

## Impact:

Sustainable and cost-effective satellite remote sensing enables the population status of southern elephant seals (SES) on sub-Antarctic Islands to be updated, updating baselines, and informing long-term conservation and management actions.

## Outcome:

Provide census data, distribution maps and establish imagery-based monitoring protocols for SES over South Georgia, the South Orkney, and South Shetland Islands, improving species management, conservation policy and species advocacy.

### Project Outputs

### Output 1:

Development of an automated approach to scan acquired VHR satellite imagery.

### Output 2:

Provide counts of SES on one or more breeding beaches over the presumed breeding peak at the end of October to: (i) better understand arrival and peak breeding times on South Georgia, and (ii) to validate acquired VHR population estimates and correctly adjust for any temporal misalignment.

### Output 3:

Produce island-wide population censuses for SES using VHR satellite imagery for each sub-Antarctic archipelagos: (i) South Georgia; (ii) the South Orkney Islands; and (iii) the South Shetland Islands.

### Output 4:

M&E, Provision of training and the dissemination of project findings and results

---

**Output 5:**

*No Response*

---

**Do you require more Output fields?**

**It is advised to have fewer than 6 Outputs since this level of detail can be provided at the Activity level.**

⊙ No

## Activities

**Each activity is numbered according to the Output that it will contribute towards, for example, 1.1, 1.2, 1.3 are contributing to Output 1.**

1.1: Identification and review of the most appropriate automation methods leading to selection of a single method to implement
1.2: Review existing DPLUS109 satellite imagery and create a training dataset for machine learning methods
1.3: Supplement training dataset from imagery acquired over the 2024 breeding season (if required).
1.4: Train and refine final automation algorithm.

2.1: Identify survey locations for UAV flights.
2.2: Finalise fieldwork plans for Austral summer 2024.
2.3: UAS ground validation and peak of breeding survey design
2.4: Fieldwork – UAV ground validation and peak of breeding survey
2.5: Produce orthorectified image mosaics and analyse UAV imagery from field surveys
2.6: Incorporate metrics from UAV surveys into population assessment 3.6

3.1: Identify AOIs for satellite imagery tasking.
3.2: Arrange image tasking (including tendering, if needed) with satellite imagery supplier.
3.3: Acquire satellite images from supplier
3.4: Apply automation developed in 1.4 to all acquired imagery
3.5: Extract island-wide counts, adjust for temporal displacements form SES breeding peak and for ground validation metrics.
3.6: Calculate final census estimates for each sub-Antarctic Island.
3.7: Production of peer-reviewed publication detailing the updated population censuses of each of the three sub-Antarctic islands examined.
3.8: Adaptation of publications into a more accessible and inclusive format (e.g., Frontiers for Young Minds article).

4.1: M&E: Conduct regular assessments throughout the lifetime of the project: weekly & monthly meetings.
4.2: M&E: Conduct bi-annual project meeting with all project partners and stakeholders.
4.3: Prepare and submit findings report and deliver summary training workshop to GSGSSI and invited internal/external parties.
4.4: Deposit satellite census data and ground-truthed UAV imagery into a publicly available repository.
4.5: Report detailing the updated population assessments provided to SCAR CAPS Action Group.
4.6: Non-technical communication of research findings to the public via social media. Ongoing through the lifetime of the project.
4.7: Communication of results at international conference.
4.8: Provide UAV training to one person based at King Edward Point, South Georgia to enhance capacity on OT.

---

# Section 11 - Budget and Funding

## Q24. Budget

**Please complete the appropriate Excel spreadsheet which provides the Budget for this application and ensure the Summary page is fully completed. Some of the questions earlier and below refer to the information in this spreadsheet.**

  ⤓ [1049_NEB2372_BCF_Budget_over__100k_MASTER_Aug23_WM_v4](#)

  📅 02/10/2023

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  🗎 xlsx 105.33 KB

## Q25. Alignment with other funding and activities

**This question aims to help us understand how familiar you are with other work in the geographic/thematic area, and how this proposed project will build on or align with this to avoid any risks of duplicating or conflicting activities.**

### Q25a. Is this new work or does it build on existing/past activities (delivered by anyone and funded through any source)?

⊙ Development of existing work

**Please provide details:**

Satellite imagery has been used globally to survey numerous species [37, 41, 42, 44-49]. Most studies have been smaller proof-of-concepts. However, several have now progressed towards larger-scale [39, 46, 50] and indeed global monitoring endeavours [51, 52]. Animals that return to land, or to ice for a portion of their lifecycle are ideally suited to this means of data collection.

The world's largest population of SES at South Georgia [29] have not been studied at scale using VHR satellite imagery. However, successful studies of populations on other sub-Antarctic Islands have been carried out; these include King George Island [22], and the Kerguelen and Crozet Archipelagos [32]. These published studies demonstrate the efficacy of the proposed methodologies. This proposal will build on their methodological developments and apply lessons learned at scale to the SES population in the South Atlantic. This proposal will build on and be strengthened by the utilisation of existing relationships, protocols, overlapping researchers and data from DPLUS109, DPLUS187 and DPLUS132.

### Q25b. Are you aware of any current or future plans for work in the geographic/thematic area to the proposed project?

⊙ Yes

**If yes, please give details explaining similarities and differences, and explaining how your work will be additional, avoiding duplicating and conflicting activities and what attempts have been/will be made to co-operate with and share lessons learnt for mutual benefit.**

Christophe Guinet, former director of the Centre d'Etudes Biologiques de Chizé and senior author of [32] currently supervises a graduate student who is working on the automation of SES counting in VHR satellite

imagery. Pre-stage 2 submission, the Project PI has discussed collaboration with CG and his team on this project, which was warmly received by both parties. However, ahead of the Stage 2 deadline CG has been conducting fieldwork in the Kerguelen Islands and has had no internet access; consequently, a formal MOU between BAS and CEBC has yet to be finalised. BAS alongside other Project Partners have a history of successful collaborations with the CEBC, particularly with work on South Georgia, and as such we expect this collaboration to also be successful. In this proposal, we are not seeking any funding for this collaboration, and have therefore not included CG in the detailed budget. However, CG has provided us with a curriculum vitae, which has been included for consideration and we have listed CG as a collaborator under project staff and as a non-board Project Partners (Q31 & 32).

## Q26. Balance of budget spend

**Defra are keen to see as much Darwin Plus funding as possible directly benefiting UKOT communities and economies. While it is appreciated that this is not always possible every effort should be made for funds to remain in-Territory.**

**Explain the thinking behind your budget in terms of where Darwin Plus funds will be spent. What benefits will the Territory/ies see from your budget? What level of the award do you expect will be spent locally? Please explain the decisions behind any Darwin Plus funding that will not be spent locally and how those costs are important for the project.**

Omitting salaries, primary funding avenues for this proposal are allocated to satellite image acquisition and OT fieldwork. Here, satellite and UAV imagery offers a financially viable means of surveying remote areas, which when compared to traditional ship, land, or aerial surveys, is more affordable, often by several orders of magnitude.

These data lend themselves to remote analyses, which will be conducted in BAS' offices in Cambridge, with little to no burden on the studied ecosystems or on either GSGSSI or BAT. Despite funding not being directly spent in the OT's, both stakeholders will benefit significantly from this project's outcomes and the collected data. The purchased satellite imagery of the main archipelagos in the southwest Atlantic will be a valuable resource that will outlast the project's lifetime.

Besides the longevity of the satellite imagery, the UAV-obtained data can also extend beyond this proposal. In addition to being used on this project, the UAV imagery can test hypotheses surrounding the detectability of animals in hard-to-reach areas (e.g., within the tussock grass), as these areas are likely to be overflown during validation surveys. Finally, funds for conferences and result dissemination will benefit stakeholders by raising awareness for an underrepresented sentinel species.

## Q27. Value for Money

**Please describe why you consider your application to be good value for money including justification of why the measures you will adopt will secure value for money.**

This proposal has been designed with value for money as a core principle. The efficacy of the proposed techniques have already been established in the sub-Antarctic [22, 32]. As such, the likelihood of this proposal not succeeding due to methodological short fallings is minimal. By using staff who have both experience in the proposed methods, the target species, and the target environment, we are reducing developmental costs and their associated risks. The cost of satellite imagery is the largest consumable, aside from salaries; however, these data are of paramount importance and facilitate a population census of this scale. They will also act as a valuable resource for future research after the completion of the current project. Output data will published with one or more DOIs through the Polar Data Centre and will be made available through the GSGSSI MPA data portal (https://www.mpa-dataportal.gs, a Darwin Plus funded initiative), and the long-term interoperability of the UAV

data will aided by an ongoing project run by the Polar Data Centre at BAS to improve UAV data storage. With the aim of striving to deliver value for money, this project will reuse capital equipment as well as data from DPLUS109 (ca. ████). This will streamline the financial efficiency of this proposal. Staff costs have been based on standard organisational pay scales, with salaried institutes providing additional support by waiving overheads (£131,000). In addition to this, BAS are also providing extra resources to support and facilitate a successful field campaign (ca. ████).

## Q28. Capital items

**If you plan to purchase capital items with Darwin Plus funding, please indicate what you anticipate will happen to the items following project end. If you are requesting more than 10% capital costs, please provide your justification here.**

Here we are not requesting BCF funds for any capital items.

# Section 12 - Safeguarding and Ethics

# Q29. Safeguarding

**All projects funded under the Biodiversity Challenge Funds must ensure proactive action is taken to promote the welfare and protect all individuals involved in the project (staff, implementing partners, the public and beneficiaries) involved in the project from harm. In order to provide assurance of this, projects are required to have specific procedures and policies in place.**

**Please upload the following required policies:**

- **Safeguarding Policy:** including a statement of commitment to safeguarding and a zero tolerance statement on bullying, harassment and sexual exploitation and abuse.
- **Whistleblowing Policy:** which details a clear process for dealing with concerns raised and protects whistle blowers from reprisals.
- **Code of Conduct:** which sets out clear expectations of behaviours – inside and outside the workplace – for all involved in the project and makes clear what will happen in the event of non-compliance or breach of these standards.

**If any of these policies are integrated into a broader policy document or handbook, please upload just the relevant or equivalent sub-sections to the above policies, with (unofficial) English translations where needed.**

**Please outline how (a) beneficiaries, the public, implementing partners, and staff are made aware of your safeguarding commitment and how to confidentially raise a concern, (b) safeguarding issues are investigated, recorded and what disciplinary procedures are in place when allegations and complaints are upheld, (c) you will ensure project partners uphold these policies.**

**If your approach is currently limited or in the early stages of development, please clearly set out your plans address this.**

This project will be conducted at the British Antarctic Survey, which is a subsidiary institute under UKRI. In some cases, BAS adopts UKRI's policies verbatim, and in other instances, BAS has developed their own policies specific to their typical work remit. All involved parties to the project will adhere to the relevant policy guidelines, with these being incorporated into the ethos of the project. All collaborations and project partners will be made aware of relevant policies, and these will be adopted it will be integrated into the project's M&E. The proposed work will largely be conducted in BAS' Cambridge office, which has a strong welfare and supporting mentality, where guidance is freely available to all staff. During the fieldwork campaign, staff will adhere to all policies listed above as well as following BAS' Polar Regions Code of Conduct.

## Q30. Ethics

**Outline your approach to meeting the <u>key principles of good ethical practice</u>, as outlined in the guidance.**

During the tenure of this project, all researchers will adhere to BAS Research and Ethics Policies and the underlying principles outlined here (https://www.bas.ac.uk/about/about-bas/our-organisation/our-policies/ethics-policy/), The OTs governing authorities will be consulted throughout and are included as a Project Partner to ensure that project benefits are realised within the OT. BAS, GSGSSI and BAT have a shared history of collaborative work and will continue to meet all legal and ethical commitments when conducting research. The proposed work primarily involves the collection of remotely sensed data over an OT's that does not have a resident population. Therefore, no individuals will have their rights, privacy or safety infringed on by this project, with key principle relating to informed consent not applicable here.

Paramount to this project's success is the health and safety (H&S) of all involved. As most analyses are desk-based, most of the workload has minimal risk. However, for the fieldwork component, all plans will be reviewed during a lengthy process by both BAS and GSGSSI, ensuring that all H&S concerns are accounted for, and appropriately mitigated. Finally, we will publish all results in Open Access, peer-reviewed journals, alongside communicating findings to key stakeholders to maintain the credibility of evidence produced.

# Section 13 - Project Staff

## Q31. Project staff

**Please identify the core staff (identified in the budget), their role and what % of their time they will be working on the project.**

| Name (First name, Surname) | Role | % time on project | 1 page CV or job description attached? |
|---|---|---|---|
| Connor Bamford | **Project Leader** | 100 | Checked |
| Peter Fretwell | Joint lead applicant | 5 | Checked |
| Nathan Fenney | Aerial mapping expert | 20 | Checked |
| Ellen Bowler | Remote sensing, deep-learning, AI expert | 50 | Checked |

**Do you require more fields?**

⊙ Yes

| Name (First name, Surname) | Role | % time on project | 1 page CV or job description attached? |
|---|---|---|---|
| Jamie Coleman | Field expert and UAV pilot | 25 | Checked |
| Sarah Manthorpe | Data manager | 6 | Checked |

| | | | |
|---|---|---|---|
| Sue Gregory | GSGSSI Project Partner | 2 | Checked |
| Michael Fedak | Regional species expert | 5 | Checked |
| Luis Hüchstädt | Regional species expert | 5 | Checked |
| Christophe Guinet | Collaborator & regional species expert | 0 | Checked |
| *No Response* | *No Response* | 0 | Unchecked |
| *No Response* | *No Response* | 0 | Unchecked |

**Please provide 1 page CVs (or job description if yet to be recruited) for the project staff listed above as a combined PDF.**

  ⮑   <u>CVs_Merged</u>
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  🕐   11:52:24
  📄   pdf 1.25 MB

**Have you attached all project staff CVs and job descriptions?**

  ⊙ Yes

# Section 14 - Project Partners

## Q32. Project partners

**Please list all the Project Partners (including the Lead Partner who will administer the grant and coordinate delivery of the project), clearly setting out their roles and responsibilities in the project including the <u>extent of their engagement so far</u>.**

**This section should demonstrate the capability and capacity of the Project Partners to successfully deliver the project. <u>Please provide Letters of Support for all project partners or explain why this has not been included</u>.**

| | |
|---|---|
| **Lead partner name:** | British Antarctic Survey |
| **Is the Lead Partner based in a UKOT where the project is working?** | ⊙ No |
| **Please explain why this project is led from outside the UKOT** | The proposed OT's do not have a permanent resident population and the required experience is at the British Antarctic Survey. |

| | |
|---|---|
| | For over 60 years, BAS has delivered world-leading Polar research. Through its extensive logistic capability, BAS facilitates access for the science community to the UK polar research operation. BAS has and will continue to supervise the management and delivery of this project, fielding an experienced team of researchers alongside collaborators from multiple institutes. |
| | CB will lead and be responsible for the delivery of this project. He currently leads the joint NERC/NSF project and has previous postdoctoral experience with WV3 satellite analysis of pinniped and cetacean species. |
| **Why is this organisation the Lead Partner, and what value to they bring to the project? (including roles, responsibilities and capabilities and capacity):** | PF will advise on management and provide expertise. Both have extensive experience under the Darwin Plus framework and in this field/geographic region. PF leads BAS' Wildlife from Space group and is a remote sensing expert. SG is the Environment and Fisheries Manager for GSGSSI and will aid in aligning the project's objectives with OT priorities. |
| | NF is a geomatics expert and will produce the ortho-mosaics. He led DPLUS109's field-campaign and will lead the fieldwork on this project. |
| | EB is a specialist in remote sensing, computer vision and deep-learning. She will lead on computer-vision and the automation of satellite imagery analyses. |
| | SM will provide data management. |
| | CB/EB/PF/SG/NF will contribute to reports and scientific papers. |
| **Allocated budget (proportion or value):** | ██████ |
| **Representation on the Project Board (or other management structure)** | ⊙ Yes |
| **Have you included a Letter of Support from the Lead Partner?** | ⊙ Yes |

**Do you have partners involved in the Project?**

⊙ Yes

| | |
|---|---|
| **1. Partner Name:** | Sue Gregory, Government of South Georgia and the South Sandwich Islands (GSGSSI) |
| **Website address:** | https://www.gov.gs/ |

| | The Government of South Georgia and the South Sandwich Islands (GSGSSI) are based in Stanley, Falkland Islands where they report to the Commissioner (also the Governor of the Falkland Islands). GSGSSI staff are mostly based in Stanley, but some work remotely from the UK, with offices at BAS' HQ in Cambridge. GSGSSI are responsible for the management of these UKOT's. |
|---|---|
| **What value does this Partner bring to the project? (including roles, responsibilities and capabilities and capacity):** | Sue Gregory is currently the Marine Environment & Fisheries Manager at GSGSSI and is a nominated Project Partner in this proposal. Sue's main responsibility will be to assist with aligning the research objectives and deliverables with those of the OT. GSGSSI will be updated through regular communication between the project lead and Sue, along with her attendance at milestone project meetings. This will enable the results of the project to be translated into actionable advice, which will inform both the management of South Georgia's MPA along with informing the terrestrial management plan. |
| **UKOT-based/other Partner** | ⊙ UKOT-based |
| **Allocated budget (proportion or value):** | ▮▮▮▮▮ |
| **Representation on the Project Board (or other management structure)** | ⊙ Yes |
| **Have you included a Letter of Support from this organisation?** | ⊙ Yes |

| **2. Partner Name:** | Professor Mike Fedak, Sea Mammal Research Unit, University of St Andrews, Scotland (SMRU) |
|---|---|
| **Website address:** | http://www.smru.st-andrews.ac.uk/ |
| **What value does this Partner bring to the project? (including roles, responsibilities and capabilities and capacity):** | Professor Mike Fedak is an ecologist and physiologist and holds an Emeritus Professorship at the Sea Mammal Research Unit at the University of St Andrews, Scotland. Over his career he has been involved extensively in southern elephant seal research in the sub-Antarctic. Specifically, MF has worked on the development and implementation of oceanographic biologging devices on these sentinel predators. <br><br> He will provide expert advice on the bioecology of southern elephant seals and provide insight into the geographic region. MF will also advise on how to translate this project's outcomes into management action and help align the outputs of this project with the wider scientific community. |
| **UKOT-based/other Partner** | ⊙ Other |
| **Allocated budget (proportion or value):** | ▮▮▮▮▮ |

| | |
|---|---|
| **Representation on the Project Board (or other management structure)** | ⊙ Yes |
| **Have you included a Letter of Support from this organisation?** | ⊙ Yes |

| | |
|---|---|
| **3. Partner Name:** | Luis Hückstädt, University of Exeter |
| **Website address:** | http://biosciences.exeter.ac.uk/ |
| **What value does this Partner bring to the project? (including roles, responsibilities and capabilities and capacity):** | Luis Hückstadt is a senior lecturer at the University of Exeter, in Cornwall (UK), and is an expert in polar marine mammal ecology, physiology and conservation. Hückstadt will contribute expertise on marine predator research, provide methodological advice on monitoring population demographics and aid with wider conservation issues in this region assuring that this project's outcomes are translated into management action. LH's time will be offered on a pro bono basis. |
| **UKOT-based/other Partner** | £0.00 |
| **Allocated budget (proportion or value):** | ⊙ Other |
| **Representation on the Project Board (or other management structure)** | ⊙ Yes |
| **Have you included a Letter of Support from this organisation?** | ⊙ Yes |

| | |
|---|---|
| **4. Partner Name:** | *No Response* |
| **Website address:** | *No Response* |
| **What value does this Partner bring to the project? (including roles, responsibilities and capabilities and capacity):** | *No Response* |
| **UKOT-based/other Partner** | ○ UKOT-based<br>○ Other |
| **Allocated budget (proportion or value):** | £0.00 |
| **Representation on the Project Board (or other management structure)** | ○ Yes<br>○ No |
| **Have you included a Letter of Support from this organisation?** | ○ Yes<br>○ No |

| **5. Partner Name:** | *No Response* |
|---|---|
| **Website address:** | *No Response* |
| **What value does this Partner bring to the project? (including roles, responsibilities and capabilities and capacity):** | *No Response* |
| **UKOT-based/other Partner** | ○ UKOT-based<br>○ Other |
| **Allocated budget (proportion or value):** | £0.00 |
| **Representation on the Project Board (or other management structure)** | ○ Yes<br>○ No |
| **Have you included a Letter of Support from this organisation?** | ○ Yes<br>○ No |

| **6. Partner Name:** | *No Response* |
|---|---|
| **Website address:** | *No Response* |
| **What value does this Partner bring to the project? (including roles, responsibilities and capabilities and capacity):** | *No Response* |
| **UKOT-based/other Partner** | ○ UKOT-based<br>○ Other |
| **Allocated budget (proportion or value):** | £0.00 |
| **Representation on the Project Board (or other management structure)** | ○ Yes<br>○ No |
| **Have you included a Letter of Support from this organisation?** | ○ Yes<br>○ No |

**Please provide a combined PDF of all letters of support.**

**LoS_Combined**
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11:59:55
pdf 1.04 MB

# Section 15 - Lead Partner Capability and Capacity

## Q33. Lead Partner Capability and Capacity

**Has your organisation been awarded Biodiversity Challenge Funds (Darwin Plus, Darwin Initiative or Illegal Wildlife Trade Challenge Fund) funding before?**

⊙ Yes

**If yes, please provide details of the most recent awards (up to 6 examples).**

| Reference No | Project Leader | Title |
| --- | --- | --- |
| DPLUS189 | Cavanagh, R | Evaluating climate change risks to Patagonian and Antarctic toothfish |
| DPLUS188 | Jackson, J | Hungry humpbacks: measuring seasonal foraging intensity at South Georgia |
| DPLUS187 | Fretwell, P | Using satellite technology to monitor seabird populations at South Georgia |
| DPLUS186 | Ratcliffe, N | Evidence-based conservation of biodiversity in the South Sandwich Islands |
| DPLUS179 | Liska, C | Characterising pelagic biodiversity at South Georgia through novel sampling methods |
| DPLUS166 | Hollyman, P | Improving identification of fish bycatch in the Antarctic krill fishery |

**Have you provided the requested signed audited/independently examined accounts?**

⊙ Yes

# Section 16 - Certification

## Certification

**On behalf of the**

Company

**of**

British Antarctic Survey

**I apply for a grant of**

£432,459.00

**I certify that, to the best of our knowledge and belief, the statements made by us in this application are true and the information provided is correct. I am aware that this application form will form the basis of the project schedule should this application be successful.**

(This form should be signed by an individual authorised by the applicant institution to submit applications and sign contracts on their behalf.)

- I enclose CVs for key project personnel, a cover letter, letters of support, a budget, logframe, Safeguarding and associated policies, and project workplan.
- Our last two sets of signed audited/independently verified accounts and annual report (covering three years) are also enclosed.

Checked

| | |
|---|---|
| **Name** | Justin Smith |
| **Position in the organisation** | Head of Finance |
| **Signature (please upload e-signature)** | ⬇ BAS_Certification_Darwin_Connor_Bamford_02102023<br>🗓 02/10/2023<br>🕐 16:59:21<br>📄 pdf 112.7 KB |
| **Date** | 02 October 2023 |

**Please attach the requested signed audited/independently examined accounts.**

⬇ UKRI-Annual-Report-2021-22
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⬇ UKRI-Annual-Report-2022-23
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🕐 12:03:16
📄 pdf 3.34 MB

**Please upload the Lead Partner's Safeguarding Policy as a PDF**

⬇ Policies_merged
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🕐 12:03:29
📄 pdf 1.13 MB

# Section 17 - Submission Checklist

## Checklist for submission

| | Check |
|---|---|
| **I have** read the Guidance, **including the "Guidance Notes for Applicants", "Monitoring Evaluation and Learning Guidance", "Standard Indicator Guidance", "Risk Guidance", and "Finance Guidance".** | Checked |

| | |
|---|---|
| **I have read, and can meet, the current** Terms and Conditions **for this fund.** | Checked |
| **I have provided** actual start and end dates **for the project.** | Checked |
| **I have provided my** budget based on UK government financial years **i.e. 1 April – 31 March and in GBP.** | Checked |
| **I have checked that our** budget is complete, **correctly adds up and I have included the correct final total at the start of the application.** | Checked |
| **The application been** signed by a suitably authorised individual **(clear electronic or scanned signatures are acceptable).** | Checked |
| **I have attached the below documents to my application:**<br>• **a** cover letter from the Lead Partner, **outlining how any feedback received at Stage 1 has been addressed where relevant and referencing any potential conflicts of interest, as a single PDF.** | Checked |
| • **my** completed logframe **as a PDF using the template provided and using "Monitoring Evaluation and Learning Guidance" and "Standard Indicator Guidance".** | Checked |
| • **my budget (which meets the requirements above) using the template provided.** | Checked |
| • **a signed copy of the last 2 annual report and accounts for the Lead Partner, or provided an explanation if not.** | Checked |
| • **my completed workplan as a PDF using the template provided** | Checked |
| • **a copy of the Lead Partner's Safeguarding Policy, Whistleblowing Policy and Code of Conduct (Question 28).** | Checked |
| • **1 page CV or job description for each of the Project Staff identified at Question 30, including the Project Leader, or provided an explanation of why not, combined into a single PDF.** | Checked |
| • **a letter of support from the Lead Partner and partner(s) identified at Question 31 and relevant OT Governments, or an explanation of why not, combined into a single PDF.** | Checked |
| **My additional supporting evidence is in line with the requested evidence, amounts to a maximum of 5 sides of A4, and is combined as a single PDF.** | Checked |
| **(If copying and pasting into Flexi-Grant) I have checked that all my responses have been successfully copied into the online application form.** | Checked |
| **I have checked the** Darwin Plus website **immediately prior to submission to ensure there are no late updates.** | Checked |
| **I have read and understood the Privacy Notice on the** Darwin Plus website**.** | Checked |

**We would like to keep in touch!**

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

Checked

**Data protection and use of personal data**

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

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

Project Title: **Southwest Atlantic Elephant Seal Population Assessment (SAESPA)**

| | Activity | No. of months | Year 1 (24/25) | | | | Year 2 (25/26) | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Q1 Apr24 | Q2 Jul24 | Q3 Oct24 | Q4 Jan25 | Q1 Apr25 | Q2 Jul25 | Q3 Oct25 | Q4 Jan26 |
| **Output 1** | **Development of an automated approach to scan acquired VHR satellite imagery.** | | | | | | | | | |
| 1.1 | Identification and review of the most appropriate automation methods leading to method selection | 1-2 | ▨ | | | | | | | |
| 1.2 | Review existing imagery from DPLUS109 and create training dataset for machine learning method | 1-2 | ▨ | | | | | | | |
| 1.3 | If required, supplement training dataset with imagery acquired from the 2024 breeding season. | <1 | | | | ▨ | | | | |
| 1.4 | Train and refine final automation algorithm. | 6-9 | | ▨ | ▨ | ▨ | ▨ | | | |
| **Output 2** | **Production of a UAV-based ground truthing survey to validate the acquired VHR population estimates.** | | | | | | | | | |
| 2.1 | Identify survey locations for UAV flights. | 1 | ▨ | | | | | | | |
| 2.2 | Finalise fieldwork plans for Austral summer 2024. | 4 | ▨ | ▨ | | | | | | |
| 2.3 | UAV ground validation and peak of breeding survey design | 2 | | ▨ | | | | | | |
| 2.4 | Fieldwork – UAV ground validation and peak of breeding surveys | 1.5 | | | ▨ | | | | | |
| 2.5 | Produce orthorectified image mosaics and analyse UAV imagery from field surveys | 2-3 | | | | | ▨ | ▨ | ▨ | |
| 2.6 | Incorporate metrics from UAV surveys into population assessment 3.6 | 1 | | | | | | ▨ | ▨ | |
| **Output 3** | **An island-wide population censuses of SES using VHR satellite imagery for each sub-Antarctic archipelagos: (i) South Georgia; (ii) the South Orkney Islands; and (iii) the South Shetland Islands.** | | | | | | | | | |
| 3.1 | Identify AOIs for satellite imagery tasking. | 1 | | ▨ | | | | | | |

Project Title: **Southwest Atlantic Elephant Seal Population Assessment (SAESPA)**

| | Activity | No. of months | Year 1 (24/25) | | | | Year 2 (25/26) | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Q1 Apr24 | Q2 Jul24 | Q3 Oct24 | Q4 Jan25 | Q1 Apr25 | Q2 Jul25 | Q3 Oct25 | Q4 Jan26 |
| 3.2 | Arrange image tasking (including tendering, if needed) with satellite imagery supplier. | 1 | ▓ | ▓ | | | | | | |
| 3.3 | Acquire satellite images from supplier. | <1 | | | ▓ | | | | | |
| 3.4 | Apply automation developed in 1.4 to all acquired imagery. | 4-5 | | | | ▓ | ▓ | ▓ | | |
| 3.5 | Extract island-wide counts, adjust for temporal displacements form SES breeding peak and for ground validation metrics. | 2-3 | | | | | | ▓ | | |
| 3.6 | Calculate final census estimates for each sub-Antarctic Island. | 1-2 | | | | | | ▓ | ▓ | |
| 3.7 | Production of peer-reviewed publication detailing the updated population censuses of each of the three sub-Antarctic islands examined. | 9 | | | | | ▓ | ▓ | ▓ | |
| 3.8 | Adaptation of publications into a more accessible and inclusive format (e.g., Frontiers for Young Minds article). | 1 | | | | | | | ▓ | ▓ |
| Output 4 | **Provision of training and the dissemination of knowledge.** | | | | | | | | | |
| 4.1 | Regular M&E throughout lifetime of project (weekly & monthly) | <1 | ▓ | ▓ | ▓ | ▓ | ▓ | ▓ | ▓ | ▓ |
| 4.2 | Bi-annual M&E meetings with all project partners and stakeholders. *Final meeting merged with 4.3 | <0.5 | ▓ | ▓ | | ▓ | ▓ | | | * |
| 4.3 | Prepare and submit findings report and deliver summary training workshop to GSGSSI and invited internal/external parties. | 1-2 | | | | | | | ▓ | ▓ |
| 4.4 | Deposit satellite census data and ground-truthed UAV imagery into a publicly available repository. | 0.5 | | | | | | | | ▓ |

Project Title: **Southwest Atlantic Elephant Seal Population Assessment (SAESPA)**

| | Activity | No. of months | Year 1 (24/25) | | | | Year 2 (25/26) | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Q1 Apr24 | Q2 Jul24 | Q3 Oct24 | Q4 Jan25 | Q1 Apr25 | Q2 Jul25 | Q3 Oct25 | Q4 Jan26 |
| 4.5 | Report detailing the updated population assessments provided to SCAR CAPS Action Group. | 2 | | | | | | | | ▓ |
| 4.6 | Non-technical communication of research findings to the public via social media. Ongoing through the lifetime of the project. | <1 | ▓ | ▓ | ▓ | ▓ | ▓ | ▓ | ▓ | ▓ |
| 4.7 | Communication of results at an international conference | 1 | | | | | | | ▓ | ▓ |
| 4.8 | Provide UAV training to one person based at King Edward Point, South Georgia to enhance capacity on OT | 2 | | | | ▓ | ▓ | | | |

Project Title: **Southwest Atlantic Elephant Seal Population Assessment (SAESPA)**

| Project Summary | SMART Indicators | Means of Verification | Important Assumptions |
|---|---|---|---|
| **Impact:**<br><br>Sustainable and cost-effective satellite remote sensing enables the population status of southern elephant seals (SES) on sub-Antarctic Islands to be updated, updating baselines, and informing long-term conservation and management actions. | | | |
| **Outcome:**<br><br>Provide census data, distribution maps and establish imagery-based monitoring protocols for SES over South Georgia, the South Orkney, and South Shetland Islands, improving species management, conservation policy and species advocacy. | 0.1: Counts from VHR satellite imagery provide a means of estimating abundance at breeding sites across the three island groups leading to the publication of three island-wide population censuses for southern elephant seals by March 2026 (Y2Q4). **[DPLUS-C02]** | 0.1.1: Data detailing the counts and distribution of SES breeding sites located in the satellite images of the three island groups published in Open Access peer-reviewed journals measured by journal confirmation email and journal metrics (e.g., access counts, citations, etc.) accessed from publisher or 3rd party (e.g., Altmetric) after publication. Aiming for 5 citations within a year of publication, and >1,000 downloads of the publication.<br><br>0.1.2: Data on new breeding locations, specifically in the southeast of South Georgia provided directly to GSGSSI as key deliverable to SGSSI MPA Research and Monitoring Plan Theme 3. Measured by email acknowledgement. | **Data acquired at an appropriate scale as to be able to produce a representative census on each of the three targeted sub-Antarctic islands.**<br><br>Satellite data acquisition will be tasked to coincide with known peaks in seal numbers on the islands. As a contingency for poor weather, which would limit data acquisition, satellites will be tasked with a higher permissible cloud cover threshold and for a week either side of the peak for each island group to maximise the likelihood of successful data collection. |

| | 0.2: New satellite imagery analysis protocols will be developed and published in peer reviewed journals to enhance the longevity of the project's impacts post completion, ensuring long-term uptake of the developed methods at other sites. Paper to be submitted for publication by December 2025 (Y2Q3). **[DPLUS-C02, DPLUS-C06 & DPLUS-C17].** | 0.2: Analyses protocols and code published in Open Access peer-reviewed journals or suitable code-repository (e.g., GitHub). Measured by journal confirmation email and journal metrics (e.g., access counts, citations, etc.) accessed from publisher or 3<sup>rd</sup> party (e.g., Altmetric) after publication. Aiming for 5 citations, >1,000 downloads of the paper and >100 pages access on GitHub (if used). | |
| | 0.3: Stakeholder engagement throughout will feed the results into regional conservation management. Aim to enhance the species-specific provisioning in a minimum of one national level policy or management plan for the Governed OT's (South Georgia) and recommendations published for OT's south of 60°S (South Orkney and Shetland Islands) by the end of the project in March 2026 (Y2Q4) **[DPLUS-B02, DPLUS-D03 & DPLUS-C19]** | 0.3: Findings seminar/workshop (attendance disaggregated by gender, age group, etc.) provided alongside reports to GSGSSI detailing species-specific provisioning recommendations to be included in both the 5-yearly MPA review and the development of site-specific management plans for the Terrestrial Protected Areas process. | |
| | 0.4: Stakeholder engagement throughout will feed the results into regional conservation management. Aim to enhance the species habitat provisioning in a minimum of one national level policy or management plan for the Governed OT's (South | 0.4: Findings seminar/workshop (attendance disaggregated by gender, age group, etc.) provided alongside reports to GSGSSI detailing species habitat provisioning recommendations to be included in both the 5-yearly MPA | |

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| | Georgia) and recommendations published for OT's south of 60°S (South Orkney and Shetland Islands) by the end of the project in March 2026 (Y2Q4) **[DPLUS-B01, DPLUS-C02, DPLUS-D03 & DPLUS-C19]** | review and the development of site-specific management plans for the Terrestrial Protected Areas process. | |
| | 0.5: Enhancing understanding of species specific biodiversity at government institutions, both in the OT and the UK **[DPLUS-A07]**, and with the wider community via social media channels **[DPLUS-C12]** by the end the project in March 2026 (Y2Q4)**.** | 0.5.1: Dissemination of findings via stakeholder reports providing diagnostic metrics disaggregated by age/gender where available.<br>0.5.2: Dissemination of findings via online social media channels (e.g., Twitter & Instagram) providing diagnostic metrics (e.g., number of followers, accounts reached and post interactions) disaggregated by gender/age group where available.<br>0.5.3: Aiming for 500 to 1,000 followers between both social media platforms, with an average of 25 interactions (e.g., 'likes', 'comments', or 'reactions') per post by the end of the project in 2026. | |
| **Outputs:**<br>**1**. Development of an automated approach to scan acquired VHR satellite imagery. | 1.1: Scoping of most appropriate automation methods, likely to be a UNET CNN (based on previous experience and efficacy with similar species). Y1Q1. | 1.1: Internal project staff review at monthly M&E meeting to review automation options (attendance disaggregated by gender, age group, etc.). | **Data acquired at a suitable volume to facilitate the development and training of an automated scanning algorithm.**<br><br>To expedite this output existing data from DPLUS109 will be used, fast- |

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| | 1.2: Review existing imagery available from DPLUS109 and create expert training dataset for the development of the automated approach to image scanning. Y1Q1. | 1.2: Internal project staff review of existing data. Status of training dataset reviewed at monthly project M&E meeting to assess validity (i.e., is the overall size of the dataset suitable as a stand-alone training dataset, or does it need supplementing with new imagery?). | tracking the establishment of a training dataset. This will enable concurrent progress to be made on both the automation development and the acquisition of the data for the 2024 census year. If additional training data are required, these can be sourced from the acquired census data, supplementing, and enhancing the pre-established training dataset. |
| | 1.3: If needed, supplement training data from imagery acquired over the 2024 breeding season. Y1Q4. | 1.3: *ibid* (if required) | |
| | 1.4: Training and refinement of final method of automation. Collation of code to open-source repository. Y2Q1 to Y2Q1. | 1.4: Internal review of proposed methods among project staff; results assessed on test images; test statistics reported at weekly and monthly M&E project meetings (attendance disaggregated by gender, age group, etc.). | |
| 2.  Provide counts of SES on one or more breeding beaches over the presumed breeding peak at the end of October to: (i) better understand arrival and peak breeding times on South Georgia, and (ii) to validate acquired VHR population estimates and correctly adjust for any temporal misalignment. | 2.1: Identification of survey locations (i.e., known breeding beaches) informed by published data and BAS' internal records. Y1Q1.<br><br>2.2: Finalise fieldwork planning (begun pre-grant in January 2024). Y1Q1 to Y1Q2.<br><br><br>2.3: Design surveys in flight software, assess the frequency of flights needed and prepare UAV for | 2.1: Internal review between project staff at monthly M&E meeting to review site selection (attendance disaggregated by gender, age group, etc.).<br><br><br>2.2.1: Receive confirmation email signing off on fieldwork plans from BAS Operations.<br>2.2.2: Receipt of permits from GSGSSI.<br>2.3: Internal review at monthly M&E meeting, and receipt of | **Underlying data for both ground truthing and peak of breeding timing collected successfully at South Georgia.**<br><br>The field team will make in situ decisions, considering local and forecasted weather conditions when finalising survey site selection to maximise the likelihood of successful data collection. Backup platforms (i.e., quadcopter UAV's) and spare parts will be taken to safeguard against mechanical failure |

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| | transportation to South Georgia. Y1Q2.<br><br>2.4: Conduct ground-count and peak of breeding validation surveys. Y1Q3.<br><br>2.5: Produce orthorectified image mosaics and analyse imagery acquired during 3.3 and produce adjustment recommendations for final population estimates (see 3.4). Y1Q4 to Y2Q2.<br><br>2.6: Incorporation of outputs into analyses and peer-reviewed publication outlined in more detail below (3.5 to 3.7). | consignment note for UAV shipment (attendance disaggregated by gender, age group, etc.).<br><br>2.4: Successful acquisition of UAV imagery over at least one breeding beach at regular intervals spanning SES' presumed breeding peak.<br><br>2.5: Internal review at monthly M&E meeting between expert project staff (attendance disaggregated by gender, age group, etc.).<br><br>2.6: Internal review at monthly M&E meeting between expert project staff (attendance disaggregated by gender, age group, etc.). | in the primary system. Multiple qualified pilots will be present in the field to safeguard against illness or injury disrupting data collection. However, safe operation and both human and animal safety will always precede data acquisition. |
| 3.   Produce island-wide population censuses for SES using VHR satellite imagery for each sub-Antarctic archipelagos: (i) South Georgia; (ii) the South Orkney Islands; and (iii) the South Shetland Islands. | 3.1: Identification of Areas of Interest (AOIs) for VHR satellite imagery tasking. These AOIs will detail (i) the locations where SES are known to breed, which will ascertained from a literature search; as well as including (ii) the identification of candidate AOIs from understudied regions. These are likely to include speculative taskings of regions where SES | 3.1: AOIs reviewed by expert project staff and feedback obtained from GSGSSI for AOIs on South Georgia. | **Delay in the publication of projects findings due to slow peer review times at many journals.**<br><br>Journal article detailing population censuses will be prepared ahead of the end of the project, thus maximising the likelihood that results are disseminated in a timely fashion once the project reaches its conclusion. Primary stakeholders |

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| | maybe expected to come ashore based on topographic data and historic sealing records. Y1Q2. | (GSGSSI and BAT) will be informed and consulted ahead of submission. |
| | 3.2: Set up the image tasking order (including tendering process, if needed) with imagery provider for the 2-week window either side of the known peak in SES breeding. Y1Q1 to Y1Q2. | 3.2: Order confirmation received from satellite company and order ID generated. | Additionally, the communication of results via formal twice-yearly reports to GSGSSI alongside online social media post and reports to the SCAR CAPS Action Group will expedite the delivery of the project's findings to stakeholders and wider audiences. |
| | 3.3: Acquire VHR satellite images from active tasking for SES breeding peak at the end of October. Y1Q3. | 3.3: Images downloaded from provider and quality verified by experts. | |
| | 3.4: Apply automation methodology developed in 1.4 to all VHR satellite imagery acquired for the three islands. Y1Q4 to Y2Q2. | 3.4: Results assessed internally at monthly project M&E meeting (attendance disaggregated by gender, age group, etc.); test statistics detailing accuracy and thresholding used for each site on each of the sub-Antarctic Islands targeted. | |
| | 3.5: Extract island-wide counts and account for temporal displacement from SES breeding peak and adjust for ground validations (2.6) to produce final counts. Y2Q2. | 3.5: Internal review of final counts at monthly and weekly M&E meetings (attendance disaggregated by gender, age group, etc.). | |
| | 3.6: Calculate final census estimates for each sub-Antarctic Island. Y2Q2 to Y2Q3. | 3.6: Internal review of final counts at monthly and weekly M&E meetings | |

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| | 3.7: Production of at least one open access peer-reviewed journal article detailing the updated population estimates from the censuses at South Georgia, the South Orkney Islands, and the South Shetland Islands. To be submitted by Y2Q3. **[DPLUS-C02, DPLUS-C06 & DPLUS-C17]**. | (attendance disaggregated by gender, age group, etc.).<br><br>3.7.1: Internal review of manuscript during its projection at weekly M&E meetings (attendance disaggregated by gender, age group, etc.).<br><br>3.7.2: Final draft provided to GSISSI and BAT (via FCDO) prior to journal submission to receive feedback.<br><br>3.7.3: Journal submission confirmation email.<br><br>3.7.4: Journal metrics (e.g., access counts, citations, etc.) accessed from publisher or 3rd party (e.g., Altmetric) after publication. Aim of >1,000 article access records, and 5 citations by the end of the project in spring 2026. |
| | 3.8: Adapt aspects of the publication(s) outlined in 3.7 for publication in a more accessible format (e.g., Fronters for Young Minds article: https://kids.frontiersin.org/) to enhance the reach and increase the social inclusivity of the research. To be submitted during Y2Q3 to Y2Q4 after the scientific paper/papers outlined in 3.7. | 3.8.1: Internal review of manuscript at monthly M&E meetings (attendance disaggregated by gender, age group, etc.). Final draft circulated with all project partners and stakeholders for feedback prior to submission. Initial confirmation email from the journal. |

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| | | 3.8.2: Access metrics available from publisher's site. However, the scope of these metrics are greatly reduced compared to those available for a full journal article. Here we will instead promote the article via social media (e.g., Twitter, Instagram), with an aim of receiving >50 interactions with each respective post. | |
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| **4**. M&E, Provision of training and the dissemination of project findings and results | 4.1: Project M&E: weekly meetings held between the project lead and co-lead to monitor the fine details of the project; monthly meetings held with all project staff to appraise progress and refine mid-to-long term objectives. Minutes taken at all meetings, shared between participants and reviewed at the start of the following meeting. | 4.1: Minutes appended to Darwin Plus reports. | **Difficulty attending training event leading to lower than desired attendance.**<br><br>Not all project members may be able to attend project meetings due to scheduling and time zone differences (e.g., UK, Falkland Islands, France). Monthly and bi-annual meetings will be held at oscillating times, to enable full participation. Minutes will be shared to all members. Hybrid meetings will also be implemented to enable all working patterns to be accommodated. |
| | 4.2: Twice yearly meetings held will all project partners to assess overall progress. Minutes taken at all meetings, shared between participants and reviewed at the start of the following meeting. | 4.2: Minutes appended to Darwin Plus reports. | |
| | 4.3: Reports delivered, and project summary training workshop provided to 25% (n = 3) of GSGSSI staff along with invited internal/external parties (i.e., BAS, | 4.3.1: Project reports submitted to GSGSSI and acknowledgment of their receipt.<br><br>4.3.2: Project workshop | Findings and training workshop will be held virtually to facilitate maximum attendance and will be scheduled at times sympathetic to parental responsibilities (i.e., daytime and outside of school holidays), accounting for different |

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| | NGOs). This workshop will detail the following pre-publication findings: (i) UAV survey procedures, (ii) adaption of lessons learned from DPLUS109; (iii) satellite image analysis protocols; (iv) automation protocols; and (v) signposting to where these open access resources can be found for future reference after the lifetime of this project. This summary training workshop will be conducted before the end of the project in Y2Q2 to Y2Q4. **[DPLUS-A01, DPLUS-A03, DPLUS-C14]** | delivered to GSGSSI and internal/external parties, attendance recorded (disaggregated by gender and age group) and post course feedback. | time zone / educational schedules between the UK and the Falklands (GSGSSI Offices). |
| | 4.4: Publicly available repository of satellite census data and ground-truthed UAV imagery finalised by Y2Q4. **[DPLUS-C16]** | 4.4: Census data and UAV imagery added to publicly accessible repository held by the Polar Data Centre at BAS and the GSGSSI MPA data portal. Verified by obtaining a DOI for this data repository and confirmation of online accessibility for the GSGSSI MPA data portal. | |
| | 4.5: Report detailing updated population estimates from all monitored sub-Antarctic islands provided to SCAR CAPS Action Group by Y2Q4. Population estimates communicated to | 4.5: Submission acknowledgement email. | |

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| | CCAMLR's krill risk assessment for sub-Area 48.3. **[DPLUS-C19]**<br><br>4.6: Non-technical communication of research findings to the public via social media channels (i.e., Twitter and Instagram) and institute's website. Ongoing throughout the project, with reporting milestones taken monthly and annually during the tenure of the grant. **[DPLUS-C12 & DPLUS-C19]** | 4.6.1: Social media analytics summarised at monthly and annual intervals. Social media analytics include metric such as number of followers (disaggregated by gender where possible), total and growth, along with engagement interactions (i.e., likes, shares or reactions), and reach of posts. Institute website traffic also reported.<br>4.6.2: Aiming for 500 to 1,000 followers between both social media channels and for an average engagement of 25 interactions per post by the end of the project in 2026. | |
| | 4.7: Communication of key findings and results at least one international conference during the tenure of this proposal Y2Q3 to Y2Q4. | 4.7.1: Acceptance email from international conference.<br>4.7.2: Enhanced interaction with social media posts released during conference (above average aim of 25 interactions per post, see 4.6.2). | |
| | 4.8: Enhancing capacity available in the OT through providing formal UAV operator training and an official qualification (A2 CofC and | 4.8: Email confirmations for: (i) enrolment on the UAV exam training course; (ii) booking of the drone training courses; (iii) booking of the flight assessment; and (iv) the | |

| | GVC) to one member of the King Edward Point Research Station Science Staff by Y2Q1. **[DPLUS-A01]** | final confirmation of successful award of qualifications (copies of certificates appended to M&E reporting at the appropriate stage). | |
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**Activities** (each activity is numbered according to the output that it will contribute towards, for example 1.1, 1.2 and 1.3 are contributing to

Output 1. Each activity should start on a new line and be no more than approximately 25 words.)


Output 1:  **Development of an automated approach to scan acquired VHR satellite imagery.**

1.1: Identification and review of the most appropriate automation methods leading to selection of a single method to implement
1.2: Review existing DPLUS109 satellite imagery and create a training dataset for machine learning methods
1.3: Supplement training dataset from imagery acquired over the 2024 breeding season (if required).
1.4: Train and refine final automation algorithm.

Output 2:  **Production of a UAV-based ground truthing survey to validate the acquired VHR population estimates.**

2.1: Identify survey locations for UAV flights.
2.2: Finalise fieldwork plans for Austral summer 2024.
2.3: UAS ground validation and peak of breeding survey design
2.4: Fieldwork – UAV ground validation and peak of breeding survey
2.5:  Produce orthorectified image mosaics and analyse UAV imagery from field surveys
2.6: Incorporate metrics from UAV surveys into population assessment 3.6


Output 3:  **An island-wide population censuses of SES using VHR satellite imagery for each sub-Antarctic archipelagos: (i) South Georgia; (ii) the South Orkney Islands; and (iii) the South Shetland Islands.**

3.1:  Identify AOIs for satellite imagery tasking.
3.2:  Arrange image tasking (including tendering, if needed) with satellite imagery supplier.
3.3:  Acquire satellite images from supplier

3.4: Apply automation developed in 1.4 to all acquired imagery

3.5: Extract island-wide counts, adjust for temporal displacements form SES breeding peak and for ground validation metrics.

3.6: Calculate final census estimates for each sub-Antarctic Island.

3.7: Production of peer-reviewed publication detailing the updated population censuses of each of the three sub-Antarctic islands examined.

3.8: Adaptation of publications into a more accessible and inclusive format (e.g., Frontiers for Young Minds article).

Output 4: **M&E, Provision of training and the dissemination of project findings and results**

4.1: M&E: Conduct regular assessments throughout the lifetime of the project: weekly & monthly meetings.

4.2: M&E: Conduct bi-annual project meeting with all project partners and stakeholders.

4.3: Prepare and submit findings report and deliver summary training workshop to GSGSSI and invited internal/external parties.

4.4: Deposit satellite census data and ground-truthed UAV imagery into a publicly available repository.

4.5: Report detailing the updated population assessments provided to SCAR CAPS Action Group.

4.6: Non-technical communication of research findings to the public via social media. Ongoing through the lifetime of the project.

4.7: Communication of results at international conference.

4.8: Provide UAV training to one person based at King Edward Point, South Georgia to enhance capacity on OT.