

Darwin Plus: Overseas Territories Environment and Climate Fund Annual Report

To be completed with reference to the "Project Reporting Information Note"
(<https://dplus.darwininitiative.org.uk/resources/information-notes/>).

It is expected that this report will be a **maximum** of 20 pages in length, excluding annexes)

Submission Deadline: 30th April 2022

Darwin Plus Project Information

Project reference	DPLUS149
Project title	Resolving ecosystem effects of the South Georgia winter krill fishery
Territory(ies)	South Georgia and the South Sandwich Islands
Lead partner	British Antarctic Survey
Project partner(s)	Government of South Georgia and the South Sandwich Islands (GSGSSI) and Antarctic Research Trust (ART)
Darwin Plus grant value	£469,653.00
Start/end dates of project	1 December 2021 – 31 May 2024
Reporting period (e.g. Apr 2021-Mar 2022) and number (e.g. Annual Report 1, 2)	1 December 2021 – 30 March 2022
Project Leader name	Martin Collins
Project website/blog/social media	https://www.bas.ac.uk/project/winter-krill-at-south-georgia/
Report author(s) and date	Martin Collins, Sophie Fielding, Jen Jackson, Norman Ratcliffe, Cecilia Liszka, Phil Trathan, Tracey Dornan (all BAS), Mark Belchier, Sue Gregory, Steve Brown (all GSGSSI), Klemens Putz (ART).

1. Project summary

Our project is entitled ‘Resolving ecosystem effects of the South Georgia winter krill fishery’, hereafter referred to as the Winter Krill Project. The main objectives of the Winter Krill Project are to obtain information on i) the distribution and abundance of *Euphausia superba* (Antarctic krill) during the winter; and ii) overlap between the distribution of krill-dependent predators and krill in the fishery area. The motivation behind this is that the commercial krill fishery around South Georgia (SG) operates exclusively during the winter period, yet information on the stock dynamics and distribution of krill during this period are sparse. Although MPA restrictions include a 30 km no-take zone around the SG coast, there is evidence to suggest that the foraging habits of krill-dependent predators such as penguins and seals vary depending on the abundance of krill, and that this may result in overlap between them and the krill fishery, particularly during low krill years. There is also evidence of baleen whales returning to SG in large numbers during the summer and of some remaining during the winter, with the increased prey demand potentially further increasing competition for krill resources. Our project will address this gap in winter data, in turn

improving management of the SG ecosystem and enabling the ecosystem-based management of the krill fishery.

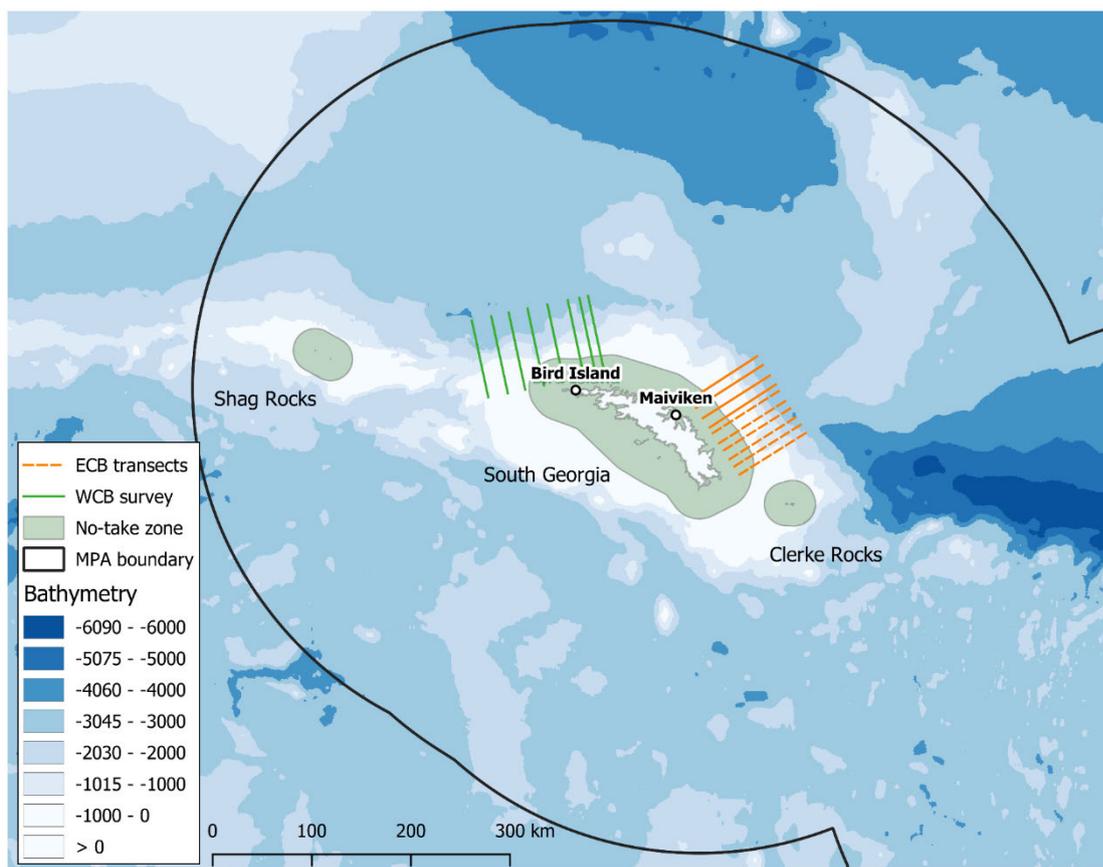


Fig. 1: Map of part of the South Georgia and South Sandwich Islands Marine Protected Area (SGSSI MPA) showing the Eastern Core Box survey transects (orange lines) that will be occupied during the project, and the Western Core Box survey (WCB) regularly occupied by BAS. Transects will likely be limited to the 4 solid orange transect lines but may extend to the dotted line transects further south if possible (time and weather dependent). Penguin tag deployments will simultaneously be made from Bird Island and Maiviken. Also indicated on the map are the no-take zones where fishing is prohibited, including a 30 km distance from the SG coastline and a 12 nm (22.2 km) distance from the coastline of Clerke and Shag Rocks.

2. Project stakeholders/partners

Formal project partners are the GSGSSI and the Antarctic Research Trust. The project team includes members of these organisations and they, as well as the BAS project team members, are included in all project meetings and communications. These partnerships were developed based on the mutual interest of all partners in the project and its outcomes and the value that the partners could add to the project by being involved, and the project was developed with the involvement of both. The GSGSSI has a central role in the management of the SG ecosystem, MPA and the krill fishery; hence they have been directly involved in developing and executing the acoustic element of the project. The role of the Antarctic Research Trust is enabling the conservation of Antarctic and sub-Antarctic animals and has therefore been involved directly in the penguin monitoring aspect of the project, including providing the tracking tags.

Monthly meetings of the full project team are held (by Zoom) on the first Monday of each month, for which minutes are recorded and shared with all team members. We have also created a shared drive on Microsoft Teams which all project team members have access to, and where all documentation related to Darwin Plus Annual Report Template 2022

the project is saved. In between these meetings, regular communication is maintained with partners either via email or by Zoom meeting. All partners are therefore involved in all project planning, decision-making and evaluation elements.

In addition to the formal project partners, we have a range of interested stakeholders that we are developing and maintaining communications with. This includes the Association for Responsible Krill Harvesting (ARK), AkerBiomarine, WWF, Birdlife International, Cefas, Pew Charitable Trusts, RSPB, South Georgia Heritage Trust (SGHT), South Georgia Association (SGA), Plymouth Marine Laboratory (PML), South Atlantic Environmental Research Institute (SAERI) and the UK Foreign and Commonwealth Development Office (FCDO). On January 24th 2022 we held a Stakeholder Meeting that was open to all of the above and 10 organisations were represented. The meeting was recorded and shared with those that could not attend and we have received positive feedback from those that have viewed it since. The recording has also been uploaded onto our project page: <https://www.bas.ac.uk/project/winter-krill-at-south-georgia/> At the Stakeholder meeting, the project partners introduced the project and project partners and summarised the objectives and proposed outputs. Following the meeting, we have compiled a mailing list of all these stakeholders and will provide them with 6 monthly updates on the project.

We have also developed a relationship with colleagues at the College of Staten Island (New York) who are conducting research of a similar nature to us on the US research vessel Nathaniel B Palmer and with whom we are investigating the possibility of collaboration.

3. Project progress

3.1 Progress in carrying out project Activities

Plans for the fit of acoustic transponders (**Activity 1.1**) were completed in good time for the vessel to go to dry dock. The scientific echosounder system was match-funded by the UK Government's Blue Belt Programme and ordered and shipped from the manufacturers in Norway. The echosounders and associated electronics were fitted to the *Pharos SG* during dry-dock in March in Montevideo (Uruguay) (**Activity 1.2**; see photos in Fig. 2). This was a significant undertaking and involved the fitting of a bespoke housing (blister) to the hull of the vessel. The system was commissioned, tested and calibrated in Falkland Islands (**Activity 1.3**) waters in late March / early April by Co-I Fielding. *Pharos SG* officers were trained in the operation of the system during calibration and testing. Training of KEP Science staff and GSGSSI Government Officers (**Activities 1.4 & 1.5**) will happen in association with the surveys this austral winter. The manual for acoustics operation will be finalised during the first survey in May.

The acoustic and predator surveys (**Activities 2.1 -2.3**) are scheduled for May, July and September 2022. Additional matched funding (not included in application) has been secured from FCDO to support the participation of an additional, highly experienced, seabird observer (Ryan Irvine) during the 2022 surveys (**Activity 2.2**). Irvine will lead the surveys and provide additional training for KEP science staff in seabird observation methods. Additional funding has been secured from the South Georgia Heritage Trust and Friends of South Georgia Island for the deployment of Sonobuoys during the July survey (**Activity 2.3**).

The Sonobuoys detect cetacean vocalisations and this will supplement the at-sea transect work. Twelve satellite tags have been purchased (from Wildlife Computers, with matched funding from project partners, Antarctic Research Trust), and have been shipped to Bird Island and King Edward Point ready for deployment in early May (**Activity 2.5**). These have been supplemented with eight Pathtrack remote download GPS tags (provided by BAS) that will be deployed at Bird Island. These will allow tracking of additional birds in greater detail than is possible with satellite tags.

Activities under Outputs 3 & 4 will only start once the surveys have been completed.

An initial stakeholder meeting (**Activity 5.1**) was held (on Zoom) on January 24th. The meeting was attended by ten stakeholder organisations (ARK, Pew Trusts, SGHT, SGA, Birdlife, Aker Biomarine, SAERI, Cefas, WWF) with others able to watch a recording of the event (available via project webpage). At the meeting, the project partners introduced the different aspects of the project and stakeholders were able to contribute ideas. Six-monthly updates will be circulated to all interested stakeholders, with the first one due after the May survey.

A project web-page has been established (<https://www.bas.ac.uk/project/winter-krill-at-south-georgia/#about>), which includes background to the project, funding acknowledgements and will also provide visualisations of data. A project logo (below) has been designed and will be used on the project, website and project reports and articles, together with the Darwin logo (as appropriate).



Activities under Output 6 (Activities 6.1 & 6.2) will come once all the surveys are completed, in the last 6 months of the project.

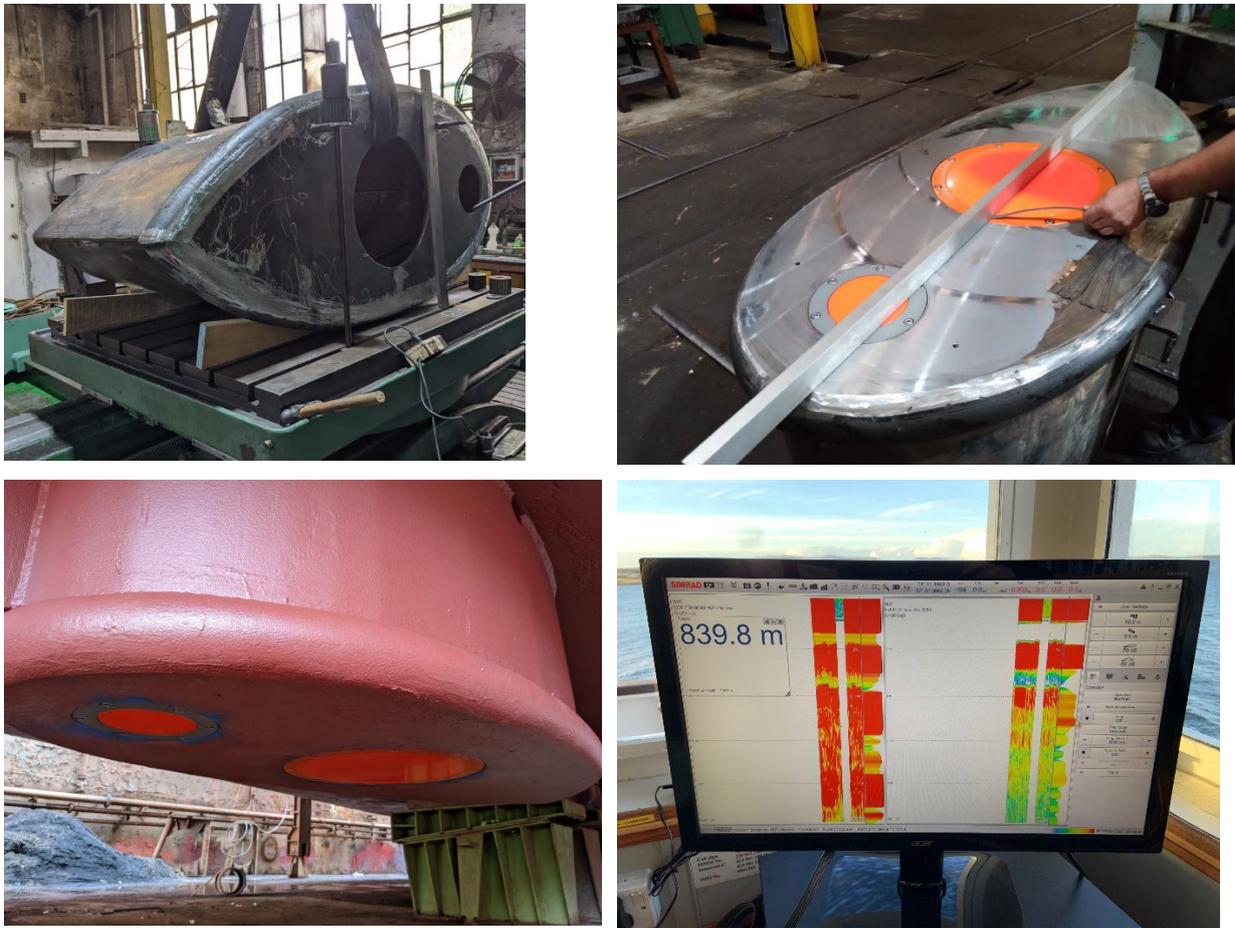


Fig. 2. Photos of the fitting of the transducers to the hull of the *Pharos SG*, in dry dock in March 2022. Top left: transducer blister for fitting to hull. Top right: transducers fitted to blister. Bottom left: blister attached to hull. Bottom right: display screen during trials.

3.2 Progress towards project Outputs

Output 1: Long-term capability for winter pelagic ecosystem assessment enabled for South Georgia

The scientific echosounder system (Simrad EK80 with 38 and 120 kHz transducers) has been fitted to the SGSSI patrol vessel *Pharos SG* (Activities 1.1 & 1.2). This was a major operation, involved significant discussion between BAS, GSGSSI and the vessel owners / operators (Byron Marine), could only be undertaken whilst the vessel was in dry-dock and required sign-off from naval architects and the vessel classification authorities. The fit took place during dry-dock in March 2022 and the acoustic system was calibrated and tested in Falkland waters in early April 2022. This greatly enhances the capability of the vessel, which is on long-term charter to GSGSSI, and will enable acoustic surveys to be undertaken as part of this project and into the future. The first survey is planned for May 2022 and this will be the first opportunity to provide training to the GSGSSI Government Officers and King Edward Point science staff (Activities 1.4 & 1.5). A manual for operating and calibrating the system is in development and will be finalised during the first survey.

Output 2: Winter krill acoustic and predator surveys / tracking undertaken.

The acoustic surveys are planned on board *Pharos SG* for May, July and September, as per the project proposal. Permits have been obtained from GSGSSI for all aspects of the survey. PI Collins will lead the first two surveys, with Tracey Doman supporting the first survey. Seabird / marine mammal observations will be led by Ryan Irvine on all three surveys, with support from King Edward Point scientists and Collins. During July, a dedicated cetacean

observer team will join for the survey and, in addition to at-sea observations, will deploy HIDAR Sonobuoys to detect cetacean vocalisations.

Output 3: Winter krill stock assessment in South Georgia fishery area for each of two years, including krill swarm characteristics

Work on this output will commence once the first season's data has been collected.

Output 4: Winter predator abundance, distribution and tracking data analysed

Work on this output will commence once the first season's data has been collected.

Output 5: Stakeholder engagement and disseminated of results in scientific and popular literature and at international fora

An initial stakeholder meeting was held in January, with excellent representation from a broad range of stakeholders. Stakeholders will be informed of project progress on a six-monthly basis. Dissemination of results will follow from the surveys.

Output 6: Updates to SGSSI management plans and legislation

Work on this output will commence once all surveys are completed.

3.3 Progress towards the project Outcome

Outcome: *An understanding of the winter distribution of Antarctic krill and potential impacts of the krill fishery on dependent predators facilitates ecosystem-based management of the krill fishery.*

The project is in its early stages, but the fitting of the scientific echosounder system to the *Pharos SG*, and subsequent testing, represent a major step towards the successful delivery of the project and a significant enhancement of the Government of SGSSI's ability to assess the abundance and biomass of krill in the Marine Protect Area.

3.4 Monitoring of assumptions

Assumption 1: Stakeholder community engage in discussions regarding management.

Comments: Stakeholders engaged in the initial meeting and were enthusiastic about the project and it's expected outcomes.

Assumption 2: Acoustic fit to *Pharos SG* successful in Year 1

Comments: The acoustic system has been fitted to *Pharos SG* and been calibrated and tested.

Assumption 3: GSGSSI update MPA Management Plan

Comments: This will be towards the end of the project.

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

Determining the abundance of krill during the winter and the impact of the winter krill fishery on krill-dependent predators is critical to ensuring the sustainable management of South Georgia's krill fishery and, more broadly, the Marine Protected Area. Until now, it has proved difficult to collect data on krill

during winter, as suitably equipped vessels (such as the BAS ships) return north during the austral winter. The fit of the scientific echosounder system to the *Pharos SG* is critical to obtaining winter data for this project, but also enables the Government of SGSSI to undertake acoustic surveys in the future and at any time of year. The provision of winter data on krill will support both domestic management of the krill fishery and also contribute to CCAMLR's management.

5. OPTIONAL: Consideration of gender equality issues

BAS are committed to equality, diversity and inclusion see (<https://www.bas.ac.uk/jobs/working-for-bas/our-cultural-values-equality-and-diversity/>) and aims to embrace diversity in all its forms and provide staff with a sense of belonging regardless of their characteristics, culture, experience, education or economic background.

From a gender equality perspective, the project has a well-balanced team. The project management team has a 50:50 gender balance. The post-doc employed on the project is female, but currently on maternity leave, with a temporary replacement (Tracey Dornan) also female.

6. Monitoring and evaluation

The project start was delayed from October 1st until December 1st, to give time to recruit and appoint a Marine Ecologist to work full-time on the project. The first four months have focussed on planning and preparation and the fit of the scientific echosounder to the *Pharos SG*. Working in a remote place, such as South Georgia, requires careful planning and preparation to ensure all equipment is shipped in good time and staff travel is arranged.

Project delivery is monitored and evaluated by a Project Management Group (PMG) that is led by the Project Manager (Collins) and Marine Ecologist (Liszka) and includes all partners and the cetacean consultants (Leaper and Calderan). The PMG meets on the first Monday of each month to discuss and review the overall progress of the project activities in the context of the agreed log-frame and to agree and plan the next steps. Meetings have been held on zoom which has facilitated full participation of all partners. Information is shared between partners using a MS Teams pages and key documents are also posted on the project web-page.

The BAS Finance Team (Christina Chatzela and Abby Lawrence) is responsible for financial management and work closely with the Project Leader and Marine Ecologist to ensure that spending is within budget.

7. Lessons learnt

The project has benefitted from excellent communication between partners, facilitated by the use of Zoom for meetings. Monthly meetings have been held between all partners, with updates provided on all aspects of the project with reference to the agreed log-frame.

The fit of the echosounder to the *Pharos SG* has involved regular communication between the BAS science team (Fielding & Collins), GSGSSI (Steve Brown), the vessel owners (Byron Marine) and the instrument suppliers (Kongsberg Simrad).

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

Not applicable – this is the first report.

9. Other comments on progress not covered elsewhere

None

10. Sustainability and legacy

The project is a high priority for the OT Government as it seeks to manage its waters to the highest standards. The long-term legacy of the project is secured by the fit of the state-of-the-art scientific echosounder to the *Pharos SG* and that equipment can be transferred to any future GSGSSI chartered vessel.

11. Darwin identity

A project website has been established (<https://www.bas.ac.uk/project/winter-krill-at-south-georgia/#about>), which features the Darwin logo and highlights Darwin Plus as the funder. A short article about the fit of the scientific echosounder to *Pharos SG* has been submitted for the April edition of the South Georgia Association Newsletter and will feature the Darwin logo. Following the first surveys, articles will be prepared for the South Georgia Association Newsletter and Marine Biological Association magazine, which will feature the Darwin Plus logo.

12. Impact of COVID-19 on project delivery

The Covid pandemic has had some impacts on the project. For example the stakeholder meeting in January was held on zoom rather than in person. However, the use of zoom has probably allowed greater participation and reduced the carbon footprint. For future meetings, we will use a hybrid format, allowing both in-person and remote participation.

Covid continues to disrupt travel to the Falkland Islands and on to South Georgia. There is currently a minimum of 5-days quarantine on arrival in the Falklands, which will affect staff travelling for the first survey in May.

From May 4th, the FIG plan to relax the quarantine requirements, so there should not be a requirement for staff to quarantine in advance of surveys in July or subsequently, but that could change.

Covid has also affected flights to the Falklands, and the flight on 18th April, on which Collins & Dornan were due to travel, was cancelled at short notice due to shortage of air crew (due to Covid infections). Collins & Dornan will now travel on April 25th.

13. Safeguarding

Please tick this box if any safeguarding violations have occurred during this financial year.

If you have ticked the box, please ensure these are reported to ODA.safeguarding@defra.gov.uk as indicated in the T&Cs.

14. Project expenditure

Table 1: Project expenditure during the reporting period (1 April 2021 – 31 March 2022)

Project spend (indicative) in this financial year	2021/22 D+ Grant (£)	2021/22 Total actual D+ Costs (£)	Variance %	Comments (please explain significant variances)
Staff costs	██████	██████	██████	Slightly lower staff costs due to maternity leave
Consultancy costs	██████	██████	██████	
Overhead Costs	██████	██████	██████	In line with staff costs
Travel and subsistence	██████	██████	██████	
Operating Costs				
Capital items				
Others (Please specify)	██████	██████	██████	Slightly lower than anticipated costs
TOTAL				

15. OPTIONAL: Outstanding achievements of your project during the reporting period (300-400 words maximum). This section may be used for publicity purposes

I agree for the Darwin Secretariat to publish the content of this section (please leave this line in to indicate your agreement to use any material you provide here).

The main achievement in the first six months of the project was the fitting of a scientific echosounder system to the *Pharos SG*. The scientific echosounder is essential for the delivery of this project, but will also enable the Government of SGSSI to undertake acoustic surveys for krill, fish or other pelagic organisms long into the future.

Checklist for submission

	Check
Different reporting templates have different questions, and it is important you use the correct one. Have you checked you have used the correct template (checking fund, type of report (i.e. Annual or Final), and year) and deleted the blue guidance text before submission?	Y
Is the report less than 10MB? If so, please email to Darwin-Projects@ltsi.co.uk putting the project number in the Subject line.	Y
Is your report more than 10MB? If so, please discuss with Darwin-Projects@ltsi.co.uk about the best way to deliver the report, putting the project number in the Subject line.	N
Have you included means of verification? You should not submit every project document, but the main outputs and a selection of the others would strengthen the report.	Y
Do you have hard copies of material you need to submit with the report? If so, please make this clear in the covering email and ensure all material is marked with the project number. However, we would expect that most material will now be electronic.	N
Have you involved your partners in preparation of the report and named the main contributors	Y
Have you completed the Project Expenditure table fully?	Y
Do not include claim forms or other communications with this report.	