
DPR11S2\1008

Safeguarding Antarctic krill stocks for baleen whales

Antarctic krill are central to Antarctic marine ecosystems, but subject to a fishery managed with insufficient spatiotemporal resolution or species representation. There is an urgent need to elucidate the spatiotemporal characteristics of interactions among krill, baleen whales and the krill fishery and to develop our capacity to forecast these interactions. This project aims to provide this information by collecting and analysing fine-scale data on krill and whale distribution, to improve krill fishery management and conserve krill-based Antarctic marine ecosystems.

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Section 1 - Contact Details

PRIMARY APPLICANT DETAILS

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GMS ORGANISATION

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Section 2 - Title & Summary

Q3. Project Title:

Safeguarding Antarctic krill stocks for baleen whales

What was your Stage 1 reference number? e.g. DPR11S1\1123

DPR11S1\1027

Q4. Summary of project

Please provide a brief summary of your project: the problem it is trying to address, its aims, and the key activities you plan to undertake.

Successful Darwin Plus Main projects in Round 11 must demonstrate substantial measurable outcomes in at least one of the themes of Darwin Plus either by the end of the project's implementation or via evidenced mechanisms for post-project delivery.

Preference will be given to discrete projects implementing existing identified environmental solutions on the ground.

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 OTs to support the environment in the short- and long-term.

Please write this summary for a non-technical audience.

Antarctic krill are central to Antarctic marine ecosystems, but subject to a fishery managed with insufficient spatiotemporal resolution or species representation. There is an urgent need to elucidate the spatiotemporal characteristics of interactions among krill, baleen whales and the krill fishery and to develop our capacity to forecast these interactions. This project aims to provide this information by collecting and analysing fine-scale data on krill and whale distribution, to improve krill fishery management and conserve krill-based Antarctic marine ecosystems.

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)

* 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)?

Yes

Please list below.

As well as the British Antarctic Territory, our project will have relevance to the Government of South Georgia and the South Sandwich Islands (SGSSI) and to the Member states of the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) - currently include 25 States and the European Union.

Q6. Project dates

Start date:

01 April 2023

End date:

31 March 2026

Duration (e.g. 2 years, 3 months):

3 years

Q7. Budget summary

Year:	2023/24	2024/25	2025/26	Total request
Amount:	£211,653.00	£246,892.00	£171,486.00	£ 630,031.00

Q8. Proportion of Darwin Plus budget expected to be expended in UKOTs (%)

Q9a. Do you have matched funding arrangements?

Yes

What matched funding arrangements are proposed?

In-kind support is already agreed from the University of California Santa Cruz, including:

- i) Vessel berths x 16 and small boat time for fieldwork through their agreement with Antarctic tour operators: [REDACTED] in-kind value.
- ii) Use of CATS (Customised Animal Tracking Solutions) tags for fine-scale three-dimensional tracking of whales in foraging aggregations: total equipment value [REDACTED], indicative value of use not estimated.
- iii) Friedlaender staff cost @5% FTE: [REDACTED] in-kind value.

Trathan has retired from BAS and has a Visiting Professor appointment at Southampton, but provides advice as a freelance scientist, pro bono.

Use of equipment is already agreed from the British Antarctic Survey, including:

- i) Use of Simrad EK80 echosounder system (yacht) for prey mapping: total equipment value [REDACTED] indicative value of use not estimated.
- ii) Use of Simrad autonomous echosounder fitted to ImpYak: total equipment value [REDACTED], indicative value of use not estimated.

Q9b. Total confirmed & unconfirmed matched funding (£)

Q9c. If you have a significant amount of unconfirmed matched funding, please clarify how you fund the project if you don't manage to secure this?

There is no unconfirmed match funding for the project. Co-funding (in-kind support) through staff time on the project (University of California Santa Cruz), use of equipment for the project (University of California Santa Cruz, British Antarctic Survey) and vessel berths through Friedlaender's (University of California Santa Cruz) existing partnership with Antarctic tourism operators has been confirmed.

Section 4 - Problem statement

Q10. 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 these problems? How will your proposed project help? Please cite the evidence you are using to support your assessment of the problem (references can be listed in your additional attached PDF document).

Antarctic krill (*Euphausia superba*) are food for numerous natural consumers, including other zooplankton, squid, fish, birds and marine mammals. Interactions between krill and its consumers structure Antarctic marine ecosystems [1]. However, krill are also subject to a commercial fishery operating in the British Antarctic Territory (BAT) and elsewhere [2], which overlaps in time and space with foraging consumers. Competition between fisheries and consumers is thus a major concern [e.g., 3, 4], especially given i) long-term krill abundance and distributional changes, attributed to climate change, ii) predator population changes post historical overexploitation, and iii) likely expansion of the krill fishery.

The Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) manages the fishery with an ecosystem approach, according to which fishing should not interfere with krill population growth, or krill-dependent consumers [5]. Yet catches have become concentrated in a few coastal hotspots, raising concerns about how local depletion of krill impacts its natural consumers [e.g., 3, 6]. There is currently a mismatch between the scales at which krill fisheries are managed, and that at which they operate and at which consumers forage [3]. Moreover, baleen whales - now recovering from historical overexploitation - are not explicitly included in CCAMLR's management approach, even though they consume more than 50% of krill eaten by all air-breathing predators [7].

To conserve biodiversity and improve protection of natural environments, better understanding is urgently needed about the spatiotemporal characteristics of interactions among krill, baleen whales and the fishery, so we can develop our capacity to forecast such interactions. This is now increasingly important, given recent reported bycatch of baleen whales by the krill fishery.

This project aims to provide such information to CCAMLR to improve krill fishery management and better conserve krill-based ecosystems. This will be achieved by analysing the contemporaneous fine-scale spatiotemporal distribution of krill, baleen whales and fisheries in the BAT. This issue is now reaching a critical situation, as recent updated estimates of krill consumption by baleen whales [27] suggest that they have been grossly under-represented in the past. If krill consumption per capita is as high as recently suggested, and if populations of baleen whales continue to recover at the rates anticipated, risks to the ecosystem may be massively inaccurate. Research to address this is now urgent.

Our research team includes scientists that helped CCAMLR develop the current Risk Assessment Framework. This Framework relies upon existing data that reflect the best available scientific advice. However, to maintain the precautionary approach, new work is now needed to ensure baleen whales are included appropriately. Without this, ecosystem risks from fishing will almost certainly increase.

The Government of BAT recognises the environmental challenges facing the Antarctic and seeks to develop appropriate mitigation measures. CCAMLR also enshrines similar such objectives, as it seeks to ensure that no long-term damage to the marine ecosystem arises as a consequence of harvesting. As such, our project will ensure that project scientists provide advice to both BAT and CCAMLR so that krill fishery management can remain precautionary.

Section 5 - Environmental Conventions, Treaties and Agreements

Q11. 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 OT Government priorities and themes will it address and how? You should also consider local, territory specific agreements and action plans here. Letters of support from UKOT Government partners/stakeholders should also make clear reference to the agreements/action plans your project is contributing towards.

Note: No additional significance will be ascribed for projects that report contributions to more than one agreement.

The krill fishery primarily operates in the southwest Atlantic including within the BAT. Our project addresses various BAT management themes, importantly, those that relate to environmental challenges and development of mitigation measures. We also address Darwin Plus themes on Biodiversity, Climate change and Environmental quality.

Recently, CCAMLR endorsed a revised management framework, the krill Risk Assessment Framework, based on the best available science and the best available data. The Framework seeks to spatially and temporally adjust the level of harvesting and set catch limits in response to variation in the demands of competing natural krill predators. The Framework developed a series of smaller scale management units in order to reduce ecosystem risks from fishing. However, the fishery continues to aggregate in coastal areas used by dependent predators where data are not available for understanding krill-predator-fishery interactions.

This need for improved data is evidenced by the recent development by the fishing industry of seasonal no-take Voluntary Buffer Zones (VBZs) around important penguin colonies [8]. Thus, there is a growing recognition that precautionary,

sustainable management is required at small spatiotemporal scales.

Our project helps address these issues which are important to BAT, Darwin Plus, CCAMLR and the krill industry. As our research team includes scientists (Trathan) that helped CCAMLR develop the current Risk Assessment Framework, including the collation of relevant biomass estimates of krill (Fielding, Dornan), we are therefore well-placed to influence CCAMLR's management strategy. As such, we will provide the results of our work directly to CCAMLR through its Working Groups and the Scientific Committee. We have a long history, through Darwin Plus support, of influencing CCAMLR (DPLUS009, DPLUS054, DPLUS072), steering CCAMLR towards its current management strategy. Delivering research directly to CCAMLR has proved highly influential for the UK.

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

Q12. Methodology

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

- How have you reflected on and incorporated evidence and lessons learnt from past and present activities and projects in the design of this project?
- The need for this work and a justification of your proposed approach.
- How you will undertake the work (materials and methods).
- How you will manage the work (roles and responsibilities, project management tools, etc.).

There is a greater understanding of foraging of krill consumers in the BAT, including whales [e.g., 10, 11, 12], through use of biologging tags.

Acoustic surveys for krill in the BAT have been undertaken annually since 1996 [16, 17]. However, over-time and with the reduction in sea ice further south [18], key fishery locations have moved south and are no longer fully constrained by these surveys [22]. Moreover, surveys are largely in the austral summer, whereas most krill harvesting in the BAT is during the austral autumn.

There are fewer independent research vessel surveys of Antarctic krill, and methods are moving to using fishing vessels to survey or utilising autonomous vehicles to access shallow and logistically dangerous (e.g., ice edge) regions [19].

Operation and management of the krill fishery, including its broad-scale overlap with krill consumers and impacts on them is of increasing importance within the CCAMLR strategy for managing the Antarctic marine ecosystem and now forms the basis of its Risk Assessment Framework.

There is increased focus on cetaceans within CCAMLR, as they return in greater numbers to the Antarctic, and their density and habitat use needs to be considered.

The partners in this project have a strong track record working on krill, krill-dependent predators, fisheries management and autonomous technology.

We will combine information on i) krill distribution measured from echosounder surveys, ii) whale distribution and behaviour measured from biologging tags, and iii) krill fishing vessel distribution and behaviour estimated from available Global Fishing Watch data and CCAMLR data, which we will request from CCAMLR through Fielding. The project will use new and existing data.

Fieldwork to deploy biologging tags and conduct prey surveys will be conducted in the Western Antarctic Peninsula region, over two austral summers/autumns (early 2024 and early 2025). We will use two platforms: i) a small yacht chartered for deployment of high resolution biologging tags and prey surveys, and ii) small boat operations from tourist vessels for deployment of longer-term biologging tags. Using two small platforms provides flexibility to pursue targeted fieldwork that is currently not feasible with national Antarctic programme platforms.

Whale biologging

Foraging aggregations of whales will be targeted, particularly fin whales - a significant but poorly known consumer of krill. Whales will be tracked using two kinds of tags: i) CATS tags which provide high resolution, fine scale information on the three-dimensional behaviour of whales, and ii) LIMPET tags which provide longer-term (weeks to months) information on the location and behaviour of whales. These new data will be supplemented by existing data for humpback and minke whales (Friedlaender).

Prey surveys

Active acoustic techniques are a routine method for determining the density and distribution of Antarctic krill. A swarms detection algorithm is applied to acoustic data collected at 120 kHz and a validated target strength model used to convert acoustic data to biomass density. When foraging aggregations of whales are located, echosounder surveys will be conducted from a yacht-mounted echosounder, supplemented by an autonomous surface vehicle (ImpYak) also carrying an echosounder, to map the three-dimensional structure of the prey field targeted by whales. The ImpYak is a small, impeller-driven, kayak that can survey an exact, pre-programmed pattern, equipped with a 120 kHz Simrad echosounder (WBT mini).

The yacht and ImpYak will collect prey-field data using star and radiator style surveys, in areas where whale foraging is occurring. The small nature of these platforms allow near-shore areas to be surveyed safely which would not be possible from larger research vessels.

These data in themselves represent a significant contribution of the project, since nearshore krill surveys have rarely been conducted in parts of the Western Antarctic Peninsula region.

Fisheries data

Information on the location, effort and catch of the Antarctic krill fishing fleet will be obtained from CCAMLR and Global Fishing Watch. These will be used to locate the spatiotemporal characteristics of fishing activity in the BAT, and for spatiotemporal predictions/forecasts of overlap among krill, whales and fisheries.

Analyses

Analyses of echosounder, biologging and fisheries data, as well as predictive modelling, will be undertaken by two dedicated post-doctoral scientists. The fine scale surveys proposed here make the predator-prey dynamics uniquely relevant to the scales of operation of the fishery and the ecosystem.

A key output from the project will be a characterisation of the krill swarm structure preferred by baleen whales, and where feasible, that preferred by fishing vessels. We will seek to identify whether and how these overlap, indicative of direct competitive effects, and potentially also of baleen whale bycatch.

Q13. 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.

The British Antarctic Territory (BAT) government / Foreign, Commonwealth & Development Office (FCDO) reiterated that understanding the distribution and predator-prey interactions of key Antarctic species is of key interest to them, and discussions identified the importance of baleen whales to krill fishery management. The FCDO has expressed its support. Trathan will act as liaison with BAT throughout the project.

The Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) is responsible for the conservation of Antarctic marine ecosystems, which includes implementing measures reducing the risk harvesting may have on the sustainability of target species. The project will engage with CCAMLR through submission of Working Papers to CCAMLR Scientific Committee meetings and Working Group meetings, and attendance of meetings. Fielding is co-convenor of the Working Group on Acoustics, Survey and Analysis Methods (WG-ASAM); Dornan is also a member. Fielding represents the UK at CCAMLR Working Group on Ecosystem Management and Methods (WG-EMM).

Members of the Association for Responsible Krill harvesting companies (ARK) represent over 90% of krill catches in CCAMLR waters. ARK coordinates and cooperates with CCAMLR on the provision of research and information on krill, the fishery and its effect on the ecosystem, with the aim of contributing to CCAMLR's work on managing the fishery sustainably. Project outputs will be provided directly to ARK. Further, Reisinger, Fielding and Trathan provide independent expert advice to ARK, helping improve ARK's capacity to fulfil its commitment towards the improved sustainability of the krill

fishery.

Q14. Gender equality

All applicants must consider whether and how their project will contribute to reducing inequality between persons of different gender. Explain how your understanding of gender equality within the context your project, and how is it reflected in your plans. Please summarise how your project will contribute to reducing gender inequality. Applicants should, at a minimum, ensure proposals will not increase inequality and are encouraged to design interventions that proactively contribute to increased gender equality.

The University of Southampton, British Antarctic Survey and Scottish Association of Marine Science are committed to equality, diversity and inclusion with all three institutes awarded either bronze or silver Athena Swan awards.

The project team includes senior and junior female scientists (Fielding and Dornan). University of Southampton policies will ensure that equal opportunities are promoted during recruitment for the PDRA position.

We will promote gender equality in our project culture and operation through: promoting a positive working environment (especially fieldwork), enabling personal and professional development; and inspiring females to pursue STEM subjects through public engagement.

Q15. Change expected

Detail the expected changes this work will deliver. You should identify what will change and who will benefit a) in the short-term (i.e. during the life of the project) and b) in the long-term (after the project has ended) and the potential to scale the approach. 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.

CCAMLR has recognized that increasingly concentrated krill fishing necessitates a smaller-scale management approach than that currently used, better reflecting the scale of krill-predator interactions and the current behaviour of the fishing fleet (i.e., at the scale of tens of km) [20]. However, catches are still managed at large scale even though 'Small Scale Management Units' have been proposed. Further, baleen whales are not explicitly considered in CCAMLR's management approach at present, even though they consume more krill than any other air-breathing group of species. Moreover, the distribution and abundance of krill in nearshore environments is poorly known, despite these environments being favoured by baleen whales and increasingly by fishing vessels.

Short-term, we expect the project to create greater awareness in CCAMLR of the relevant spatiotemporal scales at which the krill fishery should be managed, and the importance of including baleen whales in management plans. Long-term, we expect CCAMLR to implement finer scale management of the krill fishery, and to consider temporal periods within each fishing season (possibly equivalent to the penguin Association for Responsible Krill Fisheries Voluntary Buffer Zones [VBZs]). Both changes should benefit krill consumers such as baleen whales, consequently benefiting krill-based Antarctic marine ecosystems and nations and industries (tourism and fishing) that depend on Antarctic ecosystem services. Directly, this will improve environmental protection and biodiversity conservation in the BAT. A sustainable, well-managed krill fishery will also benefit nations that engage in krill fishing in the BAT and elsewhere in the southwest Atlantic (e.g., SGSSI).

Successful implementation of the semiautonomous krill survey platform will provide an exciting technological advance applicable to nearshore environments in other regions (e.g. South Georgia fjords, or complex island coastlines such as British Indian Ocean Islands) .

Forage fisheries (e.g., anchovy and sardine) elsewhere in the world are struggling to develop sustainable management approaches that do not adversely impact natural consumers [21, 23]; CCAMLR needs to learn from these failed approaches. Management of forage-fish fisheries is challenging, requiring ecological data across a range of spatiotemporal scales. Our project will aid CCAMLR to design appropriate monitoring that can be incorporated into CCAMLR's

management. Ultimately, our project will help CCAMLR develop a management approach that could influence other similar forage-fish fisheries elsewhere in the world.

Our project is also timely as it will help feed into CCAMLR's forthcoming revision of its long-term CCAMLR Ecosystem Monitoring Program (CEMP). CEMP has never been directly incorporated into krill fishery management. However, with the development of the new fishery management risk assessment [3, 7, 14, 24], CCAMLR has now agreed to revise its ecological monitoring to better support the risk assessment. Our work will feed into this revision.

Q16. Pathway to change

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

We will provide peer-reviewed publications and Working Papers to CCAMLR with spatiotemporal information at ecologically-relevant scales for the CCAMLR krill Risk Assessment Framework (outcome). We will also provide novel information on krill abundance and distribution nearshore in the Western Antarctic Peninsula region.

Antarctic krill fishing occurs primarily in autumn, when ecological information is sparse. Mid-term, the project will deliver, via peer-reviewed publications and CCAMLR Working Papers, new information for this time of year (outputs), allowing CCAMLR to better evaluate the potential impact of krill fishing on predator populations in the BAT and elsewhere (outcome). Information about baleen whale consumption of krill in autumn/winter is a key information gap.

CCAMLR could use the predictive capacity we develop (output) for setting spatiotemporal catch limits for forthcoming seasons, better resolving the scales at which fisheries impact ecosystems (outcome).

The intended impact of the project is that the Antarctic krill fishery is managed such that it is sustainable, safeguarding Antarctic krill-based ecosystems against overexploitation.

Management of forage-fish fisheries is challenging, requiring ecological data across a range of spatiotemporal scales. Our project will aid CCAMLR to design appropriate monitoring that can be incorporated into CCAMLR's management (outcome).

Q17. Exit Strategy





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?

Our project's outputs will allow CCAMLR to evaluate the impact of krill fisheries on baleen whales, and to inform CCAMLR's management of the krill fishery, with the information specifically being used in CCAMLR's ecosystem-based management framework. In this sense the project focuses on near-complete knowledge transfer to the project stakeholders, which will be achieved through publication of peer-reviewed papers, submission of Working Papers to CCAMLR, attendance of meetings and a virtual workshop for stakeholders. The project's open science ethos and practice further ensures that information and knowledge remain available beyond its lifetime.

Beyond the project lifetime, the predictive capacity we will develop as a project output could be used by CCAMLR for setting spatiotemporal catch limits for forthcoming seasons, which better resolve the scales at which fisheries impact ecosystems. The prediction application developed will be designed to allow the input of any new krill or whale data, collected by other projects, with minimal effort. This effort should be at a level where updating the data for forecasts can easily be part of the responsibilities of the members of CCAMLR or ARK. We note, however, that the prediction application will not strictly require these new data, with forecasts semi-automatically being updated when any data in the pipeline are updated (for example, the updating of regional ocean model predictions used in the model).

Ultimately, the intended impact of the project is that the Antarctic krill fishery is managed by CCAMLR such that it is sustainable, safeguarding Antarctic krill-based ecosystems against overexploitation. That is, if the project outputs are adopted by CCAMLR they are mainstreamed into CCAMLR's 'business-as-usual' operation, and do not require additional, specific funding and support. This strategy also ensures that projects benefits extend beyond BAT, to all CCAMLR member states.

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

-  [References](#)
-  17/10/2022
-  13:28:45
-  pdf 71.91 KB

Section 7 - Risk Management

Q18. 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.

Projects should also draft their initial risk register using the [Risk Register Template](#) provided, and be prepared to submit this when requested if they are recommended for funding. Do not attach this to your application.

Risk Description	Impact	Prob.	Inherent Risk	Mitigation	Residual Risk
Fiduciary (Financial) Weakening British Pound causes whale tags purchased from US company to be more expensive.	Minor	Possible	Moderate.	Threat - reduce. 1) Small buffer included in tag costing. 2) Purchase fewer tags if exchange rate declines significantly.	Minor
Safeguarding Harassment of project team members during fieldwork.	Moderate	Unlikely	Moderate	Threat - reduce. 1) Fieldwork conducted with minimal personnel external to project staff. 2) All partners' safeguarding policies and codes of conduct are made available to all team members, and external personnel. 3) Briefings on conduct and policies for all field personnel. 3) Clear signposting to procedures for reporting issues.	Minor
Delivery Chain Administrative delays cause a delay in the start date of of the postdoctoral researcher.	Major	Unlikely	Major	Threat - reduce. 1) Postdoctoral researcher to start in project year 2, but hiring process will be initiated as soon as project commences.	Moderate

Risk 4 Operational. Poor weather in the field reduces opportunities to deploy whale tags and conduct krill surveys such that enough fieldwork cannot be done.	Moderate	Possible	Major	Threat - reduce. 1) Longer fieldwork period planned, accounting for a percentage of bad weather days. 2) Two fieldwork years planned. 3) Increased field time available through partnership with Antarctic tour operators. 4) ImpYak system quicker and easier to deploy, meaning smaller good weather windows can be used.	Minor
Risk 5 Operational. Failure of ImpYak system prevents conducting/completing krill surveys.	Moderate	Possible	Major	Threat - reduce. 1) Project includes budget for training on and shakedown of ImpYak system in Scotland before deployment to field site. 2) Second, yacht-mounted echosounder is available to conduct surveys. 3) Two years of fieldwork planned, for redundancy.	Minor
Risk 6 Safeguarding Physical injury to project team members while conducting fieldwork.	Moderate	Unlikely	Moderate	1) Team members, through UoS and partners, undertake detailed fieldwork risk assessments prior to fieldwork. 2) Team members have appropriate health and safety and fieldwork training.	Minor





Section 8 - Implementation Timetable

Q19. Provide a project implementation timetable that shows the key milestones in project activities

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

[Implementation Timetable Template](#)

Please add/remove columns to reflect the length of your project. For each activity (add/remove rows as appropriate) indicate the number of months it will last, and fill/shade only the quarters in which an activity will be carried out.

 [BCF Implementation Timetable Template 2022-23 FI NAL V2](#)
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Section 9 - Monitoring and Evaluation (M&E)

Q20. 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. For more information, see [Finance Guidance](#).

Trathan and Fielding will be responsible for liaison with BAT and CCAMLR. Trathan, Fielding and Reisinger will be responsible for liaison with ARK. Information and reports relevant to CCAMLR, SCAR and ARK will also be through Trathan, Fielding and Reisinger, who regularly attends such meetings.

The project steering committee will meet as soon as is feasible before the project commences. They will develop a detailed implementation plan with specific and detailed project objectives, timelines and project outputs, building upon the project implementation plan and other details provided in this proposal. During this first meeting the steering committee will define clear milestones and delivery dates for implementation. The steering committee will convene every second month to monitor project delivery. During these formal meetings we will review outputs, outstanding goals and any obstacles or challenges to delivery. We will also review the detailed spend and remaining budget.

CCAMLR Scientific Committee reports, CCAMLR Working Group reports, ARK reports, and the peer-reviewed literature will provide an unbiased independent evaluation of the project's progress, and the project team will monitor these information sources, reporting thereon at the project committee meetings detailed above.

Costs associated with Monitoring and Evaluation are through setting aside for Monitoring and Evaluation a percentage of the staff time already budgeted for the project:

Reisinger: [REDACTED] FTE = ~30 days total. [REDACTED]
Fielding: [REDACTED] FTE = ~15 days total. [REDACTED]
Trathan: [REDACTED] FTE = ~30 days total. [REDACTED]
Dornan: [REDACTED] FTE = ~76 days total. [REDACTED]
PDRA 2: [REDACTED] FTE = ~76 days total. [REDACTED]

The total budget amount below is for the percentage of time for Monitoring and Evaluation of each project member's cost to the project (as above) and the number of days is summed for all project members contributing to Monitoring and Evaluation, per the above.

Total project budget for M&E in GBP (this may include Staff, Travel and Subsistence costs) [REDACTED]

Percentage of total project budget set aside for M&E (%) [REDACTED]

Number of days planned for M&E 229

Section 10 - Logical Framework





Q21. 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 expect to measure progress against these and how we can verify this.

Stage 2 Logframe Template

The **logframe template** (N.B. there is a different template for Stage 1 and Stage 2) needs to be downloaded from Flexi-Grant, completed and uploaded as a PDF within your Flexi-Grant application – **please do not edit the logframe template structure (other than adding additional Outputs if needed) as this may make your application ineligible**. On the application form, you will be asked to copy the Impact, Outcome and Output statements and activities - these should be the same as in your uploaded logframe.

Please upload your logframe as a PDF document.

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-  [BCF St2 and Single Stage Logical Framework Template 2022-23 FINAL.docx](#)
 -  17/10/2022
 -  14:17:00
 -  pdf 66.48 KB

Impact:

The krill fishery is managed sustainably by CCAMLR in the BAT to safeguard Antarctic krill-based ecosystems, especially including baleen whales, and especially in autumn when relevant ecological data are sparse.

Outcome:

Provision to CCAMLR of Working Papers, data and information to help ensure krill fishery management occurs at ecologically relevant spatial and temporal scales.

Project Outputs

Output 1:

Whales. Spatiotemporally explicit predictions of whale foraging presence.

Output 2:

Krill. Spatiotemporally explicit nearshore krill abundance information.

Output 3:

3D predator-consumer interactions. Publication of 3D models of whale-krill interactions.

Output 4:

Integrated krill-consumer-fisheries interactions. Temporally explicit maps of potential interactions among krill, whales and fisheries.

Output 5:

Forecasting. Test our ability to make seasonal forecasts of krill-consumer-fisheries interactions using correlative spatial models in conjunction with oceanographic model forecasts.

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 Deployment of tracking tags on whales in the Western Antarctic Peninsula region.

- 1.2 Analyse whale tracking data and develop models which produce spatiotemporally explicit predictions of whale foraging presence within the BAT.
- 1.3 Prepare data layers of these predictions for presentation to CCAMLR as Working Papers.
- 2.1 Final trials of ImpYak survey system and training field personnel on system.
- 2.2 Conduct acoustic surveys of krill abundance nearshore at the Western Antarctic Peninsula during two fieldwork periods in the project.
- 2.3 Produce spatially-explicit krill abundance estimates from these survey data and submit estimates to the CCAMLR Acoustic Survey and Assessment Methods Working Group.
- 3.1 Analyse whale tracking data and krill abundance data to characterise spatiotemporal interactions between krill and predators on foraging grounds in the BAT.
- 3.2 Write up the results from these analyses and submit 1) for peer-reviewed publication and 2) as a Working Paper for CCAMLR.
- 4.1 Collate krill fishery data, obtained from CCAMLR, for the Western Antarctic Peninsula region.
- 4.2 Analyse whale tracking data, krill abundance data, and krill fishery data together to characterise function overlap among krill, their predators and the fishery.
- 4.3 Produce data layers for spatiotemporally explicit maps of potential interactions among krill, whales and fisheries.
- 4.4 Write up the results from these analyses and submit 1) for peer-reviewed publication and 2) as a Working Paper for CCAMLR.
- 5.1 Develop habitat models for different baleen whale species to determine where interactions with fishing vessels will be most predictable and most intense.
- 5.2 Create a Shiny prediction application that produces seasonal forecasts of interactions for CCAMLR Statistical Subarea 48.1 in the BAT.

Section 11 - Budget and Funding

Q22. Budget

Please complete the template below which provides the Budget for this application. Some of the questions earlier and below refer to the information in this spreadsheet.





[Budget form for projects over £100k](#)

Please ensure you include any co-financing figures in the Budget spreadsheet to clarify the full budget required to deliver this project.

NB: Please state all costs by financial year (1 April to 31 March) and in GBP. Darwin Plus cannot agree any increase in grants once awarded.

Please upload the Lead Partner's financial accounts at the certification page at the end of the application form.

Please upload your completed Darwin Plus Budget Form Excel spreadsheet using the field below.

 [BCF Budget over 100k MASTER Apr22 - REISINGER - v_02](#)
 17/10/2022
 14:20:35
 xlsx 95.08 KB

Q23. Funding

Q23a. Is this a new initiative or a development of existing work?

Development of existing work

Please provide details:

Generally, the project builds upon the project team's previous work on whale distribution and behaviour, krill density and distribution, and potential impacts on predators of the krill fishery, in the Western Antarctic Peninsula region and elsewhere. Most recently (2020-2021), Reisinger, Trathan and Friedlaender were awarded a small (██████) Antarctic Wildlife Research Fund grant to analyse, using existing data, the spatiotemporal characteristics of humpback whale foraging behaviour in the Western Antarctic Peninsula as well as the fishing behaviour of krill fishing vessels in the same region.

However, the Darwin Plus project will represent a new initiative in that new whale biologging data will be collected, the project will for the first time deliver spatiotemporal information on krill-whale-fishery overlap at ecologically-relevant scales for the CCAMLR krill Risk Assessment Framework, and the project will provide novel information on krill abundance and distribution nearshore in the Western Antarctic Peninsula region. This is the first time the project partners and team have been assembled in this way.

Q23b. Are you aware of any other individuals/organisations/projects carrying out or applying for funding for similar work?

No

Q24. Balance of budget spend

Defra are keen to see as much Darwin Plus funding as possible directly benefiting OT 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.

There is no internationally recognised British government representation locally in the BAT. The BAT has no indigenous population and presence in the Territory is provided only by: i) the British Antarctic Survey that operates 3 scientific stations and ii) United Kingdom Antarctic Heritage Trust that manages a number of historical bases. As such, no funds are spent locally in the BAT. British Antarctic Survey is the primary UK operator in the Antarctic and is a project partner - approximately ██████ of the project budget is allocated directly to the British Antarctic Survey. A large component of the project budget (approximately ██████ is allocated for yacht hire to conduct most of the required fieldwork in the BAT, since BAS now has limited capacity to deploy scientific cruises to the Antarctic.

Our project will help BAT improve environmental stewardship through protection and biodiversity conservation in the Antarctic Peninsula region, and by analogy elsewhere. This will help BAT demonstrate regional leadership, maintaining a strong international influence for the UK, especially within CCAMLR and the Antarctic Treaty System.

Q25. 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.

We will purchase 10 LIMPET SPLASH whale tags, totalling approximately ██████████ (approximately ██████ of funding award) and a fieldwork computer plus data storage, totalling approximately ██████████ (approximately ██████ of the award). The LIMPET SPLASH whale tags are not able to be recovered: they become detached from the whale weeks to months after tagging, typically in a remote area (and pinpoint localisation of the tags is not possible) and they do not float. The tags are thus listed as consumables. The fieldwork computer and data storage will be retained by the University of Southampton /

British Antarctic Survey. The data storage will be used as one form of data archiving or re-used for future projects. The fieldwork computer will be used for future projects if it remains operable after two field seasons in harsh conditions.

Q26. 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.

Employing two early career researchers (Dornan and PDRA2) represents a favourable cost:value ratio for the project: both team members will be experienced, highly-skilled analysts (see Dornan CV and PDRA specification).

Trathan and Friedlaender provide their expertise to the project pro bono.

Whale tagging leverages Friedlaender's long-running cetacean research programme in the study region, avoiding substantial start-up and operational costs through: 1) provision of fieldwork opportunities, through Friedlaender's agreement with Antarctic tour operators (■■■■ value); 2) use of equipment for whale tagging, including tags (■■■■ value); and Friedlaender's time provided pro bono (■■■■ value).

We will use existing whale tagging data (for minke and humpback whales) and free fishing data (from CCAMLR and Global Fishing watch), reducing costs and logistical effort associated with data collection.

Development and use of the ImpYak system is an exciting value-for-money proposition. The system uses a cheap, widely-available platform, lowering costs. Its relatively small size means it is cheaper to transport, reducing substantial transport costs. Its small size/low weight also means smaller vessels and fewer personnel are required for deployment, lowering costs. BAS will provide two echosounders (total value ■■■■).

A considerable proportion of the budget is for yacht hire; this is required, because a small, mobile platform with flexible schedule maximises our ability to conduct inshore krill surveys and tag whales (including flexibility to work around weather conditions), making this a more efficient use of funds. Larger national research vessels are unable to operate effectively in the near-shore environments this project is focussed in.

Section 12 - Safeguarding and Ethics

Q27. Outputs of the project and Open Access

All outputs from Darwin Plus projects should be made available on-line and free to users whenever possible. Please outline how you will achieve this and detail any specific costs you are seeking from Darwin Plus to fund this.

We are seeking no specific funds from Darwin Plus for this.

Antarctic krill fishing effort and catch data are held by the CCAMLR Secretariat. While these data are available upon request to CCAMLR, the terms of use do not allow publication of these data themselves, and further requests for access to the data should be made to CCAMLR.

Other data, derived data products (including data layers), software (computer code) and publications will be made publicly available through software repositories such as Github (<https://github.com/>), data repositories such as Zenodo (<https://zenodo.org/>) and Open Access peer-reviewed publications as far as possible. Where a cost is associated with Open Access publication, funding will first be sought from the University of Southampton and then the other project partners. If costs are not covered by any of the partners, and a suitable alternative Open Access publisher is not identified, we will publish publicly accessible pre-prints of the research to a preprint server such as bioRxiv (<https://www.biorxiv.org/>), or openly archive post-prints of the accepted research papers through repositories such as the University of Southampton's institutional research repository (<https://eprints.soton.ac.uk/>).

The project supports Open Access principles. For example, investigators Reisinger, Trathan and Friedlaender have been involved in a community effort to publish Antarctic biologging data (<https://www.nature.com/articles/s41597-020-0406-x>),

and Reisinger is a member of the Scientific Committee on Antarctic Research Expert Group on Biodiversity Informatics.

Q28. Safeguarding

Projects funded through Darwin Plus must fully protect vulnerable people all of the time, wherever they work. In order to provide assurance of this, projects are required to have appropriate safeguarding policies in place.

Please confirm the Lead Partner has the following policies in place and that these can be available on request:

Please upload the lead partner's Safeguarding Policy as a PDF on the certification page.

We have a safeguarding policy, which includes a statement of our commitment to safeguarding and a zero tolerance statement on bullying, harassment and sexual exploitation and abuse	Checked
We have attached a copy of our safeguarding policy to this application (file upload on certification page)	Checked
We keep a detailed register of safeguarding issues raised and how they were dealt with	Checked
We have clear investigation and disciplinary procedures to use when allegations and complaints are made, and have clear processes in place for when a disclosure is made	Checked
We share our safeguarding policy with all partners	Checked
We have a whistle-blowing policy which protects whistle blowers from reprisals and includes clear processes for dealing with concerns raised	Checked
We have a Code of Conduct for staff and volunteers that sets out clear expectations of behaviours - inside and outside the work place - and make clear what will happen in the event of non-compliance or breach of these standards	Checked

Please outline how you will implement your safeguarding policies in practice and ensure that all partners apply the same standards as the Lead Partner.

Copies of the University of Southampton's 'Dignity at work and study policy' and 'Whistleblowing Policy' (both attached) will be provided to all project partners and project team members. All partners and team members will be clearly and regularly (e.g., through the regular team meetings) pointed towards the University's policies and procedures (e.g., <https://www.southampton.ac.uk/hr/services/whistleblowing/index.page>, <https://www.southampton.ac.uk/hr/services/bullying/index.page>, <https://www.southampton.ac.uk/hr/services/harassment/index.page>). In addition to the project's Risk Register, we shall report safeguarding issues to the University if and where these are reported directly to team members. The safeguarding policies of each partner (British Antarctic Survey, University of California Santa Cruz, Scottish Association for Marine Sciences) will additionally be made available to all members through a project document repository and regular signposting. The policies of each team member's respective employer will apply in the case that a safeguarding issue is lodged - safeguarding issues involving team members will be fed from the project's Risk Register to the respective employee by the University of Southampton.

Q29. Ethics

Outline your approach to meeting the key ethical principles, as outlined in the guidance. Additionally, are there any human rights and/or international humanitarian law risks in relation to your project? If there are, have you carried out an assessment of the impact of those risks, and of measures that may be taken in order to mitigate them? Any risk assessment and mitigation of human rights and/or international humanitarian law risks should be included in the Question 18 on Risk Management.

There are no human rights and/or international humanitarian law risks.

Whale tagging will be conducted under National Science Foundation Office of Polar Programmes Antarctic Conservation Act Permit ACA 2020-016, National Marine Fisheries Service Permit. No. 23095, and University of California Santa Cruz Institutional Animal Care and Use Committee approval reference 'Friea2004', all to Friedlaender (Reisinger listed as project participant). Additional institutional ethics review will be conducted by the University of Southampton Animal Welfare and Ethics Review Body in accordance with their Policy for Involving Animals in Research and Education.

The University of Southampton is committed to undertaking its research within a comprehensive ethical framework underpinned by robust research governance and policies. It is the University's expectation that staff, students and visitors should be aware of ethical considerations, ensure that they act in an ethical manner when engaged on University business and conduct their projects and studies to the highest ethical standards and the highest standards of research integrity, quality and scientific rigour. The University recognises its responsibilities to researchers and the wider community, and is strongly committed to fostering a culture and understanding of effective research governance, integrity and probity across the full spectrum of its research activities. The University is committed to and supports the Universities UK Concordat to Support Research Integrity which sets out expectations on the University as an employer of researchers, as well as on individual researchers. The University has produced a number of policies and procedures, and published a Research Integrity Statement.

Section 13 - Project Staff

Q30. 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.

Please provide 1-page CVs or job description, further information on who is considered core staff can be found in the [Finance Guidance](#).

Name (First name, Surname)	Role	% time on project	1 page CV or job description attached?
Ryan Reisinger	Project Leader	10	Checked
Philip Trathan	Co-investigator	10	Checked
Sophie Fielding	Co-investigator	7	Checked
Philip Anderson	Co-investigator	4	Checked

Do you require more fields?


Yes


Name (First name, Surname)	Role	% time on project	1 page CV or job description attached?
Ari Friedlaender	Co-investigator	5	Checked
Tracey Dornan	Postdoctoral Research Associate	66	Checked


Postdoctoral Research Associate	Postdoctoral Research Associate	66	Checked
No Response	No Response	0	Unchecked
No Response	No Response	0	Unchecked
No Response	No Response	0	Unchecked
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.

Ensure the file is named clearly, consistent with the named individual and role above.

 [Combined CVs](#)

 15/10/2022

 18:55:12

 pdf 618.13 KB

Have you attached all project staff CVs?

Yes

Section 14 - Project Partners

Q31. Project partners

Please list all the Project Partners (including the Lead Partner – i.e. the partner who will administer the grant and coordinate the delivery of the project), clearly setting out their roles and responsibilities in the project including the extent of their engagement so far and planned.

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

The partners listed here should correspond to the Delivery Chain Risk Map (within the Risk Register template) which you will be asked to submit if your project is recommended for funding.

Lead partner name: University of Southampton

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 There is no formal British government representation locally in the BAT. The BAT has no indigenous population; presence there is provided only by British Antarctic Survey that operates 3 scientific stations and United Kingdom Antarctic Heritage Trust that manages an historical base. British Antarctic Survey is a project partner.

Website address: www.southampton.ac.uk/oes

Details (including roles and responsibilities and capacity to engage with the project):

Reisinger is a lecturer at the University of Southampton. Trathan holds a Visiting Professor appointment there. The postdoctoral researcher will hold a fixed-term research appointment there.

Reisinger (principal investigator) will be responsible for project leadership and oversight of all aspects. This includes budget control through the Southampton financial control system.

Trathan will contribute expertise on marine predator research and conservation, and krill fishery management knowledge. He will be responsible for liaison with BAT and permitting and for links to fisheries vessels.

The postdoctoral researcher will be responsible for data analysis and communication (preparation of data products and peer-reviewed and information papers). They will also assist with fieldwork preparation and conduct fieldwork in year 2.

Southampton will provide facilities and support for activities related to day-to-day project management (including budgetary control, ethical and human resource oversight), fieldwork preparation, analyses, reporting and communication.

Southampton is a global top 100 university. The School of Ocean and Earth Science, collocated with the National Oceanography Centre Southampton, represents one of the world's largest groups of ocean and earth scientists and engineers. In the REF 2022, 98% of Southampton's research and all our impact case studies were judged as world leading or of international excellence.

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

Have you provided a cover letter to address your Stage 1 feedback?

Yes

Do you have partners involved in the Project?

Yes

1. Partner Name:

British Antarctic Survey

Website address:

www.bas.ac.uk

Details (including roles and responsibilities and capacity to engage with the project):

Fielding (zooplankton ecologist/acoustician) and Dornan (fisheries acoustician) are research scientists at the British Antarctic Survey (BAS).

Fielding will contribute expertise on Antarctic krill, utilising autonomous vehicles for krill surveys, acoustic techniques, and predator-prey interactions. She will be responsible for aspects of fieldwork management, including primary oversight of prey mapping. She will also be responsible for liaison with CCAMLR.

Dornan will be responsible for collection, analysis and communication of prey data. She will assist with fieldwork planning and will conduct fieldwork in year 1 and 2.

BAS, an institute of the Natural Environment Research Council (UKRI-NERC), delivers and enables world-leading interdisciplinary research in the Polar Regions. Its skilled science and support staff work together to deliver research that uses the Polar Regions to advance our understanding of Earth and our impact on it.

Through its extensive logistic capability and know-how, BAS facilitates access for the British and international science community to the UK polar research operation. Numerous national and international collaborations, combined with an excellent infrastructure, help sustain a world-leading position for the UK in Antarctic affairs.

BAS has developed international leadership within CCAMLR, leading development and implementation of new methods to manage the commercial fishery for Antarctic krill.

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:

Scottish Association for Marine Science

Website address:

www.sams.ac.uk

Details (including roles and responsibilities and capacity to engage with the project):

Anderson is Head of Robotics at the Scottish Association for Marine Science (SAMS), UK.

He will be responsible for development and use of the ImpYak semiautonomous prey mapping platform.

SAMS is Scotland's largest and oldest (since 1884) independent marine science organisation, delivering marine science for a productive and sustainably managed marine environment through innovative research, education and engagement with society. SAMS has approximately 150 staff.

Through Anderson, SAMS will provide support related to the further development and deployment of the ImpYak semiautonomous prey mapping platform.

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: University of California Santa Cruz

Website address: <https://oceansci.ucsc.edu/>

Details (including roles and responsibilities and capacity to engage with the project): Friedlaender is a Professor in the Department of Ocean Sciences at the University of California Santa Cruz (UCSC), USA.

Friedlaender will contribute expertise on baleen whale research and conservation. He will be responsible for aspects of fieldwork, including primary oversight of permitting and whale tagging. Friedlaneder will also be the primary link with Antarctic tour companies that are providing berths for fieldwork.

UCSC is a public university with approximately 18,98 enrolled students (2021-2022). In 2019 UCSC joined the Association of American Universities, an achievement that underscores the impact and quality of the campus's research and graduate and undergraduate education. In 2022, Princeton Review named UCSC the No. 2 public university in the USA for "making an impact."

UCSC supports this project through their support for Friedlaender's 'Biotelemetry and Behavioral Ecology Lab', responsible for the whale tagging component of the project, and through Friedlaender's time (5% FTE) on the project.

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

4. Partner Name: *No Response*

Website address: *No Response*

Details (including roles and responsibilities and capacity to engage with the project): *No Response*

Allocated budget (proportion or value): £0.00

Representation on the Project Board (or other management structure) Yes No

Have you included a Letter of Support from this organisation? Yes No

5. Partner Name: *No Response*

Website address: *No Response*

Details (including roles and responsibilities and capacity to engage with the project): *No Response*

Allocated budget (proportion or value): £0.00

Representation on the Project Board (or other management structure) Yes No

Have you included a Letter of Support from this organisation? Yes No

6. Partner Name: *No Response*

Website address: *No Response*

Details (including roles and responsibilities and capacity to engage with the project): *No Response*

Allocated budget (proportion or value): £0.00

Representation on the Project Board (or other management structure) Yes No

Have you included a Letter of Support from this organisation? Yes No


If you require more space to enter details regarding Partners involved in the project, please use the text field below.

No Response

Please provide a cover letter responding to feedback received at Stage 1 if applicable and a combined PDF of all letters of support.


 [Cover Letter](#)


 17/10/2022

 12:12:29

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 [Combined LoS](#)

 16/10/2022

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Section 15 - Lead Partner Capability and Capacity

Q32. Lead Partner Capability and Capacity

Has your organisation been awarded Darwin Plus, Darwin Initiative or Illegal Wildlife Trade Challenge Fund funding before (for the purposes of this question, being a partner does not count)?

No

If no, please provide the below information on the lead partner.

What year was your organisation established/ incorporated/ registered? 01 January 1952

What is the legal status of your organisation? University

How is your organisation currently funded? The University of Southampton receives income from: tuition fees and education contracts; research grants and contracts; investment; and, donations and endowment. 2021-2021 total income was £ [REDACTED]

Describe briefly the aims, activities and achievements of your organisation. Large organisations please note that this should describe your unit or department.

Aims The University of Southampton's School of Ocean and Earth Science (SOES) aims to deliver ground-breaking knowledge on fundamental scientific problems in the Ocean and Earth System, and to apply this new knowledge to address emerging environmental and societal challenges and inform action to mitigate the effects of climate change.

Activities SOES undertakes research across the breadth of Ocean and Earth Science. Research is supported by grant income of >£[redacted]/year and a graduate school of >150 PhD students. We collaborate with an extensive network of national and international partners, including >20 placement organisations for our PhD students, across six continents.

Achievements Recognition of our world-leading expertise is evidenced by us maintaining our top 5 placing for GPA within the recent UK REF2021 exercise with 60% of our overall research judged as world leading with 98% regarded as world-leading or internationally excellent. SOES also has the only Regius Professorship in Ocean Sciences.

Provide detail of 3 contracts/projects held by the Lead Partner that demonstrate your credibility as an organisation and provide track record relevant to the project proposed.

These contracts/awards should have been held in the last 5 years and be of a similar size to the grant requested in your application.

Contract/Project 1 Title Bottom Boundary Layer Turbulence and Abyssal Recipes (BLT Recipes) (Ref. NE/S001433/1)

Contract Value/Project budget (include currency) £[redacted]

Duration (e.g. 2 years 3 months) 5 years

Role of organisation in project Lead research organisation

Brief summary of the aims, objectives and outcomes of the project The aim of our proposal is to understand how centimetre-scale turbulence near the seabed shapes the rate at, and way in which, deep water masses upwell throughout the world ocean.

Client/independent reference contact details (Name, e-mail) UKRI NERC
Ref: NE/S001433/1
[redacted]

Contract/Project 2 Title Nitrogen powering life in an active serpentinising system - an analogue to early life on Earth (Ref. NE/V012169/1)

Contract Value/Project budget (include currency) £[redacted]

Duration (e.g. 2 years, 3 months)	3 years
Role of organisation in project	Lead research organisation
Brief summary of the aims, objectives and outcomes of the project	This project examines how subsurface biosphere acquires N, and how subsurface N-cycling operates and interacts with the subsurface biosphere in a serpentinising system. We will use the rare heavy form of N -15N- to track N-transformations by microbes, and 15N-content in rocks and fluids as tracers, combined with state-of-the-art bioimaging and gene expression, to assess how microbes obtain their cellular N, and to what extent N-transformations are 'actively' powering subsurface life. We will use the Oman ophiolite, the world's largest, best exposed block of oceanic crust and upper mantle as a model active serpentinising system.
Client/independent reference contact details (Name, e-mail)	UKRI NERC Ref. NE/V012169/1 [REDACTED] [REDACTED]

Contract/Project 3 Title	Implications of intraspecific trait variability across different environmental conditions for projections of marine ecosystem futures (Ref. NE/T001577/1)
Contract Value/Project budget (include currency)	£ [REDACTED]
Duration (e.g. 2 years, 3 months)	2 years
Role of organisation in project	Lead research organisation
Brief summary of the aims, objectives and outcomes of the project	We test how species respond to and affect ecosystem properties under present and future conditions. We will see how types of disturbance affect species behaviour and ecosystem properties. We will determine the physiological performance of each species by measuring molecular mechanisms underpinning adaptation. This reveals whether species can adapt to new conditions and whether such adaptive adjustments impinge on other important species roles. We will use this information to co-design and implement, with Cefas, a new model that adequately characterises species contributions under changing conditions, allowing the UK to deliver accurate forecasts of ecosystem integrity in support of policy.
Client/independent reference contact details (Name, e-mail)	UKRI NERC Ref. NE/T001577/1 [REDACTED] [REDACTED]

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

If yes, please upload these on the certification page. Note that this is not required from Government Agencies.

Yes

Section 16 - Certification

Certification

On behalf of the

Company

of

University of Southampton

I apply for a grant of



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 have enclosed CVs for project key project personnel, a cover letter, letters of support, a budget, logframe, Safeguarding Policy and project implementation timetable.
- Our last two sets of signed audited/independently verified accounts and annual report are also enclosed.

Checked





Name Ryan Reisinger

Position in the organisation Lecturer

Signature (please upload e-signature)  [RyanSignature - Blackened](#)
 15/10/2022
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Date 17 October 2022

Please attach the requested signed audited/independently examined accounts.

 [Financial Statements - UoS - Combined](#)
 15/10/2022
 19:03:07
 pdf 1.41 MB

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

Section 17 - Submission Checklist

Checklist for submission

	Check
I have read the Guidance, including the “Darwin Plus Guidance”, “Monitoring Evaluation and Learning Guidance”, “Risk Guidance” and “Financial 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 my completed logframe and timeline as a PDF using the templates provided.	Checked
I have included a 1 page CV or job description for all the Project Staff identified at Question 30, including the Project Leader, or provided an explanation of why not.	Checked
I have included a letter of support from the lead partner and main partner organisation(s), including relevant OT Governments, identified at Question 31, or an explanation of why not.	Checked
I have included a cover letter from the Lead Partner, outlining how any feedback received at Stage 1 has been addressed where relevant.	Checked
I have included a copy of the Lead Partner’s safeguarding policy, which covers the criteria listed in Question 28.	Checked
I have included a signed copy of the last 2 annual report and accounts for the Lead Partner, or provided an explanation if not.	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: Safeguarding Antarctic Krill Stocks For Baleen Whales

	Activity	No. of months	Year 1 (23/24)				Year 2 (24/25)				Year 3 (25/26)			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Output 1														
1.1	Deployment of tracking tags on whales in the Western Antarctic Peninsula region.	4				■	■			■	■			
1.2	Analyse whale tracking data and develop models which produce spatiotemporally explicit predictions of whale foraging presence within the BAT.	21	■	■	■	■	■	■	■					
1.3	Prepare data layers of these predictions for presentation to CCAMLR as Working Papers.	6						■	■					
Output 2														
2.1	Final trials of ImpYak survey system and training field personnel on system.	6	■	■										
2.2	Conduct acoustic surveys of krill abundance nearshore at the Western Antarctic Peninsula during two fieldwork periods in the project.	6				■				■				
2.3	Produce spatially-explicit krill abundance estimates from these survey data and submit estimates to the CCAMLR Acoustic Survey and Assessment Methods Working Group.	12					■	■			■	■		
Output 3														
3.1	Analyse whale tracking data and krill abundance data to characterise	18						■	■	■		■	■	■

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	Activity	No. of months	Year 1 (23/24)				Year 2 (24/25)				Year 3 (25/26)			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
	spatiotemporal interactions between krill and predators on foraging grounds in the BAT.													
3.2	Write up the results from these analyses and submit 1) for peer-reviewed publication and 2) as a Working Paper for CCAMLR.	6												
Output 4														
4.1	Collate krill fishery data, obtained from CCAMLR, for the Western Antarctic Peninsula region.	15												
4.2	Analyse whale tracking data, krill abundance data, and krill fishery data together to characterise function overlap among krill, their predators and the fishery.	9												
4.3	Produce data layers for spatiotemporally explicit maps of potential interactions among krill, whales and fisheries.	6												
4.4	Write up the results from these analyses and submit 1) for peer-reviewed publication and 2) as a Working Paper for CCAMLR.	6												
Output 5														
5.1	Develop habitat models for different baleen whale species to determine where interactions with fishing vessels	18												

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	Activity	No. of months	Year 1 (23/24)				Year 2 (24/25)				Year 3 (25/26)			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
	will be most predictable and most intense.													
5.2	Create a Shiny prediction application that produces seasonal forecasts of interactions for CCAMLR Statistical Subarea 48.1 in the BAT.	12												

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Project Summary	SMART Indicators	Means of Verification	Important Assumptions
<p>Impact: The krill fishery is managed sustainably by CCAMLR in the BAT to safeguard Antarctic krill-based ecosystems, especially including baleen whales, and especially in autumn when relevant ecological data are sparse.</p>			
<p>Outcome: Provision to CCAMLR of Working Papers, data and information to help ensure krill fishery management occurs at ecologically relevant spatial and temporal scales.</p>	<p>0.1 By end 2027, CCAMLR has reviewed the small-scale management units used to set krill catch limits in the BAT. 0.2 By end of 2027, CCAMLR has taken into account sensitive time periods for krill-dependent predators, especially baleen whales, within each fishing season, and catches are managed temporally within such seasons rather than only annually, as at present. 0.3 By March 2026, the project has demonstrated, through two field seasons and peer-reviewed publication of results, a new method for low-cost, near-shore acoustic surveys in areas where research vessels currently do not operate.</p>	<p>0.1 CCAMLR has reviewed the limits set for small-scale units, evidenced through CCAMLR meeting reports. 0.2 CCAMLR has reviewed the catch limits set for different time periods within each fishing season, evidenced through CCAMLR meeting reports. 0.3 Our CCAMLR working papers are recorded as submissions in meeting reports, with discussions also included in the reports. Our peer-reviewed journal papers will also demonstrate our autonomous vehicle acoustic surveying capability, and will be openly available for download from journal websites. 0.4 Verification will be available in the reports of the CCAMLR Scientific Committee and its Working Groups, (especially WG-Ecosystem Monitoring and Management, WG-Acoustic Survey Analysis Methods).</p>	<p>CCAMLR reviews the information provided by this project and considers it as part of a future revision and designation of small scale management units and adoption of krill fishery catch limits.</p>

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<p>Outputs: 1. Whales. Spatiotemporally explicit predictions of whale foraging presence.</p>	<p>1.1 Data layers of spatiotemporally explicit predictions of humpback, minke and fin whale foraging presence within the BAT (CCAMLR Subarea 48.1) are produced for each month in the CCAMLR fishing season, and presented as information papers to CCAMLR and the IWC (International Whaling Commission) by end of 2025.</p>	<p>1.1 Data layers are published to a publicly-accessible data repository. 1.2 Working Papers are recorded in the reports of the CCAMLR Scientific Committee and its Working Groups and in the report of the International Whaling Commission Scientific Committee.</p>	<p>Tags are able to be deployed on fin whales.</p>
<p>2. Krill. Spatiotemporally explicit nearshore krill abundance information.</p>	<p>2.1 Novel acoustic survey data, to calculate krill abundance, are collected nearshore in the Western Antarctic Peninsula during two fieldwork periods in the project: January-April 2023 and January-April 2024. 2.2 Novel spatially-explicit krill abundance estimates are produced for nearshore regions in the Western Antarctic Peninsula, by the end of 2024.</p>	<p>2.1 Our spatially-explicit krill abundance estimates have been produced and have been communicated via Working Papers to the CCAMLR Acoustic Survey and Assessment Methods Working Group, and noted in reports from Working Group meetings.</p>	<p>Krill is able to be surveyed using yacht-mounted echosounders or the ImpYak system.</p>
<p>3. 3D predator-consumer interactions. Publication of 3D models of whale-krill interactions.</p>	<p>3.1 By March 2026, information on 3D spatiotemporal characteristics of the interactions between krill and baleen whale predators on their foraging grounds in the BAT will be published as a peer-reviewed paper and reported to CCAMLR.</p>	<p>3.1 Publication of data layers and peer-reviewed manuscript, which can be obtained from the journal website. 3.2 Working Paper submitted to CCAMLR, noted in meeting reports. 3.3 Copies of these papers provided as means of verification.</p>	<p>CATS tags are able to be deployed in foraging aggregations of whales, and simultaneous prey mapping can be undertaken.</p>

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<p>4. Integrated krill-consumer-fisheries interactions. Temporally explicit maps of potential interactions among krill, whales and fisheries.</p>	<p>4.1 A key unknown for predator-krill-fishery interactions, is whether fishing vessels compete with predators and reduce the available food resource within an area. By March 2026, we will have measured this for the first time, helping confirm the impacts of krill fishing are not simply spatial overlap, but also functional overlap, demonstrated through analyses published as peer-reviewed papers and reports. 4.2 By March 2026, produce data layers for spatiotemporally explicit maps of potential interactions among krill, whales and fisheries within the BAT. 4.3 By March 2026, present data layers on spatiotemporal interactions as information papers to CCAMLR.</p>	<p>4.1 Publication of data layers and peer-reviewed manuscript, which can be obtained from the journal website. 4.2 Working Paper submitted to CCAMLR, noted in meeting reports. 4.3 Copies of these papers provided as means of verification.</p>	<p>4.1 CATS tags are able to be deployed in foraging aggregations of whales, and simultaneous prey mapping can be undertaken using yacht-mounted echosounders or the ImpYak system. 4.2 Fishery data is made available.</p>
<p>5. Forecasting. Test our ability to make seasonal forecasts of krill-consumer-fisheries interactions using correlative spatial models in conjunction with oceanographic model forecasts.</p>	<p>5.1 By March 2026, development of habitat models for humpback, fin and minke whales, the output of which will allow us to determine, at monthly timescales during the krill fishing season, where interactions with fishing vessels will be most predictable and most intense. Such identified areas should be subject to detailed scrutiny, potentially for</p>	<p>5.1 Shiny prediction application produced and accessible online. 5.2 Publication of peer-reviewed manuscript, which can be obtained from the journal website. 5.3 Working Paper submitted to CCAMLR, noted in meeting reports.</p>	<p>5.1 CATS tags are able to be deployed in foraging aggregations of whales, and simultaneous prey mapping can be undertaken. 5.2 Interactions can be forecast based on their correlations with oceanographic covariates for which forecasts exist.</p>

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	<p>designation by CCAMLR as areas requiring enhanced management (e.g. temporal closures within the fishing season or reduced fishery impacts) compared with current management practices.</p> <p>5.2 By March 2026, create a Shiny prediction application that produces seasonal forecasts at a monthly resolution of potential interactions for CCAMLR Statistical Subarea 48.1 in the BAT.</p>	<p>5.4 Copies of these papers provided as means of verification.</p>	
<p>Activities</p> <p>1.1 Deployment of tracking tags on whales in the Western Antarctic Peninsula region.</p> <p>1.2 Analyse whale tracking data and develop models which produce spatiotemporally explicit predictions of whale foraging presence within the BAT.</p> <p>1.3 Prepare data layers of these predictions for presentation to CCAMLR as Working Papers.</p> <p>2.1 Final trials of ImpYak survey system and training field personnel on system.</p> <p>2.2 Conduct acoustic surveys of krill abundance nearshore at the Western Antarctic Peninsula during two fieldwork periods in the project.</p> <p>2.3 Produce spatially-explicit krill abundance estimates from these survey data and submit estimates to the CCAMLR Acoustic Survey and Assessment Methods Working Group.</p> <p>3.1 Analyse whale tracking data and krill abundance data to characterise spatiotemporal interactions between krill and predators on foraging grounds in the BAT.</p> <p>3.2 Write up the results from these analyses and submit 1) for peer-reviewed publication and 2) as a Working Paper for CCAMLR.</p> <p>4.1 Collate krill fishery data, obtained from CCAMLR, for the Western Antarctic Peninsula region.</p> <p>4.2 Analyse whale tracking data, krill abundance data, and krill fishery data together to characterise function overlap among krill, their predators and the fishery.</p> <p>4.3 Produce data layers for spatiotemporally explicit maps of potential interactions among krill, whales and fisheries.</p> <p>4.4 Write up the results from these analyses and submit 1) for peer-reviewed publication and 2) as a Working Paper for CCAMLR.</p>			

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5.1 Develop habitat models for different baleen whale species to determine where interactions with fishing vessels will be most predictable and most intense.

5.2 Create a Shiny prediction application that produces seasonal forecasts of interactions for CCAMLR Statistical Subarea 48.1 in the BAT.