DPLUS054
Darwin Plus: Overseas Territories Environment and Climate Fund
Project Application Form

Submit by **2359 GMT Monday 21 September 2015**

Please read the Guidance Notes before completing this form.
Information to be extracted to the database is highlighted blue. Blank cells may render your application ineligible

Basic Data

1. Project Title (max 10 words)	Managing Antarctic krill fisheries: identifying candidate marine areas for protection		
2. UKOT(s) involved	Government of the British Antarctic Territory (GBAT), Government of South Georgia and the South Sandwich Islands (GSGSSI).	**Letter of support from OT government attached?**	Yes
3. Start Date:	1 April 2016		
4. End Date:	31 March 2018		
5. Duration of project (no longer than 24 months)	24 months		

Summary of Costs	**2016/17**	**2017/18**	**Total**
6. Budget requested from Darwin	£55,368.69	£44,568.69	£99,937.38
7. Total value of matched funding	£79,769.12	£79,769.12	£159,538.24
8. Total Project Budget (all funders)	£135,137.81	£124,337.81	£259,475.62
9. Names of Co-funders	British Antarctic Survey (BAS); Environmental Research and Assessment (ERA)		

10. Name, address and contact details of lead applicant organisation (responsible for delivering outputs, reporting and managing funds)*	Dr Philip N Trathan British Antarctic Survey, Natural Environment Research Council, Madingley Road, Cambridge CB3 0ET

* Notification of results will be by email to the Project Leader named in Question 12

11. Type of organisation of Lead applicant. Place an x in the relevant box.												
OT GOVT		UK GOVT	X	UK NGO		Local NGO		International NGO		Commercial Company		Other (e.g. Academic)	X

12. Partners in project. Please provide details of the partners in this project and provide a CV for the individuals listed. You may copy and paste this table if necessary

Details	Project Leader	Project Partner 1	Project Partner 2
Surname	Trathan	Lascelles	Harris
Forename(s)	Philip Neil	Ben	Colin
Post held	Head of Conservation Biology	Senior Marine Officer	Environmental consultant
Institution (if different to above)		BirdLife International	Environmental Research and Assessment
Department	Ecosystems	Science	
Telephone/Skype			
Email			

13. Has your organisation been awarded Darwin Initiative funding before (for the purposes of this question, being a partner does not count**)? If yes, please provide details of the most recent awards (up to 6 examples).**

Reference No	Project Leader	Title
EIDCF013	David Barnes	2012-2013 South Atlantic wilderness: assessment of Tristan da Cunha's seabed biodiversity
EIDCF005	Iain Staniland	2010-2011 Darwin Southern Sea Lion Programme
18019	David Barnes	2010-2012 Mapping benthic biodiversity of the South Georgia continental shelf and slope
DPLUS009	Philip Trathan	Antarctic and Sub-Antarctic Marine Protected Areas: using penguin tracking data to identify candidate areas

14. If your answer to Q13 was No, provide details of 3 contracts previously held by your institution that demonstrate your credibility as an implementing organisation. These contracts should have been held in the last 5 years and be of a similar size to the grant requested in this application. (If your answer to Q13 was Yes, you may delete these boxes, but please leave Q14)

15. Key Project personnel

Please identify the key project personnel on this project, their role and what % of their time they will be working on the project. Please provide 1 page CVs for these staff, or a 1 page job description or Terms of Reference for roles yet to be filled. Please include more rows where necessary.

Name (First name, surname)	Role	Organisation	% time on project	1 page CV or job description attached?
Dr Philip Trathan	Project Leader	BAS	17%	Yes – CV
BAS scientist 1	Researcher	BAS	19%	Yes – JD
BAS scientist 2	Researcher	BAS	70%	Yes – JD
Dr Ben Lascelles	Advisor	BirdLife	5%	Yes – CV
Dr Colin Harris	Advisor	ERA	5%	Yes – CV

Project Details

16. Project Outcome Statement: Describe what the project aims to achieve and what will change as a result. (30 words max). You can copy and paste from Q26.

Use existing Antarctic krill-dependent penguin colony data and collated penguin tracking data to identify foraging locations to define candidate protection zones especially for krill fishing areas in the Scotia Sea.

17. Background: (What is the current situation and the problem that the project will address? How will it address this problem? What key OT Government priorities and themes will it address? (200 words max)

The fishery for Antarctic krill is managed by the Commission for the Conservation of Antarctic Marine Living Resources. CCAMLR's management of krill currently comprises a set of arbitrary decision rules, based on historical fishing levels and operations. These are recognised as being inadequate for managing a fishery that potentially competes with a very broad guild of krill-dependent predators (penguins, other seabirds, seals and whales, as well as fish and squid). Failure to implement scientific evidence-based measures stems for a high degree of historical mistrust between fishing nations and conservation-minded nations, as well as from the fact that the Antarctic marine ecosystem is highly variable and more complex that generally accepted. This proposal will help in the formulation of a more scientifically robust management framework by clearly delimiting penguin resource requirements. It will also contribute to specific spatial protection measures around important seabird feeding locations. This proposal contributes to GBAT objectives relating to understanding the environment, the challenges it faces and methods for conservation and protection. It also contributes to GSGSSI objectives to engage in high quality research to underpin management and provide safe and sustainable fisheries to ensure minimal impact on non-target species and habitats, including engaging in CCAMLR.

18. Methodology: Describe the methods and approach you will use to achieve your intended outcomes and impact. Provide information on how you will undertake the work (materials and methods) and how you will manage the work (roles and responsibilities, project management tools etc). Give details of any innovative techniques or methods. (500 words max)

There are 4 species of krill-dependent penguin and over 500 sites where penguins breed in the West Antarctic Peninsula region and South Orkney Island region. However, only 22 sites have been used to collect penguin tracking information. Therefore, we propose to carry out comprehensive analyses of pygoscelid and eudyptid penguin movement behaviour and habitat utilisation, centred on mainland and island breeding colonies throughout the Scotia Sea. Once developed, our models will be capable of being parameterised for other species for which tracking data are available, for example ice seals or Antarctic fur seals. Specifically, we will:

i. Develop a suite of habitat preference models for krill-dependent penguins (the major avian consumers of krill). We will build computer models to best represent how these species utilize their available habitat. The models will be based on part of an existing multi-colony tracking dataset (over 1,000 tracks), and will incorporate multiple environmental and physical data layers such as sea surface temperatures, bathymetry, primary productivity, sea level anomalies, eddy kinetic energy and sea ice extent as well as available proxies for prey availability (physical hydrography and associated krill abundance).

ii. Validate each model using part of the tracking dataset across the range of colonies for which they were developed, to assess how habitat variability between colonies impacts predictive power. Specifically, we aim to identify which physical and environmental characteristics are most likely to lead to models with the highest level of predictive success, and which characteristics may be the best predictors for penguin distribution in variable environmental settings across different colonies.

iii. Test the predictive function of the most appropriate models at a suite of penguin breeding colonies in the region for which coarse resolution Argos telemetry data (platform terminal transmitters, PTT) are available. The most appropriate models will be the ones that perform best in terms of the match between tracking data and predicted penguin distribution, based on the key environmental characteristics of the colony identified above.

iv. Contingent on the validation steps outlined above, we will apply the most appropriate models to key breeding colonies for which no telemetry data are available, in order to generate predictive maps of habitat suitability and preference for these locations.

The project will provide testable hypotheses that will guide future research, namely to validate predicted important at-sea habitat at as-yet unstudied penguin colonies. Additionally, long-term management of krill fisheries will benefit from quantitative information on key penguin habitat; this is particularly relevant to the krill fishery in terms of current fishing levels and future potential expansion.

We will also estimate krill intake for penguins during different phases of their lifecycles (including post-breeding). We will then link with existing work being undertaken by BirdLife and ERA to consider other seabird species and species-specific foraging ranges and habitat preferences. This will allow us to generate resource demand estimates for seabirds. This information can then be used to inform fisheries management, as well as the development of spatial protection measures, particularly during critical periods of different seabird life cycles.

19. How does this project:
a) Deliver against the priority issues identified in the assessment criteria
b) Demonstrate technical excellence in its delivery
c) Demonstrate a clear pathway to impact in the OT(s)
(500 words max)

This proposal delivers against many of the priority issues identified within the Darwin Plus guidance notes. This is because our proposal is designed to help build sustainable fisheries in an area that is known to be warming more rapidly than the global ocean as a whole. For much of the twentieth century the climate of the west Antarctic Peninsula region has warmed at an unprecedented rate. This has been particularly rapid in recent decades with the warming ascribed to changes in atmospheric circulation over the Southern Ocean. These conditions have now resulted in significant trends in seasonal sea ice with a later autumn advance (+1.9±0.5 days year^{-1}) and an earlier spring retreat (-1.2±0.4 days year^{-1}), such that the winter duration of sea ice is -3.1±0.10 days year^{-1} shorter over the period 1979/80 to 2010/11. This is important because sea ice is a critical habitat for parts of the krill life cycle.

Reduced sea ice is also critical as it potentially facilitates new harvesting strategies for the krill fishery. A series of years in the early part of this century with longer ice free conditions in the Bransfield Strait probably contributed towards the development of a new harvesting strategy, leading krill fishing vessels to explore within the Bransfield Strait. Once established, this new spatial pattern of harvesting persisted and is now the dominant strategy. Overall, it appears that the observed seasonal change in sea ice duration has probably facilitated change and variability in krill fishing locations.

As krill fishing locations have changed, the cumulative number of penguin colonies where competitive interactions potentially might occur has also increased. Competitive interactions may occur at any time, but are most likely when individuals are highly constrained. During brood and crèche, Adélie, chinstrap and macaroni penguins in Area 48 usually forage within 50 to 100km of their colonies, while gentoos generally feed closer inshore within 20km. Thus, spatial overlap potentially occurs at almost all colonies but harvesting impacts are not quantified. Managing competitive interactions will be vital as Adélie and chinstrap penguin populations are declining across the Antarctic Peninsula and South Orkney Islands.

Harvesting impacts are generally unknown as the majority of penguin breeding colonies are not monitored. It is therefore crucial that CCAMLR determine where and when penguins and other krill predators feed and determine the biomass of krill needed. This proposal builds on previous work undertaken by the same group of researchers. It will link penguin telemetry data with penguin colony location data to produce relevant management information through a series of spatially and temporally resolved computer models.

Developing the necessary scientific understanding and providing ecosystem-based initiatives to ensure the Antarctic krill fishery is sustainably managed, is critical. The krill fishery currently operates in the Antarctic Peninsula and Scotia Sea region, so falls within two UKOTs (GSGSSI and GBAT). Thus, to improve the conservation, protection and management of the marine environment in these UKOTs requires that CCAMLR use the best available scientific evidence to develop innovative solutions to protect krill and its predators.

20. 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. (250 words max)

The stakeholders for this work are the CCAMLR Member states who are actively engaged in developing

a new management system for Antarctic krill. This project will therefore help expedite the process. Other stakeholders include tourist companies and NGOs that value the natural status of the Antarctic ecosystem. Two UKOTs (GSGSSI and GBAT) are also key stakeholders as the Antarctic krill fishery operates within their areas of interest.

The PL has engaged with CCAMLR over many years and is currently the senior ecological adviser to the UK Delegation to CCAMLR. He regularly attends CCAMLR Working Group meetings, the Scientific Committee and Commission. He is active in the science of developing a new management system for krill, working with NGOs and fishing nations. He submitted 4 papers to CCAMLR this year linked to the subject of this proposal. The CCAMLR CEMP Fund is also actively considering a research proposal by the PL that could be considered as additional co-funding for this Darwin Plus proposal.

Within CCAMLR the debate on krill management needs to be revitalised through a collaborative approach that better involves fishing nations and conservation-minded nations. The panel of advisors linked to this project include scientists from both fishing and conservation-minded nations.

The PL and PPs have communicated with GBAT and GSGSSI officials who all are extremely supportive of this proposal. The PL will continue to work with them ensuring that scientific papers submitted to CCAMLR also meet the needs of the respective UKOTs where appropriate.

21. Institutional Capacity: Describe the implementing organisation's capacity (and that of partner organisations where relevant) to deliver the project.
(500 words max)

BAS/NERC has a long history of working in the Antarctic. More specifically, the PL specialises in penguin and ecosystem research and leads a team that involves other penguin specialists. The PL has a high profile internationally and is a member of the steering committee for the 9th International Penguin Conference; he is also part of the IUCN Species Survival Commission Penguin Specialist Group. The PL is also the Chair of the Science Advisory Group for the Antarctic Wildlife Research Fund, a new collaboration between the krill fishing industry, NGOs and scientists. Consequently, the PL has a wide network of contacts that will help facilitate engagement with the penguin research community.

The PL also has extensive firsthand experience of working within national and international environments. He was the lead scientist working on the development of the South Georgia MPA and the lead scientist working on the UK's proposal to establish the world's first High Seas MPA within CCAMLR waters. The PL has been involved with CCAMLR for over 20 years and is a senior adviser to the UK Delegation to CCAMLR. He has extensive experience of working with multiple stakeholders, including fishing companies and NGOs. CCAMLR relies on Member contributions, but has asked the PL to liaise with experts in predator tracking to facilitate the development of research tools that will benefit ecosystem management and monitoring related to spatial and temporal management of the krill fishery. The proposed project fulfils this requirement.

BirdLife has unparalleled experience of integrating information on birds, often derived from many disparate sources, and of setting up large scale, multi-sourced tracking databases, including of negotiating data access and data use. More specifically this PP has wide ranging experience of designing and implementing relational databases and user interfaces. This PP also has very extensive experience of delivering impactful conservations outputs from these tools. Including providing white-paper reports to Regional Fisheries Management Organisations and hotspot analyses to feed into national and international marine spatial planning, including the Convention on Biological Diversity's EBSA process.

ERA has an established track record in delivering practical, cost-effective, sustainable environmental management solutions based on high quality research. This PP has expertise in environmental management, ecology and protected areas, GIS and mapping. Recently, ERA has been working with BirdLife, the Scientific Committee on Antarctic Research (SCAR), the Secretariat of the Agreement on the Conservation of Albatrosses and Petrels (ACAP) and scientists worldwide to define Important Bird Areas (IBAs) in Antarctica. Data on numbers of birds at breeding colonies were analysed against criteria defined by BirdLife to derive a list of 204 IBAs throughout Antarctica.

All three institutes are co-located in Cambridge, which will facilitate the collaborative nature of this project. The data needed for the project are also already established, including the penguin tracking data and the penguin colony distribution information developed by the PL, together with the list of Antarctic IBAs. Each institute also has considerable experience in the requisite analysis methods and data management routines.

APPLICANTS SEEKING £100,000 OR OVER SHOULD PROCEED TO QUESTION 26

22. Expected Outputs			
Output (*what will be achieved e.g. capacity building, action plan produced, alien species controlled)*	Indicators of success *(how we will know if its been achieved e.g. number of people trained/ trees planted)*	Status before project/baseline data *(what is the situation before the project starts?)*	Source of information *(where will you obtain the information to demonstrate if the indicator has been achieved?)*
1. Calculation of the biomass of Antarctic krill and other prey species consumed by different krill-dependent penguin species during different phases of their annual cycle.	Working papers will be submitted via the UK Delegation to CCAMLR to the next relevant meetings of WG-EMM, with later submission to selected peer-reviewed journals.	Diet composition data are available for all krill-dependent penguins during their summer breeding period, but data have never been collated to provide an overall consumption estimate. Data on winter diet will need to be derived from the literature, so estimates will be less certain than for summer diet.	List of UK papers submitted to CCAMLR WG-EMM.
2. Model collated penguin tracking data to determine the preferred foraging sites and moulting locations.	Candidate sites will be identified from each tracking dataset. The number and extent of these will be moderated by reference to behavioural signals present in the data. All tracking data and covariate environmental data will be used to extrapolate to colonies without any tracking data. Working papers will be submitted via the UK Delegation to CCAMLR to the next relevant meetings of WG-EMM, with later submission to selected peer-reviewed journals.	Reports on the collation of tracking data have already been submitted to CCAMLR, but no robust spatial analyses have been submitted to date. A number of Adélie penguin tracks have been used in the CCAMLR process to designate the South Orkney Islands MPA.	List of UK papers submitted to CCAMLR WG-EMM.
3. Determination of spatial and temporal scales appropriate to manage the Antarctic krill fishery by CCAMLR. Input to processes for designating appropriate	Spatial foraging models will be integrated with models of prey consumption to identify core feeding areas, for input into the CCAMLR krill fishery management	Areas of spatio/temporal resource competition between fishermen and penguins have not been properly delineated. This is now feasible using penguin tracking	List of UK papers submitted to CCAMLR WG-EMM and to CEP. However, ultimately the level of success will be provided by the number of spatial or temporal

protection measures within BAT in relation to the krill fishery. Determine the need for new Antarctic Specially Managed Areas or new Antarctic Specially Protected Areas within BAT through the CEP, part of the Antarctic Treaty. Contribute to the review in 2018 of the SGSSI MPA.	process. Working papers will be submitted via the UK Delegation to CCAMLR to the next relevant meetings of WG-EMM, with later submission to selected peer-reviewed journals. Working papers will also be submitted via the UK Delegation to the CEP to contribute to the ASMA and ASPA processes.	data and colony location data to refine habitat usage. Our models will ensure areas of potential spatial and temporal resource conflict between the krill fishery and penguins will be more properly delineated.	zones and ASMAs and ASPAs adopted.

23. Expected change: How will each of the outputs contribute to the overall outcome of the project? (100 words max)

Rigorous scientific analysis is critical for identifying important penguin foraging habitats, especially when also justifying associated changes in access for fisheries, and particularly where economic imperatives have held a strong voice. For the first time in 35 years, we are in a position to build the necessary habitat models for penguins that have the potential to persuade CCAMLR of the need to manage the Antarctic krill fishery at spatial and temporal scales relevant to krill-dependent predators. The deliverables listed in Q22 are all necessary to generate the results needed for management, as well as those for spatial and temporal protection.

24. Main Activities	
Output 1	Develop a working paper for CCAMLR WG-EMM detailing penguin consumption of Antarctic krill and other important prey species throughout the year for the South Orkney Islands and the west Antarctic Peninsula; revise the paper for peer-reviewed publication.
1.1	Analyse dietary information from the CCAMLR Ecosystem Monitoring Program for sites on the South Orkney Islands and west Antarctic Peninsula in order to determine the contribution of Antarctic krill and other species in penguin diets during different periods of the breeding season.
1.2	Undertake a literature review to determine the contribution of Antarctic krill and other species in penguin diets during the post-breeding winter periods.
1.3	Determine the overall annual prey requirements for breeding and non-breeding penguins taking into account any seasonal prey selection and the energetic contents of individual dietary items.
Output 2	Develop a set of working papers for CCAMLR WG-EMM detailing modelled candidate foraging sites and moulting areas based on available tracking data and colony location data; revise the papers for peer-reviewed publication.
2.1	Develop habitat preference models for krill-dependent penguins to best represent how these species utilize their available habitat.
2.2	Validate each model across the range of colonies for which they were developed, to assess how habitat variability between colonies impacts predictive power.
2.3	Test the predictive function of the best models at a suite of penguin breeding colonies in the region for which coarse resolution Argos telemetry data (platform terminal transmitters, PTT) are available.

2.4	Apply the best models to key breeding colonies for which no telemetry data are available, in order to generate predictive maps of habitat suitability and preference for these locations
Output 3	Underpin new krill fishery management processes in CCAMLR, including delineating spatial and temporal protection measures. Contribute to CEP spatial and temporal protection measures.
3.1	Engage with GBAT and GSGSSI to identify UK policy requirements.
3.2	Develop scientific papers for delivery to CCAMLR and CEP via the appropriate UK Delegation.
3.3	Engage internationally within CCAMLR and CEP to explain the conservation imperatives within the UK Delegation papers and to advocate appropriate conservation measures.
3.4	Contribute towards the GSGSSI led review of the SGSSI MPA in 2018 and the CCAMLR led review of the South Orkney Island Southern shelf MPA in 2019.

25. Risks			
Description of the risk	Likelihood the event will happen (H/M/L)	Impact of the event on the project (H/M/L)	Steps the project will take to reduce or manage the risk
Penguin population data are not available.	L	L	Updates to penguin population data will be valuable but not vital. The PL developed a database of penguin colony site population data in 2008 which will serve the needs of the project. The BirdLife IBA database will provide site colony information for other seabird species. Moreover, remote sensing methods are rapidly providing a new baseline for penguin and other seabird breeding distribution in the Antarctic.
Penguin tracking community are not willing to allow project access to data.	L	L	BAS and BirdLife have already secured access to penguin tracking data from across the scientific community. Both also have good relationships with other institutions around the world that have collected these data and have their support. Sufficient data are held by the panel of advisors to this project that will allow progress to be made.
Sample sizes of available data are insufficient to allow conclusive sites to be identified.	L	L	Although some species and regions may be poorly surveyed, the PL and PPs have extensive knowledge of what data exists and believe there is sufficient to identify a representative network of sites. This is particularly true within the BAT waters.
No clear habitat preferences are evident in the tracking data or detectable by current habitat modelling approaches.	M	L	This will only impact the accuracy of distributional predictions for untracked populations. Various other statistical tests exist that may allow us to explain the environmental niche occupied by the

			tracked populations and this would allow a more direct extrapolation which may be useful to the management process.
Computer power is inadequate to resolve the habitat models.	M	L	Habitat models can require intensive computational effort and/or considerable statistical support in order to resolve habitat requirements. We will therefore work with our existing network of experts, statisticians and other modelling contacts to minimise any potential impacts of this on our delivery of candidate areas.
CCAMLR is unable to agree appropriate management measures.	M	M	CCAMLR is a difficult international forum, but generally remains an evidence-based legal instrument. Often new approaches take time to be socialized; however robust scientific evidence is generally accepted.

APPLICANTS SEEKING LESS THAN £100,000 YOU MAY SKIP QUESTION 26

26. LOGICAL FRAMEWORK

Darwin Plus projects will be required to report against their progress towards their expected outputs and outcome if funded. 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.

Project summary	Measurable Indicators	Means of verification	Important Assumptions
Impact: (Max 30 words)			
Outcome: (Max 30 words)	0.1 0.2 etc	0.1 0.2 etc	
Outputs: **1**.	1.1 1.2 etc	1.1 1.2 etc	
2.			
3.			
4.			
Activities (each activity is numbered according to the output that it will contribute towards, for example 1.1, 1.2 and 1.3 are contributing to Output 1) 1.1 1.2 1.3 etc			

27. Sustainability: How will the project ensure benefits are sustained after the project has come to a close? If the project requires ongoing maintenance or monitoring, who will do this? (200 words max)

All data to be used in this project are held in international databases, including those maintained by BirdLife (penguin tracking data, terrestrial IBA locations) and CCAMLR (penguin colony locations, penguin diet data). These databases are already resourced and will continue to be into the foreseeable future. This will facilitate analytical updates to be undertaken by responsible bodies as new data become available, and for the impacts of conservation measures to be monitored.

Periodic revisions will be important as the Antarctic Peninsula and Scotia Sea are areas of recent, regional, rapid climate change. In particular, changes in seasonal sea ice have already been linked to changes in krill abundance. More recently, new (unpublished) work undertaken by the PL and others, highlights recent changes in krill harvesting locations in the Antarctic Peninsula region, with increased overlap and potential impact upon breeding penguins. The rapid environmental changes in the Peninsula region highlight the need for urgent and continued effort in managing the Antarctic krill fishery.

The panel of experts who have agreed to join the project steering committee (see section 29 below) are all involved in CCAMLR and so understand the need to deliver practical, pragmatic management outcomes which will require periodic review.

28. 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. (200 words max)

All data are currently held in international databases and data can be readily requested by any individual, subject to existing widely accepted data access rules (BirdLife http://seabirdtracking.org/?q=termsofuse; CCAMLR https://www.ccamlr.org/en/data/access-and-use-ccamlr-data). All analytical methods, computer routines and results will be published as part of the project's submission to CCAMLR.

The routines themselves will also be made available as open-source code so localised systems can be established in the supporting UKOTs, with the offer to make them available to other UKOTs as appropriate. The analysis routines will also have general applicability to other fisheries outside the Antarctic where penguins, or other seabirds, forage and are in potential competition with fisheries.

In addition to submitting all project outputs to CCAMLR, we will also publish our results in the scientific peer-reviewed literature. Publication in high-impact journals also often requires that data and analysis routines are made available in open access databases.

We also commit to making results available to the general public by giving presentations at appropriate meetings and events. For example, the 9th International Penguin Conference will attract many different media representatives. Finally, we will also provide media press releases about significant scientific results and important management initiatives resulting from the project.

29. Monitoring & Evaluation: How will the project be monitored and who will be responsible? Will there be any independent assessment of progress and impact? When will this take place, and by whom? (250 words max)

A project steering committee will be created that will include (i) all project staff including the PL and PPs; (ii) experts in penguin tracking; and (iii) a stakeholder able to represent the project beneficiaries, possibly a member of the UK Delegation to CCAMLR from the Polar Regions Department. Three experts in penguin tracking who are also key tracking data holders have already agreed to participate in the steering committee; these are a.) Dr Andrew Lowther, Norway; b.) Dr Mercedes Santos, Argentina; and c.) Dr Jefferson Hinke, USA.

The project steering committee will convene as soon as is feasible after the project commences, saving costs by use of the videoconference facilities at BAS. They will develop a detailed implementation plan with specific and detailed project objectives, timelines and project outputs, building upon the details described in this proposal. During this first meeting the steering committee will define clear milestones and delivery dates for implementation.

We have budgeted for one face-to-face meeting for the steering committee, probably at the end of the first year. This meeting will review progress and examine the project milestones and delivery dates.

A project implementation group comprising the PL and PPs will convene every three months 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 and Working Group reports will provide an unbiased independent evaluation of the project's progress.
The project completion report is after the project is over and is linked to the final payment.

30. Financial controls: Please demonstrate your capacity to manage the level of funds you are requesting. (Who is responsible for managing the funds? What experience do they have? What arrangements are in place for auditing expenditure?)
BAS/NERC will control finances through the fully audited RCUK Shared Business Services Centre (SBS). A separate budget cost centre will be created for the project. The project steering committee will oversee the strategic spending of funds, with day-to-day oversight and authorisation by the PL who will be ultimately accountable for managing the budget. The PL has successfully managed budgets for both BAS/NERC projects and externally funded project for nearly 20 years. Some of these budgets have been considerably larger than the budget requested for this project. BAS/NERC also employs staff within a dedicated Finance Department. These staff will also monitor spend to ensure budgets are managed appropriately.

Please complete the separate Excel spreadsheet which provides the Budget for this application. Some of the questions earlier and below refer to the information in this spreadsheet. If you are requesting over £100,000 from Darwin Plus, you must complete the full spreadsheet.

31. Value for Money: Please explain how you worked out your budget and how you will provide value for money through managing a cost effective and efficient project. You should also discuss any significant assumptions you have made when working out your budget. (200 words max)
To provide an appropriate level of expertise, we propose to use established scientists with extensive experience of spatial analyses. These scientists would be committed to the project until complete. BAS will complement support, with additional staff-time and resources necessary for the project. We shall also be benefitting from use of systems and analyses that have already been developed (DPLUS009). In doing so, we shall be avoiding considerable development costs. We shall also make use of existing data. Telemetry data are very costly to collect and also require considerable logistic effort, all of which has already been expended. Similarly, colony location and population count data have already been collated by the PL and PPs. Following a recent penguin tracking workshop at BAS in May 2015, we now have an internationally agreed plan of action with an international panel of experts willing to provide advice and to act as a project steering group. We are also seeking additional co-funding from CCAMLR; early indications about this are positive. Thus, this project represents exceptional value, particularly as the very real political difficulties associated with this kind of project are being gradually eroded, meaning the project has a high probability of generating important conservation outcomes.

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

[1] CCAMLR Working Group on Ecosystem Monitoring and Management takes place in July; Scientific Committee and Commission are in October/November. Committee for Environmental Protection takes place in May.

[2] Outputs will also be submitted to CCAMLR and CEP in 2018-2019.

	Activity	No of Months	Year 1 – 2016-2017													Year 2 – 2017-2018										
			A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M
Output 1	Working paper for CCAMLR WG-EMM[1] and SC detailing penguin consumption of Antarctic krill and other important prey species.	12		X		X			X	X								X			X	X				
1.1	Analyse dietary data from the CCAMLR Ecosystem Monitoring Program for the South Orkney Islands and west Antarctic Peninsula.	4																								
1.2	Undertake literature review to determine penguin diets during the post-breeding winter periods.	2																								
1.3	Determine the annual prey requirements for breeding and non-breeding penguins taking into account prey energetic contents.	6																								
Output 2	Set of working papers[2] for CCAMLR WG-EMM and SC detailing modelled candidate foraging sites and moulting areas.	24		X		X			X	X								X			X	X				
2.1	Develop habitat preference models for krill-dependent penguins to best represent how these species utilize their available habitat.	12																								
2.2	Validate each model across the range of colonies for which they were developed, to assess habitat variability between colonies.	4																								
2.3	Test predictive function of models at a suite of penguin breeding colonies in the region for which Argos telemetry data are available.	4																								
2.4	Apply models to breeding colonies for which no telemetry data are available, in order to generate predictive maps of habitat suitability.	4																								

Output 3	Underpin new krill fishery management processes in CCAMLR, including delineating spatial and temporal protection measures.	24		X		X			X	X								X			X	X				
3.1	Engage with GBAT and GSGSSI to identify UK policy requirements and to determine strategy for engagement at CCAMLR.	Ongoing																								
3.2	Develop scientific papers for delivery to CCAMLR and CEP via the appropriate UK Delegation.	Ongoing																								
3.3	Engage internationally within CCAMLR and CEP[2] to advocate appropriate conservation measures.	Ongoing																								
3.4	Contribute towards the review of the SGSSI MPA in 2018 and to the CCAMLR led review of the South Orkney Island MPA in 2019.	4																								

CERTIFICATION

On behalf of the British Antarctic Survey, a constituent part of the Natural Environment Research Council

I apply for a grant of £99,937.38 in respect of **all expenditure** to be incurred during the lifetime of this project based on the activities and dates specified in the above application.

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 lead institution to submit applications and sign contracts on their behalf.)*

- I enclose CVs for key project personnel and letters of support.
  - CV for Dr Philip Trathan (PL);
  - CV for Dr Ben Lascelles (PP);
  - CV for Dr Colin Harris (PP);
  - Job description for BAS 1;
  - Job description for BAS 2;
  - LoS from British Antarctic Survey (applicant);
  - LoS from BirdLife International (partner);
  - LoS from Environmental Research and Assessment (partner);
  - LoS from GBAT (supporting UKOT);
  - LoS from GSGSSI (supporting UKOT).
- I enclose the most recent 2 years of signed and audited/independently verified accounts. The link below points to the audited annual accounts for NERC (of which BAS is a constituent part) for the past 2 years:

http://www.nerc.ac.uk/latest/publications/strategycorporate/annualreport/archive/.

Name (block capitals)	Mags Clark
Position in the organisation	Head of Finance

Signed	PDF	**Date:**	21 September 2015

If this section is incomplete the entire application will be rejected. You must provide a real (not typed) signature. You may include a pdf of the signature page for security reasons if you wish. Please write PDF in the signature section above if you do so.

Application Checklist for submission

	Check
Have you **read the Guidance Notes**?	Y
Have you **checked the Darwin Plus website** immediately prior to submission to ensure there are no late updates?	Y
Have you provided **actual start and end dates** for your project?	Y
Have you provided your **budget based on UK government financial years** i.e. 1 April – 31 March and in GBP?	Y
Have you checked that your **budget is complete**, correctly adds up and that you have included the correct final total on the top page of the application?	Y
Has your application been **signed by a suitably authorised individual**? (clear electronic or scanned signatures are acceptable in the email)	Y
Have you included a **1 page CV for all the key project personnel**?	Y
Have you included a **letter of support from the applicant organisation, main partner(s) organisations and the relevant OT Government**?	Y
Have you included a **copy of the last 2 years' annual report and accounts** for the lead organisation?	Y

Once you have answered the questions above, please submit the application, not later than midnight **2359 GMT Monday 21 September 2015** to Darwin-Applications@ltsi.co.uk using the first few words of the project title **as the subject of your email**. If you are e-mailing supporting documentation separately please include in the subject line an indication of the number of e-mails you are sending (e.g. whether the e-mail is 1 of 2, 2 of 3 etc). You are not required to send a hard copy.

DATA PROTECTION ACT 1998: Applicants for grant funding must agree to any disclosure or exchange of information supplied on the application form (including the content of a declaration or undertaking) which the Department considers necessary for the administration, evaluation, monitoring and publicising of Darwin Plus. Application form data will also be held by contractors dealing with Darwin Plus monitoring and evaluation. It is the responsibility of applicants to ensure that personal data can be supplied to the Department for the uses described in this paragraph. A completed application form will be taken as an agreement by the applicant and the grant/award recipient also to the following:- putting certain details (i.e. name, contact details and location of project work) on the Darwin Initiative and Defra/FCO/DFID websites (details relating to financial awards will not be put on the websites if requested in writing by the grant/award recipient); using personal data for the Darwin Initiative postal circulation list; and sending data to Governor's Offices outside the UK, including posts outside the European Economic Area. Confidential information relating to the project or its results and any personal data may be released on request, including under the Environmental Information Regulations, the code of Practice on Access to Government Information and the Freedom of Information Act 2000.