



EIDCF001

Submit by Friday 19 February 2010



DARWIN200

**DARWIN INITIATIVE APPLICATION FOR OVERSEAS TERRITORIES CHALLENGE FUND:
Round 17**

Please read the Guidance Notes before completing this form.

1. Name, postal address and contact details of applicant organisation and main individual:	
Dr Tom Hart, Institute of Zoology, Regents Park, London, NW1 4RY.	
E-mail address:	Phone:
2. Working title/name of the proposed resulting Darwin project (not exceeding 10 words):	
Automating seabird counts from standardised photos contributed by volunteers	
3. Proposed UKOT(s) involved (in Challenge Fund award):	Other collaborating country/ies (including metropolitan UK if appropriate) to be involved in the proposed resultant project:
Falkland Islands South Georgia British Antarctic Territories	

4. Principals in Challenge Fund work

(a) Please give the details of the main individuals (max 2) from the applicant organisation who will be directly involved in the Challenge Fund award. CVs must be enclosed (max 2 pages each).

Details	Main individual	2nd individual
Surname	Hart	
Forename(s)	Tom	
Post held	Post-Doctoral Research Assistant	
Department	Institute of Zoology	
Telephone		
Email		

(b) Prospective collaborating partners relevant to the Challenge Fund award. Please provide details below, plus letters of support. (These letters should express their intention to collaborate, their contribution to the Challenge Fund activity, their endorsement of the proposed partnership, and the expected contribution of the proposed resultant Darwin project to the conservation of the biodiversity of the relevant UKOT(s).)

Details	Main project partner	Other partners
Organisation	Oxford University	British Antarctic Survey
Function/ Purpose of Organisation	To optimise a computer vision algorithm for penguin counts from photographs.	To supply photographs and standard counts of colonies, to assist with analysis and publication of cruise ship data.
Name of Main Contact	Dr Robin Freeman	Dr Norman Ratcliffe
Post Held	Post-Doctoral Researcher	Post-Doctoral Researcher

5. Concept note for the Challenge Fund award (max 500 words). This question concentrates on what the current application is for and should demonstrate the objectives of the award including

- **what work will be carried out under the award;**
- **the location and duration of this work;**
- **what you expect to achieve from receiving the Challenge Fund award;**
- **details of how you will monitor and evaluate the work (reporting requirements for this fund are in the process of being finalised).**

Governments face difficult choices when deciding how to allocate limited resources to environmental management, and conservation decisions are often hampered by a lack of basic biological data - in particular for longer term monitoring in remote areas. The Scotia Arc and the Antarctic Peninsula are subject to rapid climate change that has already impacted on penguins; we are seeing the creation of small new colonies while many established colonies are declining. It is unclear whether this is due to migration or changes in reproductive success. Time series data are needed from many more colonies to answer this question.

Due to the expense and logistical difficulties of carrying out science in the Antarctic and sub-Antarctic, data collection is limited by the fact that biologists can either obtain frequent counts from a limited number of sites or infrequent counts from a larger number of sites. However, many of the data poor sites are visited regularly by tourists. Direct counts by volunteers are usually too unreliable to use. However, if biologists could take data from standardised photographs, it would enable the science community to use volunteers and greatly increase the data available to scientists and policy makers.

Aerial and standardised oblique photographs are frequently used to count animals such as penguins¹. Repeat sampling can also add information about the timing of key stages of reproduction. Recent advances in computer vision allow individual identification of penguins from plumage coloration². The problem of identifying objects of one type and counting them is a much simpler process than individual recognition, but the algorithms need optimisation.

The aims of the project are to:

- Collect oblique photos of penguin colonies and ground-truth with counts.
- Develop the visual recognition algorithm and calibrate an automated penguin count system against manual counts.
- Analyse tour operator, Falkland Islands and South Georgia records of cruise ship landings to determine sites visited regularly throughout the breeding season that would be candidates for inclusion in a monitoring network.
- Generate cruise ship support for a pilot study and subsequent monitoring programme.
- Identify four key sites to place tripods or suitable trig/GPS points for the 2010-11 visitor season on the Falkland Islands, South Georgia or the Antarctic peninsula.
- Design a monitoring programme for the Scotia Arc and peninsula using a network of fixed camera mounts at suitable tourist landing sites.

Evaluation of the work will be the successful completion or publication of the following:

- A scientific report detailing how cruise ship visits to colonies by date.
- A computer vision algorithm that counts penguins from photos.
- A web-based photographic database design and quote.
- Counts of penguins at trial colonies obtained from automated image analysis.

Literature Cited:

1. Trathan, P. N. (2004) Image analysis of colour aerial photography to estimate penguin population size. *Wildlife Society Bulletin* 32: 332-343.
2. Burghardt, T. & Campbell, N. (2007) Individual Animal Identification using Visual Biometrics on Deformable Coat Patterns. In: *International Conference on Computer Vision Systems (ICVS07)*, DOI:10.2390

6. Concept note for resultant project (max 500 words). This question concentrates on the full Darwin application you intend to submit after the Challenge Fund award and should demonstrate:

- **Expected purpose and outputs of the resultant Darwin project**
- **How the resultant Darwin project would meet a need (and how this need was defined) in the UKOTs and help the territory/ies in its implementation of any or all of the following Conventions: the Convention on Biological Diversity (CBD)/Convention on Migratory Species (CMS)/Convention on International Trade in Endangered Species (CITES).**
- **Brief evidence of the proposed partners' intentions to collaborate in the Challenge Fund award and an outline of their expected role in the resultant Darwin project: include brief details of contact to date and planned ongoing collaboration. This would normally be supported by a letter or email of support, which may present the majority of this evidence.**
- **The expected role of the OTs and UK individuals in the resultant Darwin project**

Agreements such as the Agreement on Albatrosses and Petrels (ACAP) show the urgent need for monitoring of avian predators in Overseas Territories. The CBD and CMS have not been ratified for the Falkland Islands, South Georgia and British Antarctic Territories, but these territories have management plans expressing similar intentions to protect and conserve biodiversity and range. Estimates of population size and the timing of breeding are derived from very few sites near to scientific bases, resulting in very poor statistical power to detect change. Low cost, easily-calibrated techniques are needed that could be scaled up across other overseas territories.

This project will provide a cost-effective tool to increase the number of sites that are monitored and provide data to test hypotheses of predator responses to climate change, pressure from fisheries and the impact of tourism. Many sites are visited by untrained observers who, if observations are standardised, could provide a wealth of data to extend coverage of population counts and the timing of breeding. Preliminary data from Bird Island, South Georgia show excellent calibration between visual and photographic manual counts.

Photos taken by volunteers could contribute to:

1. Counts of adults and chicks throughout the season
2. The timing of peak breeding, when chicks form crèches and when they fledge.

The resulting Darwin project would scale up the existing photographic surveys to a wider area and include ground-truthing by Oceanites Antarctic Site monitoring (<http://www.oceanites.org>) which censuses a number of colonies each year.

This project falls directly into the Darwin Challenge fund remit for the following reasons:

- 1) It would greatly increase the number of population data available to management at low cost, because most of the logistical costs are borne by tour operators.
- 2) Calibration of photos and ground-truthing colonies in the present could generate count data from historical photos to extend monitoring data into the past.
- 3) This study will develop techniques easily applied to other Overseas Territories.
- 4) The image database could provide added value as a future platform for standardising marine mammal or seabird sightings.

The Institute of Zoology, the British Antarctic Survey and Oxford University have existing collaborations to develop novel monitoring techniques and analyses, which have resulted in four scientific papers in the last 12 months and two further papers submitted:

Expected deliverables of the Darwin project are:

- A network of tripods or GPS trig points at sites visited by tour operators.
- An image database with integrated count software for penguin colonies.
- Analysis and publication of populations over time and the timing of reproduction.
- A database of available historical colony photos and calibration with current photos to generate historical colony counts.

OTs are expected to provide the following support for this project:

- Dates and timing of site visits by cruise ships.
- Support for and access to sites that are frequently visited (as part of the normal permitting process).
- Consultation into the selection of sites and measures, so that the data obtained can feed directly into management.

7. Justification of need for a Challenge Fund award. Please provide details of why alternative funding is not available from within your own organisation or from other sources. Will matched funding be provided? (max 250 words)

Existing funding is not available for this award as it is a new project for which we need good pilot data. Until the photographs have been ground-truthed and the image processing algorithm validated, there will be no immediate academic output. This in turn limits the sources of funding. While there is a risk of failure for any pilot study, these risks have been mitigated by research into the problem and by consultation with visual processing experts.

Because this is a new project and the main applicant is at an early career stage, matched funding cannot be provided by the IOZ, but alternative sources of funding are being actively sought. We are seeking additional funding from the Foreign and Commonwealth Office, the Antarctic tourism industry and camera manufacturers.

8. Costs. Provide a detailed breakdown of costs to be funded by the Darwin Initiative.

Budget Line	Year 1	Year 2
Please complete those appropriate to your application – they may not all be relevant	Apr 2010 – Mar 2011	Apr 2011 – Mar 2012
Travel costs (airfares, sea travel, visas, travel documents)		
Subsistence costs (30 days: 2 individuals at £20 per day of fieldwork)		
Overhead costs (including office costs)		
Operating costs consultation costs of image analysis and fieldwork consumables		
Capital costs Camera equipment and tripods		
Other (please specify)		
Salaries (specify by individual) Tom Hart – 5.5 months at full economic cost		
TOTAL REQUESTED FROM DARWIN INITIATIVE		

9. Provide anticipated dates of award activity (including start and finish dates) and any milestones where relevant.

Date	Key Milestone
6/2010	START
6/2010	Generate tour operator support for volunteer photos
8/2010	Complete analysis of ship movements
8/2010	Identify four key sites to place tripods
10/2010	Complete preliminary visual recognition algorithm
10/2010	Set up pilot sites for volunteer photographs
01/2011	FINISH

10. In what year would you expect to submit the full Darwin project application?

Round 18

I certify that, to the best of our knowledge and belief, the statements made in this application are true and the information provided is correct.

Name (block capitals): TOM HART

Position in organisation: Post-Doctoral Research Assistant

Signed:

Dated: 12th March 2010

Challenge Fund Application - Checklist for submission

	Check
Have you provided anticipated start and end dates for your award?	Yes
Are your concept notes within 500 words each?	Yes
Has your application been signed	Yes
Have you read the Guidance Notes and are you satisfied that your concept would be eligible for a main project application?	Yes
Have you included CVs and letters of support as required?	Yes

Once you have answered Yes to the questions above, please submit the application in Word format, not later than 2359h GMT on Friday 19 February 2010 to Darwin-Applications@ltsi.co.uk using the title of the project (or first few words) as the subject of your email.

Metropolitan UK applicants should send a hard copy of a wet signature page to the Darwin Applications Unit, c/o LTS International, Pentlands Science Park, Bush Loan, Penicuik EH26 0PL.

Applicants from the UKOTs should fax a copy of the signature page to the Darwin Applications Unit on 0131 440 5501 or email a scanned original signature to Darwin-applications@ltsi.co.uk.

DATA PROTECTION ACT 1998: Applicants 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 the Darwin Initiative. Application form data will also be held by contractors dealing with Darwin Initiative 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 (ie name, contact details and location of project work) on the Darwin Initiative and Defra 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 Foreign and Commonwealth Office posts outside the United Kingdom, 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