Darwin Initiative: Half Year Report

(due 31 October 2014)

Project Ref No	DPLUS009
Project Title	Antarctic and Sub-Antarctic Marine Protected Areas: using penguin tracking data to identify candidate areas
Country(ies)	GSGSSI, BAT
Lead Organisation	British Antarctic Survey
Collaborator(s)	BirdLife International and Scientific Committee for Antarctic Research
Project Leader	*Phil Trathan*
Report date and number (eg HYR3)	*7 October 2014 HYR3*
Project website	*www.seabirdtracking.org (NB: not yet live with new database)*

1. Outline progress over the last 6 months (April – Sept) against the agreed baseline timetable for the project (if your project has started less than 6 months ago, please report on the period since start up to end September).

The project this period has focused mainly upon developing the tracking database and amalgamating penguin telemetry data. The database has been developed under contract by MGEL and is now nearly complete. A copy of the database contract with MGEL is supplied as supporting material (minus personal and commercial information) (Ann1).

The work with MGEL has focussed on restructuring the underlying Procellariiform database to allow it to house penguin tracking data, ensuring that data is stored in a consistent and comparable way to allow automation of a number of processes within the site. All existing seabird tracking data have been reformatted and transferred over to the new system. In parallel a new website has been developed with a Google Maps style mapping tool, where data can be queried and viewed by species, site, life-history and device type. Additional tools allow the tracks to be viewed as lines, areas can be selected where all available data are summarised, and a year slider to see how data collection has varied between years. All of these are tools that were requested by the penguin tracking community during the IPC8 conference in November 2013. The website also has a dedicated penguin page, which provides background to the database development, shows the Darwin logo, summarises most recent penguin data submissions, and has links to other relevant websites such as the Global Penguin Society (reflecting the ownership of much of the penguin tracking data in existence). Data submission and request pages have been built into the website to streamline, and where possible automate, data access processes. Levels of data access and visibility can be selected by data owners during the submission process, thus giving the greatest level of flexibility to protect data owners' rights, while encouraging as broad a contribution of data as possible. Again this was something requested during the IPC8 workshop. See images of the website in the Annex.

Penguin data compilation continues to progress well, though we have not yet given an open call for data submission, which will come once the website is finalised and has been fully tested over the next few months. In the meantime we have been working with some of the major penguin tracking data owners to submit data in advance of launch so that we have a good cross section of species and geographies included. We have so far compiled 992 tracks (2/3 of our project target), from 45 different datasets, collected on 9 species over a 16 year period (1998-2014). These represent data from 29 different breeding colonies and have been contributed by 13 different scientists and research institutes. This includes contributions from BirdLife South Africa (our first submission), Australian Antarctic Division, CNRS-Chize (France),

British Antarctic Survey and the RSPB. Discussions were held with a number of data owners at the Biologging 5 conference held in Strasbourg, France in Sept 2014, which has resulted in the promise of further extensive datasets from researchers in South America, Germany, Japan and the USA. We hope to trial the online data submission process with these data owners once the new website is ready for launch.

Common Name	Scientific Name	N tracks
Adélie Penguin	*Pygoscelis adeliae*	86
African penguin	*Spheniscus demersus*	20
Chinstrap Penguin	*Pygoscelis antarctica*	193
Gentoo Penguin	*Pygoscelis papua*	59
King Penguin	*Aptenodytes patagonicus*	90
Macaroni Penguin	*Eudyptes chrysolophus*	454
Northern Rockhopper Penguin	*Eudyptes moseleyi*	9
Royal Penguin	*Eudyptes schlegeli*	15
Southern Rockhopper Penguin	*Eudyptes chrysocome*	66
	Grand Total	**992**

Table 1: Summarising penguins species for which tracking data has already been received.

The database has now migrated to its own cloud server space (which includes two servers, one holding the database, the other for running the website and tools). This was felt the best option for hosting the data, allowing for greater expansion in the future as more data becomes available and making it easier for potential integration with other databases, such as those developed by the Expert Group on Birds And Marine Mammals (EGBAMM) under SCAR and Movebank. While this comes at a cost (c£3000 a year), which will be covered by the Darwin Plus funds during the life of the project, and covered by BirdLife and others into the future, it allows for smooth running of the site and greatest flexibility going forward.

In terms of outputs of analysis of tracking data, trials have already been undertaken on several datasets to see how well the scripts that BirdLife had previously developed for identification of marine Important Bird Areas for Procellariiform species work for the penguins. Indications are that with a few amendments to some aspects of the analysis (e.g. how a trip is defined >x km for >x hrs from leaving the colony; the Area Restricted Search patterns undertaken and the kernel density used to define a core area) it should function equally as well for penguins. We have also explored developing maps of distribution (known and predicted) and abundance (based on weighting linked to colony size) for some species which would give useful summaries of data that could input to a number of processes in the Antarctic, such as prey (primarily krill) consumption needs within given areas, or for inclusion in MPA proposals.

In addition, considerable effort has focussed on convening a penguin tracking and habitat analysis workshop in May 2015, just after this Darwin Plus Project (DPLUS009) finishes. Funds have been secured to invite ~15 participants to the workshop which will be held at the British Antarctic Survey in Cambridge. The workshop concept was discussed at the recent meeting of the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) Working Group on Ecosystem Monitoring and Management where it was strongly encouraged.

At the workshop, we plan to undertake analyses of penguin telemetry data provided by workshop participants. We wish to explore different ways to analyse these data so that we can characterise preferred penguin foraging habitat in terms of bathymetry, remotely-sensed sea surface temperature, sea surface height, sea ice, primary production and other potential habitat correlates. As well as determining preferred habitat characteristics, we also wish to explore how we can extrapolate our analyses of preferred habitats to penguin colonies where no tracking data exist.

At the workshop, we propose to use different modelling frameworks (e.g. MaxEnt, spatial

application of GLM, GAM etc) for these analyses so that we can compare different approaches. We plan to structure our analyses so that we can compare models within and between sites. We have three separate telemetry sites at the South Orkney Islands and two telemetry sites at the South Shetland Islands. We have tracking data for all *Pygoscelis* species, Adélie (*P. adeliae*), chinstrap (*P. antarctica*) and gentoo (*P. papua*) penguins. These species all depend, to a greater of lesser extent, upon Antarctic krill (*Euphausia superba*).

The main outcomes of the workshop will be a set of papers that we plan to submit to peer-reviewed journals, with workshop attendees (and potentially others) as authors, a workshop report that we will submit to CCAMLR, specifically to the CCAMLR Working Group on Ecosystem Monitoring and Management whose current main focus of work is the development of management methods for the commercial fishery for Antarctic krill. The approaches developed will also help inform BirdLife's work to identify marine Important Bird Areas within the region.

Extract from the WG-EMM Report (paragraphs 2.170 – 2.172):

WG-EMM-14/03 reported on progress to develop an integrated database developed by SCAR, BirdLife International and BAS to facilitate the analysis of penguin tracking data around the globe. As tracking studies proliferate, coordinating standard analyses and data formats will be important. The penguin database, based on the existing BirdLife Global Procellariiform Tracking Database, is designed to enable spatial analyses to be undertaken that will help inform a variety of CCAMLR analyses, including work on the development of a variety of feedback management approaches for the krill fishery and work on the spatial planning processes needed for identifying candidate CCAMLR marine protected areas (MPAs).

The Working Group noted that US AMLR and BAS scientists have agreed to convene a penguin tracking workshop at BAS in mid-May 2015. This workshop will bring together those scientists that hold penguin tracking data for the southwest Atlantic, particularly for those species that are also CEMP monitoring species, with the specific intent of initiating collaborative work to build habitat models. Penguin tracking data are known to be available from Hope Bay on the Antarctic Peninsula and from Livingston Island and King George Island at the South Shetland Islands (Subarea 48.1), Signy Island, Powell Island and Laurie Island at the South Orkney Islands (Subarea 48.2) and from Bird Island and mainland South Georgia (Subarea 48.3). Other scientists with expertise in habitat modelling and spatial analysis of tracking data will also be invited. The outputs of this workshop will be presented to CCAMLR at WG-EMM-15.

The Working Group encouraged these collaborative efforts, noting that habitat models may help improve the understanding of general spatial distributions of predators throughout the year and extend the utility of tracking data collected from a limited number of breeding colonies. The Working Group noted that it will be important to consider how data products from such modelling efforts are made available for the work of CCAMLR. The Secretariat advised that GIS shape files could be one useful product from tracking data, as those could be incorporated into the CCAMLR GIS and provided to interested users based on established protocols for data access and use. Other formats could also be envisioned and would be welcomed, but appropriate metadata would be necessary to understand how such data products could be used.

2a. Give details of any notable problems or unexpected developments that the project has encountered over the last 6 months. Explain what impact these could have on the project and whether the changes will affect the budget and timetable of project activities.

No unforeseen problems have arisen that have any consequences for budgeting.

2b. Have any of these issues been discussed with LTS International and if so, have

changes been made to the original agreement?	
Discussed with LTS:	Yes/No
Formal change request submitted:	Yes/No
Received confirmation of change acceptance	Yes/No

3a. Do you currently expect to have any significant (eg more than £5,000) underspend in your budget for this year?

Yes ☐ **No X** Estimated underspend: £0.00

3b. If yes, then you need to consider your project budget needs carefully as it is unlikely that any requests to carry forward funds will be approved this year. Please remember that any funds agreed for this financial year are only available to the project in this financial year.

If you anticipate a significant underspend because of justifiable changes within the project and would like to talk to someone about the options available this year, please indicate below when you think you might be in a position to do this and what the reasons might be:

N/A

4. Are there any other issues you wish to raise relating to the project or to Darwin's management, monitoring, or financial procedures?

None at present.

If you were asked to provide a response to this year's annual report review with your next half year report, please attach your response to this document.

Please note: Any planned modifications to your project schedule/workplan can be discussed in this report but should also be raised with LTS International through a Change Request.

Please send your **completed report by email** to Eilidh Young at Darwin-Projects@ltsi.co.uk . The report should be between 2-3 pages maximum. **Please state your project reference number in the header of your email message eg Subject: 20-035 Darwin Half Year Report**

Annex - Screen grabs from the new database website

Home Database Albatrosses and Petrels Penguins About

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Seabird Tracking Database

Welcome to the Penguins Node of the Seabird Tracking Database

Submitted by drupal7 on Sat, 06/07/2014 - 13:40

Explore tracks with Mapping Tools

After the albatrosses, the penguins are the next most threatened group of seabirds.

Following discussions held at the 8th International Penguin Conference, Sept 2013 in Bristol, UK it was agreed that the establishment of a penguin tracking database, along the lines of the successful Procellariiform database, would help advance penguin conservation in the marine realm. This was deemed particularly timely as it coincided with ongoing discussions within the Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR) to establish Marine Protected Areas under the Antarctic Treaty.

There have been numerous penguin tracking studies, but the results have never been brought together in one place. Working with the Scientific Committee on Antarctic Research and the British Antarctic Survey, along with a range of researchers all over the world, the database was established in 2014.

Video: Juan Masello showing 3D dive profiles

Diving profiles of three penguin species tracked from New Island, the Falklands. The results from this study, conducted by Masello and colleagues, can be seen here.

Database Status for Penguins

Datasets	3
Contributors	3
Species	2
Tracks	32
Points	9,461

What's new for Penguins in the database?

- Macaroni Penguin, tracked from Courbet (Cotter) colony, by Charles-André Bost, Maria Dias
- African Penguin, tracked from Dassen Island colony, by Ross Wanless, Christina Hagen
- African Penguin, tracked from Bird Island (SA) colony, by Ross Wanless, Christina Hagen, Maria Dias

Acknowledgments:

Funders – Darwin Plus, EU Best

DARWIN INITIATIVE

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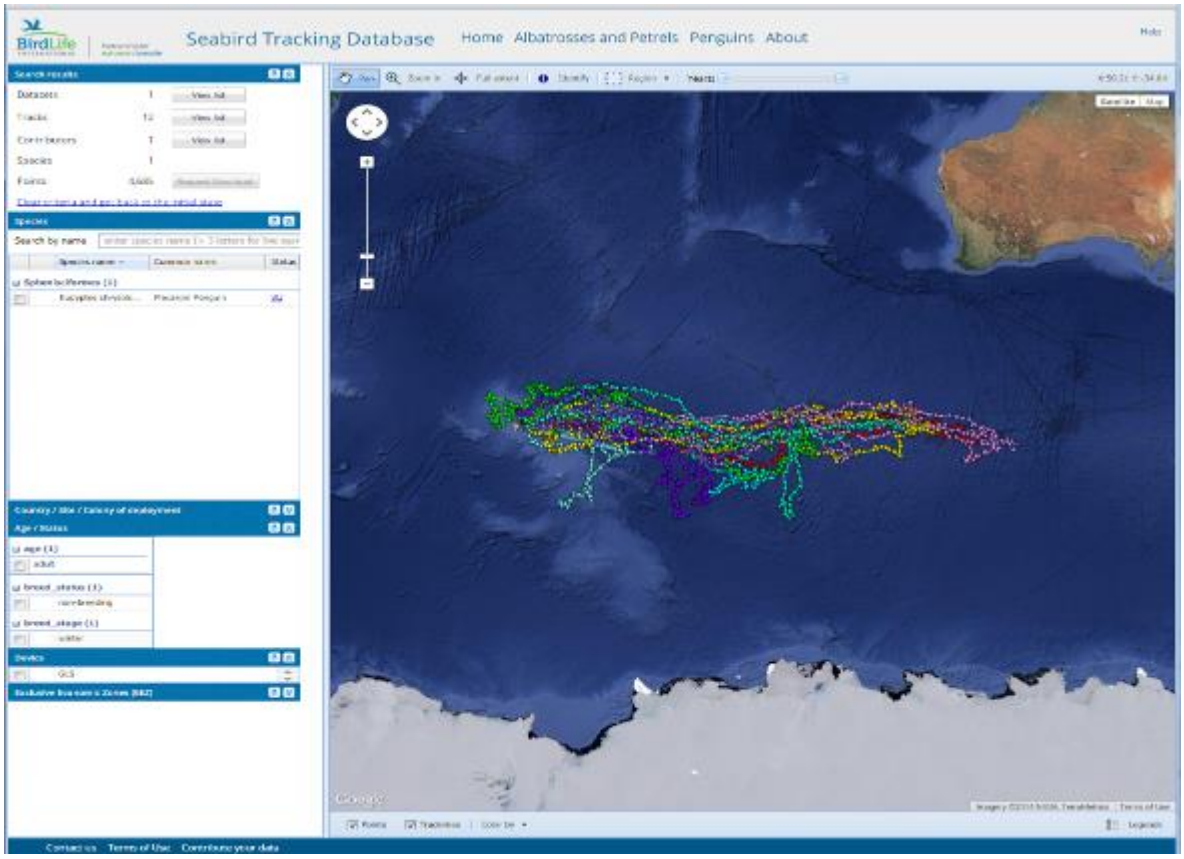
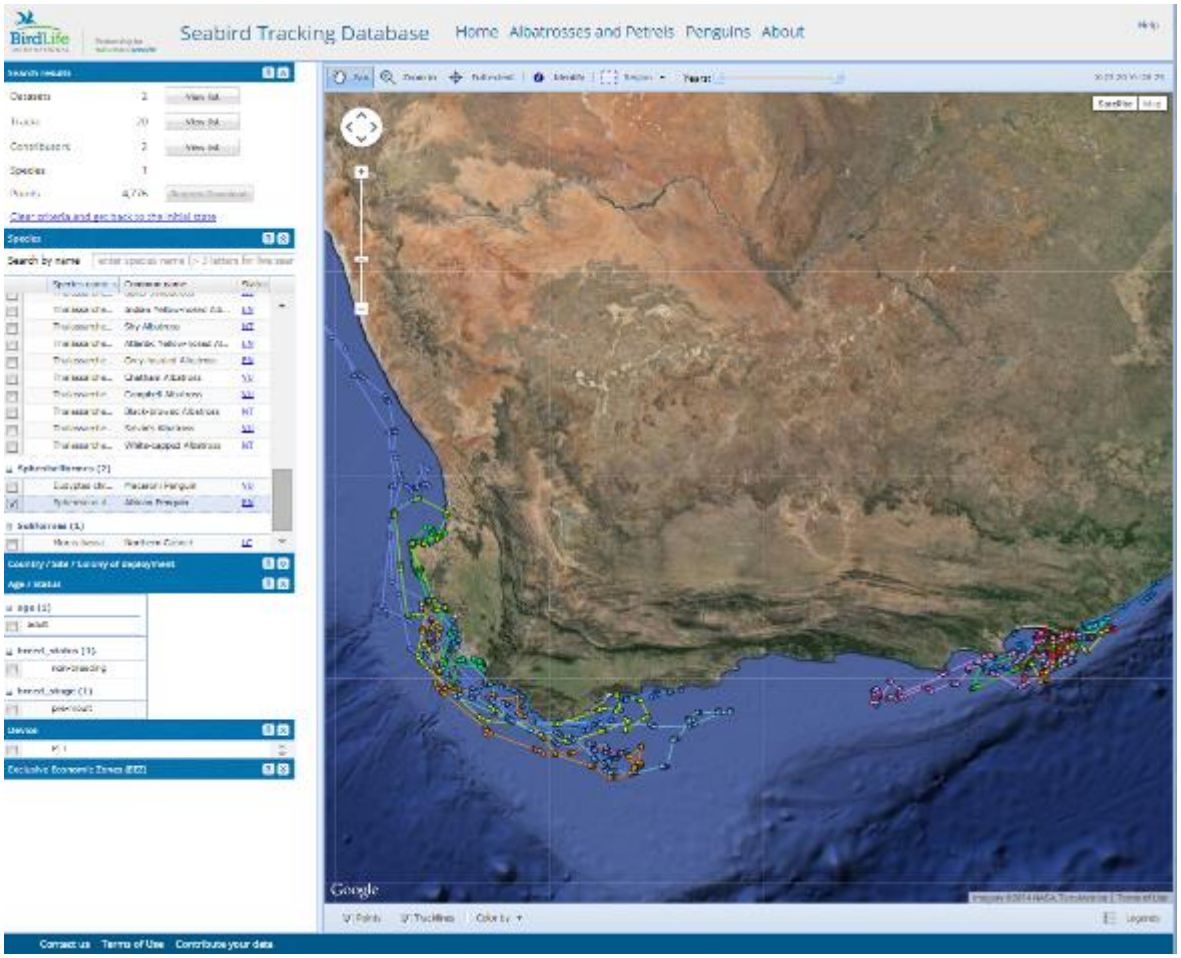
Link:

GPS Global Penguin Society



Macaroni Penguin GLS tracks from French Southern Territories during the winter (non-breeding) period, tracklines coloured by each track.



African Penguin PTT tracks from two colonies in South Africa during the pre-moult period, tracklines coloured by track.