Darwin Plus:
Overseas Territories Environment and Climate Fund
Annual Report

Important note *To be completed with reference to the Reporting Guidance Notes for Project Leaders:*

it is expected that this report will be about 10 pages in length, excluding annexes

Submission Deadline: 30th April 2020

Darwin Plus Project Information

Project reference	DPLUS092
Project title	Seabird sentinels: mapping potential bycatch risk using bird-borne radar
Territory(ies)	Falkland Islands (FI); South Georgia and The South Sandwich Islands (SGSSI)
Lead organisation	British Antarctic Survey (BAS)
Partner institutions	BirdLife International
Grant value	£269,420.00
Start/end date of project	1 July 2019 to 31 December 2021
Reporting period (e.g., Apr 2018-Mar 2019) and number (e.g., AR 1,2)	Apr 2019-Mar 2020 Annual Report 1 (AR1)
Project leader name	Richard Phillips
Project website/blog/Twitter	https://www.bas.ac.uk/project/bycatch-risk-of-wandering-albatrosses-using-radar-detection/ https://www.bas.ac.uk/media-post/new-funding-uses-seabirds-as-sentinels-of-south-atlantic-ocean/ https://www.birdlife.org/worldwide/news/seabird-sentinels-will-help-mitigate-bycatch https://www.birdlife.org/sites/default/files/attachments/sea_change_17-7-19_web.pdf (page 4) https://twitter.com/BirdLifeMarine/status/1157328360332320773 https://twitter.com/BirdLife_News/status/1159388873430065152 https://community.rspb.org.uk/getinvolved/b/albatross-stories/posts/ana-carneiro---real-time-albatross-conservation-part-1 https://community.rspb.org.uk/getinvolved/b/albatross-stories/posts/ana-carneiro---real-time-albatross-conservation-part-2 https://museumofzoologyblog.com/2020/05/05/tracking-albatrosses/ https://www.darwininitiative.org.uk/assets/uploads/Darwin-Newsletter-June-2020-Safeguarding-our-Seas-FINAL.pdf (page 11) https://twitter.com/BirdLifeMarine/status/1269963354312974336
Report author(s) and date	Richard Phillips and Ana Carneiro; 29 June 2020

1. Project overview

Seabirds are amongst the most threatened birds in the world, often as a direct consequence of incidental mortality (bycatch) in fisheries. Assessing their susceptibility to bycatch is therefore essential for effective management and conservation. Wandering albatrosses at South Georgia have declined catastrophically since the 1960s, leading to the GSGSSI-led Action Plan, and their listing as one of just nine global priority populations by the Agreement on the Conservation of Albatrosses and Petrels (ACAP), among the 100s world-wide for the 31 ACAP species. Limited vessel-based monitoring indicate that two areas of particularly high risk for wandering albatrosses are the Patagonian Shelf and subtropical convergence. Impacts of illegal fishing there and elsewhere are unknown.

The project will link habitat preference, at-sea activity patterns and data from novel radar-detecting tags to quantify interactions of tracked birds with individual legal and illegal vessels (based on AIS data). This will greatly improve on previous coarse-scale analyses of overlap with fishing effort to clearly identify areas and periods of highest susceptibility to bycatch for different life-history classes (age, sex, breeding status).

2. Project stakeholders/partners

Project Partners

The project has one main partner; BirdLife International.

BirdLife International

The project main data analysts are based in BirdLife International. Ana Carneiro was also responsible for the initial fieldwork at Bird Island and for the training of the field assistants for subsequent device deployments. Regular contact (weekly or at least fortnightly) was maintained with the Project Leader (BAS) to discuss progress, fieldwork preparation and training, other issues, data analyses and to plan future activities. This has been very effective in ensuring that the project keeps progressing well.

Project stakeholders

Many stakeholders were identified. Among the UK OTs, these are GSGSSI and Falklands Government. There are multiple stakeholders among the NGOs, including BirdLife International, BirdLife Albatross Task Force and partners, Falklands Conservation, Projeto Albatroz (Brazil), and CICMAR (Uruguay), all involved in promoting seabird conservation. Other stakeholders include fisheries managers, in both national (Argentina, Uruguay, Brazil, Chile - SUBPESCA) and international bodies (ICCAT and CCAMLR).

Stakeholders were kept informed of project progress via email or social media. Stakeholders supported our correspondence and dialogue with fisheries representatives in Brazil, Argentina, Chile, Uruguay, South Georgia and the Falkland Islands to access their national Vessel Monitoring System (VMS) data.

3. Project Progress

3.1 Progress in carrying out project Activities

Output 1 Understand fine-scale attendance patterns of wandering albatrosses of different age, sex and breeding status to legal and illegal fishing vessels.

Activity 1.1. Organise fieldwork logistics

Progress to date: All the equipment, including multiple types of tracking device, were purchased and shipped to Bird Island, South Georgia. A fieldwork protocol detailing the deployment strategy (i.e. number of birds in each sex and life-history stage), deployment periods (tailored for each life-history stage) and device configurations (sampling intervals etc.) was finalised. Field assistants were trained in device deployment and programming. Applications for animal welfare and ethical review, environmental evaluation and govt. permits to conduct scientific activities in South Georgia have all been approved. Ana Carneiro attended a series of training courses (including personal survival techniques and first aid), and completed medical and dental examinations required for travel to the BAS field stations.

Activity 1.2 Collect and compile fisheries and tracking data (i.e. radar, 3-D acceleration, GPS location, and immersion data).

Progress to date: We contacted fisheries representatives in Brazil, Argentina, Chile, Uruguay, South Georgia and the Falkland Islands to access their national Vessel Monitoring System (VMS) data. There has been some progress but these data are mostly 'commercial in confidence' and we are still discussing access in most cases. We had multiple virtual meetings with David Kroodsma (Director of Research and Innovation) and others at Global Fishing Watch [GFW]) with regards to accessing satellite Automatic Identification System (AIS) data from vessels. This established a research collaboration with GFW, and we obtained AIS data that correlates with our positive vessel radar detections (i.e. when birds are close to fishing and other vessels). Satellite AIS and VMS data will help identify vessels with which the birds are interacting and the proportion with AIS in operation, determine the distance at which birds respond to fishing vessels - legal and illegal, unreported and unregulated (IUU), and the proportion of time spent behind vessels (and are therefore at risk).

Deployment of devices on juvenile wandering albatrosses (which require remote-download devices) were made in early December 2019. The batteries in these devices were expected to last for 6+ months, when birds disperse widely in the south Atlantic to southwest Indian Oceans. Due to device failures related to battery issues, we only received data for c. 30 days post-fledging. The device manufacturer will be sending new devices to replace the faulty ones, at no cost, and a new set of juvenile deployments are planned for early December 2020.

The tracking of adult and pre-breeding wandering albatrosses with GPS-radar and immersion loggers started in early December 2019. Ana Carneiro was in the field from December to the end of February. She completed deployments for breeders during incubation, and for pre-breeders and non-breeding (sabbatical) adults during the breeding season. The BAS field assistants collected data for adults during brood-guard in March/April 2020, and will deploy on breeders during post-guard chick-rearing in July 2020, completing data collection from all breeding stages.

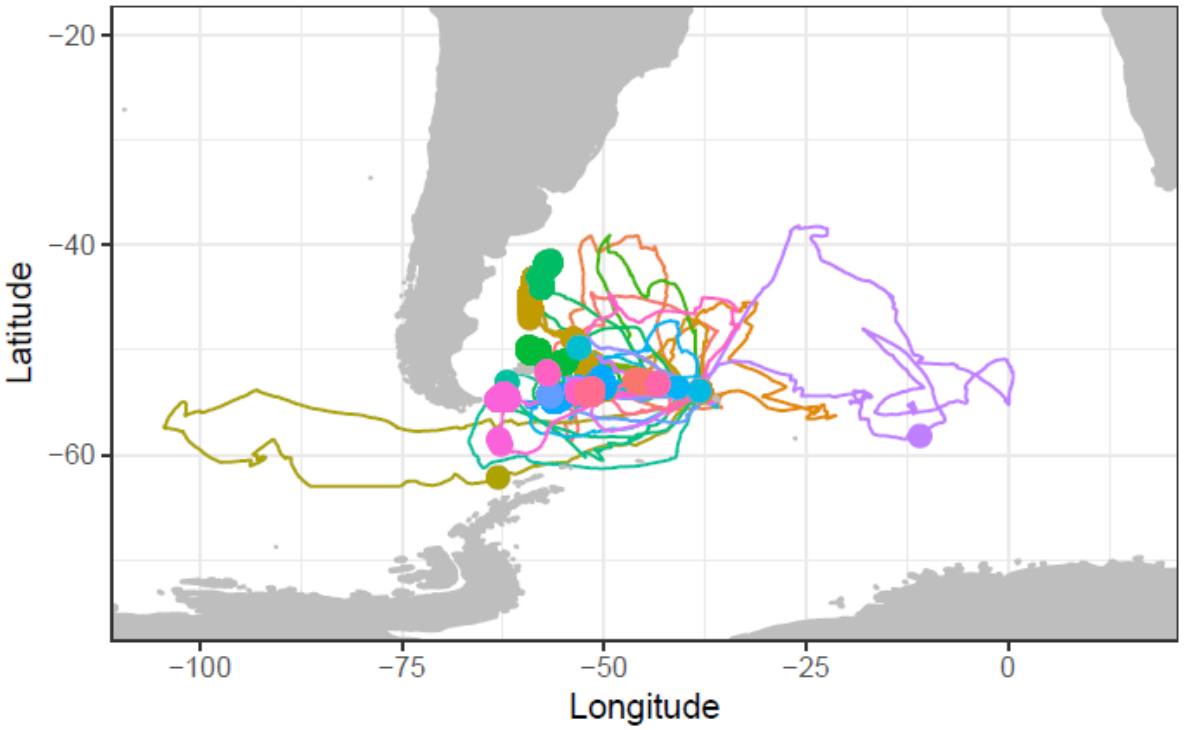
The project will also benefit from archived tracking data (GPS and immersion) collected from wandering albatrosses at Bird Island in previous field campaigns (without radar).

Activity 1.3 Data analysis to determine the distance at which wandering albatrosses respond to vessels (i.e. change direction, flight height etc. based on acceleration data), and proportion of time spent behind each vessel.

Progress to date: GPS-radar detection devices in combination with immersion loggers and accelerometers were deployed on 104 wandering albatrosses of different ages and sex (breeders in incubation: 30; breeders in brood-guard: 30; immatures: 29; sabbaticals: 15). GPS data were filtered to remove erroneous locations, and interpolated to obtain regular 10-min intervals. Data were split into foraging trips based on the first GPS fix outside a buffer of 100 m around the nest and the last GPS fix before return to the same buffer. Leg-mounted loggers tested for saltwater immersion every 6 seconds, and recorded the timing of any transitions between wet and dry states. Time spent dry indicates the bird is in flight, whereas wet time represents foraging activity or sitting on the water. The date-times of each wet-dry transition were rounded to the nearest 10 minutes, and then matched to the GPS fixes to calculate the number of landings (representing prey capture attempts) and the proportion of time spent wet. Landings and flights were assigned to daylight or darkness based on the time of the civil twilight.

All positive radar detections were matched in space and time with GFW data on AIS vessel locations. Initial analyses have involved using the “prox” function in wildlifeDI package in R (Long et al. 2019) to identify likely interactions. Twenty-three of the 30 birds tracked on foraging trips during incubation had contact with vessel radar (18 were from fishing vessels), as did six tracked immatures (2 from fishing vessels) and six sabbatical birds (one from fishing vessels). We do not yet have the GFW data for trips during brood-guard, but will request these and other data once the post-guard chick-rearing deployments have been completed.

The figure below is to illustrate the foraging trips of wandering albatrosses during the incubation period from Bird Island, South Georgia. Coloured circles indicate locations where birds encountered vessels.



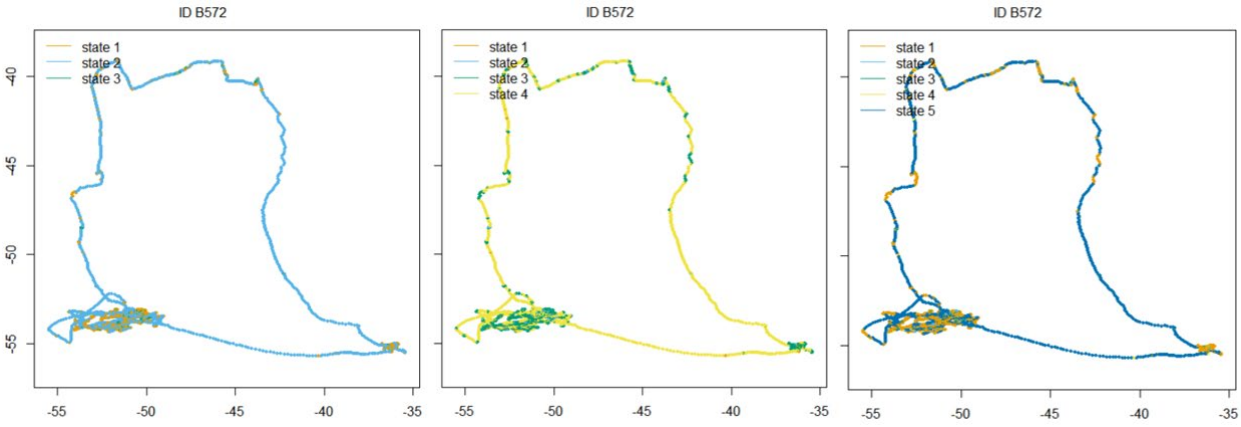
Activity 1.4 Assess whether a signature is detectable in GPS, acceleration and immersion data that indicates scavenging behind vessels vs feeding on natural prey. If so, quantify time spent following vessels from other GPS and immersion datasets (from the current and previous seasons).

Progress to date: A literature review has been conducted to compare different methods for identifying search behaviour from GPS, immersion and acceleration data. Several methods were considered including: 1) first passage time, 2) speed-tortuosity thresholds, 3) k-means clustering, 4) Hidden Markov Models, and 5) Expectation-maximization binary clustering.

Based on the results from the literature search, we are developing scripts written in the R language to work with Hidden Markov Models (HMM) using the package *momentuHMM*. Hidden Markov Models allow the inclusion of multiple data streams to classify behaviour (acceleration, turning angles and step lengths derived from GPS data, and number of landings derived from immersion loggers). Using *momentuHMM* we will also test for the effect of covariates on the probability of transitioning between states. For example, we may be able to use radar detections in state classification to assign two foraging states: “natural” vs “anthropogenic (behind fishing vessels)”.

Using a smaller subset of data to train the models, we compared the fit of models with 3-5 putative latent behavioural states (see figure below). We started with a simple null model, including only GPS data (turning angles and step lengths), followed by a model including 3 (turning angles, step lengths and number of landings OR turning angles, step lengths and proportion of wet) and 4 (turning angles, step lengths, number of landings, and proportion of wet) data streams. The diagnostic plots of the models including immersion data suggest that we still need some adjustments in the data distributions, and we are currently working on that. We hope to validate foraging behind fishing vessels using radar data.

The plots bellow are to illustrate the use of *momentuHMM* to classify behaviours. The plots represent the foraging trip of one individuals tracked from Bird Island, South Georgia during incubation. The results shown below are from models including 3 data streams: turning angles, step lengths and number of landings. The different number of states represent: foraging 1, travelling, resting (3 states), + search (4 states), + foraging 2 (5 states).



Output 2 Model habitat preferences of wandering albatrosses of different age, sex and breeding status.

Progress to date: activities under this output are not due to start until April 2021.

Output 3 Identification of the areas, periods and fleets from which bycatch risk is greatest for wandering albatrosses of different age, sex and breeding status.

Progress to date: activities under this output are not due to start until October 2020.

Output 4 Dissemination and application.

Progress to date: A series of communication channels were set up to publicise the project (see "Project website/blog/social media etc." above).

3.2 Progress towards project Outputs

Output 1 Understand fine-scale attendance patterns of wandering albatrosses of different age, sex and breeding status to legal and illegal fishing vessels.

Progress to date: The data collected so far gave us a first insight into the capabilities of novel bird-borne radars to quantify interactions of tracked wandering albatrosses with legal and IUU vessels. Data analysis is still ongoing and more data are yet to be collected, but it is already obvious that some of the radar detections did not correspond with a nearby vessel AIS location, suggesting that they originated from vessels without AIS, some of which will be IUU. The majority of detections were in the high seas, where risk-assessments based on the assumption that the co-occurrence of seabirds and fisheries lead to interaction (therefore mortality risk) are only available at very coarse resolutions. This technology has the power to clearly identify where and when in the Southern Ocean are albatrosses the most susceptible to bycatch. With this new technology, stakeholders and policy makers will have crucial information for improving regulations, targeting bycatch observer programmes and monitoring compliance with recommended bycatch mitigation to reduce bycatch to negligible levels.

The tracked birds of different ages and sex showed different levels of vessel attendance, with breeding birds attending more fishing vessels than pre-breeders and sabbatical birds during the breeding season. The behaviour of pre-breeders has provided new insights into the ecology of the species. Wandering albatrosses during this life-history stage seem to spend more time attending the colony than previously expected, and they also did not visit other breeding sites. This information is crucial to improve the current estimates of bycatch risk.

Output 2 Model habitat preferences of wandering albatrosses of different age, sex and breeding status.

Progress to date: not yet started.

Output 3 Identification of the areas, periods and fleets from which bycatch risk is greatest for wandering albatrosses of different age, sex and breeding status.

Progress to date: We still have to collect tracking data for the post-guard chick-rearing period. The activities related to this output are planned to start in Year 2.

Output 4 Dissemination and application

Progress to date: We have created various channel for the dissemination of the project results and to engage with stakeholders. This will facilitate communication once more results are available.

3.3 Progress towards the project Outcome

Project outcome: Improve understanding of susceptibility of wandering albatrosses to bycatch, including by legal and illegal vessels, and map the areas and periods of highest risk to better target bycatch mitigation and fisheries observer programmes.

0.1 Areas, periods and fleets of highest susceptibility of wandering albatross to bycatch recognised by fisheries regulatory bodies and incorporated into their management decisions.

Prior to this project, there was a knowledge gap regarding the proportion of birds from different life-history stages and sex that interact with vessels in the South Atlantic. Limited vessel-based monitoring indicate that two areas of particularly high risk for wandering albatrosses are the Patagonian Shelf and subtropical convergence. Impacts of IUU fishing there and elsewhere are also unknown. We are waiting on further, planned data collection before properly addressing this outcome. We expect from the available tracking data (without radar) that wandering albatrosses will interact with more fishing vessels during the post-guard chick-rearing when most individuals travel to higher risk areas. However, the radar loggers seem to have the potential to be a "game-changer" given the capacity to detect and locate the presence of vessels in national and international waters. Radar loggers will for the first time allow an estimation of the proportion of illegal vessels operating in areas used by wandering albatrosses from Georgia by providing unprecedented information on the distribution of fisheries in remote areas. This information is crucial to improve conservation advocacy and efforts. Radar loggers therefore have the capacity to be used for surveillance in remote ocean sectors.

0.2 Better advocacy strategies and allocation of resources to target bycatch mitigation and compliance-monitoring.

The identification of areas, periods and fleets of highest susceptibility of wandering albatross to bycatch will inform conservation advocacy and efforts. An improved understanding of bycatch risk, including from IUU vessels, will help focus allocation of the limited resources available to improve mitigation and compliance-monitoring. Stakeholders will be invited to a meeting in the last year of the project to make sure recommendations are tailored to their requirements.

3.4 Monitoring of assumptions

The assumptions identified at the proposal stage were:

1. **Tracked birds will have contact with vessels**- our first results showed that wandering albatrosses tracked from Bird Island, South Georgia interact with vessels, and that time spent near fishing and other vessels differs according to life-history stages.

2. **VMS or AIS data will be available for the tracking period**- we have established a productive working relationship with Global Fishing Watch, who have provided us with AIS data. We are still having ongoing discussion with Brazil, Argentina, Chile, Uruguay, South Georgia and the Falkland Islands to access their VMS data. Chile has already granted access.

3. **Stakeholders will engage with the project**–we have maintained regular contact with stakeholders via email or social media to ensure they are engaged with the project. The PI is closely involved with the international Agreement on the Conservation of Albatrosses and Petrels (ACAP), representing the interests of UK government bodies with devolved responsibilities for conservation of marine fauna in UK OTs and surrounding waters. He attended the last ACAP meeting where he discussed the project with stakeholders.

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

Albatrosses are the primary declining biodiversity in South Georgia, and the Government of South Georgia and South Sandwich Island's (GSGSSI) Albatross Conservation Action Plans aim to arrest this decline by 2020. Fisheries are the mainstay of the economies of the OTs. They have exemplary records in the last 1-2 decades of managing their own fisheries, providing the foundation for the Blue Belt programme. That initiative is intended to provide long-term protection for the marine environment but will not safeguard seabird populations from the OTs

when they forage in the EEZs of Brazil, Uruguay, Argentina and Chile, and in the High Seas (under ICCAT jurisdiction).

All the South Atlantic OTs consider conservation of threatened albatrosses and other seabirds to be top priorities in their environmental strategies, including National Plans of Action for fisheries.

Our project addresses Blue Belt ambitions as well as the goals in these documents, including multiple priorities in the GSGSSI Action Plan for wandering albatross. Indeed, the UK has a specific commitment under ACAP to report on progress with this Action Plan. Our project will also help the OTs meet the Convention on Biological Diversity's Aichi Targets.

The highest priority within these plans is to reduce bycatch of albatrosses in fisheries outside South Georgia waters. This year we have made progress towards our outputs (see Section 3.1 and 3.2 for details) which will when complete make a positive contribution towards the goals in the documents listed above.

4. Monitoring and evaluation

Monitoring and evaluation is conducted by the Project Leader who assesses progress against the logical framework. This underpins all aspects of the work plan, provides measurable outcomes, and sets realistic targets for completion. Monitoring of the finances of the project is carried out using BAS's internal financial systems.

There have been no changes to the M&E plan over the reporting period. The Project Leader has weekly face-to-face meetings or calls with BirdLife International which is sufficient for monitoring project for M&E. Regular emails are exchanges with stakeholders to ensure engagement.

5. Lessons learnt

We learned that using novel technology such as these GPS-radar devices can be challenging. Radar loggers are a potential "game-changer" to understand seabird-fisheries interactions. Some aspects of this technology and its application, however, are still in development. For example, there was limited documentation available explaining how the devices work. It took several attempts and different device programming configurations before we could successfully deploy the loggers on our target species. There were communication problems with the first batch of devices that arrived in the UK and all had to be sent back to the manufacturer in New Zealand. These problems were all overcome by allowing a sufficient period of preparation, including a devices testing phases in advance of the fieldwork. We also had unexpected issues with the satellite-linked GPS-radar loggers that were deployed on juveniles (which require remote-download devices). Unfortunately, the manufacturer had changed the device battery but not appreciated the repercussions for solar recharging. All these devices appeared to be working properly when they were tested and only started to fail after one month post-deployment. The manufacturer will send a new batch of loggers, at no cost, to be deployed in December 2020.

We also learned that obtaining VMS data can be more challenging than expected, even for countries that claim these data are openly available for scientific purposes, such as Brazil. We are still discussing with most countries how we can obtain these data. To overcome this issue, we have established a collaboration with GFW to obtain AIS data.

6. Actions taken in response to previous reviews (if applicable) n/a

7. Other comments on progress not covered elsewhere

We have no other comments to make.

8. Sustainability and legacy

The Project Leader attended the ACAP meeting in 2019 and engaged with many stakeholders to discuss about the expected outcomes of the project. A series of media communication materials, which will remain online, have been produced. The project website will remain online and will share the results of the project. Scientific papers will be published in open access journals.

The outcomes of this project (improve understanding of susceptibility of wandering albatross to bycatch and map areas and periods of highest risk to better target bycatch mitigation and fisheries observer programmes) will be monitored and sustained through BAS and BirdLife's ongoing engagement with stakeholders and tuna RFMOs. We are working to ensure they undertake regular monitoring and review seabird bycatch rates and build seabird bycatch elements into tuna RFMO compliance monitoring processes.

9. Darwin identity

The Darwin Initiative logo has been used on our two main project webpages. The main project webpage with maps is hosted by BAS and can be found here. The page hosted by BirdLife International can be found here. The Darwin Initiative has also been acknowledged as a funder of the project in all our communication material, examples of which can be seen here and here. The logo has also been used in presentations about the project. Darwin has been mentioned as a funder in the BirdLife International Marine Programme newsletter linking back to the Darwin Initiative and its social media channels. We have given several talks referring to the project, and in all cases made reference to the Darwin funding.

South Georgia has no permanent residents but the government is very aware of the Darwin Initiative as a funder of this project, as well as several other projects taking place on the islands, including for the habitat restoration project, and invasive plant management. The Falklands Government have also a good understanding of Darwin.

10. Project Expenditure

Table 1: Project expenditure <u>during the reporting period</u> (1 July 2019 – 31 March 2020)

Project spend (indicative) in this financial year	**2019/20 D+ Grant (£)**	**2019/20 Total actual D+ Costs (£)**	**Variance %**	**Comments (please explain significant variances)**
Staff costs				
Consultancy costs				
Overhead Costs				
Travel and subsistence				
Operating Costs				
Capital items				
Others (Please specify)				
TOTAL				

Annex 1: Report of progress and achievements against Logical Framework for Financial Year 2019-2020 - <u>if appropriate</u>

Project summary	Measurable Indicators	Progress and Achievements April 2019 - March 2020	Actions required/planned for next period
Impact Population declines of wandering albatrosses from South Georgia will slow or reverse, and species conservation status will improve due to more effective management.		Albatrosses are the principal declining group of species for the Territories involved in the project. GSGSSI have specific albatross species action plans that this project is attempting to address.	
Outcome Improve understanding of susceptibility of wandering albatrosses to bycatch, including by legal and illegal vessels, and map the areas and periods of highest risk to better target bycatch mitigation and fisheries observer programmes.	0.1 Areas, periods and fleets of highest susceptibility of wandering albatross to bycatch recognised by fisheries regulatory bodies and incorporated into their management decisions. 0.2 Better advocacy strategies and allocation of resources to target bycatch mitigation and compliance-monitoring.	0.1-0.2 Currently unable to measure against the indicators as the analysis and reports have not yet been completed.	Continuation of analyses
Output 1. Understand fine-scale attendance patterns of wandering albatrosses of different age, sex and breeding status to legal and illegal fishing vessels.	1.1 Find the distance at which wandering albatrosses respond to vessels and proportion of time spent behind each legal and IUU vessel.	1.1 We have collected most of the data to understand the fine-scale attendance patterns of wandering albatrosses to legal and illegal fishing vessels. The radar loggers proved to be a "game-changer" given the capacity for identifying IUU vessels, and interactions occurring in the high-seas, where information is badly needed.	
1.1 Organise fieldwork logistics.		Activity 1.1 is complete.	Activity 1.1 is complete.
1.2 Collect and compile fisheries and tracking data (i.e. radar, 3-D acceleration, GPS location, and immersion data).		Extensive tracking data for adult birds during incubation and brood-guard, and pre-breeders and sabbatical during the breeding season have been collected. Vessel AIS data have been compiled.	Finish tracking data collection for the remaining life-history stages: post-guard chick-rearing and juveniles. Continue to engage with fisheries representatives to be granted access to VMS data.

Project summary	Measurable Indicators	Progress and Achievements April 2019 - March 2020	Actions required/planned for next period
1.3 Data analysis to determine the distance at which wandering albatrosses respond to vessels (i.e. change direction, flight height etc. based on acceleration data), and proportion of time spent behind each vessel.		All tracking data collected have been cleaned and standardised according to standard protocols. Positive radar locations were matched in space and time to GFW vessel AIS data to determine the distance at which wandering albatrosses respond to vessels and the proportion of time spend behind each vessel.	Continue data analysis after data collection finishes to have a full understanding of seabird-fishery interactions for different life-history stages and sex.
1.4 Assess whether a signature is detectable in GPS, acceleration and immersion data that indicates scavenging behind vessels vs feeding on natural prey. If so, quantify time spent following vessels from other GPS and immersion datasets (from the current and previous seasons).		Literature review to identify the best methods to classify behaviours. Stared developing codes to work with HMMs.	Improve HMMs to distinguish between feeding behind vessels (i.e. anthropogenic resources) and feeding on natural prey.
Output 2. Model habitat preferences of wandering albatrosses of different age, sex and breeding status.	2.1 Relationship between species and oceanographic variables. 2.2 Predictive maps of wandering albatross distribution and high-density hotspots.	2.1-2.2 Currently unable to measure against the indicators as the analysis have not yet been completed.	
2.1 Extract oceanographic data at appropriate spatial and temporal scales.		This activity has not yet commenced	Identify a set of oceanographic variables that are biologically relevant for wandering albatrosses and download from public databases.
2.2 Build and evaluate habitat models.		This activity has not yet commenced	Build habitat models based on the oceanographic variables identified in the literature as of relevance for wandering albatrosses.
2.3 Generate predictive maps of distribution of wandering albatrosses of different age, sex and breeding status.		This activity has not yet commenced	Use the results from the models above to predict distribution maps of wandering albatrosses of difference age, sex and breeding status.

Project summary	Measurable Indicators	Progress and Achievements April 2019 - March 2020	Actions required/planned for next period
Output 3. Identification of the areas, periods and fleets from which bycatch risk is greatest for wandering albatrosses of different age, sex and breeding status.	3.1 Maps of the overlap of predicted habitat use with fine-scale data on fishing effort (reported effort by 1 deg. square, VMS or AIS data) and proportion of time spent behind vessels. 3.2 Maps quantifying the risk of birds from each fleet and in different periods.	3.1-3.2 Currently unable to measure against the indicators as the analysis have not yet been completed. Work towards achieving this output will start in October 2020.	
3.1 Calculate temporal and spatial overlap between predicted distributions of wandering albatrosses and fishing effort. Identify areas and times of greatest interaction (and therefore bycatch risk).		This activity has not yet commenced	Combine all the results from the individual analysis to identify areas and times of greatest interaction between albatrosses and fisheries.
4. Dissemination and application	4.1 Results and recommendations shared with stakeholders to inform their conservation advocacy and efforts. 4.2 Data deposited in global databases. 4.3 Reports/papers to working groups of fisheries bodies 4.4 Publish two manuscripts. 4.5 Share results via websites and conferences.	4.1-4.5 Currently unable to measure against the indicators as the results of the project have not yet been completed. We have created various communication channels for the dissemination of the project and to engage with stakeholders.	Continue disseminating results of the project and engaging with stakeholders.
4.1a Share results and recommendations with stakeholders. 4.1b Organise workshop in South America with main stakeholders		4.1a The Project Leader has engaged with stakeholders during the ACAP meeting last year to discuss about the project. 4.1b This activity has not yet commenced.	Continue engagement with stakeholders and organise the workshop in South America.
4.2 Deposit tracking data into BirdLife online Tracking Database.		This activity has not yet commenced	Deposit data into BirdLife online Tracking Database when data collection is completed.

Project summary	Measurable Indicators	Progress and Achievements April 2019 - March 2020	Actions required/planned for next period
4.3 Prepare reports for working groups		This activity has not yet commenced	Prepare reports prior to the workshop to be discussed with stakeholders.
4.4 Prepare manuscripts for publication in peer-reviewed journals.		This activity has not yet commenced	Prepare manuscripts after all data analysis is finished.
4.5a Attend national and international conference to present results. 4.5b Make results available via websites for public dissemination.		4.5a This activity has not yet commenced 4.5b Various communication channels for the dissemination of the project and to engage with stakeholders were set during this reporting year.	Prepare material to disseminate results, and attend national and international conferences.

Annex 2: Project's full current log frame as presented in the application form (unless changes have been agreed) - if appropriate

N.B. if your application's log frame is presented in a different format in your application, please transpose into the below template. Please feel free to contact Darwin-Projects@ltsi.co.uk if you have any questions regarding this.

Project summary	Measurable Indicators	Means of verification	Important Assumptions
Impact: Population declines of wandering albatrosses from South Georgia will slow or reverse, and species conservation status will improve due to more effective management. (Max 30 words)			
Outcome: (Max 30 words) Improve understanding of susceptibility of wandering albatrosses to bycatch, including by legal and illegal vessels, and map the areas and periods of highest risk to better target bycatch mitigation and fisheries observer programmes.	0.1 Areas, periods and fleets of highest susceptibility of wandering albatross to bycatch recognised by fisheries regulatory bodies and incorporated into their management decisions. 0.2 Better advocacy strategies and allocation of resources to target bycatch mitigation and compliance-monitoring.	0.1 Results of the project will be communicated to stakeholders via email, teleconferences and, if appropriate, in person. Key stakeholders will be invited for a workshop at the end of the project. 0.2 Workshop report with agreed recommendations for improved bycatch management including targeting of resources to monitor bycatch rates and compliance with recommended mitigation will be widely shared. 0.3 Consult expert opinion and peer-review process.	Tracked birds will have contact with vessels. In a preliminary study (Indian Ocean) using similar devices, 79.5% of loggers attached to birds detected vessels. VMS or AIS data will be available for the tracking period. This project combines multiple sources of access to vessel locations. Stakeholders will engage with the project. Discussions throughout the project will be made to ensure engagement of stakeholders and viability of the actions.
Outputs: **1**. Understand fine-scale attendance patterns of wandering albatrosses of different age, sex and breeding status to legal and illegal fishing vessels.	1.1 Find the distance at which wandering albatrosses respond to vessels and proportion of time spent behind each legal and IUU vessel.	1.1 Consult expert opinion and peer-review process.	Tracked birds will have contact with vessels. In a preliminary study (Indian Ocean) using similar devices, 79.5% of loggers attached to birds detected vessels.
2. Model habitat preferences of wandering albatrosses of different age, sex and breeding status.	2.1 Relationship between species and oceanographic variables. 2.2 Predictive maps of wandering albatross distribution and high-density hotspots.	2.1 Models will be validated by performance metrics using withheld data. 2.2 Consult expert opinion and peer-review process.	Seabird data will correlate with environmental data and models will have good predictive capacity. There is ample evidence that seabirds select habitats based on oceanographic

			cues. Additionally, large sample sizes, correct choice of oceanographic variables and the use of appropriate methods will minimize the chances of poor model performance.
3. Identification of the areas, periods and fleets from which bycatch risk is greatest for wandering albatrosses of different age, sex and breeding status.	3.1 Maps of the overlap of predicted habitat use with fine-scale data on fishing effort (reported effort by 1 deg. square, VMS or AIS data) and proportion of time spent behind vessels. 3.2 Maps quantifying the risk of birds from each fleet and in different periods.	3.1 Consult expert opinion and peer-review process.	Fine-scale data will remain available and vessels will be detected by loggers (see above).
4. Dissemination and application	4.1 Results and recommendations shared with stakeholders to inform their conservation advocacy and efforts. 4.2 Data deposited in global databases. 4.3 Reports/papers to working groups of fisheries bodies 4.4 Publish two manuscripts. 4.5 Share results via websites and conferences.	4.1 Results and recommendations available for OT governments, other countries, and local and international NGOs. Workshop with the main stakeholders. 4.2 Datasets available online. 4.3 Working papers discussed at fisheries meetings. 4.4 Manuscripts accepted for publication. 4.5 Monitor number of visitors to the website and interest in the project at conferences.	Manuscripts will be accepted for publication. Working group papers will be discussed as relevant for particular agenda items. The novelty and relevance of the study for the conservation of wandering albatrosses will make it a priority in conservation or policy journals, and for consideration by fisheries management bodies.

Activities (each activity is numbered according to the Output to which it will contribute, e.g. 1.1, 1.2 and 1.3 are contributing to Output 1)

1.1 Organise fieldwork logistics.

1.2 Collect and compile fisheries and tracking data (i.e. radar, 3-D acceleration, GPS location, and immersion data).

1.3 Data analysis to determine the distance at which wandering albatrosses respond to vessels (i.e. change direction, flight height etc. based on acceleration data), and proportion of time spent behind each vessel.

1.4 Assess whether a signature is detectable in GPS, acceleration and immersion data that indicates scavenging behind vessels vs feeding on natural prey. If so, quantify time spent following vessels from other GPS and immersion datasets (from the current and previous seasons).

2.1 Extract oceanographic data at appropriate spatial and temporal scales.

2.2 Build and evaluate habitat models.

2.3 Generate predictive maps of distribution of wandering albatrosses of different age, sex and breeding status.

3.1 Calculate temporal and spatial overlap between predicted distributions of wandering albatrosses and fishing effort. Identify areas and times of greatest interaction (and therefore bycatch risk).

4.1a Share results and recommendations with stakeholders.

4.1b Organise workshop in South America with main stakeholders

4.2 Deposit tracking data into BirdLife online Tracking Database.

4.3 Prepare reports for working groups

4.4 Prepare manuscripts for publication in peer-reviewed journals.

4.5a Attend national and international conference to present results.

4.5b Make results available via websites for public dissemination.

Checklist for submission

	Check
Is the report less than 10MB? If so, please email to Darwin-Projects@ltsi.co.uk putting the project number in the Subject line.	Yes
Is your report more than 10MB? If so, please discuss with Darwin-Projects@ltsi.co.uk about the best way to deliver the report, putting the project number in the Subject line.	No
Have you included means of verification? You need not submit every project document, but the main outputs and a selection of the others would strengthen the report.	Yes
Do you have hard copies of material you want to submit with the report? If so, please make this clear in the covering email and ensure all material is marked with the project number. However, we would expect that most material will now be electronic.	No
Have you involved your partners in preparation of the report and named the main contributors	Yes
Have you completed the Project Expenditure table fully?	Yes
Do not include claim forms or other communications with this report.	