

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 2018

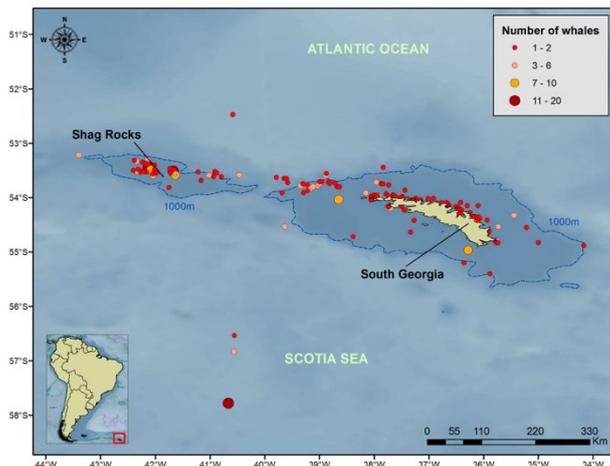
Darwin Plus Project Information

Project reference	DPLUS057
Project title	Population recovery of right whales in South Georgia waters
Territory(ies)	South Georgia
Contract holder institution	British Antarctic Survey
Partner institutions	University of St Andrews, International Fund for Animal Welfare, Woods Hole Oceanographic Institute, University of Utah, Instituto Aqualie, Projeto Baleia Franca, Happywhale, University of Barcelona
Grant value	£312,111
Start/end date of project	01/04/17 to 31/12/19
Reporting period (e.g., Apr 2017-Mar 2018) and number (e.g., AR 1,2)	April 2017-March 2018 Annual Report 1
Project leader name	Jennifer Jackson
Project website/blog/Twitter	@polarbiome
Report author(s) and date	Jennifer Jackson 24/05/18

1. Project overview

Southern right whales are slowly recovering from whaling and are the most commonly seen whale in South Georgia (SG) waters. This summer feeding population is likely one of the most significant Antarctic krill consumers in SG waters, but its distribution, abundance and population recovery status has not been investigated. Whales summering in South Georgia have been directly linked, through photo-identification and satellite tagging, to winter calving grounds at Península Valdés (PV), Argentina. PV has had high calf mortalities in the last decade, causes of which are unknown. Growing evidence indicates that SG environmental conditions influence whale population dynamics, suggesting foraging success is a primary factor influencing reproductive-rates. It is therefore timely and important to conduct surveys of the feeding ground, to investigate prey sources, habitat-use between seasons and in relation to krill fishing within the Marine Protected Area, population abundance and connectivity with calving areas, health and population recovery status. In summary, the project will conduct a survey of South Georgia southern right whale feeding ground recovery, post whaling, characterising the distribution, diversity, habitat use, health and calving ground connections, abundance and recovery status of this population following whaling during January/February 2019.

The project is located in South Georgia; the map below also shows numbers of right whales sighted opportunistically in this region.



2. Project stakeholders/partners

This project has involved a number of project partners. Partnership development has proceeded via regular email and Skype calls with partners in order to plan project elements. The primary partners involved in project planning and decision making are St Andrews University (genetics and hormone analysis), Woods Hole Oceanographic Institute (drone deployment) and Instituto Aqualie (satellite tracking). Once data are in hand, the input of regional collaborators at the University of Utah and Instituto Baleia Franca becomes stronger as they will be matching images of whales with their catalogues.

Happywhale is a strategic partner who is assisting with promotion of the work and encouraging right whale image collection within the Antarctic tourist community. The International Association of Antarctic Tour Operators (IAATO) community were informed about the project via email and distribution of project leaflets, and this resulted in four submissions of right whale photo-identifications to happywhale.com during 2018/19. We learned from this exercise that more work is required to increase the visibility of the project among the Antarctic tour operators, particularly the South Georgia tourist community (visitors and naturalists). PI Jackson therefore co-developed a project proposal to the International Whaling Commission (IWC) Scientific Committee (May 2018) with two research colleagues to develop laminated whale ID and photo-ID guides, naturalist information sheets and Powerpoint tools for circulation within the Antarctic tourist community, to improve community understanding of how to gather useful whale photo-identifications and how these data can be used to understand whale movements and abundance. This proposal was supported by the IWC, and subsequently funding has been made available by the Southern Ocean Research Partnership to develop this guide during June-October 2018 for circulation in advance of the next Antarctic season (Jan/Feb 2019).

The partnership discussions are working well and there are no problems to report. All key stakeholders have been engaged during the process of project planning, including meetings held during February 2018 with the South Atlantic Environmental Research Institute, the Government of South Georgia and the South Sandwich Islands, and Falklands Conservation. An evening talk on the broad aims of the project and outcomes was also given in the Falklands (at the Chamber of Commerce) in February 2018 in order to inform stakeholders and citizens about project progress. The Government of South Georgia and the South Sandwich Islands also have been providing advice regarding appropriate vessels for the survey, and we are currently liaising with them to develop an application for a scientific research permit for the planned survey work. We have also offered support to the South Atlantic Environmental Research Institute for

their cetacean research program, and held multiple meetings to exchange information and project development ideas during January and February 2018.

The IWC Scientific Committee have been engaged with the project through three avenues. Firstly, a field report on the 2018 South Georgia right whale expedition (primarily supported by EU BEST, document SC/67b/SH20) was presented to the Scientific Committee's Southern Hemisphere sub-committee for discussion and feedback, particularly with regional delegates from range states of Argentina, Brazil and South Africa, which all contain southern right whale calving grounds potentially associated with the South Georgia feeding ground. Secondly, as discussed above Jackson (with two IWC colleagues) developed a funding proposal to develop a whale photo-identification guide for Antarctic tour operators to improve visibility of project activities within this community. This concept was discussed within the Photo-Identification Working Group and then endorsed by the Scientific Committee (see above). Thirdly, PI Jackson and PP Carroll proposed to organise an IWC Scientific Committee workshop to review right whale catch records across the Southern Hemisphere, to help progress regional assessments of population recovery. This will assist with the finalisation of the catch series review being conducted by this project (Output 4.1). The Scientific Committee endorsed this proposal. Funding for the workshop will be confirmed by the IWC in October 2018, and it will be held during 2019/20.

The CCAMLR Scientific Committee are an additional stakeholder and have not yet been engaged with this project. Reporting to CCAMLR is planned to occur after the 2019 field survey has taken place.

3. Project Progress

The first year of this project has been the planning phase towards a South Georgia field season to be held in Jan/Feb 2019. During year 1, a full vessel specification and invitation to quote was devised for the survey vessel that opened for bids between 6th October and 30th November 2017. Contract negotiations to secure the vessel are now ongoing. The charter costs quoted for 35 days of work are significantly higher than those originally factored into the DARWIN grant and we are seeking supplementary funding to maintain the survey length. Bespoke equipment for the survey has also been purchased, or loans identified where appropriate. This includes purchase of sonobuoys for localising whales, photographic equipment, foul weather gear, biopsy equipment, a Dewar for cold storage of samples on deck, and arrangements for a loan of acoustic equipment from US National Oceanic and Atmospheric Administration. The field team have undergone wilderness first aid training and obtained medical approval for their deployment. A contract for Dr Vighi's post-doctoral work to be conducted with the University of Barcelona and Agreement of Understanding is currently being drawn up with the British Antarctic Survey and is anticipated to be agreed before the end of May 2018.

3.1 Progress in carrying out project Activities

All project activities set for this year have been met and timings are on track. The first project year has focussed on planning for year two activities, and no significant delays with project progress have been identified to date. One challenge has been the availability of suitable charter vessels to support the work, and the costs quoted for conducting the survey at 35 days are significantly higher than the funds originally factored into the grant for this time-period. We have applied for additional funding elsewhere to ensure 35 days of survey can be carried out.

3.2 Progress towards project Outputs

None of the project outputs 1-4 can be commenced before the field survey is conducted in year 2 of the project. However some progress has been made towards project output

5 through (5.1) productive pre-project meetings in Stanley with stakeholders the South Atlantic Environmental Research Institute, the Government of South Georgia and the South Sandwich Islands and Falklands Conservation in February 2018, and (5.2) development of the relationship with citizen science whale image analysts happywhale.com, who have supplied the project with four citizen-contributed South Georgia and Falkland Islands right whale images from this 2017/2018 season.

3.3 Progress towards the project Outcome

The main project outcome has not yet been achieved since the field surveys will take place in 2018/19. Work conducted in 2017/18 to provide a full specification of the vessel charter and run a tender for the charter means that an appropriate survey vessel is close to being secured to achieve the outcome. Bespoke items for the survey which have a long lead-time or are difficult to secure have been purchased. Permit applications for conducting the work in South Georgia waters are under preparation (deadline in June 2018) as well as an application for review of the project procedures by the BAS animal welfare and ethics review board, and a full project risk assessment for Operations planning.

3.4 Monitoring of assumptions

There have not been changes to the assumptions currently outlined in the project plan. One assumption was that there would be appropriate vessels available which could support the project at the level of anticipated funding. This has not proved to be the case over the timescale of project planning (most experienced Antarctic vessels book their projects 3+ years in advance). Our higher costs reflect the lack of local availability to support this expedition, requiring vessels to come from further afield and therefore requiring additional mobilisation costs. The project is meeting this change in circumstances by seeking further supplementary funds from other sources to support the extra costs, which are hoped to be secured by the end of July 2018 to enable smooth cruise planning thereafter. One major assumption in our project plan (outcome assumption 2) of was that bad weather would occur at ~3 days in 10 based on estimates from people experienced in at-sea conditions at South Georgia. However the 2018 EU BEST funded field survey suffered significantly more bad weather days than those anticipated. During 19 South Georgia survey days in 2018, only 5 days had workable weather conditions and no days had weather sufficiently good to deploy satellite tags or drones. In order to reduce the impact of bad weather on project outcomes we are seeking further funding from other sources to extend the length of the survey (funds to support up to two months of survey time during Jan/Feb 2019 are sought). We are also broadening the scope of the survey in order to enhance collection of data that is not negatively impacted by poor weather, for example bringing a high-quality echo-sounder onto the field cruise in order to characterise the prey field while we are working with whales, to better understand the context of their habitat use.

CONFIDENTIAL: Given the reasonable risk that poor weather may not enable us to deploy any satellite tags this season, we are negotiating a collaborative agreement with Argentine researchers to obtain tracking data from their current southern right whale satellite tracking project based on the right whale calving ground at Península Valdés (Argentina), to characterise South Georgia habitat use using the high latitude component of data and ensure this aspect of the project can be completed. In return, the researchers will deploy our satellite tags in Península Valdés, to potentially track whales into South Georgia, and can use the Argentine habitat use and migratory connection data to further develop their own project goals to understand local habitat use patterns. Argentine-UK collaborations can be tricky to negotiate due to diplomatic considerations at the government level, and negotiations to develop this collaboration are still underway, so this aspect of project planning is currently confidential.

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

Since the project is still in the planning phase, there has not been any progress on environmental and climate outcomes yet.

4. Monitoring and evaluation

Financial monitoring has been carried out by the British Antarctic Survey, while Skype and telephone based project meetings have been conducted to progress project planning. As detailed in the project proposal, we also submitted a field report to the IWC Scientific Committee during May 2018 for discussion (see Report Section 2, no significant changes to the project plan result from this feedback). No changes have been made to the current M&E plan, and no problems with this approach have been identified to date.

5. Lessons learnt

The main lessons learnt are from the EU BEST supported field survey in January/February 2018, which taught us that local weather and sea conditions may be more prohibitive to some of the planned science than originally anticipated, and that certain types of science are more tractable to achieve in South Georgia waters (visual surveys, photo-ID and acoustic monitoring) than others (satellite tracking, drone deployment) due to local conditions. Consequently, the field team plan will be modified in 2019 to ensure at least two whale photo-ID experts are present, to maximise the opportunity of getting good quality photo-IDs which can be matched with calving grounds and between survey years.

We also found that the first year of promotion of the project within IAATO/the Antarctic tourist community was not very successful in terms of visibility. Consequently, we are preparing Powerpoint materials, naturalist notes and laminated photo-ID guides for tour ships which will be principally funded by the Southern Ocean Research Partnership and circulated in September 2018, significantly in advance of the upcoming field season, to allow time for email and social media based promotion of these citizen science activities within the community.

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

N/A

7. Other comments on progress not covered elsewhere

N/A

8. Sustainability and legacy

Talks about the South Georgia right whale project have been given to the South Georgia Association (October 2017), and at a public evening event held in the Chamber of Commerce in Stanley, Falkland Islands in February 2018, on the National Geographic 'Orion', and to the King Edward Point community (including South Georgia museum, government members and local scientists). Leaflets encouraging collection of photo-IDs were circulated within the Antarctic tour operator community; as described in Section 2 there will now be a photo-ID guide developed to improve Antarctic tour operator engagement in this and related whale photo-ID projects to measure abundance and connectivity. Increased interest in this aspect from the Antarctic tour community can be directly measured by photo-ID submissions to happywhale.com. The project (combined EU BEST and DARWIN funded aspects) has been highlighted in a BBC News item (see section 9 below) as well as two radio interviews, one with Falklands Radio to increase visibility within the Territory.

Our strategy for this project is to develop a sustained program of data collection to understand the distribution and habitat use of whales recovering in South Georgia waters. Further work is required to develop this program through burgeoning

relationship with funders who have an interest in South Georgia and its biodiversity heritage.

9. Darwin identity

The project has used the Darwin Initiative logo in all public talks given so far (see section 8). The Darwin Initiative was also highlighted in a BBC News item about the project (<http://www.bbc.co.uk/news/science-environment-42708207>). The project forms part of a larger program. At present given that the project is still in preparation stage, visibility of the Darwin Initiative is not yet high but Darwin activities and funding opportunities will be heavily promoted via social media and project related outreach activities during the 2018/19 season.

10. Project Expenditure

Table 1: Project expenditure during the reporting period (1 April 2017 – 31 March 2018)

Project spend (indicative) in this financial year	2017/18 D+ Grant (£)	2017/18 Total actual D+ Costs (£)	Variance %	Comments (please explain significant variances)
Staff costs				
Consultancy costs				
Overhead Costs				
Travel and subsistence				
Operating Costs	60,622	55,408.22	-8.5%	One item included under this heading 'sonobuoys' is currently with a third party identified as "BAS" and is being modified for our specific requirements. We have informed DARWIN of this change.
Capital items	6,660	6,659.73	0%	
Others (Please specify)				
TOTAL	67,282	62,067.9		

Annex 1: Report of progress and achievements against Logical Framework for Financial Year 2017-2018 – if appropriate

Project summary	Measurable Indicators	Progress and Achievements April 2017 - March 2018	Actions required/planned for next period
<p>Impact</p> <p>Integrate whale abundance, status and habitat use data into GSGSSI MPA planning, CCAMLR krill management models, IWC Conservation Management Plan, supporting objectives of the Conventions on Biological Diversity and on Conservation of Migratory Species, and to IUCN Cetacean Specialist Group</p>		<p>No progress on these items to date</p>	
<p>Outcome</p> <p>To establish and publish baseline data on the status and recovery levels of South Georgia southern right whale feeding grounds, post whaling. Characterise abundance, distribution, diversity, habitat use, health and calving ground connections for conservation management.</p>	<p>The project will provide the first baseline data on the feeding ground abundance and recovery population status of southwest Atlantic southern right whales.</p> <p>This data will contribute to (i) the GSGSSI's marine management through interim and final publicly available reports, in particular to inform MPA monitoring and review processes, (ii) CCAMLR krill spatial management modelling framework, (iii) the IWC Conservation Management Plan for this population</p>	<p>The survey vessel specification was constructed for a tender exercise which concluded in November 2017 with at least one bid received.</p> <p>Purchases of key equipment have been made, including sonobuoys for acoustic monitoring, a Paxarm biopsy system, photographic equipment, foul weather gear, a Dewar for cold storage of samples on deck.</p>	<p>0.1 Five week field survey</p> <p>0.2 Satellite tracking of ten whales</p> <p>0.3 Photo-identification and microsatellite genotype matching between South Georgia over two field seasons and with Argentine and Brazilian calving grounds</p> <p>0.4 Stable isotope data from up to 20 whales and 100 zooplankton samples to determine whale prey</p> <p>0.5 Collation of all available right whale sightings data</p> <p>0.6 Hormone assays and body condition photographs from up to 20 whales.</p> <p>0.7 Collation of oceanographic data associated with SG marine ecosystem</p> <p>0.8 Calculate abundance and feeding ground connectivity with</p>

			<p>Argentina and South Africa</p> <p>0.9 Collate right whale catch history data from southwest Atlantic</p> <p>0.10 Conduct population modelling of the historical trajectory of right whales in the southwest Atlantic to measure population status and recovery levels.</p>
<p>Output 1: Report to GSGSSI on (i) status assessment of southern right whale SG distribution, habitat use and recovery patterns in the southwest Atlantic, (ii) risks to the population, (iii) recommended actions to mitigate risks</p>	<p>Data compiled from cruise and combined with other sightings, incorporated into a single document available externally for viewing on the website of the GSGSSI.</p> <p>Provides a baseline for measuring change in species characteristics in response to impacts, including climate change.</p>	<p>Whale sightings data collected from cruises to date have been compiled. The collation into a document will occur during 2018/19.</p>	
<p>Activity 1.1 Virtual project planning meeting with all project partners and key stakeholders in GSGSSI in May 2017 with subsequent M&E meetings every six months.</p>		<p>Regular Skype, email and telephone calls with project partners and stakeholders have kept project planning on track and ensured key personnel have input into project planning.</p>	
<p>Activity 1.2.1 Obtain permits from GSGSSI and Animal Ethics approvals for fieldwork and scientific procedures.</p> <p>Activity 1.2.2 Equipment purchase, permit applications, shipping of equipment to Falkland Islands as British Antarctic Survey cargo.</p>		<p>Permit applications are in progress. Deadlines for these occur during 2018/19.</p> <p>Key equipment has been purchased. Shipping deadlines occur during 2018/19.</p>	
<p>Activity 1.3 Travel to Falkland Islands for pre-cruise workshop in Stanley, Falkland Islands to discuss cruise details and expected outcomes with OT government officials, NGOs and Antarctic tour operators.</p>		<p>To occur during 2018/19</p>	
<p>Activity 1.4 Survey embarks from Stanley, Falkland Islands for 5 weeks</p> <p>Activity 1.4.1 Deploy DIFAR sonobuoys and use sonobuoy transmissions</p>		<p>To occur during 2018/19</p>	

<p>and sightings to locate whales</p> <p>Activity 1.4.2 Skin samples collected from all encountered whales (50)</p> <p>Activity 1.4.3 Photographs collected of all encountered whales (50-60, head shots collected via hexacopter)</p> <p>Activity 1.4.4 Satellite tracking of up to 10 whales (PP Zerbini and Andriolo)</p> <p>Activity 1.4.5 Blubber samples collected from 10-20 whales (PP Carroll)</p> <p>Activity 1.4.6 Photogrammetry measurements taken by hexacopter from 10-20 whales</p> <p>Activity 1.4.7 Blog about survey on British Antarctic Survey website, using blog, twitter and media outlets to share photos and videos from the voyage.</p>	
<p>Activity 1.5 Biological samples shipped from the Falkland Islands to UK as British Antarctic Survey cargo in April 2018, transported at appropriate storage temperature.</p>	<p>To occur during 2019/20</p>
<p>Activity 1.6.1 Provide photo-ID catalogue to regional associates in Brazil and Argentina, also IWC secretariat for open access hosting and happywhale.com. Circulate copies of catalogue to tour operators working in the South Georgia region in order to encourage crowd-sourced photo submissions</p> <p>Activity 1.6.2 Project Partners (Rowntree and Groch) conduct photo-ID matching with Argentine and Brazilian calving grounds. Project Partner Rowntree will also conduct photo-ID matching between the two South Georgia survey years to identify any resights.</p>	<p>To occur during 2018/19. Construction of South Georgia photo-ID catalogue from 2018 cruise is in progress.</p>
<p>Activity 1.7.1 Compile acoustic and sightings data from cruise years 1 and 2 (PP Leaper and PL Jackson)</p> <p>Activity 1.7.2 Compile oceanographic data over two years of surveys to put sightings and satellite tracks in oceanic context (Trathan at BAS)</p> <p>Activity 1.7.3 Construct right whale habitat models (PP Zerbini)</p>	<p>Compilation of acoustic and sightings data from year 1 is in progress.</p> <p>Oceanographic data have not yet been compiled, to occur during 2018/19</p> <p>Right whale habitat models to be constructed during 2019/20.</p>
<p>Activity 1.8.1 Provide cruise report, distribution patterns and habitat use analysis to International Whaling Commission (June 2019)</p> <p>Activity 1.8.2 Report on right whale habitat use patterns from two years of</p>	<p>To occur during 2019/20</p>

surveys to South Georgia government (Sept 2019) Activity 1.9.1 Zooplankton and whale isotope analysis (Stowasser at BAS) Activity 1.9.2 Whale prey identification (Stowasser at BAS)		
Activity 1.10.1 DNA extraction, microsatellite genotyping & mitochondrial DNA sequencing (PL Jackson, PP Carroll) Activity 1.10.2 Measure population diversity of South Georgia and differentiation from calving ground, as well as matching microsatellite genotypes of individuals with those available from Península Valdés calving ground and with the 2018 SG survey (PP Carroll) Activity 1.10.3 Measure assignment of South Georgia whales to calving grounds using global dataset held (PP Carroll)		To occur during 2018/19 and 2019/20
Activity 1.11.1 Assay stress hormones in blubber samples e.g. cortisol (PP Hall) Activity 1.11.2 Assay progesterone to measure pregnancy in blubber-sampled whales identified as female (PP Hall)		To occur during 2018/19 and 2019/20
Activity 1.12 Photogrammetry analysis of whale body condition from photos (PP Moore)		To occur during 2019/20
Activity 1.13 Organise UK workshop in Nov 2019 with project partners and stakeholders to present science outputs from SG field surveys, conclude population recovery status of southwest Atlantic right whales and write conservation management recommendation report to GSGSSI.		To occur during 2019/20
Output 2. Report key whale habitat use data to CCAMLR through a scientific paper to the EMM Working Group for consideration within spatial management proposals for regional krill fishery development.	Right whale habitat use patterns in SG waters provided in 2019 scientific report to CCAMLR EMM group. This group has never previously considered information on whale habitat use in relation to krill fishery discussions. This is therefore a precedent breaking initiative.	To occur during 2018/19 and 2019/20
Activity 2.1 Summarise results from Activities 1.4 and 1.7 to prepare CCAMLR scientific report on right whale habitat use		To occur during 2018/19 and 2019/20

Activity 2.2 Project member (Trathan) present report to CCAMLR EMM meeting discussing the relative consumption of krill by penguins, seals and whales and the necessity for considering cetaceans in krill fisheries management	To occur during 2019/20	
<p>Output 3. Report right whale connectivity and health assessment data to the IWC to address multiple scientific recommendations and concerns regarding threats and data gaps and contribute to the IWC Conservation Management Plan for this population.</p>	<p>Right whale health and connectivity parameters will be provided in a 2019 scientific report to IWC Scientific Committee. The GSGSSI final report (output 1) will also be submitted as further information. A series of recommendations and ways in which this work addresses Conservation Management Plan concerns will also be drafted for endorsement by the IWC Scientific Committee.</p>	To occur during 2019/20
Activity 3.1 Summarise results from activities 1.4, 1.6, 1.9, 1.10, 1.11 and 1.12 into IWC scientific report on right whale connectivity and health status on SG feeding grounds using all SG data collected to date.	To occur during 2019/20	
Activity 3.2 Present report to IWC Scientific Committee meeting	To occur during 2019/20	
<p>Output 4. Calculate right whale depletion levels and recovery status in the southwest Atlantic, considering the population abundance in South Georgia and strength of linkages with calving areas.</p>	<p>Complete population abundance and assessment paper in Nov 2019, for publication. Present for endorsement by the IWC scientific committee. Contribute to IUCN Cetacean Specialist Group for next threat status determination for southern right whales.</p>	To occur during 2019/20
Activity 4.1 PDRA Vighi to conduct in-depth review of southwest Atlantic right whale catches using historical material, including logbooks and import records. Generate a catch series (or series of catch series to capture the catch uncertainty).	To occur during 2018/19 and 2019/20.	

<p>Activity 4.2 PL Jackson, PP Carroll, PP Zerbini and PP Leaper to measure SG right whale abundance using mark recapture information from two seasons of surveys, also considering estimates derived from density data obtained from acoustic monitoring and sightings.</p>	<p>To occur during 2019/20</p>
<p>Activity 4.3 PL Jackson, PP Carroll and PP Zerbini use connectivity data (Activity 3.1) to quantify the degree of connection between SG and PV and measure abundance as proportion of PV abundance.</p>	<p>To occur during 2019/20</p>
<p>Activity 4.4 PL Jackson to build a density dependent Bayesian population modelling framework to assess the recovery status of southwest Atlantic right whales using results from activities 4.1, 4.2 and 4.3 above.</p>	<p>To occur during 2019/20</p>
<p>Activity 4.5 Present report to IWC Scientific Committee meeting for feedback and to obtain endorsement of the abundance calculations and population status estimates.</p>	<p>To occur during 2019/20</p>
<p>Output 5. Create strong collaborative network of stakeholders to sustain project results, assist with further monitoring and broaden scope of baseline surveys to other whale species</p>	<p>5.1 Collaborative workshop at the close of the project involving all stakeholders in Stanley, Falkland Islands in order to communicate results and agree final recommendations arising from project and future work.</p> <p>5.2 Right whale photos made open access through public databases including through Antarctic tour industry portal happywhale.com and results promoted through stakeholder linkages to encourage future submission of right whale photographs for identification and matching.</p> <p>Progress on developing this network was made via pre-meetings with stakeholders in Stanley, Falkland Islands in January and February 2018, and email, Skype and telephone consultations during the project planning stages. Leaflets have been distributed to Antarctic tour operators. Emails, a blog and Twitter messaging was also done to encourage engagement by Antarctic tourists. Work to continue on this outcome in 2018/19 and 2019/20.</p>
<p>Activity 5.1 Organise a 3 day project summary workshop in UK, with 1 day open to all, presenting science summaries, and 2 days open to steering group and OT representatives to discuss and agree conservation recommendations, including South Georgia Government, key Falkland</p>	<p>To occur during 2019/20</p>

Islands environmental research institutes and NGOs and Antarctic tour operators. Krill fishery representatives will also be invited.	
Activity 5.2 Compile conservation recommendations from steering group and stakeholders into project summary report	To occur during 2019/20
Activity 5.3 Write Darwin summary project report	To occur during 2019/20
Activity 5.4 Audit of project expenditure	To occur during 2019/20

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

Please note that changes to the original application logframe have been agreed with Darwin and these changes are included in Annex 2 below.

Project summary	Measurable Indicators	Means of verification	Important Assumptions
<p>Impact: Integrate whale abundance, status and habitat use data into GSGSSI MPA planning, CCAMLR krill management models, IWC Conservation Management Plan, supporting objectives of the Conventions on Biological Diversity and on Conservation of Migratory Species, and to IUCN Cetacean Specialist Group (Max 30 words)</p>			
<p>Outcome: To establish and publish baseline data on the status and recovery levels of South Georgia southern right whale feeding grounds, post whaling. Characterise abundance, distribution, diversity, habitat use, health and calving ground connections for conservation management. (Max 30 words)</p>	<p>The project will provide the first baseline data on the feeding ground abundance and recovery population status of southwest Atlantic southern right whales.</p> <p>This data will contribute to (i) the GSGSSI’s marine management through interim and final publicly available reports, in particular to inform MPA monitoring and review processes, (ii) CCAMLR krill spatial management modelling framework, (iii) the IWC Conservation Management Plan for this population</p>	<p>0.1 Five week field survey 0.2 Satellite tracking of ten whales 0.3 Photo-identification and microsatellite genotype matching between South Georgia over two field seasons and with Argentine and Brazilian calving grounds 0.4 Stable isotope data from up to 20 whales and 100 zooplankton samples to determine whale prey 0.5 Collation of all available right whale sightings data 0.6 Hormone assays and body condition photographs from up to 20 whales. 0.7 Collation of oceanographic data associated with SG marine ecosystem 0.8 Calculate abundance and feeding ground connectivity with Argentina and South Africa</p>	<p>Requires that fieldwork is successfully achieved. Two possible hindrances:</p> <p>(1) Equipment failure (data cannot be collected). To mitigate against this at least two items of all equipment required for conducting the fieldwork will be carried, including cameras, biopsy rifles, hexacopters, multiple sonobuoys, hydrophones, tag deployment systems. All equipment is well maintained and serviced.</p> <p>(2) Bad weather (data cannot be collected). The 30-day length of the survey is designed to minimise the impact of bad weather on data collection. We take into account 3 bad weather days in 10 to give 21 survey days, and use acoustic localisation to maximise data collection opportunities when weather permits.</p>

		<p>0.9 Collate right whale catch history data from southwest Atlantic</p> <p>0.10 Conduct population modelling of the historical trajectory of right whales in the southwest Atlantic to measure population status and recovery levels.</p>	<p>(3) Personnel injury. All personnel are highly experienced with working on small boats and with fieldwork of this nature. The vessel will remain close to the north coast of South Georgia for the duration of the survey, within one day's sailing of King Edward Point station if urgent medical assistance is required. All personnel have first aid training.</p> <p>Mark resight abundance estimation requires that there are resightings of whales between years. To maximise resight opportunities we will (1) acoustically localise whales using sonobuoys to maximise encounter rates, (2) encourage tourist photo-ID submissions via Project Partner Cheeseman (www.happywhale.com), (3) use microsatellite genotypes to identify siblings and parents and conduct mark recapture using very close-kin. We will also minimise risk by using alternate means of measuring abundance, through analysis of (i) sightings data, (ii) acoustic detection densities and (iii) quantifying connectivity with SG calving ground (where abundance estimates are available)</p>
<p>Outputs:</p> <p>1. Report to GSGSSI on (i) status assessment of southern right whale</p>	<p>Data compiled from cruise and combined with other sightings,</p>	<p>1.1 Achievement of 0.1-0.6 above</p>	<p>None envisaged</p>

<p>SG distribution, habitat use and recovery patterns in the southwest Atlantic, (ii) risks to the population, (iii) recommended actions to mitigate risks</p>	<p>incorporated into a single document available externally for viewing on the website of the GSGSSI.</p> <p>Provides a baseline for measuring change in species characteristics in response to impacts, including climate change.</p>	<p>1.2 Report for future MPA planning</p> <p>1.3 Falklands based workshop on project plans and feedback with stakeholders including GSGSSI in Feb 2019</p> <p>1.4 UK based workshop in Nov 2019 with stakeholders including GSGSSI to share results and agree report recommendations</p>	
<p>2. Report key whale habitat use data to CCAMLR through a scientific paper to the EMM Working Group for consideration within spatial management proposals for regional krill fishery development.</p>	<p>Right whale habitat use patterns in SG waters provided in 2019 scientific report to CCAMLR EMM group. This group has never previously considered information on whale habitat use in relation to krill fishery discussions. This is therefore a precedent breaking initiative.</p>	<p>2.1 Information from 0.2, 0.4, 0.5 and 0.7 integrated into ARC GIS database and made publicly accessible through www.bas.ac.uk</p> <p>2.2 Report for CCAMLR prepared and publicly available through www.ccamlr.org</p>	<p>Assumes that a CCAMLR report on whale habitat use will be acceptable for discussion by the CCAMLR Scientific Committee who do not traditionally consider whales in their ecosystem management discussions.</p> <p>To address the risk that this information is rejected, we will seek recommendation for this work during the delayed 2018 joint IWC/CCAMLR meeting on ecosystem modelling through multiple IWC and CCAMLR Project Partners who will be involved in this joint meeting.</p>
<p>3. Report right whale connectivity and health assessment data to the IWC to address multiple scientific recommendations and concerns regarding threats and data gaps and contribute to the IWC Conservation Management Plan for this population.</p>	<p>Right whale health and connectivity parameters will be provided in a 2019 scientific report to IWC Scientific Committee. The GSGSSI final report (output 1) will also be submitted as further information. A series of recommendations and ways in which this work addresses Conservation</p>	<p>3.1 Information from 0.3, 0.4 and 0.6 collated into summary of population connectivity, diversity and health status which will be provided in a report to IWC, publicly available through www.iwc.int</p>	<p>None envisaged</p>

	Management Plan concerns will also be drafted for endorsement by the IWC Scientific Committee.		
4. Calculate right whale depletion levels and recovery status in the southwest Atlantic, considering the population abundance in South Georgia and strength of linkages with calving areas.	<p>4.1 Complete population abundance and assessment paper in Nov 2019, for publication. Present for endorsement by the IWC scientific committee. Contribute to IUCN Cetacean Specialist Group for next threat status determination for southern right whales.</p>	<p>4.1 Catch series to be provided to the IWC Secretariat for databasing where it will be publicly accessible.</p> <p>4.2 Population assessment model made available as open source code in R</p> <p>4.3 Recorded endorsement of (i) abundance metric, and (ii) population status estimate by IWC scientific committee.</p>	Abundance and connectivity measurement may require application of a variety of approaches. For example there is a risk that no whales are resighted between years for mark-recapture analysis. However two field seasons of data collection means estimation of connectivity with Brazil/Argentina will be more robust. Without resights we will use the connectivity estimate to derive a measure of the proportion of whales using SG from those grounds, and use established abundance estimates from breeding grounds as primary modelling info to establish population status.
5. Create strong collaborative network of stakeholders to sustain project results, assist with further monitoring and broaden scope of baseline surveys to other whale species	<p>5.1 Collaborative workshop at the close of the project involving all stakeholders in Stanley, Falkland Islands in order to communicate results and agree final recommendations arising from project and future work.</p> <p>5.2 Right whale photos made open access through public databases including through Antarctic tour industry portal happywhale.com and results promoted through stakeholder linkages to encourage future submission of right whale photographs for identification and</p>	<p>5.1 Workshop report publicly available (output 1),</p> <p>5.2 Press release and news report about workshop generated by BAS and through Project Partner press teams.</p> <p>5.3 happywhale.com tracks photo submissions during and after project to evaluate impact of project awareness on tourist interest in the project.</p>	Through engagement with OT stakeholders throughout the project period, and including stakeholder-assisted development of conservation management recommendations, we hope to maximise chances of sustainability following this baseline work. Feedback into key scientific bodies (IWC and CCAMLR) as well as the IWC Conservation Management Plan will also provide internationally recognised recommendations which will provide additional impetus for assisting development of a South

	matching.		Georgia and South Sandwich Islands whale monitoring program in the future.
<p>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)</p> <p>Activity 1.1 Virtual project planning meeting with all project partners and key stakeholders in GSGSSI in May 2017 with subsequent M&E meetings every six months.</p> <p>Activity 1.2.1 Obtain permits from GSGSSI and Animal Ethics approvals for fieldwork and scientific procedures.</p> <p>Activity 1.2.2 Equipment purchase, permit applications, shipping of equipment to Falkland Islands as British Antarctic Survey cargo.</p> <p>Activity 1.3 Travel to Falkland Islands for pre-cruise workshop in Stanley, Falkland Islands to discuss cruise details and expected outcomes with OT government officials, NGOs and Antarctic tour operators.</p> <p>Activity 1.4 Survey embarks from Stanley, Falkland Islands for 5 weeks</p> <p>Activity 1.4.1 Deploy DiFAR sonobuoys and use sonobuoy transmissions and sightings to locate whales</p> <p>Activity 1.4.2 Skin samples collected from all encountered whales (50)</p> <p>Activity 1.4.3 Photographs collected of all encountered whales (50-60, head shots collected via hexacopter)</p> <p>Activity 1.4.4 Satellite tracking of up to 10 whales (PP Zerbini and Andriolo)</p> <p>Activity 1.4.5 Blubber samples collected from 10-20 whales (PP Carroll)</p> <p>Activity 1.4.6 Photogrammetry measurements taken by hexacopter from 10-20 whales</p> <p>Activity 1.4.7 Blog about survey on British Antarctic Survey website, using blog, twitter and media outlets to share photos and videos from the voyage.</p> <p>Activity 1.5 Biological samples shipped from the Falkland Islands to UK as British Antarctic Survey cargo in April 2018, transported at appropriate storage temperature.</p> <p>Activity 1.6.1 Provide photo-ID catalogue to regional associates in Brazil and Argentina, also IWC secretariat for open access hosting and happywhale.com. Circulate copies of catalogue to tour operators working in the South Georgia region in order to encourage crowd-sourced photo submissions</p> <p>Activity 1.6.2 Project Partners (Rowntree and Groch) conduct photo-ID matching with Argentine and Brazilian calving grounds. Project Partner Rowntree will also conduct photo-ID matching between the two South Georgia survey years to identify any resights.</p> <p>Activity 1.7.1 Compile acoustic and sightings data from cruise years 1 and 2 (PP Leaper and PL Jackson)</p> <p>Activity 1.7.2 Compile oceanographic data over two years of surveys to put sightings and satellite tracks in oceanic context (Trathan at BAS)</p> <p>Activity 1.7.3 Construct right whale habitat models (PP Zerbini)</p> <p>Activity 1.8.1 Provide cruise report, distribution patterns and habitat use analysis to International Whaling Commission (June 2019)</p> <p>Activity 1.8.2 Report on right whale habitat use patterns from two years of surveys to South Georgia government (Sept 2019)</p> <p>Activity 1.9.1 Zooplankton and whale isotope analysis (Stowasser at BAS)</p>			

Activity 1.9.2 Whale prey identification (Stowasser at BAS)

Activity 1.10.1 DNA extraction, microsatellite genotyping & mitochondrial DNA sequencing (PL Jackson, PP Carroll)

Activity 1.10.2 Measure population diversity of South Georgia and differentiation from calving ground, as well as matching microsatellite genotypes of individuals with those available from Península Valdés calving ground and with the 2018 SG survey (PP Carroll)

Activity 1.10.3 Measure assignment of South Georgia whales to calving grounds using global dataset held (PP Carroll)

Activity 1.11.1 Assay stress hormones in blubber samples e.g. cortisol (PP Hall)

Activity 1.11.2 Assay progesterone to measure pregnancy in blubber-sampled whales identified as female (PP Hall)

Activity 1.12 Photogrammetry analysis of whale body condition from photos (PP Moore)

Activity 1.13 Organise UK workshop in Nov 2019 with project partners and stakeholders to present science outputs from SG field surveys, conclude population recovery status of southwest Atlantic right whales and write conservation management recommendation report to GSGSSI.

Activity 2.1 Summarise results from Activities 1.4 and 1.7 to prepare CCAMLR scientific report on right whale habitat use

Activity 2.2 Project member (Trathan) present report to CCAMLR EMM meeting discussing the relative consumption of krill by penguins, seals and whales and the necessity for considering cetaceans in krill fisheries management

Activity 3.1 Summarise results from activities 1.4, 1.6, 1.9, 1.10, 1.11 and 1.12 into IWC scientific report on right whale connectivity and health status on SG feeding grounds using all SG data collected to date.

Activity 3.2 Present report to IWC Scientific Committee meeting

Activity 4.1 PDRA Vighi to conduct in-depth review of southwest Atlantic right whale catches using historical material, including logbooks and import records. Generate a catch series (or series of catch series to capture the catch uncertainty).

Activity 4.2 PL Jackson, PP Carroll, PP Zerbini and PP Leaper to measure SG right whale abundance using mark recapture information from two seasons of surveys, also considering estimates derived from density data obtained from acoustic monitoring and sightings.

Activity 4.3 PL Jackson, PP Carroll and PP Zerbini use connectivity data (Activity 3.1) to quantify the degree of connection between SG and PV and measure abundance as proportion of PV abundance.

Activity 4.4 PL Jackson to build a density dependent Bayesian population modelling framework to assess the recovery status of southwest Atlantic right whales using results from activities 4.1, 4.2 and 4.3 above.

Activity 4.5 Present report to IWC Scientific Committee meeting for feedback and to obtain endorsement of the abundance calculations and population status estimates.

Activity 5.1 Organise a 3 day project summary workshop in UK, with 1 day open to all, presenting science summaries, and 2 days open to steering group and OT representatives to discuss and agree conservation recommendations, including South Georgia Government, key Falkland Islands environmental

research institutes and NGOs and Antarctic tour operators. Krill fishery representatives will also be invited.

Activity 5.2 Compile conservation recommendations from steering group and stakeholders into project summary report

Activity 5.3 Write Darwin summary project report

Activity 5.4 Audit of project expenditure

Annex 3 Onwards – supplementary material (optional but encouraged as evidence of project achievement)

Appendix 1:

Publicity regarding South Georgia right whale project (all available on request):

“Whales and their recovery from whaling in the Southern Hemisphere” Cambridge Pint of Science public lecture, Cambridge, 21st March 2018.

“South Georgia whales: recovery from whaling” Falkland Islands Chamber of Commerce, 25th February 2018.

“South Georgia whales: recovery from whaling” South Georgia, to National Geographic “Orion” passengers, 5th February 2018.

“South Georgia whales: recovery from whaling” South Georgia, to King Edward Point staff, 1st February 2018.

“South Georgia whales: recovery from whaling” South Georgia Association, British Antarctic Survey, 10th November 2017

BBC news article on South Georgia right whale project: <http://www.bbc.co.uk/news/science-environment-42708207>

Appendix 2:

Summary leaflet appended on 2018 expedition (circulated to South Georgia Government, potential funders and also available as a Powerpoint movie, currently on live screens at the British Antarctic Survey).

Appendix 3:

IWC Scientific Committee field report on 2018 cruise (SC/67b/SH20, available at www.iwc.int)

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.	X
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.	
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.	X
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.	
Have you involved your partners in preparation of the report and named the main contributors	X
Have you completed the Project Expenditure table fully?	X
Do not include claim forms or other communications with this report.	