Darwin Initiative Annual Report

Darwin Project Information

Project Ref Number	18-019
Project Title	Mapping benthic biodiversity of the South Georgia continental shelf and slope
Country(ies)	South Georgia, Falkland Islands and UK
UK Contract Holder Institution	British Antarctic Survey
Host country Partner Institution(s)	Government of South Georgia and South Sandwich Islands
Other Partner Institution(s)	Shallow Marine Surveys Group
Darwin Grant Value	£218,560
Start/End dates of Project	01 Apr 2010/30 Jun 2013
Reporting period and annual report number (1,2,3..)	01 Apr 2010-30 Mar 2011 Annual Report 1
Project Leader Name	David K A Barnes
Project website	http://www.antarctica.ac.uk/sgmarbase
Author(s) and main contributors, date	Oliver Hogg, David Barnes, Dave O'Connor

1. Project Background

The project was designed to establish baseline data on the macro- and mega-benthic biodiversity of the continental shelf and slope around the archipelago of South Georgia (Atlantic sector of the Southern Ocean, see arrow in Fig 1). At ~54°S,37°W South Georgia forms part of the Scotia Arc mountain chain, and is a large, isolated area of continental shelf, 300 km south of the Polar Front (PF).

The project links expertise in the UK and Falkland Islands with those in the Government of South Georgia and South Sandwich Islands (GSGSSI). The work aims to identify key (endemic) species and biodiversity hotspots and utilise data to formulate management strategies for the conservation of biodiversity in the South Georgia Maritime Zone. The proposal will establish the status of benthic biodiversity of the continental shelf and slope waters around the island of South Georgia, make this data universally available and to use it to establish current threats, future loss and conservation strategy. The funding would be to take original samples (from shallows to deep sea), to identify existing collections, to catalogue and identify all species and to map these into a fully spatially referenced database. South Georgia's biodiversity is a key component of that for UK overseas territories due to the island's great age and isolation. Benthos probably constitutes about two thirds of all of species which occur at South Georgia and a much greater proportion of its endemics. This project would fulfil a key role of the Darwin Initiative in mapping biodiversity in an area which is suspected to be highly diverse, but very poorly studied and uniquely threatened by climate change (seas around South Georgia are amongst the fastest warming on the planet).

2. Project Partnerships

Project partnerships: The partnership between the team members in the British Antarctic Survey (BAS, the UK lead institution) and those in the GSGSSI (host country partner) started well and has made consistent progress throughout the last year. Likewise communication and co-operation between both lead, host and the other partner organisation, the Shallow Marine Surveys Group (SMSG) of the Falkland Islands, has been highly effective in all of the major tasks undertaken this year.

The management structure of the project operates with David Barnes responsible for overall finance and the BAS lead components (such as data capture, publication and cruise planning and preparation for the RRS James Clarke Ross fieldwork). Oliver Hogg (line managed by David Barnes at BAS) has undertaken most of the literature search, data input and analysis. Mark Belchier (BAS) has provided contextual advice (e.g. on regional fisheries) and strengthened liason between host, UK lead and Falkland Island partner. Paul Brickle has driven the SMSG-lead components of the project (such as the Pharos SCUBA-based scientific cruise). Paul Brewin (line managed by Paul Brickle) has undertaken much of the field work and data analysis in the Falkland Islands. Martin Collins (GSGSSI) has been fully informed and provided feedback on every component of the work. We have made no changes to the management structure of the project over the reporting period. Relationships are mainly managed via e-mail, though we have also phoned when closer communication is needed but in addition Martin Collins has travelled to UK, Paul Brickle and other members of SMSG have travelled to South Georgia and Oliver Hogg has travelled to Falkland Islands to work co-operatively in South Georgia waters.

Additional partnerships, such as with the Joint Nature Conservation Committee, Natural History Museum, London; Zoological Society London; Hamburg University, Germany; the international Census of Antarctic Marine Life (CAML) programme, South Georgia Heritage Trust and other minor collaborations in Northern Ireland (UK), Argentina, Chile, Uruguay, Brazil and the US have all supported the project in terms of identifications and contextual information about species, communities and assemblages. There has also been considerable work in kind by non-project staff in BAS, namely Peter Enderlein, Huw Griffiths, Peter Fretwell and Chester Sands. Thus the UK lead institution has increased its knowledge, understanding and communication to be a more effective project partner.

Other Collaboration: Over the last year the project has collaborated with other projects in the region, notably a PhD on information potential from fisheries vessels (e.g. bycatch) and databasing work in BAS but also bipolar hub work funded by (CAML) and an Overseas Territories Environment Programme hosted at BAS. The common goal of these various projects is increasing information resolution and accessibility with a view to supporting biodiversity conservation.

The partnership is supporting the host country institution (GSGSSI) to build their capacity to establish patterns of biodiversity richness and vulnerability and thus assessment of threats. Ultimately this should enable the region to better meet CBD criteria.

3. Project progress

The project proposed to undertake work along two main phases, the first of which would occupy the full reporting year. The first phase involved establishing the linkage between partners, training, literature searches and data collation (from 1 April 2010- 31 March 2011) - has been completed. This culminated in the submission of a major document – a scientific paper, accepted in the prestigious journal PLoS One. This followed a collaborative report of the scientific case and early progress or the work which is in press in the journal Antarctic Science. The first fieldwork, a scientific SCUBA based cruise has been successfully undertaken and the planning is well advanced by the October 2011 cruise of the RRS James Clark Ross. Oliver Hogg and Paul Brewin both have had oral presentations accepted by the second World Conference on Marine Biodiversity which will report progress on different aspects of the project later this year.

3.1 Progress in carrying out project activities

1.1 Literature search for georeferenced data has been completed with 20,000 new records added

1.2 Georeferenced species records have each been checked against the World Record of Marine Species (WORMS) for validity.

1.3 Georeferenced data from 1.2 has been added into the South Georgia GIS.

2.1 Georeferences of samples from South Georgia without full species level identification are apparent in the database.

2.2 Taxonomists willing to undertake identification of new material have been identified for flatworms (Odile Voluntario), anemones (Estefania Rodriguez), hydroids (Alvaro Pena-Cantero), octocorals (Michelle Taylor), amphipod crustaceans (Cedric d'Udekem d'Acoz and Mike Thurston), isopod crustaceans (Florian Leese, Cristoph Held & Stefanie Kaiser), bivalve and gastropod molluscs (Katrin Linse), brachiopods (Bernie Cohen), bryozoans (Piotr Kuklinski), echinoid echinoderms (Thomas Saucede), holothuroid echinoderms (Mark O'Loughlin) and stelleroid echinoderms (Rafael Martín-Ledo), oligochaetes (Christer Erséus), Sponges (Claire Goodwin), seaweeds (Emma Wells).

2.3 Many existing samples are in the process of being identified to species level and some have been sent to Guelph University for investigation of the CO1 gene (barcoding).

3.1 The scientific paper in supplement 2 reports on the querying of the database to investigate the status of data by taxa and area.

3.2 The scientific paper in supplement 2 reports on the identification of hotspots of endemsism and richness (from 3.1).

3.3 The scientific paper in supplement 2 reports on the identification of 'coldspots' which have been poorly sampled.

3.4 We have prioritised 11 coldspots for investigation by the next scientific cruise to sample, we will not be able to properly assess hotspots for conservation until after this cruise.

3.5 We have drafting and submitted a preliminary paper investigating the state of knowledge and a path to be able to start making biodiversity priorities.

4.1 The dates of the scientific cruise by RRS James Clarke Ross to South Georgia have been set and participants invited. The benthic camera landing system is currently being constructed by Peter Enderlein for which the sea trials are in July.

4.2 Planning for a second SCUBA diving cruise aboard the Pharos has begun, with support of project partner GSGSSI confirmed. Some funding is still required for logistics and additional scientific personnel. Preliminary plans include sampling the southern coast of South Georgia, revisiting poorly sampled areas of the 2010 cruise, and monitoring of settlement plates.

3.2 Progress towards Project Outputs

Overall progress has been slightly ahead of schedule. Outputs 1-3 have progressed well, whilst 4,5 should progress later in 2011/12 as envisaged. We have no need to change our output indicators as these seem fine and represent our projects successes. Our assumptions still stand as assumptions.

1. Very good progress has been made on the georeferenced database of South Georgia benthos onto the South Georgia GIS website but it is not yet live viewable (proof of progress is the additional data that can be accessed on www.SCAR-MarBIN.be). This data should be viewable on the planned website (http://www.antarctica.ac.uk/sgmarbase) within the next six months, well before the closure of the project.

2. Collation and verification of existing sample collections is progressing more or less as hoped – taxonomists have been identified for most samples. However the process of identifying it is slow and it is hard to influence it. Many samples should have been sent for genetic barcoding within the next few months. Proof of progress will be the barcode sequence data back from Guelf University.

3. Identification of hotspots of key species (endemics; species at range edge) has been attempted and submitted in a paper, although it is clear that historic patterns of sampling dominate the explanation. The science cruise of RRS James Clarke Ross has been planned on this basis and should significantly improve our ability to estimate true patterns. Proof of progress here is best seen in the PLoS One paper (supplement 2).

4. Identification of South Georgia intertidal samples (seaweeds and fauna) is progressing steadily. Relationships have been established between taxonomists willing to assist in species identification. Emma Wells and Paul Brewin to submit final report to South Georgia Heritage Trust in August, 2011, and a peer reviewed publication.

Progress towards further goals has been very limited, but this is as expected for this point in the project. So far our project seems to be reaching the goals to ultimately become the useful a tool to a long-term management strategy for conservation of South Georgia biodiversity that we hoped.

3.3 Standard Measures

6A Oliver Hogg has received training to use ArcGIS and data analysis software and deck working on vessels at sea (PST certificate pass). Paul Brewin has received training in ArcGIS.

7 This year two types of training materials have been produced, the first of which has been primary publications (One in Antarctic Science the other in PLoS One). The second has been a massively upgraded source of accessible geo-referenced marine biodiversity information – from 3000 records prior to Apr 2010 to 23000 checked records in Apr 2011.

8 Both Oliver Hogg and Paul Brewin have each spent three weeks on a collaborative scientific cruise organised by the GSGSSI.

9, 10, 12A, 13B, 15C,15D,16A-C,18D,19C,19D,20,23 not planned nor delivered for this year.

11A One paper is in press in a peer reviewed journal (Antarctic Science), which is in line with what we expected.

11B Two papers were submitted to peer reviewed journals, one in press whilst the other has been refereed, requiring only minor changes so is likely to be accepted.

14B Oliver Hogg reported the project concept, planning and initial findings to the European Marine Biology Symposium in August 2010 and gave further results at the South Georgia ‘Science-industry’ meeting in Sept 2010. Paul Brewin and Oliver Hogg will both lead oral presentations at the World Conference on Marine Biodiversity later this year.

15B An article has been submitted to DIVE magazine article (by JNCC) and locally the project has been covered by both Penguin News and the GSGSSI newsletter (online). In the Flaklnad Islands an update of the SMSG webpage details project work and progress.

22 Over 4300 intertidal and subtidal samples were collected on the Pharos cruise, To date processing of the intertidal samples progressing as planned, with approximately 1/3 of intertidal samples processed. Over 400 subtidal and intertidal quadrate images have been prepared for quantitative analyses of species and habitat composition.

Table 1 Project Standard Output Measures

Code No.	Description	Year 1 Total	Year 2 Total	Year 3 Total	Total to date	Number planned for this reporting period	Total planned from application
6A	Number of people to receive other forms of education/training	2	2	0	2	2	4
7	Number of (ie different types - not volume - of material produced) training materials to be produced for use by host country	2	2	2	2	2	2 per year
8	Number of weeks to be spent by UK project staff on project work in the host country	6	13	0	6	6	20
9	Number of species/habitat management plans to be produced for Governments, public authorities, or other implementing agencies in the host country	0	1	1	0	0	2
10	Number of individual field guides/manuals to be produced to assist work related to species identification, classification and recording	0	0	1	0	0	1
11A	Number of papers to be published in peer reviewed journals	1	2	1	2	1	4
11B	Number of papers to be submitted to peer reviewed journals	2	2	1	2	2	5
12A	Number of computer based databases to be **established** and handed over to host country	0	1	0	0	0	1
13B	Number of species reference collections to be **enhanced** and handed over to host country(ies)	0	1	0	0	0	1
14B	Number of conferences/ seminars/ workshops **attended** at which findings from Darwin project work will be presented/ disseminated.	2	3	1	2	2	6
15B	Number of local press releases in host country(ies)	1	2	1	1	1	4
15C	Number of national press releases in UK	0	1	1	0	0	2
15D	Number of local press releases in UK	0	1	1	0	0	2
16A	Number of newsletters to be produced	0	1	1	0	0	2
16B	Estimated circulation of each newsletter in the host country						unknown
16C	Estimated circulation of each newsletter in the UK						~450

Code No.	Description	Year 1 Total	Year 2 Total	Year 3 Total	Total to date	Number planned for this reporting period	Total planned from application
18D	Number of local TV programmes/features in UK	0	1	0	0	0	1
19C	Number of local radio interviews/features in host country(ies)	0	1	0	0	0	1
19D	Number of local radio interviews/features in UK	0	1	0	0	0	1
20	Estimated value (£'s) of physical assets to be handed over to host country(ies)	0	0	~£7k	0	0	~£7k
22	Number of permanent field plots to be established during the project and continued after Darwin funding has ceased	10	0	0	0	10	10
23	Value of resources raised from other sources (ie not Darwin funding) for project work	0	0	~£9k	0	0	~£9k

Table 2 Publications

Type (eg journals, manual, CDs)	Detail (title, author, year)	Publishers (name, city)	Available from (eg contact address, website)	Cost £
Journal	See Supplement 1	Cambridge University	http://journals.cambridge.org/action/displayJournal?jid=ANS	Nil
Journal	See Supplement 2		http://www.plosone.org	£1000
Website	P. Brickle and P, Brewin - South Georgia Expedition report	Online	http://smsg-falklands.org	Nil

3.4 Progress towards the project purpose and outcomes

Progress on the main project purpose has been entirely satisfactory and in many areas better than anticipated. Establishment of baseline data on the macro- and mega-benthic biodiversity of the South Georgia shelf and slope is well underway. We have identified biodiversity sampling 'coldspots', ie areas which have been very poorly sampled and drawn up a cruise plan to investigate these areas. We have collected some original samples, examined existing collections, and mapped considerable numbers (reported in the publications) into a fully spatially referenced database. Habitat mapping from subtidal benthic photographs has commenced, with the identification of several key habitat types (eg *Himantothallus grandifolius* beds, *Macrocystis pyrifera* beds, complex red algal turf assemblages). Sponge identification progressing through partnership with Claire Goodwin. Intertidal habitats and species characteristics show very high variability at small (0.5 m) spatial scales, and are likely to be due to many physical (wave exposure, proximity to glaciers) and biological (presence of fur seals and elephant seals) processes. Examination of intertidal species have shown to include potential new records for South Georgia (eg platyhelminthes), and many examples of important but poorly described groups (amphipods, oligochaetes). This project is thus on target to fulfil a key role of the Darwin Initiative by mapping biodiversity in an area which we have demonstrated, as suspected, to be highly diverse. We consider that the purpose level assumptions suggested still hold true and that the suggested indicators are adequate for measuring outcomes.

3.5 Progress towards impact on biodiversity, sustainable use or equitable sharing of biodiversity benefits

Progress towards;

a) understanding any change in the state of biodiversity; we have established a first baseline upon which change can be measured.

b) achievement of a) will enable estimates to be made on the level of 'sustainability' of current use and therefore advise on what if any action needs to be made to move towards sustainable use.

c) achievement of a) and b) should benefit the mid to long term future of fisheries in the region and thus the major source of income to the host country.

4. Monitoring, evaluation and lessons

Progress of the project is monitored by both main partner, host and other partner and discussed by monthly emails and occasionally phone. The main areas to monitor progress in for the first year have been 1) record entry, 2) shallow cruise, 3) publications, and 4) preparations for the deep water cruise. The major effort of the first year has been to collate and input of hard records into the database which has been easy to monitor by simply querying the number of records entered. As this has tailed off (as new records are harder to find) the monitoring has been important to show when we had to make a pragmatic decision at what records / per effort level to stop at. The second the shallow water diving cruise was designed and undertaken by the minor partner (SMSG) and so the main partner (BAS) and hosts were the main monitors of progress through regular updates and question feedback. The two publications generated so far were both subjected to multiple internal and external peer review (which is mandatory at BAS) – all criticism of the work had to be either defended satisfactorily or altered in accordance with suggestions. Likewise the talks that have been presented generated questions that had to be answered in front of peers. Finally the deep water cruise is being organised by BAS (host) and thus has had to meet deadlines for the Natural Environment Research Council on cruise planning meetings and paperwork. The main lessons learnt this year have been that there is little merit in planning in too much detail too far ahead as so much changes – for example our deep water cruise has had its planned month of departure changed twice and the complementary personnel independently changed twice! Changing plans hurt some time elements of the project but elsewhere there were gains, for example winning money to buy the planned microscope elsewhere. Darwin/DEFRA flexibility in allowing us to put this towards an imaging system to aid categorisation of habitat types and animal density will be a major aid if it works well.

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

Not applicable.

6. Other comments on progress not covered elsewhere

The design of the project has not significantly changed from original plans over the last year. The most significant difficulties encountered during the year have been trying to plan the 2011 cruise given that possible time slots varied from October, December and January and from travelling as a dedicated cruise to combining with geologists or geologists and pelagic biologists. Most of these have been sorted out now – it will be a dedicated cruise leaving Falkland Islands in October. The main issue at the moment is keeping the development (design and building inhouse) of the deep water camera system on track for the sea trials on the ship in July 2011.

7. Sustainability

The profile of the project within the country has been fairly low to date, but this was envisaged in the first year and is largely due to little substance to promote until the database is up and running and secondly South Georgia has only a brief itinerant tourist population. Notably there has been a high profile effort to de-rat the island which has (rightly) taken alot of the focus in 2010/11 but with the publication of our two papers and the cruise imminent we should get good publicity this year. The exit strategy for the project will be the legacy of the open access database which will be addable to, the specimen and DNA libraries which again will be addable to and checkable by anyone. In addition we will have PDFs of all material (such as publications) that can be requested free by anyone, anywhere. New work that will work in tandem with this Darwin project have also been won (such as an Overseas Territories Environment Programme grant) will continue to develop the work into a dynamic plan for assessing threat to biodiversity and continuously developing measures to counter these. Application to the Mia J. Tegner Memorial Research Grant has been made for further of entry of Discovery report data for Falkland Islands, building on South Georgia work. If accepted, this will create the best picture of south Atlantic biodiversity to date, linking South Georgia biogeography with South America. Finally a new South Georgia postal stamp issue is underway, featuring marine landscapes and species collected on the Pharos cruise.

8. Dissemination

Dissemination activities in the host country have not commenced yet but we will have a display at the South Georgia museum with our papers, specimens, photographs and details of the website. Towards the end of the year (Jan-Mar 2012) we will develop lecture and lesson plans for younger target audiences. During the time around the cruise (October 2011) we plan to do media casts and talks in the Falkland Islands and before that we have accepted talks on the project in scientific conferences.

9. Project Expenditure

Table 3 Project expenditure during the reporting period (Defra Financial Year 1 April 2010 to 31 March 2011)

Item	**Budget**	Expenditure	Variance
Rent, rates, heating, overheads etc			
Office costs (eg postage, telephone, stationery)			
Travel and subsistence			
Consumables			
Publication costs			
Capital items/equipment (specify)			
Others (specify)			
Salaries (specify by individual)			
TOTAL			

10. OPTIONAL: Outstanding achievements of your project during the reporting period (300-400 words maximum). This section may be used for publicity purposes

I agree for LTS and the Darwin Secretariat to publish the content of this section (please leave this line in to indicate your agreement to use any material you provide here)

In this section you have the chance to let us know about outstanding achievements of your project over the year that you consider worth highlighting to LTS and the Darwin Secretariat. This could relate to achievements already mentioned in this report, on which you would like to expand further, or achievements that were in addition to the ones planned and deserve particular attention eg in terms of best practice. We may use material from this section for various promotion and dissemination purposes, including e.g. publication in the Defra Annual Report, Darwin promotion material, or on the Darwin website. As we will not always be able to ask projects on an individual basis for their consent to publish the content of this section, please note the above agreement clause.

Photographs from the project are included.

First and foremost the project has been outstanding in terms of communication, co-operation and co-ordination between the three partners. We have undertaken several significant pieces of work, all of which have proceeded without any problems developing between or within any of the partners. We have employed two first rate members of staff (Oliver Hogg and Paul Brewin) both of which have developed papers and had oral presentations accepted into a highly competitive international conference. The project has increased the number of geo-referenced marine biodiversity records from 3000 prior to April 2010 to a remarkable 23000 checked and databased records by Apr 2011. The research cruise of the Pharos was the first proper survey of the shallows of the South Georgia archipelago, arguably one of the most rapidly changing and biodiversity-sensitive locations on Earth. Our first output paper has been accepted in a very highly rated international journal (PLoS One). We have been on, or ahead of schedule throughout the entire year and the main research cruise of the RRS James Clarke Ross is in the advanced planning stages and a novel piece of survey equipment in the process of being designed.

Annex 1 Report of progress and achievements against Logical Framework for Financial Year: 2010/11

Project summary	Measurable Indicators	Progress and Achievements April 2010 - March 2011	Actions required/planned for next period
Goal: *To draw on expertise relevant to biodiversity from within the United Kingdom to work with local partners in countries rich in biodiversity but constrained in resources to achieve* *The conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources* Determine the benthic biodiversity of the South Georgia shelf and slope.		*(report on any contribution towards positive impact on biodiversity or positive changes in the conditions of human communities associated with biodiversity eg steps towards sustainable use or equitable sharing of costs or benefits)*	*(do not fill not applicable)*
Purpose To establish baseline data on the macro- and mega-benthic biodiversity of the South Georgia shelf and slope, identify key (endemic) species and biodiversity hotspots and utilise data to formulate management strategies for the conservation of biodiversity in the South Georgia Maritime Zone.	The project will provide the first detailed study of benthic biodiversity on the South Georgia shelf and slope	Progress good - 20,000 records have been found, collated, checked taxonomically and added to database. Good candidate (Paul Brewin) employed and trained by Shallow Marine Surveys Group. Good SCUBA survey of shallows by SMSG. Two strong publications in international journals in press.	Detailed planning, purchasing, mustering and undertaking scientific cruise (JR262) of RRS James Clarke Ross [October/November 2011]. Sorting of material, preservation and sending to appropriate taxonomists. Outreach of project to variety of levels.
Output 1. Baseline georeferenced database of South Georgia benthos, hosted by BAS/GSHSSI, available to researchers and can be database supplemented by future work.	Data from variety of sources incorporated into Arc GIS system for analysis and available externally for viewing on the SGGIS. Provide a baseline for measuring change in biodiversity and species characteristics in response to impacts, including climate change.	Data able to be visualised on SGGIS (www.sggis.gov.gs).and SCARMarBIN but restricted access at the moment. Specimens have been sent to international taxonomic specialists and database queried to provide first baseline of benthic biodiversity (PLoS One paper) which in turn has generated 'coldspots' of sample effort – which will be targeted by the research cruise. The original suggested indicators remain appropriate but we have yet to outreach much to secondary sources (part b).	
Activity 1.1 Literature search for georeferenced data		20,000+ records found added to database (www.sggis.gov.gs).and www.SCARMarBIN.be Data from cruises and material back from taxonomists will be carried out in the next period – and website will go live.	
Activity 1.2, Checking georeferenced species records		20,000! records have been checked against the World Record of Marine Species (WORMS) for validity.	
Activity 1.3 Input of georeferenced data into the South Georgia GIS		20,000 checked records have been added to database (www.sggis.gov.gs).and	

Project summary	Measurable Indicators	Progress and Achievements April 2010 - March 2011	Actions required/planned for next period
		www.SCARMarBIN.be	
Output 2. Collation and verification of existing sample collections (BAS cruises; GSGSSI trawl surveys).	BAS/GSGSSI collections identified and catalogued. Verified material passed to the NHM, London. Problematic material/new species sent to taxonomic experts.	Cataloguing of BAS specimens and previously catalogued collections in NHM have been located. New collections are now with taxonomists. This indicator is good but will be hard to gage within the project lifespan (ie it is longer term). We have sent genetic samples for CO1 (Census of Marine Life bar coding project) analysis and are awaiting results from Guelf University.	
Activity 2.1 Identification of samples		Some samples identified and new ones collected by SMSG survey. Most samples identified are already with taxonomists or await coarse level sorting.	
Activity 2.2. Search for taxonomists		Taxonomists identified for most taxa and happy to receive material though processing time cannot be guaranteed.	
Activity 2.3 Sending samples away		Samples being processed by taxonomists and identified material sent for barcoding – this will continue until project end. For example within the last few weeks our specialist in Uruguay reported that this has just yielded a new flatworm species for South Georgia.	
Output 3. Identification of key regions (hotspots) and of key species (endemics; species at range edge).	Investigate the biodiversity hotspots on the SG shelf/slope and inshore areas.	(a) Scientific paper(s) on the biodiversity of South Georgia outreach (talks, posters) to fishing industry (through annual GSGSSI meetings), tourists (cruise ships, museum), and other stakeholders (e.g. FCO, SGHT).	
Activity 3.1 Using database		The database was initially used for the first paper about the ideas and potential of the project but was fully used for the PLoS One analyses and proved extremely powerful and useful.	
Activities 3.2 and 3.3 Identifying hotspots and coldspots respectively		Sampling and biodiversity hotspots and coldspots are identified in detail in our PLoS One paper. Hotspots are all to the north of the island, mainly around Cumberland East Bay. Cold spots are mainly across the southern shelf particularly at the east and west ends.	
Activity 3.4 Prioritising areas		Highest priority areas have been planned for sample sites for JR 262 cruise.	
Activity 3.5 First scientific paper		First paper accepted in 'Antarctic Science' (now In press – proofs corrected) and second paper accepted in 'PLoS One'.	
Output 4. Long-term management strategy for conservation of South Georgia biodiversity. Advice for areas and methods for monitoring and protection of key locations, habitats and species.	Provision of rapid assessments of geographic status on all suspected endemics, edge or range and regionally rare species.	Outputs 4 onwards not planned for first year of project but indicators remain unchanged.	

Annex 2 Project's full current logframe

Project summary	Measurable Indicators	Means of verification	Important Assumptions
Goal: Effective contribution in support of the implementation of the objectives of the Convention on Biological Diversity (CBD), the Convention on Trade in Endangered Species (CITES), and the Convention on the Conservation of Migratory Species (CMS), as well as related targets set by countries rich in biodiversity but constrained in resources.			
Project Sub-Goal: Determine the benthic biodiversity of the South Georgia shelf and slope.	Accessible and searchable data on the abundance and distribution of hundreds of benthic species around South Georgia.	Visualisation of data in databases and quality control by all species presence being linked to original report of data.	[redacted]
Purpose: To establish baseline data on the macro- and mega-benthic biodiversity of the South Georgia shelf and slope, identify key (endemic) species and biodiversity hotspots and utilise data to formulate management strategies for the conservation of biodiversity in the South Georgia Maritime Zone.	The project will provide the first detailed study of benthic biodiversity on the South Georgia shelf and slope	South Georgia Govt will legislate to protect areas of high biodiversity or hotspots of important endemics.	
Outputs 1. Baseline georeferenced database of South Georgia benthos, hosted by BAS/GSHSSI, available to researchers and can be database supplemented by future work.	Data from variety of sources incorporated into Arc GIS system for analysis and available externally for viewing on the SGGIS. Provide a baseline for measuring change in biodiversity and species characteristics in response to impacts, including climate change.	(a) Data visualised on SGGIS (see: www.sggis.gov.gs).and SCARMarBIN (b) Direct provision of data to a variety of sources from secondary schools to international taxonomic specialists and climate change modellers	**None envisaged**
2. Collation and verification of existing sample collections (BAS cruises; GSGSSI trawl surveys).	BAS/GSGSSI collections identified and catalogued. Verified material passed to the NHM, London. Problematic material/new species sent to taxonomic experts.	• Catalogued specimens donated to NHM and available to taxonomists and as reference material • Provision of genetic samples for CO1 (Census of Marine Life bar coding project) and	Willingness of taxonomic experts to engage. Expertise in BAS on mollusca, bryozoa, Links already to NHM (polychaetes), NUI Galway (octopods). ZSL (corals), University of Glasgow (brachiopods), Hamburg University (Acari, Isopods, tanaids), University of Seville (hydroids), Université de Bourgogne (echinoids), University of Montevideo

Project summary	Measurable Indicators	Means of verification	Important Assumptions
		other phylogenetic analysis.	(flatworms), Royal Belgian Institute of Natural Sciences (Amphipods).
3. Identification of key regions (hotspots) and of key species (endemics; species at range edge).	Investigate the biodiversity hotspots on the SG shelf/slope and inshore areas.	(b) Scientific paper(s) on the biodiversity of South Georgia (c) outreach (talks, posters) to fishing industry (through annual GSGSSI meetings), tourists (cruise ships, museum), and other stakeholders (e.g. FCO, SGHT).	Data is of sufficient quality and distribution to meaningfully assign hotspots of richness or of endemics (rather than simply sample representing effort)
4. Long-term management strategy for conservation of South Georgia biodiversity. Advice for areas and methods for monitoring and protection of key locations, habitats and species.	Provision of rapid assessments of geographic status on all suspected endemics, edge or range and regionally rare species.	(a) Incorporation into South Georgia Management Plan (b) Formulation of protected areas in SGMZ to protect key areas/species.	New genetic studies support the validity of endemics and distributions.
5. Development of expertise in identifying benthos, thus aiding future assessment of wider impacts of fisheries and recognition of alien species arrival or spread.	Training skills transfer. Within the team in identification of bryozoans and molluscs (from BAS), in fish (from GSGSSI), in shallows benthos (from SMSG) and from expert taxonomists in other taxa. Particularly important for recognition of future change or alien arrival. Also training in sample design and strategy, IT approaches to georeferenced data visualisation and use.	(a) Identification workshop held in Stanley, FI. (b) Publication (web-based) of a guide to South Georgia benthos	Identification error rate is small.
Activities (details in workplan) 1.1 Literature search 1.2 Verification of records 1.3 Data input 2.1 Identification of samples 2.2 Search for taxonomists			

Project summary	Measurable Indicators	Means of verification	Important Assumptions
2.3 Sending samples away 3.1 Using database 3.2 Identifying hotspots 3.3 Identifying coldspots 3.4 Prioritising areas 3.5 First scientific paper 4.1 deep cruise planning 4.2 shallow cruise planning 4.3 scientific cruises 4.4 Observer training 4.5 Sorting of samples 5.1 Data analysis 5.2 Writing papers 5.3 Conferences 5.4 Press release 6.1 Biodiversity data goes live 6.2 Lesson planning 6.3 Biodiversity guide 6.4 Lecture preparation 6.5 Liaison with stakeholders			
Monitoring activities: Indicator 1 Provision of (literature) data in the South Georgia GIS database Indicator 2 Provision of specimens in key institutions Indicator 3 Hotspot & coldspot information provided to stakeholders, submission of scientific paper Indicator 4 Scientific cruises and specimens from these Indicator 5 Provision of 'route map' for biodiversity conservation and protected area planning Indicator 6 Workshop, biodiversity guide, lecture for tourist ships			

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

This may include outputs of the project, but need not necessarily include all project documentation. For example, the abstract of a conference would be adequate, as would be a summary of a thesis rather than the full document. If we feel that reviewing the full document would be useful, we will contact you again to ask for it to be submitted.

Attached are; Supplement 1 - Paper accepted in the journal 'Antarctic Science'

Supplement 2 - Paper accepted in the journal 'PLoS One'

Supplement 3 - Photographs of the Pharos SCUBA survey of South Georgia

Supplement 4 – Plan for cruise of RRS James Clarke Ross in October 2011

Checklist for submission

	Check
Is the report less than 5MB? If so, please email to Darwin-Projects@ltsi.co.uk putting the project number in the Subject line.	Yes
Is your report more than 5MB? If so, please advise Darwin-Projects@ltsi.co.uk that the report will be send by post on CD, 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.	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.	