

Darwin Plus: Overseas Territories Environment and Climate Fund

Final Report

***Important note** To be completed with reference to the Reporting Guidance Notes for Project Leaders:
it is expected that this report will be a maximum of 20 pages in length, excluding annexes*

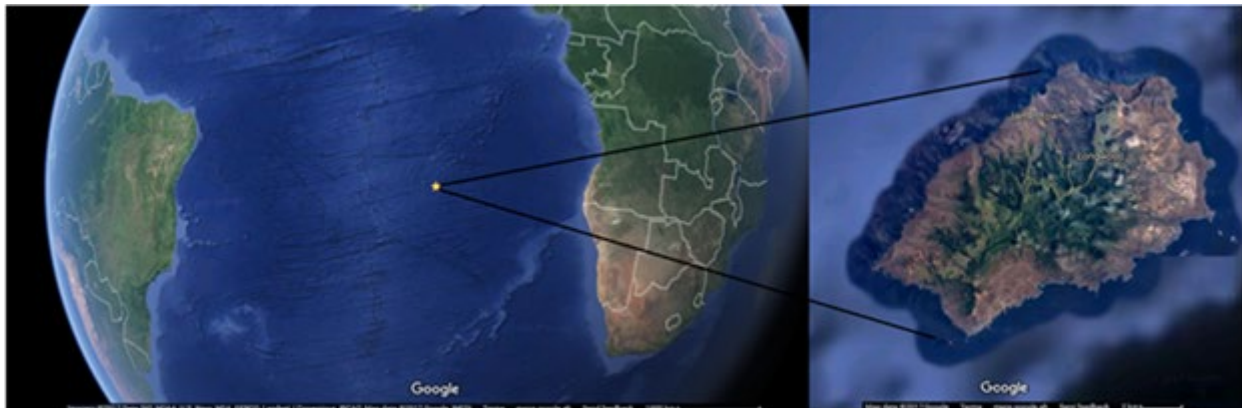
Darwin Project Information

Project reference	DPLUS040
Project title	Securing the future for St Helena's endemic invertebrates
Territory(ies)	St Helena
Contract holder Institution	St Helena National Trust
Partner institutions	St Helena Government The Natural History Museum, London Museum für Naturkunde und Vorgeschichte, Dessau, Germany Buglife
Grant value	£179,332
Start/end date of project	1 st August 2015 to 30 th June 2018
Project leader name	Jeremy Harris
Project website/Twitter/blog etc.	http://www.trust.org.sh/invertebrates/ http://www.maiisg.com/resources/projects/ver.php?id=100 https://www.facebook.com/Buglifes/?ref=bookmarks
Report author(s) and date	Amy-Jayne Dutton 28 th September 2018

1 Project Overview

St Helena, a remote Overseas Territory in the South Atlantic, is a treasure trove of invertebrate diversity with over 460 endemic species present on a land mass only 5x10 miles in size.

Map 1. St Helena's location in the South Atlantic



The environment on St Helena has changed significantly since its discovery in 1502; original habitats have been almost destroyed with only a few plants remaining in many locations and

the island is now predominantly covered in non-native plant species. These changes in vegetation are likely to have had significant impacts on associated fauna.

While the high biodiversity of St Helena is well recognised (Churchyard *et al.*, 2014), the associations of the invertebrate fauna with the endemic plants and habitats has not been fully investigated, with some exceptions including areas of cloud forest and semi-desert. The value or use of non-native habitats by native species has been similarly overlooked.

A Belgian expedition undertook surveys in locations across St Helena in the 1960s and produced a four volume book on their results (La Faune Terrestre de L'île de Sainte-Helene, 1977). Since this, there have been substantial changes in vegetation and conservation practices but no wide ranging surveys. The more recent invertebrate surveys have been sporadic, focussed on relatively small areas and often undertaken over a short period during the St Helenian summer (Dec-Mar).

A survey with a wider scope was needed to gain a greater understanding of the diversity, abundance and distribution of the invertebrates of St Helena, to inform conservation efforts for this important group which contains such high levels of endemism.

This project aimed to address this need with a year-long baseline survey at locations across the island. This would offer the most complete data set to date, providing in-depth knowledge of the abundance and distribution of a range of invertebrate species. This, in conjunction with habitat and weather data, will also improve the understanding of the impacts of seasonality and conservation efforts on invertebrates in different parts of the island.

A comprehensive resource collection was also a planned output for this project, including a high quality specimen collection, identification equipment, and digital resources. This would provide long-term resources for St Helena, including for further research.

Churchyard, T., Eaton, M., Hall, J., Millett, J., Farr, A., Cuthbert, R. and Stringer, C. (2014) *The UK's wildlife overseas: a stocktake of nature in our Overseas Territories*. RSPB, Sandy, UK.

2 Project Stakeholders/Partners

This project has benefitted from the engagement from organisations and individuals experienced in invertebrate conservation on St Helena and further afield. They have helped to steer the project, have given input into methods and approaches, and have engaged with and trained local project staff throughout the life of the project.

As the major land-owner on St Helena, the St Helena Government (SHG) is a key partner for conservation work on the island. SHG has been closely involved with this project since its inception and have expressed a clear interest in the results. In particular, SHG's Senior Environment Officer has been clear that this project will serve to inform their conservation efforts and land management, along with the implementation of environmental legislation. Members of the Environmental Management Division (EMD), LEMP (Landscape and Ecology Mitigation Programme for the airport project) and Biosecurity have accompanied staff and experts in the field, have taken part in training workshops, with EMD having had input into steering group meetings and project oversight.

Input from professional entomologists from both the Natural History Museum, London and Museum für Naturkunde und Vorgeschichte, Dessau, Germany has been invaluable for steering the methods and management of the collection and fieldwork. Both institutions now have specimens that are new to science (Coleoptera and Lepidoptera) which require taxonomic description (Annex 6.1 Timm Karisch Lepidoptera report; 6.2 Howard Mendel report). Material has been prepared and already some specimens have been returned to the collection on St Helena (Annex 6.3 Reimportation Permit; 6.4 Reimported moths photo). The stakeholders have also been proactive in linking the project to other specialist taxonomists as necessary, and will continue to provide information which will further knowledge on these species. Peer reviewed journal articles are also in draft and will hopefully be published in the coming months (Annex 6.5 Journal papers in draft).

Buglife has been a partner for successive invertebrate projects on St Helena and this organisation continues to provide support for this work. They are committed to supporting the

establishment of an online invertebrate database which will allow for centralised data management, publicly accessible records, and up to date information (Annex 6.6a Steering group meeting minutes June 2018; 6.6b Sarah Henshall (Buglife) meeting minutes). Roger Key, an independent entomologist, has also been instrumental in continuing work on the field guide, also making links for the designing of the online database, and giving other valuable project support.

Vicky Wilkins from the IUCN SSC Mid Atlantic Islands Invertebrate Specialist Group (MAISG) has also provided support and oversight, particularly with the '*Red Listing*' of 38 terrestrial invertebrate species, which have been submitted to IUCN and will be published in November 2018.

Amy-Jayne Dutton, past Project Manager of DPLUS025 (Spiky yellow woodlouse project) was part of the steering group until joining the project staff as Manager at the end of January 2018. Mike Jervis, previous Project Manager, retained links with the project after leaving St Helena in May and has provided valuable advice and support for the concluding portion of the project.

3 Project Achievements

3.1 Outputs

While the invertebrates of St Helena have received sporadic attention from short term projects (Annex 6.4b Screenshot of Invertebrate reports folder), there has not been a long-term effort undertaken before this project, or an island-wide survey since the Belgian expedition of the 1960s, since which time the flora and fauna is likely to have significantly altered.

Already, through this project there is now a far greater understanding of the distribution and abundance of over 300 of St Helena's invertebrate species (Output 1). This is likely to increase as samples receive specialist investigation. The data from this survey provides a baseline against which future surveys and management can be measured.

This project has provided specimens and data that will be worked on and analysed far beyond the life of the project and initial analysis has been presented so far (Annex 6.7a Initial Report on Invertebrate Survey Findings; 6.7b Invertebrate Report Appendix). Also, in reality, the sheer quantity of data has in fact presented unanticipated challenges for completing work previously envisaged as being possible within the project timeframe. As described in AR3, an additional staff member was recruited, which not only increased sample sorting, but has presented an opportunity to further improve invertebrate capacity on St Helena. Given the extremely high number of endemic invertebrate species, some groups and individual specimens cannot yet be analysed using in-house expertise alone, but will require specialist attention. While this limits information available in the short term (although there are still 57 pages to the initial report), this presents an opportunity to further engage with the entomological community and highlight the extraordinary diversity of species here (already begun as discussed in section 2). The report presented as evidence is of initial findings only; there are likely to be updates to the report and additional findings through further analysis of specimens for many months to come.

This data will also be utilised to inform future Red List assessments of terrestrial invertebrates, and six species have already been identified as in need of updated accounts from this data (*Hirtopsallus suedae*, *Vernonia wollastoniana*, *Helenolius dividens*, *H. insulicola*, *Sanctahelenia insularis* and *S. sanctahelenae*). Thirty more invertebrate species will be Red Listed by the end of March 2019.

Most elements of education achievements under Output 2 have been described in AR3. This includes the staff trained in invertebrate identification and the use of the St Helena Invertebrate digital resource set. While there are currently four staff within the Trust team with invertebrate identification skills (Project Manager, Education and Project Officer and two Project Assistants), staff turnover means that there are an additional two people with invertebrate skills developed at the Trust who regularly engage with invertebrate conservation on the island (previous PM and Project Officer). Mike Jervis is another former PM, now off island but still involved remotely. This will greatly benefit the island as there will be awareness of the value of the invertebrates of St Helena in other organisations operating on the island.

The Educational Resource pack, although finalised, has not yet been shipped as the contact in the UK has been on Maternity leave. It is expected to be shipped soon and should reach St Helena by Christmas. Once it arrives, the staff at the Trust will undertake a workshop with teachers from each school (originally organised for August) to present the information available and to encourage this to be incorporated into the curriculum.

The field guide is now entering its final stages of editing, most chapters have now been finalised, with the Spider section now having received feedback from Spider experts (Annex 6.6 Steering group meeting minutes June 2018). The St Helena Nature Conservation Group has agreed to fund the publication of 500 copies once the book is completed (Annex 6.8 SNCG Minutes).

Identification sheets for St Helena's Lepidoptera species have been updated by Timm Karisch and hard copies distributed to members of the Trust, SHG (EMD, Biosecurity) and other stakeholders (Annex 6.9a Lepidoptera identification guide; 6.9b Peaks moths guide).

Two outputs (Output 3 and 4) were partially addressed with the Darwin Plus mapping project (DPLUS052). The activities of this were changed from mapping individual trees to mapping and monitoring the habitat. This is difficult to link with invertebrates specifically, as these tend to rely on the microhabitats within the broader habitat types, but even so, changes over time can now be accurately catalogued (e.g. shrinking of habitat) and effect on invertebrates monitored using the baseline data from this project as a reference (Annex 6.10 Habitat monitoring sheet and photographs). The monitoring and mapping overview (Annex 6.11) provides a summary of monitoring requirements and initial mapping incorporating data from DPLUS052 (made available June 2018) and additional LEMP data, which will be updated to provide a more accurate baseline in collaboration with LEMP (i.e. Pipe path and Flagstaff), with monitoring providing long-term analysis of changes.

The knowledge of the Prosperous Bay Plain Mole Spider has been enhanced and summarised during this project, through the production of the Mole Spider report (Annex 6.12). This provides a comprehensive overview of knowledge highlighting issues and factors that may affect findings and is a valuable information base for further work.

3.2 Outcome

The project has achieved its intended outcome to the greatest possible extent within the timeframe given, substantially increasing knowledge on St Helena's invertebrates and their habitats, and increasing the local capacity for effect conservation and monitoring. The results of this project will benefit conservation management of invertebrates on St Helena into the future as there is better understanding of how the invertebrates use the habitat, as well as the diversity and abundance in different areas of the island.

The formation of a centralised invertebrate reference collection is of key importance for the future of invertebrate research on St Helena and will be invaluable for invertebrate conservation work moving forward.

The resources and results produced by the long-term survey will be of use far beyond the life of the project and this, along with input from expert entomologists will continue to improve the understanding of the diversity and distribution of invertebrates and inform conservation efforts more broadly on St Helena.

Finding endemic species in non-native habitat (Annex 6.7a Initial Report) shows that some of these species are not dependent on endemic vegetation as was previously assumed, or may depend on other food sources like lichen, fungi or algae, or they may be dispersing away from remnant areas. This provides important evidence that conservation efforts should also consider the potential of non-native habitat for supporting valuable fauna where endemic habitat is not available. This also helps to differentiate between the more generalist endemic species and those which are likely to be highly specialist and so more at risk from habitat loss.

IUCN Red List of Threatened Species Accounts have now been produced for thirty nine endemic terrestrial invertebrates. Thirty eight more are expected to be published in November 2018. From initial analysis of the survey results, at least six species accounts on the IUCN Red

List have been identified as in need of review. The results from this survey will better inform future listings on the Red List and may be central to accounts for some species in due course. These have been undertaken by Amy-Jayne Dutton following completion of Red List assessor training with support from Vicky Wilkins from MAISG (Annex 6.13 IUCN Global Red List Assessor Certificate).

As covered in Section 2, reports produced by visiting experts Howard Mendel and Timm Karisch also present results of their fieldwork and recommendations for conservation actions (Annex 6.1 and 6.2).

Forty percent of species are now represented within the St Helena Invertebrate Collection. However, this continues to increase and the collection will be staying at the Trust to allow us to continue to work towards increasing this number following the end of the project until a suitable time for the collection to move to the Museum of St Helena (Annex 6.14 Letter from Museum of St Helena).

As stated in Section 3.1 a report on Prosperous Bay Plain spider has been produced (Annex 6.12) which has improved knowledge in the distribution of mole spider and identifies further areas of research.

3.3 Long-term strategic outcome(s)

Invertebrates are rarely credited for the important role that they play in the sustaining of entire ecosystems. They are a relatively unexplored group globally and may hold the key to many of the conservation challenges that we will face in the 21st Century. On St Helena we have in specialist circles been appraised of the significance of our endemic invertebrate life for several decades now (e.g. Ashmole and Ashmole, 2000). Even so, the gaps in knowledge have thus far prevented identification of clear actions which would directly benefit invertebrate conservation.

A robust knowledge base lies at the foundation of effective conservation work. As such, this project has taken great strides in better understanding the invertebrate fauna of the island. The knowledge gained from this project is already assisting with the screening of sites facing development, as well as attracting interest from numerous academics and institutions seeking to further their knowledge and understanding. Findings from this project will help to inform management of sites, inform decision making including policies as well as helping to target future research.

The island's conservation community have also directly benefited from the preliminary results of this project through the assessment of the presence and identity of invertebrates in key locations across the island (Annex 6.7) and there is a clearer understanding that for conservation work on the island to be successful, invertebrate communities must form part of the plan. This has been identified in the Invertebrate Conservation Strategy (2016) which was highlighted by steering group members and has been recommended to be updated following this project (Annex 6.6a).

Beyond St Helena, other island territories are realising that they too may well be sitting on a veritable treasure trove of endemic invertebrate life. Ascension, Tristan Da Cunha and the Falklands have each expressed interest in further exploring their invertebrate fauna. The Invertebrate Collection on St Helena will be a national asset for discussion and sharing of knowledge on the invertebrates across these OT's as there is likely to be substantial cross-over of non-native species.

Being involved with the Mid Atlantic Island Invertebrate Specialist Group (MAISG) also allows for the effective dissemination of information.

Further strategic outcomes have been achieved through the Project's engagement with the IUCN Red List of Threatened Species. Through training individuals within the team in delivering Red List assessments, St Helena is able to be a contributor to the highest profile and most relied upon tool in establishing species conservation status. As part of this leading global dataset, St Helena endemic invertebrates can tell a story that may well garner attention and direct funding to the island for conservation in years to come.

This project directly contributes to articles 7, 8, 12, 13 and 17 of the Convention on Biological Diversity.

4 Sustainability and Legacy

In addition to the long-term benefits outlined in 3.3, the project has drawn the various sources of invertebrate knowledge and information into a manageable, accessible format. It also leaves the island with a permanent physical collection which will benefit the island and invertebrate knowledge and conservation for many years to come. The Invertebrate Collection, along with the knowledge on maintenance will provide a reference collection for further research, which may be of use not only for St Helena but also other islands (e.g. Ascension). As well as this physical legacy, the findings of the survey will persist, and will encourage ongoing interaction and engagement with the material collected.

The Field guide is now in its final stages and Roger Key has dedicated a substantial amount of personal time to moving this forward. SNCG are committed to funding its publication (Annex 6.8) and this will be a valuable island resource.

The database of invertebrate records and sites is currently in an Excel Spreadsheet format (Annex 6.15a;b) but this will be moved forward with support from Buglife to design an online system following a meeting in April with the British Records Centre and Roger Key (as discussed in Section 2; Annex 6.6a;b).

Results will also be utilised to inform management plans moving forward; there is a workshop being held in December 2018 to update the Peaks Management plan and results will be used to make management suggestions.

There are now three local staff with in-depth invertebrate knowledge, who will be retained in the Trust and will lead and advise on invertebrate matters. It is hoped that further funding can be sourced to continue to progress invertebrate research on the island.

Through the regular education activities delivered during this project in conjunction with the Forest Schools programme all school-aged children can identify at least a few endemic invertebrates. With the arrival of the new education pack it is hoped that a longer-term programme can be established, in conjunction with marine and other conservation areas.

5 Lessons learned

This has been an in depth project, with some technical elements which have proved challenging when faced with changes in staff and other issues.

It is clear that relying on the expertise of one member of a team creates pressure on staff and the management of the project. The engagement of the wider invertebrate conservation community has proved invaluable to the project as well as increased dissemination of results. This approach has also allowed for the engagement of several more individuals and organisations, and provided a more rigorously managed project.

The requirement to redo the Logframe for the project, although highlighted in previous reviews, caused additional pressure at a time of changing project managers as it took several iterations before it was accepted. This should be a key element of the project and for future projects a SMART logframe will be prioritised.

The initial work at the Natural History Museum provided invaluable stacked images of type specimens which have been used throughout the project, and while the visit to the Belgium museum was unavoidably cancelled, this would have provided further quality resources.

Output 1 has ended up being the largest focus of this project, with the other Outputs being less prominent, particularly in light of a mapping project (DPLUS052) also being undertaken which would potentially supersede mapping of habitat undertaken by this project.

The sheer volume of specimens collected was a variable that was difficult to plan for. Various approaches were considered, particularly as regards to the duration that malaise traps were

activated for. In addition, some consideration was given to the limitations of the sampling technique itself. In hindsight, more focus could have been given to developing robust sampling methodologies for those species not suited to malaise trap capture (i.e flightless insects). Further time and funding could also have been allocated to sample sorting and species ID (in particular, the engagement of specialists) to provide even greater value from data analysis following sampling activities. Visiting experts did provide exceptional value through this project and the local knowledge developed will prove extremely valuable to the island moving forward. This component worked so well in fact that going forward, we would consider providing for even more specialist input and training.

Many UKOTs have a rich endemic invertebrate fauna, but these species do not yet play the appropriate role in conservation. As this project demonstrates, UKOTs should not hesitate to initiate the necessary basic research in invertebrates as this often stimulates input from other parties, providing knowledge that would not otherwise be gained.

5.1 Monitoring and evaluation

As is often the case in small, remote communities, the delivery of this project was heavily reliant on the human resources available. During the life of the project, the personal circumstances of the original Project Manager necessitated the re-structuring of the project team and some adjustment to the project outputs.

The M&E systems in place for consideration of these significant changes served the project well and allowed for the Project Lead to effectively manage change within the project to ensure that the project outputs progressed. Partners and stakeholders were engaged and extremely supportive of the project throughout and there is no doubt that the links forged with partner and stakeholder institutions will survive this project by many years.

There has not been any external evaluation of the project in its entirety. An audit of the project will be completed in compliance with DPLUS guidelines and the project has been examined in conjunction with the St Helena National Trust's annual external examination. No project specific recommendations have been received through this process.

5.2 Actions taken in response to annual report reviews

The reviews were shared with the project partners and Steering Group, with comments taken into account where feasible. Several of the comments from the last review were already underway (Logframe revision, website updating). Some minor issues have been clarified or addressed within this Final Review (Leader).

6 Darwin Identity

Publicity of the project has included newspaper articles (Annex 6.16), social media updates, radio interviews, outreach activities and displays (Annex 6.4c). The vehicle used by the project team also prominently displays the Darwin Initiative logo (Annex 6.4d) As a result of this project there is a higher awareness of invertebrates, and the Darwin Initiatives funding of this important species group, with members of the public regularly engaging with the team regarding invertebrates they have seen, or specific questions they may have. Support from Darwin Plus will also be mentioned in all publications on St Helena Lepidoptera by Timm Karisch.

While there are a number of Darwin Initiative projects that have run during the time of this one, it is generally recognised as a distinct project, with suitable collaboration strengthening recognition of the value of the project.

The Darwin Initiative is a key funder of a number of conservation projects on St Helena. As such, there is a high presence of the Darwin logo, including on vehicles and clothing, which often remain visible following the end of a specific project.

7 Finance and administration

7.1 Project expenditure

Project spend (indicative) since last annual report	2018/19 Grant (£)	2018/19 Total actual Darwin Costs (£)	Variance %	Comments (please explain significant variances)
Staff costs				
Consultancy costs				
Overhead Costs				
Travel and subsistence				
Operating Costs				
Capital items				
Others				
TOTAL				

Staff employed (Name and position)	Cost (£)
Amy-Jayne Dutton, Project Manager	
Liza Fowler, Education and Project Officer	
Sheena Isaac, Assistant Project Officer	
Natasha Stevens, Assistant Project Officer	
TOTAL	

Consultancy – description of breakdown of costs	Other items – cost (£)
TOTAL	0

Capital items – description	Capital items – cost (£)
TOTAL	0

Other items – description	Other items – cost (£)
Overseas staff relocation – flights	
Buglife Admin costs and project support	
TOTAL	

7.2 Additional funds or in-kind contributions secured

Source of funding for project lifetime	Total

	(£)
Horniman Museum for Jo Hatton to accompany Howard Mendel to St Helena	
TOTAL	

Source of funding for additional work after project lifetime	Total (£)
RSPB for staff continuation after the end of the project	
TOTAL	

7.3 Value for Money

The project has provided a range of equipment which will remain on St Helena. Getting specialist equipment to the island provides a challenge and often presents an initial obstacle to furthering or developing work, therefore this Darwin project allowed progression of work by simply providing funds to purchase specialist entomological equipment, immediately improving the effectiveness of actions to further entomological work on St Helena. This project has instigated action that is unlikely to have been achieved without this Darwin funding. Equally, funding to support the visits by two specialist entomologists has been exceptional value for money as they both have experience on St Helena but were unlikely to visit otherwise. This has cost a fraction of a true consultancy fee for this work, particularly with the ongoing further work in their home countries. This enabled the best information to be gathered 'on the ground', with their second visit allowing methods to be honed. The local team gained significant information and training provided by these visiting experts, which ensured the transfer of specialist knowledge to St Helena.

There has also been collaboration with staff on other Darwin projects during this time, particularly DPLUS052 and DPLUS025. This has allowed sharing of knowledge and techniques and ensured further sustainability due to the cross-over.

Annex 1

Project's original (or most recently approved) logframe (if your project has a logframe), including indicators, means of verification and assumptions. N.B. Insert your full logframe. If your logframe has changed since your application and was approved by a Change Request the newest approved version should be inserted here, otherwise insert the logframe from your application. If your application's logframe 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
<p>Impact</p> <p>St Helena's unique invertebrates are recognised as globally significant and locally valued; and the habitats upon which they rely are understood, secured and improved, for future generations.</p>		<p>St Helena Invertebrate Conservation Strategy.</p> <p>St Helena Government State of the Environment Report.</p> <p>Peer-reviewed journal articles published</p>	
<p>Outcome</p> <p>Improved conservation management of St Helena's invertebrates as a result of new knowledge of key species and habitats, and increased local capacity for effective conservation and monitoring.</p>	<p>By 2018 50% of terrestrial invertebrate species are represented in the St Helena Invertebrate collection begun by the St Helena National Trust in 2015 (pre-project specimens were not held in a central on-island collection).</p> <p>By 2018 improved data on the ecology, distribution and abundance of the prosperous bay mole spider will be presented in a report to inform future conservation work</p> <p>Baseline assessment of invertebrate value of 3 key habitat types (Scrubwood, Gumwood, Cloud Forest) to inform conservation management by 2018</p> <p>Conservation management recommendations have been made based on survey results and a clear protocol has been established for ongoing data collection and monitoring by 2018</p>	<p>Dry and wet specimen collections collated by St Helena National Trust</p> <p>Digital reference collection including stacked images updated to include pictures or references to 50% of known species on St Helena</p> <p>New chapters in invertebrate field guide.</p> <p>Threatened species red-listed under IUCN criteria</p> <p>Report on survey results including conservation management recommendations for invertebrates</p> <p>Report on Prosperous Bay Plain Mole Spider</p> <p>Project Final Report</p>	<p>Invertebrates are considered during land planning and development</p> <p>Invertebrate surveys result in enough specimens collected for reference collection to improve sufficiently.</p> <p>Access is permitted to all key sites</p>

Project Summary	Measurable Indicators	Means of Verification	Important Assumptions
<p>Output 1.</p> <p>Capacity for conservation management to incorporate the Island's endemic invertebrates is improved through greater understanding of invertebrates' distribution, abundance, and the effects of seasonality, predators and climate change.</p>	<p>Invertebrate numbers and distribution are defined across the island in accordance with malaise trap and fieldwork findings by June 2018 (data not previously defined across habitats throughout the island)</p> <p>Predatory and pest species impacting endemic invertebrate species across the island are identified and actions recommended to environmental organisations on St Helena by June 2018</p>	<p>Report on survey results including conservation management recommendations for invertebrates, including invasive species impacts and potential controls</p> <p>New records of all species, including rare and scarce species or species new to science</p> <p>Invertebrate database updated to include new records and distribution knowledge</p> <p>Updated red-listings of Threatened species under IUCN criteria</p> <p>Project final report.</p>	<p>International museums with St Helena material permit access to collections.</p> <p>External support can be accessed for invertebrate species identification.</p> <p>Enough invertebrates will be collected in survey to answer research questions.</p>
<p>Output 2.</p> <p>St Helena has all the skills and resources to identify invertebrates.</p>	<p>Four Trust staff trained in invertebrate identification and competent in the use of the St Helena Invertebrate Digital reference collection by June 2018(baseline = 1).</p> <p>Improved invertebrate awareness and identification skills for 60 people as a result of Six workshops provided by Trust staff to other organisations on St Helena and departments in SHG by 2018</p> <p>Two museum staff trained in the use and maintenance of the specimen collection, including the database, by 2018 (baseline = 0)</p> <p>75% of school-aged children participated in invertebrate themed activities through the Forest School programme by June 2018 (maintaining estimated baseline of 75%)</p> <p>100% of island schools have access to the Educational Resource pack, with at least 2 teachers from each school</p>	<p>Staff participation in workshops and field training days with expert entomologists</p> <p>Training in use of Digital Resource provided by project staff for project partners and stakeholders</p> <p>Training manual/resources</p> <p>Material from workshops and photographic evidence of workshops being undertaken</p> <p>Pre and post training assessments</p> <p>Training session in specimen collection maintenance undertaken</p> <p>Keys produced and included in project final report.</p> <p>Forest Schools activity log</p> <p>Updated Education Pack</p> <p>Improved chapters in invertebrate field guide.</p> <p>Project final report.</p>	<p>Schools curriculum retains biodiversity/natural sciences strand.</p> <p>External support can be accessed for taxonomic keys development.</p> <p>External support is maintained for producing the field guide.</p> <p>Invertebrate surveys result in enough specimens collected for reference collection to improve sufficiently.</p>

Project Summary	Measurable Indicators	Means of Verification	Important Assumptions
	<p>receiving training on how to incorporate invertebrates into the curriculum by end of project.</p> <p>Twelve field guide chapters improved with additional species data and photographs by June 2018</p>		
<p>Output 3.</p> <p>Monitoring systems developed for three areas of restoration work across St Helena</p>	<p>Three locations of restoration work are mapped by 2018</p> <p>Habitat monitoring methodology is developed and future monitoring methodology accepted by steering group and carried out by 2018</p>	<p>SHEIS database and GIS maps</p> <p>Monitoring methodology defined.</p> <p>Monitoring data</p> <p>Evidence of steering group discussion</p>	<p>Collaboration is maintained with Darwin Plus Project no.052: <i>Mapping St Helena's biodiversity and natural environment</i> for on-ground vegetation assessments.</p>
<p>Output 4.</p> <p>Monitoring systems developed for five natural regeneration areas across St Helena</p>	<p>Five locations of natural regeneration work are mapped by 2018</p> <p>Habitat monitoring methodology is developed and future monitoring methodology accepted by steering group and carried out by 2018</p>	<p>SHEIS database and GIS maps</p> <p>Monitoring methodology defined.</p> <p>Monitoring data</p> <p>Evidence of steering group discussion</p>	<p>Collaboration is maintained with Darwin Plus Project no.052: <i>Mapping St Helena's biodiversity and natural environment</i> for on-ground vegetation assessments.</p>
<p>Output 5.</p> <p>There is increased knowledge of the ecology and distribution of the Prosperous Bay Mole Spider.</p>	<p>100% of Prosperous Bay Plain is searched for mole spider molehills (walk-over of site with molehill GPS coordinates taken) and mapped by 2018 (baseline search area unknown).</p> <p>The population size of the Prosperous Bay Mole Spider is estimated from fresh molehill locations by June 2018</p> <p>Report on the ecology of the mole spider is completed and disseminated to relevant stakeholders by 2018</p>	<p>Prosperous Bay Mole Spider report.</p> <p>Invertebrate database.</p>	<p>Molehills are able to be located easily by surveyors.</p> <p>Enough molehills are located to confidently be able to estimate population size.</p>
<p>Activity 1.1 Visit the Royal Museum for Central Africa in Tervuren, Belgium to photograph specimens.</p> <p>Activity 1.2 Visit the Natural History Museum in London to photograph specimens.</p> <p>Activity 1.3 Conduct a year-long invertebrate survey.</p>			

Project Summary	Measurable Indicators	Means of Verification	Important Assumptions
<p>Activity 1.4 Identify specimens collected in the survey.</p> <p>Activity 1.5 Produce reports.</p> <p>Activity 1.6 Re-assess any Red Listed species where new data may affect the listing.</p> <p>Activity 1.7 Determine the impact of invasive predatory species on native invertebrate species and habitats.</p> <p>Activity 1.8 Determine the effect of seasonality on invertebrates.</p> <p>Activity 1.9 Determine the effect of conservation efforts for habitats on invertebrates</p> <p>Activity 1.10 Determine invertebrate diversity and abundance differences between natural, restored and non-native habitats.</p> <p>Activity 1.11 Assess shifts in distribution of invertebrates attributable to global warming.</p> <p>Activity 1.12 Make data available.</p> <p>Activity 2.1 Improve the invertebrate identification resource kit which was developed under the 'Laying the Foundations' project.</p> <p>Activity 2.2 Continue invertebrate education programmes to school children and update the education pack which was developed under the 'Laying the Foundations' project.</p> <p>Activity 2.3 Create accurate, tested invertebrate keys.</p> <p>Activity 2.4 Improve the field guide with new information and photographs.</p> <p>Activity 2.5 Improve the Museum of St Helena reference collection.</p> <p>Activity 2.6 Make the contents of the reference collection available online.</p> <p>Activity 3.1 Map the Millennium Forest.</p> <p>Activity 3.2 Map High Peak.</p> <p>Activity 3.3 Map Blue Point.</p> <p>Activity 3.4 Make data available.</p> <p>Activity 4.1 Map Flagstaff Scrubwoods.</p> <p>Activity 4.2 Map Pipe Path Scrubwoods.</p> <p>Activity 4.3 Map Signal House Scrubwoods.</p> <p>Activity 4.4 Map Peak Dale Gumwoods.</p> <p>Activity 4.5 Map Blue Point Scrubwoods.</p> <p>Activity 4.6 Make data available.</p> <p>Activity 5.1 Map the molehills to see distribution</p> <p>Activity 5.2 Assess mole spider population size.</p> <p>Activity 5.3 Make data available.</p>			

Annex 2 Report of progress and achievements against final project logframe for the life of the project (if your project has a logframe)

Project summary	Measurable Indicators	Progress and Achievements for the life of the project
<p>Impact:</p> <p>St Helena's unique invertebrates are recognised as globally significant and locally valued; and the habitats upon which they rely are understood, secured and improved, for future generations.</p>		<p>Global recognition of St Helena's invertebrates has been improved through this project providing a greater understanding of the diversity and abundance of species on St Helena. Invertebrate species have been Red Listed, and invertebrates and their habitats are now considered during planning applications and other potentially harmful activities or developments.</p> <p>A number of invertebrate species are present on the Environmental Protection Ordinance (2016) and there has been international engagement through MAISG, Buglife, Natural History Museum, Horniman Museum and Gardens and Museum für Naturkunde und Vorgeschichte, Dessau, Germany. The results of these surveys will be integrated into future management plans and policy to improve invertebrate conservation.</p>
<p>Outcome</p> <p>Improved conservation management of St Helena's invertebrates as a result of new knowledge of key species and habitats, and increased local capacity for effective conservation and monitoring.</p>	<p>By 2018 50% of terrestrial invertebrate species are represented in the St Helena Invertebrate collection begun by the St Helena National Trust in 2015 (pre-project specimens were not held in a central on-island collection).</p> <p>By 2018 improved data on the ecology, distribution and abundance of the Prosperous Bay Mole Spider will be presented in a report to inform future conservation work</p> <p>Baseline assessment of invertebrate value of 3 key habitat types (Scrubwood, Gumwood, Cloud Forest) to inform conservation management by 2018</p> <p>Conservation management</p>	<p>This project has made significant impact in the understanding of St Helena's invertebrates, in key habitat types but also in non-native habitats that have previously received little attention.</p> <p>There is now a collection holding 40% of the islands species, which is being increased as specimens are collected and is expected to reach 50% before Christmas 2018. Knowledge on curation is now imbedded in the invertebrate team and will continue to be maintained.</p> <p>A huge amount of knowledge has now been amassed on invertebrates from across the island, both endemic and non-native, which will be built upon by future work</p> <p>Native habitats are now recognised for their invertebrate value, not just for the presence of endemic plants. We now have evidence of the links between endemic invertebrates and their host plant species, as well as species that appear to utilise non-native vegetation (Annex 6.1 Timm Karisch Lepidoptera Report; 6.2 Howard Mendel Report; 6.7a Initial Report on Invertebrate Survey Findings).</p> <p>Annex 6.7 and 6.11 present information on invertebrate presence in different habitats and highlights valuable endemic habitat areas. These also provide</p>

	recommendations have been made based on survey results and a clear protocol has been established for ongoing data collection and monitoring by 2018	recommendations on conservation and future monitoring (Section 3.2; Annex 6.7). Regular monitoring should take into account conservation actions and needs, particularly until current data is fully analysed. This data provides a springboard for invertebrate conservation management; the results of this survey will be utilised into the future and are likely to stimulate further analysis, discussion, and input from other experts.
<p>Output 1.</p> <p>Capacity for conservation management to incorporate the Island's endemic invertebrates is improved through greater understanding of invertebrates' distribution, abundance, and the effects of seasonality, predators and climate change.</p>	<p>Invertebrate numbers and distribution are defined across the island in accordance with malaise trap and fieldwork findings by June 2018 (data not previously defined across habitats throughout the island)</p> <p>Predatory and pest species impacting endemic invertebrate species across the island are identified and actions recommended to environmental organisations on St Helena by June 2018</p>	<p>Invertebrate numbers and abundance have been assessed through the use of malaise traps in locations across the island. These give a very good understanding of species likely to be caught (flying insects in particular). Other search methods have been undertaken in addition to target species less well represented, particularly beetles from two visits by Coleopterist Howard Mendel and moths from two visits by Lepidopterist Timm Karisch (Annex 6.2;6.1).</p> <p>The survey has revealed the abundance of some non-native species, including some identified as pests or potentially impacting endemic species (Annex 6.7).</p> <p>Findings will be used to update the Species Records, currently managed by Roger Key. This and the Species List will be used to design an online platform for St Helena's invertebrate records, supported by Buglife as discussed in section 2.</p> <p>39 terrestrial invertebrates are currently Red Listed, with 38 expected to be published in November 2018 (discussed in section 2). Six species have been identified as in need of review (section 3.1).</p>
Activity 1.1 Visit the Royal Museum for Central Africa in Tervuren, Belgium to photograph specimens.		Cancelled in Change Request 3.
Activity 1.2 Visit the Natural History Museum in London to photograph specimens.		Completed AR1.
Activity 1.3 Conduct a year-long invertebrate survey.		Undertaken January to October 2017 (reported in AR3). Initial results presented in Annex 6.7.
Activity 1.4 Identify specimens collected in the survey.		Specimens identifiable with on-island expertise complete. Others await specialist identification. Annex 6.7; 6.4e.
Activity 1.5 Produce reports.		Annex 6.7 Initial Report on Invertebrate Survey Findings

Activity 1.6 Re-assess any Red Listed species where new data may affect the listing.	Species likely to require re-assessment identified (section 3.1) 30 more species have been identified to be Red Listed by March 2019.
Activity 1.7 Determine the impact of invasive predatory species on native invertebrate species and habitats.	Annex 6.7a Initial Report on Invertebrate Survey Findings
Activity 1.8 Determine the effect of seasonality on invertebrates.	Annex 6.7a Initial Report on Invertebrate Survey Findings
Activity 1.9 Determine the effect of conservation efforts for habitats on invertebrates.	Annex 6.7a Initial Report on Invertebrate Survey Findings
Activity 1.10 Determine invertebrate diversity and abundance differences between natural, restored and non-native habitats.	Annex 6.7a Initial Report on Invertebrate Survey Findings
Activity 1.11 Assess shifts in distribution of invertebrates attributable to global warming.	This project provides a baseline, from which future changes can be assessed. Differences in distribution discussed in Annex 6.7a Initial Report on Invertebrate Survey Findings
Activity 1.12 Make data available.	Report will be made available on www.trust.org.sh by end of October 2018.
<p>Output 2.</p> <p>St Helena has all the skills and resources to identify invertebrates.</p>	<p>Four Trust staff trained in invertebrate identification and competent in the use of the St Helena Invertebrate Digital reference collection by June 2018 (baseline = 1).</p> <p>Improved invertebrate awareness and identification skills for 60 people as a result of six workshops provided by Trust staff to other organisations on St Helena and departments in SHG by 2018</p> <p>Two museum staff trained in the use and maintenance of the specimen collection, including the database, by 2018 (baseline = 0)</p> <p>75% of school-aged children participated in invertebrate themed activities through the Forest School</p>
	<p>Four current Trust staff have been trained in invertebrate identification, including the use of the St Helena Digital Reference collection. Additionally two staff who now work for other organisations on St Helena and one LEMP staff member have also received training.</p> <p>Two moth identification workshops have been run by Timm Karisch. In 2017 genitalia extraction workshop with eight local staff (AR2) and 25 people were involved in a moth identification workshop in April 2018 (Annex 6.4f). A moth identification booklet produced, including a specialist Peaks sheet and hardcopies given to SHG Biosecurity, EMD Peaks team, local landowners (Annex 6.9a;b).</p> <p>AR2 documents 6 days of training workshops held for local conservation staff including biosecurity. Four of these workshop days covered identification skills for 27 local conservation staff.</p> <p>Museum staff will be trained in the maintenance of the collection and use of the specialist database. The Museum Manager was trained in 2016/17 (AR2) and the previous Project Manager David Pryce now volunteers at the museum and is already familiar with the system. Further training will be given when the collection and equipment is handed over to the Museum (Annex 6.14).</p>

	<p>programme by June 2018 (maintaining estimated baseline of 75%)</p> <p>100% of island schools have access to the Educational Resource pack, with at least 2 teachers from each school receiving training on how to incorporate invertebrates into the curriculum by end of project.</p> <p>Twelve field guide chapters improved with additional species data and photographs by June 2018</p>	<p>As discussed in AR3, school children have been involved in invertebrate activities during Forest School sessions. Unfortunately, funding for Forest schools ended in March 2018, but every school was involved in invertebrate activities. Now every school-aged child is able to recognise at least a few endemic invertebrates.</p> <p>Ten education packs have been ordered and are due to be shipped soon, these will be given to each school and a teacher training workshop run (discussed in section 3).</p> <p>The final section of the Invertebrate Field Guide is being worked on (discussed in section 2 and 3.1).</p>
Activity 2.1 Improve the invertebrate identification resource kit which was developed under the 'Laying the Foundations' project.		This has been reported on in all 3 Annual Reports. The digital resources have been in use throughout the project (section 3.1).
Activity 2.2 Continue invertebrate education programmes to school children and update the education pack which was developed under the 'Laying the Foundations' project.		This was continued during the project until the end of March 2018 as described in AR3.
Activity 2.3 Create accurate, tested invertebrate keys.		Keys discussed in AR3. There is limited expertise for testing on St Helena. Moth identification guide has been produced and disseminated (section 3.1)
Activity 2.4 Improve the field guide with new information and photographs.		Field guide final sections being worked on (section 2).
Activity 2.5 Improve the Museum of St Helena reference collection.		Reference collection has been improved throughout the project and will remain in the Trust to continue to be improved (Annex 6.14).
Activity 2.6 Make the contents of the reference collection available online.		This will be undertaken with the online database as discussed in section 2 and 4.
Output 3. Monitoring systems developed for three areas of restoration work across St Helena	<p>Three locations of restoration work are mapped by 2018</p> <p>Habitat monitoring methodology is developed and future monitoring methodology accepted by steering group and carried out by 2018</p>	<p>Basic maps are presented from DPLUS052 and LEMP data (Annex 6.11). These maps will be updated with data from ongoing monitoring. Monitoring methodology was outlined in AR3, and undertaken in 2018 (Annex 6.10). Invertebrate monitoring at appropriate sites will be incorporated into conservation actions, including National Conservation Area management plans where appropriate.</p>

Activity 3.1 Map the Millennium Forest.		Map 3 in Annex 6.11
Activity 3.2 Map High Peak.		Map 7 in Annex 6.11
Activity 3.3 Map Blue Point.		Map 4 in Annex 6.11
Activity 3.4 Make data available.		Maps available on www.trust.org.sh by end of October 2018
Output 4. Monitoring systems developed for five natural regeneration areas across St Helena	Five locations of natural regeneration work are mapped by 2018 Habitat monitoring methodology is developed and future monitoring methodology accepted by steering group and carried out by 2018	Basic maps are presented from DPLUS052 and LEMP data (Annex 6.11). These maps will be updated with data from ongoing monitoring. Monitoring methodology was outlined in AR3, and undertaken in 2018 (Annex 6.10). Invertebrate monitoring at appropriate sites will be incorporated into conservation actions, including National Conservation Area management plans where appropriate.
Activity 4.1 Map Flagstaff Scrubwoods.		Map 6 in Annex 6.11
Activity 4.2 Map Pipe Path Scrubwoods.		Map 5 in Annex 6.11
Activity 4.3 Map Signal House Scrubwoods.		Not undertaken. Discussed in AR3.
Activity 4.4 Map Peak Dale Gumwoods.		Map 2 in Annex 6.11
Activity 4.5 Map Blue Point Scrubwoods.		Map 4 in Annex 6.11
Activity 4.6 Make data available.		Maps available on www.trust.org.sh by end of October 2018
Output 5. There is increased knowledge of the ecology and distribution of the Prosperous Bay Mole Spider.	100% of Prosperous Bay Plain is searched for Mole Spider molehills (walk-over of site with molehill GPS coordinates taken) and mapped by 2018 (baseline search area unknown). The population size of the Prosperous Bay Mole Spider is estimated from fresh molehill	Current knowledge of Prosperous Bay Plain Mole Spider synthesised in Annex 6.12. This includes a map of the area covered in searches and discussion on distribution and population size. While 100% of the area was not covered, approximately 80% of the suitable area of the Central Basin was covered, which can be utilised to target searches on the much larger area of Prosperous Bay Plain. This report has received comments by SHG and will be accessible online, with point data available to anyone wishing to undertake further work, clearly

	locations by June 2018 Report on the ecology of the Mole Spider is completed and disseminated to relevant stakeholders by 2018	presenting what has been undertaken so far.
Activity 5.1 Map the molehills to see distribution		Annex 6.12
Activity 5.2 Assess mole spider population size		Annex 6.12
Activity 5.3 Make data available		Report with less specific location map available on trust.org.sh by end of October 2018

Annex 3 Standard Measures

Code	Description	Totals (plus additional detail as required)
Training Measures		
1	Number of (i) students from the UKOTs; and (ii) other students to receive training (including PhD, masters and other training and receiving a qualification or certificate)	
2	Number of (i) people in UKOTs; and (ii) other people receiving other forms of long-term (>1yr) training not leading to formal qualification	
3a	Number of (i) people in UKOTs; and (ii) other people receiving other forms of short-term education/training (i.e. not categories 1-5 above)	
3b	Number of training weeks(i) in UKOTs; (ii) outside UKOTs not leading to formal qualification	
4	Number of types of training materials produced. Were these materials made available for use by UKOTs?	
5	Number of UKOT citizens who have increased capacity to manage natural resources as a result of the project	3
Research Measures		
9	Number of species/habitat management plans/ strategies (or action plans) produced for/by Governments, public authorities or other implementing agencies in the UKOTs	
10	Number of formal documents produced to assist work in UKOTs related to species identification, classification and recording.	
11a	Number of papers published or accepted for publication in peer reviewed journals written by (i) UKOT authors; and (ii) other authors	
11b	Number of papers published or accepted for publication elsewhere written by (i) UKOT authors; and (ii) other authors	
12b	Number of computer-based databases enhanced (containing species/genetic information). Were these databases made available for use by UKOTs?	
13a	Number of species reference collections established. Were these collections handed over to UKOTs?	1 - currently at the St Helena National Trust then being handed to the Museum of St Helena.
13b	Number of species reference collections enhanced. Were these collections handed over	

Code	Description	Totals (plus additional detail as required)
	to UKOTs?	
Dissemination Measures		
14a	Number of conferences/seminars/workshops/stakeholder meetings organised to present/disseminate findings from UKOT's Darwin project work	
14b	Number of conferences/seminars/workshops/stakeholder meetings attended at which findings from the Darwin Plus project work will be presented/ disseminated	
Physical Measures		
20	Estimated value (£s) of physical assets handed over to UKOT(s)	
21	Number of permanent educational/training/research facilities or organisation established in UKOTs	
22	Number of permanent field plots established in UKOTs	
23	Value of resources raised from other sources (e.g., in addition to Darwin funding) for project work	

Annex 4 Publications

Type *	Detail (title, author, year)	Nationality of lead author	Nationality of institution of lead author	Gender of lead author	Publishers (name, city)	Available from (e.g. weblink, contact address, annex etc)
Report *	Initial Invertebrate Survey Report Liza Fowler, Sheena Isaac and Natasha Stevens, 2018	British (St Helenian)	British	Female		Annex 6.7 Will be uploaded to http://www.trust.org.sh/shnt-conservation-programmes/natural-heritage/invertebrates/
Report*	Prosperous Bay Plain Mole Spider Amy-Jayne Dutton, 2018	British	British	Female		Annex 6.12 Will be uploaded to http://www.trust.org.sh/shnt-conservation-programmes/natural-heritage/invertebrates/ be uploaded to
Identification guide*	Lepidoptera of St Helena- Illustrated Identification Chart, Timm Karisch, 2018	German	German	Male		Annex 6.9 Will be uploaded to http://www.trust.org.sh/shnt-conservation-programmes/natural-heritage/invertebrates/ be uploaded to
Draft journal articles*	Listed in Annex 6.5					

Annex 5 Darwin Contacts

Ref No	DPLUS040
Project Title	Securing the future for St Helena's endemic invertebrates
Project Leader Details	
Name	Jeremy Harris
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Partner 1	
Name	Lourens Malan
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Partner 2	
Name	Timm Karisch
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Role within Darwin Project	Project partner and Steering group member
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Partner 3	
Name	Howard Mendel
Organisation	The Natural History Museum, London
Role within Darwin Project	Project partner and steering group member
Email	
Partner 4	
Name	Sarah Henshall
Organisation	Buglife
Role within Darwin Project	Project partner and Steering group member
Email	

Annex 6 Supplementary material (optional but encouraged as evidence of project achievement) 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.	
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.	
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	
Have you completed the Project Expenditure table fully?	
Do not include claim forms or other communications with this report.	