



Department
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Development



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

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|-----------------------------------|--|
| Project reference | DPLUS025 |
| Project title | Conservation of the Spiky yellow woodlouse and black cabbage tree woodland on St Helena |
| Territory(ies) | St Helena island |
| Contract holder Institution | St Helena National Trust (SHNT) |
| Partner institutions | Environmental Management Division – St Helena Government (EMD); Royal Society for the Protection of Birds (RSPB); Zoological Society of London (ZSL) |
| Grant value | £37,090 |
| Start/end date of project | 1st April 2014 – 31st March 2017 |
| Project leader name | Jeremy Harris |
| Project website/Twitter/blog etc. | http://www.nationaltrust.org.sh/ https://www.facebook.com/SHNTspikyyellowwoodlouse/ |
| Report author(s) and date | Amy-Jayne Dutton (Spiky yellow woodlouse project manager) 28th June 2017 |

1 Project Overview

The island of St Helena in the south Atlantic holds approximately 30% of the total number of endemic species of all UK Territories (Churchyard et al., 2016). This includes numerous invertebrate species.

The ecosystems of St Helena have been greatly degraded since human colonisation; the cloud forest on the High Central Ridge ('the Peaks') has undergone substantial losses during the expansion of the flax industry, and is now threatened by fragmentation and a myriad of non-native plant species. The largest portion of cloud forest is found on the High Central Ridge (referred to as Diana's Peak), with a smaller fragment also remaining on High Peak, which is isolated from Diana's Peak by several kilometres. The presence of cloud forest vegetation on St Helena is crucial for the hydrological processes on the island, as well as supporting a huge variety of endemic and native flora and fauna species.

Figure 1. Location of St Helena



On St Helena, there is a rare area of contiguous Black cabbage tree (*Melanodendron integrifolium*) woodland on High Peak, known as ‘the Dell’, which has been reduced to approximately 250m². This was believed to be the last stronghold of the Spiky yellow woodlouse (*Pseudolaureola atlantica*), which was listed as Critically Endangered in 2015 when it was estimated that there was approximately 50 individuals left. The Dell is also an important refuge for other cloud forest species including several bryophytes and five endangered ferns (e.g., only approximately 100 *Dryopteris cognata* remain). This area of cloud forest habitat is isolated and in great danger of being lost to the encroaching non-native vegetation.

This project attempted to address the loss of important cloud forest to secure Spiky yellow woodlouse habitat, specifically to secure the future of the Dell’s ecosystem through restoration of an area of cloud forest on High Peak. Secondly this project aimed to gain further information on the Spiky yellow woodlouse and to protect the remaining population through instigation of a captive breeding programme. After the discovery of further Spiky yellow woodlouse populations on Diana’s Peak in 2015 as part of DPLUS029, the original objective of setting up a captive breeding programme was altered through a change request. A day-long workshop was undertaken in January 2016 with all project partners and stakeholders, to focus on increasing understanding of the habitat and ecological requirements of this species through in-depth observations across known Spiky yellow woodlouse areas.

The Spiky yellow woodlouse itself is a high profile endemic species, valuable to the island as a symbol of the unique features of this island, and as a rare and unusual species itself. Greater understanding of this species’ needs is crucial to implementing effective conservation actions.

2 Project Stakeholders/Partners

Staff from St Helena Governments Environmental Management Division were highly engaged with this project; staff involved with DPLUS029 (Conserving St Helena’s rare endemic trees and associated invertebrates) supported fieldwork (Evidence provided as **Doc1** - agreement between projects) and the EMD nursery at Scotland produced the majority of the plants for the restoration area (Section 3, Output 1.3).

This project has engaged a number of stakeholders throughout the project, with financial and time support received from several non-governmental organisations.

Conservation on St Helena has received long-term support from the Royal Society for the Protection of Birds (RSPB), and this project has received dedicated attention, including staff time, equipment provision, and funding both during and post project. Sarah Havery of the RSPB was a project partner and key stakeholder helping to drive the project forward.

The Zoological Society of London (ZSL) was also an official project partner who donated a weather station along with other equipment and Paul Pearce-Kelly was able to provide support and historic information of involvement on St Helena and the Spiky yellow woodlouse.

Both the RSPB and Buglife have been involved in crucial steps of this project, including hosting a day-long project partner and stakeholder workshop in early 2016 leading to the development of a Spiky Yellow Woodlouse Strategy and Action Plan (2016-2021)

(<https://portals.iucn.org/library/sites/library/files/documents/Rep-2016-010.pdf> accessed 16.06.17) which provided direction for the final year of the project as well as long-term goals.

Both RSPB & Buglife also assisted SHNT with job interviews for the new Project Manager in the UK, and in communicating key findings of the project (particularly Spiky Yellow Woodlouse fluorescence).

The number of involved stakeholders has sometimes resulted in differences in perceived priorities for work and methods. This has required tact and an open attitude to ensure that all opinions are taken into account to produce the best result for the project and in moving forward to plan for future conservation actions on St Helena.

Independent stakeholders and organisations engaged with the project during the development of the Spiky Yellow Woodlouse Strategy and Action Plan (2016-2021), and during the appointment of the new Project Manager in May 2016, providing information and advice from their specialist areas. These included Roger Key (independent invertebrate specialist), Tim Woodfine from Marwell Zoo and Colin Clubbe from Kew Botanical Gardens. Mark Bushell, from Bristol Zoological Society has also been actively involved in communications during the project and promoting longer-term support.

A regular monthly update provided by SHNT gave stakeholders the opportunity to engage throughout the project (Evidence provided as **Doc2 - example updates**). A meeting of on-island project partners was undertaken half way through the 2016/17 project year to review project progress and needs (**Doc3 - meeting minutes**). Regular 3-monthly Skype meetings were also undertaken with the RSPB.

This project has been a good example of positive stakeholder collaboration to ensure the continuation and success of a project. Output reports will be available to stakeholders and some may be made publicly available depending on content as specific locations will not be made public.

3 Project Achievements

3.1 Outputs

Output tables have been used from the original application, with changes noted as appropriate, in lieu of a logframe.

Output 1. 1,000 square metres of new black cabbage tree woodland created around the Dell.

| Output (<i>what will be achieved</i>) | Indicators of success (<i>how we will know if its been achieved</i>) | Status before project/baseline data (<i>what is the situation before the project starts?</i>) | Source of information (<i>where will you obtain the information to demonstrate if the indicator has been achieved?</i>) | Final achievements (<i>what evidence is presented</i>) |
|---|---|--|--|---|
| One Ha of new black cabbage tree woodland created around the Dell. Changed to 1,000 square meters with change request | Pasture cleared. 1,000 square meters of young trees and ground cover species planted and surviving. | Global habitat area of black cabbage tree woodland only 250 m ² . State declining each year due to tree fall in strong winds. Much of potential surrounding site taken-up by pasture. | Records of plants introduced will be maintained, together with data on their survival and growth. | 1,975 plants installed in restoration area around the Dell and natural regeneration occurring. Doc4 - Restoration techniques report produced. Doc5 - Photographs of progress and challenges. Restoration area regularly maintained. No recent loss of trees in the 'Dell'. |

There are large areas of pasture grasses around the Dell. Attempts to replant around the Dell have been undertaken over several projects and several years, with a disjointed evidence base. As part of this project, grass and invasive plant species have been managed around the Dell, including a trial herbicide treatment of an area of kikuyu grass. Over 600 endemic trees and 1300 endemic ground cover plants have been successfully installed and have established, predominantly in front of the Dell but with some individuals around the area. There are more

plants still in production which will enable continued planting. There has been regular management by the Spiky yellow woodlouse fieldworker (employed as part of the project), including monitoring of established and newly planted individuals.

Evidence provided: A Restoration report has been produced to detail actions and successes of the restoration Doc4. Total numbers planted stated in Output 1.3 Table 1. Photographs show achievements Doc5.

Output 1.1 Clearance of at least 0.05 ha (500 sq metres) of pasture grasses outside the Dell.

The area within the new windbreaks and in and around the border of the two areas of rebony (*Trochetiopsis x benjaminii*, a man-made hybrid of two endemic species not native to the area) has been regularly weeded by the Spiky yellow woodlouse fieldworker to prevent the re-growth of pasture grasses, predominantly kikuyu (*Pennisetum clandestinum*) and other invasive weeds (including Whiteweed *Austroeupeatorium inulifolium*, Mexican creeper *Lophospermum erubescens*, Bilberry tree *Solanum mauritianum* and Arum lily *Zantedeschia aethiopica*). The trial of leaving sprayed kikuyu to rot in situ successfully protected the friable soil below and provided an area for replanting, as utilised by the Darwin Initiative Community Forests Project (20-005) at the Ginger Patch. The sprayed area now has reduced vigorous grass coverage and is being planted with endemic ground cover species, with ferns naturally establishing. Cut grass during management is used as mulch around replantings. Grass has also been removed from the path border to encourage native fern growth, which will eventually help to shade out the competitive kikuyu grass.

Output 1.2 Creation of windbreaks to protect plantings

Twenty two windbreaks were installed after the failure of an extended shade canopy due to high winds. These have now been in place for over two years and withstand the regular strong winds well. Only one has had to be repaired in that time. Plants behind these are well established and native ferns are naturally establishing below them (Doc4).

Output 1.3 Seed collection and rearing of at least 5,000 appropriate endemic ground cover plants and 600 endemic trees (assuming 40% survival)

Table 1.

| Year \ Plant species | Dwarf jellico | Peak grass | Black scale fern | Lobelia | Tree fern | Black cabbage tree | Dogwood |
|----------------------|---------------|------------|------------------|---------|-----------|--------------------|---------|
| 2014/15 | 300 | 200 | | 0 | 0 | 120 | 0 |
| 2015/16 | 400 | 83 | | 0 | 0 | 108 | 90 |
| 2016/2017 | 0 | 131 | 17 | 98 | 106 | 200 | 122 |
| Total | 700 | 414 | 17 | 98 | 106 | 428 | 212 |

All the flowering plants have been produced and grown at the EMD nursery with the help and support of EMD Nursery Officer Vanessa Thomas and Nursery charge hand Daryl Leo, except 200 Black cabbage trees which were grown in the Peaks nursery, looked after by the EMD Peaks team. 106 Tree ferns were extracted from a nearby area of Tree fern (*Dicksonia arborescens*) thicket (with no Spiky yellow woodlice present) to install in the restoration area in collaboration with EMD Peaks team who have extensive experience with this technique. These have established well and will provide essential ground cover.

Black scale fern (*Diplazium filamentosum*) has been translocated from surrounding established swards. There are established swards within the restoration area that are likely to have been installed by this technique, therefore there is high confidence in the establishment for further swards.

Other methods of propagation trialled to improve numbers of plants produced have been discussed in the Restoration Report, including cuttings and grass splitting.

The target number of endemic trees was met, but the target number of ground cover plants was not reached by the end of the project. While it was still hoped that the plant target could be

reached at the time of the half annual report, collection and rearing has been limited by both extremely poor seed set of Dwarf jellico (*Berula burchellii*), slow seedset of other species, and the island drought (November 2016 to February 2017) which limited the ability to sow seed and establish plants in the nursery. Seed collection from planted individuals is being undertaken as material is available and production and planting of endemic species will continue post-project, benefitted by the Spiky yellow woodlouse field worker being retained through additional funding.

There is a number of plants currently growing in the nursery including Diana's peak grass (*Carex diana*) seedlings, Diana's peak grass from grass splitting, Dwarf Jellico cuttings, black scale, brown scale (*Pseudophegopteris diana*) and plastic fern (*Asplenium compressum*). The instigation of the Environmental Protection Ordinance (EPO) from St Helena Government means that SHNT will not be able to collect seed from the wild without the support of EMD. This restricts future options without the necessary permit, the process for which is currently in progress.

Output 1.4 Dependent on the success of the windbreaks, construction of further sections to protect plantings in open areas within the site

10 additional windbreaks were added to the restoration area to extend the area protected. This allowed a continuous area of wind protection between the established rebony patches and is believed to be successfully aiding establishment, particularly of the St Helena Dogwoods *Nesohedyotis arborea* (**Doc4**).

Output 1.5 Planting and performance monitoring of established cloud forest species

During the reporting year (2016/17) 322 endemic trees, 229 flowering plants for ground cover and 123 ferns have been planted at the Dell.

Long-term plant performance is difficult to concretely establish due to changes in staffing and continuity issues, as well as the inability to define individual plants of well-established ground cover species, but recent plantings have established well. The production of the restoration techniques report will also provide an outline of work undertaken during this project for improved continuity of information post-project. An outline of monitoring methodology for the Dell has also been produced (**Doc6**).

One Whitewood (*Petrobium arboreum*) and six established young Black cabbage trees have been lost to stem rot during this year, but other individuals appear to be successful. The endemic ground cover species appear to be stable.

Output 2. Assessment of effectiveness of restoration techniques in the re-establishment of cloud forest on open ground

| Output (what will be achieved) | Indicators of success(how we will know if its been achieved) | Status before project/baseline data (what is the situation before the project starts?) | Source of information (where will you obtain the information to demonstrate if the indicator has been achieved?) | Final achievements (what evidence is presented) |
|---|---|--|--|--|
| Assessment of effectiveness of shade canopy at enhancing re-establishment of cloud forest on open ground. | Data collected and synthesized into a report of scientific paper. | Shade canopy technique not known to be attempted before. | Humidity, rainfall, temperature, light levels and plant performance regularly assessed both under and outside the canopy throughout the project. | Windbreaks installed instead of shade canopy extension. Vegetation around windbreaks regularly monitored. Doc4 - Restoration techniques report produced. |

Evidence provided: Restoration techniques report Doc4, climate monitoring protocol Doc7.

Output 2.1 Design of protocols for regular monitoring of the micro-climate

Microclimate is difficult to monitor. Protocols for this were not undertaken prior to the previous Project Manager leaving. A weather station (donated by project partner, ZSL) has now been installed on High Peak to collect data on conditions experienced, complemented by dataloggers in four key Spiky yellow woodlouse areas. This will improve information on conditions on the Peaks. A trial deployment of dataloggers was undertaken around the windbreaks before further windbreaks were installed, but minimal differences in temperature or humidity were found.

Output 2.2 Undertake planned monitoring protocols

Monitoring of microclimate was not undertaken under the shade canopy before its removal in November 2016. Dataloggers and weather station are now in place on High Peak and Diana's Peak and monitoring protocols are in place **Doc7**.

Output 2.3 Using data in conjunction with plant monitoring results, analyse and compile report on performance of the shade canopy as a cloud forest restoration tool

Minimal information has been available on technical aspects of the success of the shade canopy. The Restoration techniques report gives further information on the shade canopy, windbreaks and plant propagation techniques used for information on current methods, and to allow planning of further work or investigations.

Output 3. Assessment of the number and location of existing Spiky yellow woodlouse sub-populations, habitat specifications and spatial extent

| Output (what will be achieved) | Indicators of success(how we will know if its been achieved) | Status before project/baseline data (what is the situation before the project starts?) | Source of information (where will you obtain the information to demonstrate if the indicator has been achieved?) | Final achievements (what evidence is presented) |
|---|--|---|---|--|
| Paper or report on biology of the spiky yellow woodlouse produced | Paper published and/or supplement to existing report produced and disseminated to stakeholders | A report on previous work is currently in compilation, but still contains a number of gaps e.g. because feeding behaviour cannot be studied in detail in the wild | Existing data will be complemented by the results of the captive breeding (e.g. including supplementary feeding experiments) Change request submitted and accepted to alter aims to improve knowledge on current subpopulations | Captive breeding was not undertaken but additional sub-populations identified. Reports on current knowledge of Spiky yellow woodlouse biology, ecology, and habitat needs undertaken Doc8a and Doc8b . Paper on fluorescence submitted to British Myriapod and Isopod Bulletin Doc9 |

The number and extent of Spiky yellow woodlouse subpopulations is far higher and larger than suspected when the project was originally written. With support from DPLUS029 who initially identified additional locations on Diana's Peak, a number of new locations have been found, with individuals ranging across a large area of the Peaks. The discovery of Spiky yellow woodlouse fluorescence under UV light has also greatly increased knowledge of population

numbers and extent. The use of a UV torch as a search technique is relatively novel and information found through this technique will inform future work.

Features of locations vary quite widely within the cloud forest habitat; individual Spiky yellow woodlouse have now been found on a wider range of plants than expected, including non-native species. Four key areas were focussed on to minimise disturbance and allow for targeted work. This provides a base of information which can be extended and supplemented with further work.

EVIDENCE: Two reports on Spiky yellow woodlouse ecology and habitat have been produced from current PM observations over the last 10 months of the project and information provided by DPLUS029 Doc8a & 8b. Paper on fluorescence submitted to British Myriapod and Isopod Bulletin Doc9. Specimen collection methodology defined Doc10.

Output 3.1. Define the key variables to be monitored at Spiky yellow woodlouse sites and establish monitoring methodology. Make detailed observations of wild individual behaviour.

Basic survey techniques were undertaken, incorporating techniques developed by DPLUS029. Wild behaviour observed at several locations over numerous hours, including at night and early morning. Video footage used to document specific behaviours observed.

Techniques utilised have been reported in **Doc8** and four key areas regularly visited.

Output 3.2 Obtain data on micro-habitat specifications (plant community structure, humidity, light, temperature, mist levels etc.) of each sub-population

Dataloggers deployed in four key locations to obtain basic temperature and humidity information (Output 2.2). There is immense difficulty in identifying specific Spiky yellow woodlouse habitat specifications due to access, terrain and delicate nature of the vegetation. Baseline habitat data taken at survey points and summarised in the habitat report **Doc8b**, with vegetation summaries for the four key locations also produced **Doc8c**.

Output 3.3 Monitor and complete baseline assessment of the health and value of the habitat at each sub-population (site character assessment)

Due to the extent of the subpopulations, and the fragility of the habitat, work focused on four accessible key areas of Spiky yellow woodlouse occupancy across the Peaks (Output 3.2). This was undertaken utilising information provided by DPLUS029. This provides a baseline for expansion in further work, for long-term monitoring of population health.

Output 3.4 Obtain information on analogue species. Define a specimen collection methodology, protocol and effective preservation.

Very little information available on analogue species, this has been noted in the Ecology report. Specimen collection methodology has been produced **Doc10**.

Output 4 Complete a risk analysis of establishing an ex situ population including an evidence base of analysed research data, examples and expert opinions

There are limited applicable examples of invertebrate captive breeding programmes, particularly on isolated islands, as any attempt would be undertaken on St Helena. A Risk Analysis has been written **Doc11**, including expert opinions from stakeholders visited by PM. There is too little information on the Spiky yellow woodlouse to produce a Population Viability Analysis, but consideration of this will be incorporated into planned further work.

Output 4.1 As part of the monitoring methodology at Spiky yellow woodlouse sites, conduct observations on feeding behaviour

It can be difficult to define whether observations of activity involve definite feeding. Where visible detritus and exoskeleton were present, confidence in the assumption that feeding was

actually occurring was higher. The assumption of feeding on algae or other microscopic substances is difficult to prove in the field. Some high quality videos were made which allow for closer scrutiny of behaviour and activities.

Observations and assumptions have been incorporated into the Ecology report **Doc8a**. There is potential for future work on analysis of stomach contents to better define feeding, particularly if undertaken in conjunction with analysis of plant material. This option will be assessed alongside additional support and funding during an extension to the PM role on return to the UK.

Output 4.2 Compile findings into a report or scientific paper

Ecology findings compiled into a report and disseminated. Scientific paper written on the fluorescence of Spiky yellow woodlouse has been submitted to British Myriapod and Isopod bulletin to be peer-reviewed **Doc9**. An article for British Wildlife Magazine will be written as part of follow on work in 2017.

Output 5. Biodiversity inventory and Habitat Action Plan produced for the Dell

| Output (what will be achieved) | Indicators of success(how we will know if its been achieved) | Status before project/baseline data (what is the situation before the project starts?) | Source of information (where will you obtain the information to demonstrate if the indicator has been achieved?) | Final achievements (what evidence is presented) |
|--|--|--|--|--|
| Biodiversity inventory and Habitat Action Plan produced for the Dell | Habitat Action Plan disseminated to stakeholders and incorporated into national conservation planning, biodiversity inventory lodged on EMD's Biological Records Database. | Vascular plant species relatively well known at the Dell, but bryophytes have not been studied. Some invertebrate records were made a decade ago, but populations have probably declined substantially since then. | Species will be mapped and surveyed as far as possible, using primarily non-destructive sampling methods. | Site Action Plan written for the Dell and restoration area Doc12 . Desk study of invertebrate species present on High Peak undertaken Doc13 . |

Output 5.-1 Conduct surveys of plant and invertebrate species within the Dell

Baseline data was collected from all locations where Spiky yellow woodlouse surveys were conducted. The ground layer in the Dell is particularly delicate and numerous revisits were avoided. Invertebrate data was taken from records to compile a list for High Peak to avoid excessive disturbance to the Dell as an exhaustive survey would be difficult and likely to negatively affect the habitat. A visiting expert from Natural History Museum has surveyed around the Dell as part of DPLUS040 and additional species may be identified as part of that visit.

Output 5.2 Compile species inventory and Habitat Action Plan to be disseminated to stakeholders. Agree with stakeholders on best approach to incorporate findings into policy. Habitat Action Plan produced in conjunction with EMD feedback.

A Site Action Plan has been written as part of this project to guide future management **Doc12**. This has been disseminated to EMD and will be used to direct actions undertaken during the contract extension of the current fieldworker. Invertebrate species inventory undertaken for High Peak **Doc13**.

3.2 Outcome

Habitat restoration work will (in subsequent years) increase the area and connectivity of the surviving black cabbage tree woodland, stabilizing the existing fragment and creating conditions for rare specialist inhabitants to expand

There has been successful planting of a number of endemic species in the restoration area outside of the Dell, aided by the shelter provided by the shade canopy and latterly the windbreaks (Section 3.1 Output 1). Habitat management has controlled the invasion of a number of non-native plant species in the restoration area and around the main 'Dell' site, including bramble (*Rubus pinnatus*), Bilberry tree and Mexican creeper. Kikuyu grass and Arum lily (*Zantedeschia aethiopica*) are removed when found. There has been an increase in native fern cover in some areas and evidence of some natural regeneration, particularly under the windbreaks.

Plant production was limited by conditions (drought and second year of consecutive poor seed set) and restrictions on collection from instigation of the Environmental Protection Ordinance, the legislation and permits for which are in progress and will be more fully defined in future workshops soon to be undertaken (Section 3.1 Output 1).

This restoration and management has stimulated support from other organisations (RSPB, ZSL), and further funding has already been provided by the RSPB for extension of the fieldworker contract to sustain management actions on this site, including further planting, as well as Spiky yellow woodlouse habitat management across the Peaks. This will provide continuity of management and greater likelihood of long-term success, as well as improving collaborative working between SHNT and EMD.

A Habitat Management Plan will provide guidance for efforts to be continued into the future.

A targeted Site Action Plan for the Dell has been drawn up and feedback received from EMD (Section 3.1 Output 5). This will help to define and provide continuity in future management actions to maintain a quality area of habitat. The undertaking of a biodiversity inventory was negatively affected by the change in PM as knowledge, experience and information was lost, but information is available through a database and experienced staff retained within SHNT and EMD. The overall actions undertaken to preserve the habitat will not be negatively affected. Undertaking a specific biodiversity inventory survey can be redone at a later date if deemed necessary to provide specific information.

Spiky yellow woodlouse numbers will be increased ex situ, saving them from extinction and providing potential for reintroduction at a future date

The development of a captive breeding facility was altered with a change request to focus on further research to produce a risk assessment and Population Viability Analysis in line with the Spiky yellow woodlouse Action Plan. Additionally observations were undertaken to try to define the species' ecological and habitat needs.

The change request enabled a risk assessment on captive breeding to be produced and has received feedback from specialists at both Bristol Zoological Society and Zoological Society of London. More long-term research is required to define the parameters needed for a Population Viability Analysis, this will be built into the Spiky yellow woodlouse Strategy and options for improving this research will be established during the extension of the Spiky yellow woodlouse manager into June/July 2017 provided by RSPB funding.

The increase in Spiky yellow woodlouse locations found by DPLUS029 and collaborative work with EMD has substantially increased knowledge on extant population extent and numbers (July 2016-March 2017 by new PM). This is crucial to define appropriate targeted management actions for this species. This provides better insight into the species' requirements, with greater

information on what plants it is found on, and further biological information. This species acts as a high profile flagship for the habitat and species of the Peaks (over 4000 hits on RSPB & Buglife Blogs in 2016) and findings such as Spiky yellow woodlouse fluorescence under UV light helped to raise the profile of the species further (2.5K views of two fluorescence videos on the specific Spiky yellow woodlouse Facebook page).

Lessons learned (e.g. the value of a new shade canopy technique) will be well documented so that others can benefit from our experiences.

A restoration techniques report has been produced and will be disseminated providing information on techniques undertaken (Section 3.1 Output 2). This will provide a clear understanding of methods undertaken so far and form a basis for continuing to improve techniques and ensure that past mistakes are not repeated. While the shade canopy was eventually removed during the project, it was an important trial and provided insight into feasible options for other sites, although with less technical information than originally hoped, and consequently windbreaks have been developed as a more feasible option.

3.3 Long-term strategic outcome(s)

This work cements efforts to protect the Dell, an identified important biodiversity hotspot on St Helena. This requires long-term effort and the production of a Site Action Plan can be used to take work forward, protecting not only a Spiky yellow woodlouse locality, but also the other rare flora and fauna found within it.

A specific Spiky yellow woodlouse conservation strategy was developed during this project, with collaboration of a number of stakeholders, both locally and in the UK and is hosted on the IUCN SSC website. Long-term aims were defined and this will provide the basis for continuing work on this flagship invertebrate and its habitat for St Helena. This is a national strategy, complementing the Invertebrate Strategy, and will provide a stronger basis for improved decision making for this species and on the Peaks more generally.

This work directly contributes to Articles 8 and 9 of the Convention on Biological Diversity (e.g. 8b: "Promote the protection of ecosystems, natural habitats and the maintenance of viable populations of species in natural surroundings"), the Global Strategy for Plant Conservation (especially Objective 2: "Plant diversity is urgently and effectively conserved") and Section 15 of St Helena's National Environmental Management Plan (e.g. "Implement prioritised species action plans").

The knowledge of Spiky yellow woodlouse locations across the Peaks, as well as plant species they are found on, and other basic biology and ecology, has been greatly improved by this project. This work sets out knowledge as it currently stands, and will be available to inform future work on populations across the Peaks. The estimate of population numbers has also been greatly increased, to 980 individuals, and the prognosis for the species is far better than it was at the beginning of 2015.

4 Sustainability and Legacy

In addition to the long-term benefits of the Spiky yellow woodlouse strategy and improved knowledge set out in section 3.3, the discovery of the fluorescence of the Spiky yellow woodlouse is likely to be a key finding which will help to inform future work into the species, and may help to inform work on other species where fluorescence is a possibility, particularly invertebrates.

The Spiky yellow woodlouse has continued to be developed as a high profile flagship invertebrate species and there is a greater understanding of the species and its needs locally. A great deal of attention has been focussed on the Spiky yellow woodlouse which in turn provides the Peaks region of St Helena with the international attention it needs to withstand mounting pressures from invasive species and development. The Peaks are a remarkable and rare habitat. As many as 250 endemic invertebrate species are entirely restricted to this fragile and fragmented habitat. The information gathered by this project on the Spiky yellow

woodlouse serves to greatly strengthen the case for support for the Peaks and provides a charismatic lead that will aid in the conservation of the habitat as a whole, and by association, other less striking species.

A number of key stakeholder relationships have been developed and further funding has been sourced which will continue to develop the work of the project and retain valuable field staff experience and knowledge. This has the added benefit of ensuring direct collaboration between EMD and SHNT through the secondment of experienced staff.

The resources acquired during this project will remain valuable equipment for continuation of SHNT work. The weather station will collect data important to long-term island weather knowledge.

5 Lessons learned

Staffing issues presented a major challenge for this project when the original PM could no longer continue. Additionally, there was a change in overall control of the project between organisations and a substantial change in outputs through a change request.

While these changes could have had severe detrimental effects on the project, it actually allowed for the incorporation of additional information from DPLUS029 and stimulated action from stakeholders (Spiky yellow woodlouse strategy workshops), and is a good example of what can be achieved from an initial problem.

With changes in expected outputs, this project ended up having a number of different ambitious elements. This was a challenge for a new staff member to achieve the maximum gains in the final year of the project. This may have been improved with further changes to the project but has provided invaluable experience of the challenges of running a project and managing expectations. The change in project staff also resulted in the loss of some information which was not handed over during transition, this has been addressed through the production of thorough documents at the end of the project to provide suitable information for anyone wishing to continue or develop on actions undertaken in the future.

A large amount of new information has been gained, particularly in conjunction with DPLUS029 information, and collaborative work has been strengthened by this project.

Plant production became an increasing challenge during the project. It was believed at the time of the Half Annual Report that issues with production could be overcome, but issues were underestimated, compounded by lack of seed set and drought. This will be fed into future targets and aims to provide more achievable targets and to encourage consideration of alternative or novel plant production techniques. Issues also arose relating to the implementation of the recently implemented EPO, however these should soon be more clearly set out through the establishment of regulations that will make the EPO easier for future projects to take into account. Issues with plant production will be dealt with in a number of ways including other funding applications to extend nursery capacity, and great collaborative work to maximise efficiency of collection, storing and rearing.

5.1 Monitoring and evaluation

The changes noted in section 5 provided the project with an opportunity to take stock of progress and prioritise actions going forward, The change in PM also required the various stakeholders of the project to engage in more detail to ensure that key outputs were achieved. Significant field knowledge has been built on island through the training of local staff and collaboration with partners working in the Spiky yellow woodlouse environment. These collaborations have not only provided a great deal of support and enhanced the legacy of the project but also ensured additional external scrutiny of the projects objectives.

Communication with stakeholders has been regular throughout the project, with the established group being given the opportunity to participate through feedback on the monthly updates.

5.2 Actions taken in response to annual report reviews

Plant propagation became a larger issue than initially considered, as covered in section 3.1 Output 1.3, and discussed in Section 5.

Alternative propagation techniques have also been covered in the Restoration Techniques report.

Captive breeding was an initial aim of the project but this was changed with additional information gained (Section 3 Output 3). This changed due to concerns about the sustainability of this element of the project, but additionally the information on the number of Spiky yellow woodlouse, and the necessity of this programme, also changed. Now it can be considered far less of a priority action, as the further investigation has shown a much greater Spiky yellow woodlouse population. Although this option should not be completely disregarded as the stability of the populations is not yet known, work into the risk analysis provides an initial assessment of options if deemed necessary.

6 Darwin Identity

The project has received publicity on a number of occasions, with the Darwin identity promoted wherever possible. The Darwin logo is present on all posters and Darwin funding of this project is mentioned in press releases, newsletter articles, blogs and on the facebook page. Summary of publicity is provided in **Doc14**. The Darwin logo is on the SYW Strategy & Action Plan hosted on the IUCN website.

There are a number of other Darwin projects currently being undertaken on St Helena, in addition to the legacy from previous projects (Darwin logo on vehicles and t-shirts). This means that there is high presence of the logo on St Helena and good understanding of Darwin's role in supporting conservation projects. There is also considerable cross-communication and collaboration between projects where appropriate; DPLUS029 as described in Section 2 and 3, collaboration with staff from DPLUS040 for fieldwork, and collaboration with DPLUS052 on vegetation classifications for mapping.

Key findings such as the fluorescence resulted in international coverage, primarily by Buglife and RSPB, which gained interest from other parties such as the BBC. These high profile announcements also improved local interactions and interest in the project. Darwin is acknowledged in the article for Myriapod bulletin, currently being peer-reviewed.

7 Finance and administration

7.1 Project expenditure

| Project spend (indicative) since last annual report | 2016/17 Grant (£) | 2016/17 Total actual Darwin Costs (£) | Variance % | Comments (please explain significant variances) |
|---|-------------------|---------------------------------------|------------|--|
| Staff costs | | | 5 | |
| Consultancy costs | | | | None assigned |
| Overhead Costs | | | 2 | |
| Travel and subsistence | | | 15 | Cheaper than expected for PV arrival on St Helena (£2000 budgeted, less than £1000 used) |
| Operating Costs | | | | None assigned |
| Capital items | | | | None assigned |
| Others | | | 13 | Fewer additional costs realised |

| Project spend (indicative) since last annual report | 2016/17 Grant (£) | 2016/17 Total actual Darwin Costs (£) | Variance % | Comments (please explain significant variances) |
|---|-------------------|---------------------------------------|------------|---|
| TOTAL | 26,181 | 24,011.45 | 9 | |

| Staff employed (Name and position) | Cost (£) |
|--|-----------------|
| Amy-Jayne Dutton, Spiky yellow woodlouse project manager | |
| Colin Richards, Spiky yellow woodlouse field worker (Full time from August 2016) | |
| Donald Thomas, Casual worker during interim work before PM arrival | |
| TOTAL | 16642.99 |

| Other items – description | Other items – cost (£) |
|---|------------------------|
| Windbreaks Weather station software Invertebrate nets Binoculars and UV torch Cocopeat for plant production Field phone and credit Marquee for Nature Day activity Advert for Nature Day activity Posters for project promotion during events Nail gun for windbreak repairs Additional timber Sundry stationary | |
| TOTAL | 1,785.05 |

7.2 Additional funds or in-kind contributions secured

| Source of funding for project lifetime | Total (£) |
|--|-----------------|
| RSPB - 30% Project Manager salary (2016/17) | |
| RSPB Staff time (10% International Assistant Officer salary) | |
| RSPB – Project camera, camera accessories for macro-photography; P&P for equipment (including ZSL weather station) | |
| ZSL Weather station, camera trap, storage equipment | |
| Bristol Zoo – head torches and dataloggers | |
| EMD nursery plant production cost at 38p per plant | |
| TOTAL | 14602.78 |

| Source of funding for additional work after project lifetime | Total (£) |
|--|-----------------|
| RSPB for cloud forest field staff until March 2018 | |
| RSPB for Project Manager extension until August 2017 | |
| TOTAL | 14350.16 |

7.3 Value for Money

Collaboration with other Darwin projects has resulted in better dissemination of knowledge across organisations and more efficient working practices. The SHNT is a nimble organisation and has been able to efficiently adapt and accommodate changes in personnel. In particular, the SHNT was able to provide the project with support during the absence and eventual resignation of the former PM as well as the recruitment of a subsequent PM. This ensured that the project suffered very little loss to progress despite significant delays and problems with project leadership.

Likewise, field staff already involved in the restoration area have been retained and this will maintain effectiveness of work undertaken through continuity, improving the sense of ownership of the area. Additionally, SHNT staff engage in knowledge sharing which further ensures the dispersal of specialist knowledge and skills within the local conservation community.

There has been a great deal more information found out during this project, particularly the last 12 months, which greatly contributes to increasing the knowledge of the Spiky yellow woodlouse (Section 3 Output 3). This has required very little in the form of capital funds needed. This project has attracted attention from a number of international partners and has cemented collaborative efforts and communication between organisations on St Helena running Darwin funding projects (DPLUS029, DPLUS052, DPLUS051, DPLUS040).

This project has cemented the information on the Spiky yellow woodlouse, furthered information on its biology and ecology, and provided direction for future work on this species and its habitat. Restoration outside the Dell has continued and methods have been honed to continue to contribute to conservation on St Helena. In addition collaborations have been promoted which has benefitted several projects. This project has been simple but has produced some striking results, as demonstrated by the image of the Spiky yellow woodlouse glowing under UV light. These images, which easily capture the imagination, are key to effective promotion and engagement with both stakeholders and the general public. Future work can only be enhanced by these findings.

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 Stage 2 logframe. 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 |
|--|-----------------------|-----------------------|-----------------------|
| Impact: | | | |
| Outcome: | | | |
| Outputs: | 1.1 | 1.1 | |
| 1. | 1.2 | 1.2 | |
| | 1.3etc. | 1.3 | |
| 2. | 2.1 | 2.1 | |
| | 2.2 | 2.2 | |
| 3. | 3.1 | 3.1 | |
| Activities (each activity is numbered according to the output that it will contribute towards, for example 1.1, 1.2 and 1.3 are contributing to Output 1) | | | |

No Logframe submitted with application, tables in application used in section 3.1.

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

No logframe to report against.

| Project summary | Measurable Indicators | Progress and Achievements for the life of the project |
|----------------------|-----------------------|---|
| Impact: | | |
| Outcome | | |
| Output 1. | | |
| Activity 1.1 | | |
| Activity 1.2. | | |
| Output 2. | | |
| Activity 2.1. | | |
| Activity 2.2. Etc. | | |
| Output 3.Etc. | | |

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 | |
| 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 | 2; Spiky yellow woodlouse conservation (<i>Pseudolaureola atlantica</i>) A Strategy for its Conservation (2016-2021); 'The Dell' Site Action Plan |
| 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 | 1 - Submitted paper on Spiky yellow woodlouse fluorescence to British Myriapod and Isopod Bulletin |
| 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? | |

| Code | Description | Totals (plus additional detail as required) |
|-------------------------------|--|---|
| 13b | Number of species reference collections enhanced. Were these collections handed over 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) | £7016 |
| 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 | £14602.78 for the project lifetime and £14350.16 for continuation of work |

Annex 4 Publications

| Type * (e.g. journals, manual, CDs) | 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) |
|--|--|----------------------------------|---|-----------------------------|----------------------------|---|
| Conservation Strategy | Spiky yellow woodlouse conservation (<i>Pseudolaureola atlantica</i>) A Strategy for its Conservation (2016- 2021), Havery <i>et al.</i> , 2016 | British | British | Female | | https://portals.iucn.org/library/sites/library/files/documents/Rep-2016-010.pdf |
| | | | | | | |
| | | | | | | |
| | | | | | | |

Annex 5 Darwin Contacts

| | |
|-------------------------------|--|
| Ref No | DPLUS0025 |
| Project Title | Conservation of the Spiky yellow woodlouse and Black cabbage tree woodland. |
| Project Leader Details | |
| Name | Jeremy Harris |
| Role within Darwin Project | Project Leader |
| Address | Broadway House, Jamestown, St Helena, South Atlantic Ocean, STHL 1ZZ |
| Phone | |
| Fax/Skype | |
| Email | |
| Partner 1 | |
| Name | Sarah Havery |
| Organisation | Royal Society for the Protection of Birds |
| Role within Darwin Project | Project stakeholder providing partner support and facilitating international project support |
| Address | UK Overseas Territories Unit, Global Conservation Programmes, The Lodge, Sandy, Bedfordshire, SG19 2DL |
| Fax/Skype | |
| Email | |
| Partner 2 | |
| Name | Vanessa Thomas |
| Organisation | St Helena Government, Environmental Management Division |
| Role within Darwin Project | Project stakeholder providing plants |
| Address | EMD Nursery, Scotland, St Helena, South Atlantic, STHL 1ZZ |
| Fax/Skype | |
| Email | |
| Partner 3 | |
| Name | Paul Pearce-Kelly |
| Organisation | Zoological Society of London |
| Role within Darwin Project | Project stakeholder providing partner support including advice and specialist equipment |
| Address | Zoological Society of London, Regent's Park, London, England NW1 4RY |
| Fax/Skype | |
| Email | |

