

Darwin Plus: Overseas Territories Environment and Climate Fund Annual Report

To be completed with reference to the "Project Reporting Information Note"
(<https://dplus.darwininitiative.org.uk/resources/information-notes/>).

It is expected that this report will be a **maximum** of 20 pages in length, excluding annexes)

Submission Deadline: 30th April 2022

Darwin Plus Project Information

Project reference	DPLUS084
Project title	Identifying and conserving resilient habitats in the British Virgin Islands
Territory(ies)	British Virgin Islands
Lead partner	Royal Botanic Gardens Kew (Kew)
Project partner(s)	National Parks Trust of the Virgin Islands (NPTVI); Fort Worth Zoo (FWZ)
Darwin Plus grant value	£275,258
Start/end dates of project	1 st April 2019 – 31 st March 2023
Reporting period (e.g. Apr 2021-Mar 2022) and number (e.g. Annual Report 1, 2)	April 2021 – March 2022, AR3
Project Leader name	Thomas Heller
Project website/blog/social media	Twitter: @KewUKOTs , #DPLUS084 Moment kew.org: https://www.kew.org/science/our-science/projects/resilient-habitats-bvis ResearchGate: https://www.researchgate.net/project/Identifying-and-conserving-resilient-habitats-in-the-British-Virgin-Islands-DPLUS084
Report author(s) and date	Thomas Heller [M], Nancy Woodfield-Pascoe [F], Dr Colin Clubbe [M], Chenae Walters [F], Dr Juan Viruel [M], Sara Barrios [F] 29 th April 2022

1. Project summary

Through field survey and mapping, the project will improve understanding of the status of the [British Virgin Islands](#) (BVI)'s forests and the globally threatened plant and animal species and the ecosystem services they support. International partnerships will deliver up-to-date biodiversity information and resources, *ex-situ* collections of globally threatened plant species and strengthened local capacity key to habitat recovery and mitigation of natural disasters. This will enable management that promotes future resilience and BVI partners will be empowered to secure their biodiversity into the future.



Figure 1. Map of the [British Virgin Islands](#), with the four islands targeted by the project labelled.

2. Project stakeholders/partners

NPTVI has a long history of project collaboration with both Kew and FWZ, so uniting in this project is cost effective and time efficient in terms of joint fieldwork missions. It builds upon existing strengths within each partner organisation during training in flora and fauna identification and survey techniques.

The three project partners (Kew, NPTVI, FWZ) are represented on the project Steering Group, co-chaired by Dr Colin Clubbe [M] (Head of Conservation Science, Kew) and Dr Cassander Titley O’Neal [F] (Director, NPTVI, since October 2019), providing a regular forum for engagement in project planning, monitoring and evaluation and decision making. Meeting minutes are available on the project’s Hightail page: [4th May 2021](#), [29th July 2021](#), [13th January 2022](#), [21st April 2022](#).

All project partners are integral members of fieldwork teams, with ten members of NPTVI personnel (Dr Titley-O’Neal, Nancy Woodfield-Pascoe, Keith Grant, Chenae Walters, Chane Smith, Glendon Gregg, Michael Young, Athley Stevens, Jason Johnson and Anderson Blackman) having participated in fieldwork in BVI. This has been of great importance in keeping the project on track through the disruption of the Covid-19 pandemic, with the NPTVI being able to continue making progress with project activities where international partners have been unable to visit the BVI, providing support remotely where needed. See section 3.1 for details. NPTVI staff are the focus of capacity building as part of the project, with training having been delivered in the field across four target islands (Anegada, Fallen Jerusalem, Tortola and Virgin Gorda) and in the nursery at the J.R. O’Neal Botanic Garden (JRONBG) on Tortola.

3. Project progress

3.1 Progress in carrying out project Activities

Output 1. Detailed census of globally threatened species (five plants and 2 animals) and population ecology profiled

Activity 1.1 Fieldwork to survey globally threatened species. NPTVI have continued regular fieldwork throughout the year, visiting all focal islands of the project (Anegada, Virgin Gorda, Fallen Jerusalem and Tortola) on 16 field trips, with match funding from the Mohammed Bin Zayed Fund helping to extend the reach of this fieldwork (Woodfield-Pascoe, 2022). January and February 2022 saw the first joint fieldwork between NPTVI-Kew in two years following relaxation of Covid-19-related travel restrictions, permitting an intensive period of

survey work on the four islands. Areas visited that were previously un-surveyed for threatened species include north of Gorda peak (Heller *et al.*, 2022, p. 16; Woodfield-Pascoe, 2022), below North Sound Road (Heller *et al.*, 2022, pp. 17–18), and Coxheath (Woodfield-Pascoe, 2022).

Surveys for exemplar species included the five target tree species: *Myrcia neokiaerskovii* (syn = *Calyptanthus kiaerskovii*) (CR), *Myrcia neothomasiana* (syn = *C. thomasiana*) (EN), *Vachellia anegadensis* (EN), *Varronia rupicola* (EN), *Zanthoxylum thomasianum* (EN); and two animal species: *Cyclura pinguis* (CR), *Spondylurus anegadeae* (CR). During field survey the team continued to make new records for other globally threatened and native species of flora (e.g. *Solanum conocarpum*, *Eugenia earhartii*).

Activity 1.2 Genetic analysis of *Z. thomasianum* populations. DNA was extracted from all 611 available samples of *Zanthoxylum* (collected in years 1 and 2 of this project), using a modified CTAB extraction protocol. These include 362 leaf tissue samples of *Z. thomasianum* from across its geographic range in the British Virgin Islands (Virgin Gorda, Tortola), US Virgin Islands (St Thomas, St John), and Puerto Rico, for detailed population-level genetic analysis. Also included under this activity are 224 leaf tissue samples of related *Zanthoxylum* species (representing 37 taxa) from across the Caribbean, to enable phylogenomic analysis of the group and a better understanding of the species boundaries and evolutionary placement of *Z. thomasianum*. Genomic libraries have been prepared for 384 of these samples, in preparation for hybridisation with a custom target capture kit developed for *Zanthoxylum* and High Throughput Sequencing (Reichelt *et al.*, 2021).

See summary [report on *Zanthoxylum* genetic studies](#) for evidence.

Activity 1.3 Produce GIS occurrence layers for globally threatened species. Field data is added to the project GIS following each field trip and once data has been cleaned. This year 149 plant occurrence records for globally threatened species have been added to the project database. See (Woodfield-Pascoe, 2022) for a map of data points.

Output 2. Habitat requirements of globally threatened species (five plants and 2 animals) characterised

Activity 2.1. Establish experimental design for vegetation survey plots. The experimental design for the vegetation survey plots was largely completed in Y1 and 2 of the project (see [AR2](#)), making use of the Rapid Botanic Survey (RBS) method described by Hawthorne & Marshall (2016), with the addition of a measured 15x15m plot in which trees over a threshold diameter are measured and recorded, as well as incorporation of reptile surveys. However, in view of the major disruption to the fieldwork schedule caused by the Covid-19 pandemic, the Steering Group decided to refine the approach to ensure most efficient use of time in the field, reverting to the published RBS approach without the measured plot, saving significant set-up time with no data critical to the core project lost. This also enables the faunal elements of the survey to be more flexibly conducted separately from the vegetation survey.

With the amount of time passing since hurricanes Irma and Maria making coarse field assessments of their impact increasingly difficult, the project will also be making use of remote sensing data to make comparisons between forest quality and hurricane impact. The Normalised Differential Vegetation Index (NVDI) is being analysed across the years prior to and after the hurricanes of 2017 up to the present time. This will indicate forest health across the BVI and can be compared with the Rapid Botanic Surveys data generated for this project. This is possible as a result of project [DPLUS081 Mapping for evidence based policy, recovery and environmental resilience](#).

Activity 2.2. Field work to gather vegetation and habitat data. 26 Rapid Botanic Surveys have been conducted in the past year, with the January/February 2022 NPTVI-Kew joint fieldwork representing an opportunity to focus on this activity, and provide training for new NPTVI staff, and refresher training for existing NPTVI staff. NPTVI have continued this programme, implementing this training during subsequent fieldwork at Coxheath. All four focal islands were visited to undertake vegetation surveys: Anegada (3 surveys); Fallen Jerusalem (2); Virgin Gorda (7); Tortola (14).

In addition to these vegetation surveys, a variety of monitoring equipment was deployed in the field during Y1 of the project, including a network of game cameras (recording animal

movements in *Cyclura pinguis* and *Spondylurus anegadae* habitat on Anegada, feral animal activity on Fallen Jerusalem, and phenological development of plants of *Zanthoxylum thomasianum* on Virgin Gorda and Tortola), reptile artificial retreats, and data loggers recording temperature and relative humidity at key sites across all four islands. This year of the project, field teams have visited deployed equipment to service kit (change batteries) and recover data on all four focal islands of the project.

For evidence, see fieldwork reports ([Heller et al., 2022](#); [Woodfield-Pascoe, 2022](#))

Activity 2.3 Consult archives, historical records for land use history and maps. Historical records for the British Virgin Islands were consulted at the National Archives in London and reported in AR1. There is no new activity for Y3 to report here. However, in Y4, the team plan to make use of aerial survey imagery of the islands made in the 1950s, available from the Virgin Islands Government Survey Department, to gain further insights into land use history.

Activity 2.4 Produce GIS layers of forest plot data and forest habitat critical for globally threatened flora and fauna. Field data is added to the project GIS following each field trip after data has been cleaned. The 26 Rapid Botanic Surveys conducted this year have yielded 1487 individual data records for inclusion in the analysis. Work to verify plant identifications is on-going.

Output 3. *Ex-situ* collections of five globally threatened plants enhanced to support conservation

Activity 3.1. Collect seed material of five globally threatened plant species from wild populations for *ex-situ* conservation and seed storage behaviour studies. *Ex-situ* seed collections were made of two of the project's five exemplar species: *Zanthoxylum thomasianum* (EN) in January 2022 ([Heller et al., 2022](#), p. 34), and *Myrcia neothomasiana* (EN) in October 2021 ([Woodfield-Pascoe, 2022](#)).

Other globally threatened plant species with seed collected for *ex-situ* conservation in the past year include *Machaonia woodburyana* (EN) from Virgin Gorda in October 2021 ([Woodfield-Pascoe, 2022](#)), and *Sabal causiarum* (VU) from Anegada in January 2022 ([Heller et al., 2022](#), p. 34).

Activity 3.2. Undertake seed storage behaviour studies. No seed storage behaviour studies undertaken during this period due to limited material available. A desiccation tolerance test requires using 100 seeds. Those plants with seeds collected in the past year have been in relatively small quantities where immediate propagation has been more appropriate use of this limited material.

Activity 3.3 Collect plant material from wild populations for vegetative propagation and *ex-situ* conservation. Newly germinated seedlings of exemplar species *Myrcia neothomasiana* (EN) were rescued from Gorda Peak National Park, where the species germinates well on the public trail, but vulnerable to trampling ([Heller et al., 2022](#), p. 34). Cuttings of *Zanthoxylum thomasianum* were also made from plants of Virgin Gorda ([Woodfield-Pascoe, 2022](#)). The plants have been added to the collections at J.R. O'Neal Botanic Garden (JRONBG) for growing on.

A cutting of *Leptocereus quadricostatus* (EN) was collected from the population on Middle Cay, Anegada, where the plant is severely threatened by feral goats, and added to the *ex-situ* collections at JRONBG ([Heller et al., 2022](#), p. 34).

Output 4. Capacity building delivered to enable NPTVI to establish new *ex-situ* collections of globally threatened plant species, identify suitable habitat for those species and implement management to enhance resilience

Activity 4.1. Training and Evaluation Plan produced. The Training and Evaluation plan was revisited in the Steering Group [meeting in July 2021](#), to consider the impacts of the Covid-19 pandemic on the training schedule, and training needs following staff turnover in NPTVI in the past year. Possibilities for online delivery were considered (where international travel remained very uncertain in the face of travel restrictions) for each of the training topics, and agreement was reached that Microsoft Teams Education (to which Kew has a subscription) would be explored as a platform. Areas for additional support for new staff (e.g. fundamentals of horticulture, seed conservation) were also highlighted and solutions planned.

Activity 4.2. Training of four NPTVI staff in germination experiments, plot-based quantitative survey techniques, presence/absence survey and species identification delivered by Kew and FWZ specialists. The experience and strong skillset of long-serving members of the NPTVI field team have made peer-to-peer training of new staff within NPTVI a valuable means of capacity building. As NPTVI have continued fieldwork over the course of the year, new staff members have been introduced to key species of conservation interest across the BVI, data collection in the field, making *ex-situ* collections, and maintaining a network of monitoring equipment across field sites (Woodfield-Pascoe, 2022).

Kew specialists were able to build on this productively when joint fieldwork could resume in January/February 2022 (Heller *et al.*, 2022), working with a total of nine NPTVI staff, plus a local naturalist on Anegada. Topics covered included quantitative survey techniques (Rapid Botanic Survey), species identification (native, non-native and threatened plant species), operating and servicing TinyTag dataloggers, and collecting scientific samples.

Activity 4.3 Training of four NPTVI staff evaluated by Kew and FWZ specialists and reviewed by Steering Group. The project Steering Group met online on the 21st April 2022, during which updates to the recorded training activities for the past year were reviewed and agreed for the [Training sheet of the Monitoring and Evaluation Workbook](#).

Activity 4.4 Produce Final report 'Training and Evaluation' section. Training delivered during the project has been recorded in fieldwork reports and the [project M&E Workbook](#). These will be our primary sources of information and evidence for the Training and Evaluation of the final report, along with the evaluations carried out under activity 4.3.

Output 5. Monitoring and Evaluation and project reporting

Activity 5.1. Produce Monitoring and Evaluation Plan. The Monitoring and Evaluation Plan agreed in Y1 of the project has continued to serve the project and Steering Group well and is regularly reviewed in Steering Group meetings. See [DPLUS084 Steering group meeting 21 April 2022 minutes](#).

Activity 5.2. Produce quarterly reports. The project Steering Group has been kept up to date on project progress through comprehensive fieldwork reports, covering activities relating to capacity building, project GIS development, as well as activities undertaken in the field. See fieldwork reports (Heller *et al.*, 2022; Woodfield-Pascoe, 2022) and the [Monitoring and Evaluation Implementation Worksheet](#) is kept up to date and forms a reference for Steering Group discussion.

Activity 5.3. Undertake Steering Group meetings and produce minutes. Steering Group meetings were held on [4th May 2021](#), [29th July 2021](#), [13th January 2022](#), and [21st April 2022](#) and have continued to be an effective forum for monitoring progress and making decisions.

Activity 5.4 Produce final report. The system for documenting and reporting activities and results described in Activities 5.1 – 5.3 is generating a vital resource for completing the final project report in the final weeks of the project and demonstrating success in achieving the desired Outcome.

3.2 Progress towards project Outputs

Output 1. Detailed census of globally threatened species (five plants and 2 animals) and population ecology profiled

At the beginning of the project, existing GIS data from past fieldwork was available for BVI's threatened plant species, but with significant gaps in coverage (areas without survey), and very variable in level of detail, particularly with respect to population ecology. Regarding threatened reptiles, long term data has been gathered for *Cyclura pinguis*, but a need for collating and making this available in a single GIS was identified, while no dedicated surveying for *Spondylurus anegadae* has been carried out. *Cyclura pinguis* was last assessed for the IUCN Red List in 1996 (Critically Endangered) and *Spondylurus anegadae* in 2016 (Critically Endangered, possibly Extinct).

Progress towards this output:

Indicator 1.1 Detailed quantitative surveys of known populations and unsurveyed areas.

Survey work conducted during the course of the year has contributed new data (48 individual data points) for threatened tree species *Myrcia neothomasiana*, *M. neokiaerskovii*, *Zanthoxylum thomasianum*, *Vachellia anegadensis* and *Varronia rupicola*. A new record of [Spondylurus anegadae on iNaturalist](#) has been added to the project database. Together, these data form a detailed census of these species in the BVI, not previously available for these species. Furthermore, these surveys have presented opportunities for acquiring new data on other poorly known species, such as *Eugenia earhartii* (EN) and *Solanum conocarpum* (EN), both of which were until recently thought to be restricted to St John in the US Virgin Islands.

For evidence, see Section 3.1 (Activity 1.1) of this report, and pages 25-27 of the [January-February 2022 fieldwork report](#) (Heller *et al.*, 2022) and [NPTVI 2021/22 fieldwork reports](#) (Woodfield-Pascoe, 2022).

Indicator 1.2 Population genetics of BVI populations of *Z. thomasianum* researched.

Good progress is being made towards better understanding the population ecology of *Zanthoxylum thomasianum*, with all known BVI sub-populations having been sampled for leaf tissue and success in extracting good quantities of DNA for genetic analysis. These studies are enhanced by the collection of leaf tissue samples of individuals of *Z. thomasianum* across its range internationally for inclusion in this project's research, made possible by funding from the Bentham Moxon Trust and US Fish and Wildlife Service. This will enable a full picture of genetic diversity and structure in the species with which to inform conservation measures. Furthermore, inclusion of related species of Caribbean *Zanthoxylum* will help answer questions of species boundaries and evolutionary history in the group, both of which are knowledge gaps important in *Z. thomasianum* conservation.

For evidence of progress, see Section 3.1 (Activity 1.2) of this report and Annex 3 for a summary of results obtained so far.

Indicator 1.3 GIS occurrence layers of globally threatened species produced. Data collected for the project so far has been cleaned and collated in preparation for generating the final GIS occurrence layers to be uploaded to the BVI National GIS. Evidence in section 3.1 (Activity 1.3) of this report.

Output 2. Habitat requirements of globally threatened species (five plants and 2 animals) characterised

At the outset of this project, the habitat preferences of threatened species were only very broadly characterised, with no quantitative data on associated species assemblage or vegetation structure or history.

Progress towards this output:

Indicator 2.1 Quantitative forest surveys undertaken on four islands, within and outside threatened species habitat.

To date 28 Rapid Botanic Surveys have been conducted for this project (2 on Virgin Gorda in Y1 of the project, 26 across four islands in Y3). Surveys conducted to date have focused on habitat known to support one of the seven exemplar threatened species. Future survey work will place more emphasis on habitat lacking these species to enable comparisons to be made, along with remote sensing data made available through [DPLUS081 Mapping for evidence based policy, recovery and environmental resilience](#). Distribution of surveys among the islands will also reflect terrestrial area and vegetation complexity, with Tortola requiring more surveys than Fallen Jerusalem, for example.

In addition, the project is amassing a valuable body of data from field cameras (capturing images of animal use of habitats, as well as phenological events in threatened plant species).

For evidence, see Section 3.1 (Activity 2.1 and 2.2) of this report, and (Heller *et al.*, 2022, pp. 28–34; Woodfield-Pascoe, 2022).

Indicator 2.2 Study of vegetation history on four islands completed. All progress to towards this output to date took place in Y1 of the project. However, as noted in Section 3.1 (Activity 2.3), the team plan to make use of aerial survey imagery of the islands made in the 1950s to gain further insights into land use history.

Indicator 2.3 GIS layers produced of forest plot data and an expert reviewed layer showing locations of forest habitat critical for globally threatened flora and fauna. Data collected for the project so far is being cleaned and collated in preparation for generating the final GIS layers to be uploaded to the BVI National GIS.

Output 3. *Ex-situ* collections of five globally threatened plants enhanced to support conservation.

Though much work had taken place in the BVI to improve *ex-situ* conservation of threatened species, with most of the BVI's globally threatened plant species represented in seed banks (Millennium Seed Bank in the UK, JRONBG in BVI), at the outset of this project, these were mostly as single accessions, and some species were not represented at all. *Ex-situ* nursery plants grown at JRONBG suffered major losses as a result of Hurricane Irma in 2017, leaving most of the BVI's threatened species not represented in *ex-situ* collections in the conservation nursery or plantings there.

Progress towards this output:

Indicator 3.1 Seed quality and storage behaviour studies completed for five plant species. No progress as measured by this indicator has been possible over the past year. Training in conducting seed storage behaviour studies will be delivered through capacity building programme in June 2022. The method involved also requires 100 seeds of the target species, quantities that have not been available to date.

Indicator 3.2 Seed or cuttings from 5 globally threatened plants held at J.R. O'Neal Botanic Gardens for propagation. Target exceeded by having secured twelve globally threatened species. *Ex-situ* collections of six globally threatened species added to JRONBG collections: *Machaonia woodburyana*, *Sabal causiarum*, *Myrcia neothomasiana*, *Leptocereus quadricostatus*, *Solanum conocarpum*, *Pitcairnia jareckii* in addition to the six species previously reported in AR1 and AR2.

For evidence, see Section 3.1 (Activity 3.1 and 3.3) and (Heller *et al.*, 2022, pp. 34–35; Woodfield-Pascoe, 2022).

Output 4. Capacity building delivered to enable NPTVI to establish new *ex-situ* collections of globally threatened plant species, identify suitable habitat for those species and implement management to enhance resilience

NPTVI staff have gained good levels of field and horticultural experience in the years leading up to this project, mostly working with a subset of threatened and other native species. However, gaps identified include skills in identifying a broader range of native and non-native species, quantitative vegetation survey techniques and germination testing. No training in reptile identification and census has been delivered previously.

Progress towards this output:

Indicator 4.1 Training and Evaluation Plan produced. The Training and Evaluation Plan was reviewed in the Steering Group meeting in July 2021 in response to disruption caused by Covid-19 pandemic. See Section 3.1 (Output 4, Activity 4.1) for details.

Indicator 4.2 Training of four NPTVI staff in germination experiments, plot-based quantitative survey techniques, presence/absence survey and species identification delivered by Kew and FWZ specialists. This target has been exceeded, with nine NPTVI staff trained in quantitative survey techniques (Rapid Botanic Survey), species identification (native, non-native and threatened plant species), data collection in the field, making *ex-situ* collections,

and maintaining a network of monitoring equipment across field sites, and collecting scientific samples. Training in germination experiments are planned for Y3.

See Section 3.1 (Output 4, Activity 4.2) for details and evidence.

Indicator 4.3 Training of four NPTVI staff evaluated by Kew and FWZ specialists and reviewed by Steering Group. Training evaluated in Steering Group meetings and recommendations made to ensure that progress in this area continues to be satisfactory. Recommendations include blended online and in-person training as well as inclusion of conservation fundamentals for new staff.

Indicator 4.4 Final report ‘Training and Evaluation’ section produced. Training documented in readiness for final report.

Output 5. Monitoring and Evaluation and project reporting

A coordinated effort to survey and provide training for flora and fauna did not exist prior to the project. To ensure successful delivery of project goals, effective Monitoring and Evaluation was one of the priorities to implement from the outset of the project.

Progress towards this output:

Indicator 5.1 Monitoring and Evaluation Plan produced. After reviewing, no changes to the M&E Plan were considered necessary this year.

Indicator 5.2 Quarterly reports produced. Progress against logframe reviewed in each Steering Group meeting and minuted (see link to meeting minutes under Indicator 5.3, below). Activities documented in fieldwork reports (Heller *et al.*, 2022; Woodfield-Pascoe, 2022).

Indicator 5.3 Steering Group meetings held, and minutes produced. Steering Group meetings were held and minuted in [May 2021](#), [July 2021](#), [January 2022](#), and [April 2022](#).

Indicator 5.4 Final report produced. [M&E workbook](#) kept up-to-date for completion of final report.

3.3 Progress towards the project Outcome

The Project outcome, as defined in the original application is:

“BVI’s forest habitats resilient to natural disasters and critical for supporting threatened species are well understood and spatially identified; globally threatened species secured *ex-situ* to mitigate against future disasters.”

Despite the disruption caused by the Covid-19 pandemic (see section 12, below), much has been achieved in the project to date and, with a busy final year ahead, we are on schedule to achieving our desired Outcome.

Indicator 0.1 Locations of forest habitat critical for globally threatened flora and fauna on four islands identified, mapped and GIS layer produced. Forest surveys have been undertaken by NPTVI and Kew across more than four islands, with data on globally threatened species, as well as the habitats in which they occur, collected and collated in the project GIS. This fills a significant gap in our understanding of the forests that demonstrate a resilience to natural disasters and support threatened species. At the outset of the project, detailed habitat-level data was lacking for most sites, and no attempt had been made to integrate this with threatened species occurrence data. A key focus of the coming year will be further habitat-level surveys for a data-rich GIS on which to base decisions. See evidence presented for Outputs 1 and 2 in Sections 3.1 and 3.2, above.

Indicator 0.2 Live plants and/or seeds of at least five globally threatened plant species secured at the J.R. O’Neal Botanic Garden. *Ex-situ* collections of 11 globally threatened species established at JRONBG. This exceeds the target set and includes three of the exemplar plant species. The project team will continue to develop *ex-situ* collections over the

final year of the project, securing as much potentially genetically diverse material from different localities as possible. See evidence presented for Output 3 in Sections 3.1 and 3.2, above.

3.4 Monitoring of assumptions

Assumption 0.1 Weather conditions allow boat access and fieldwork to be completed

This risk continues to hold true for future fieldwork; however, weather is not the only issue to be considered as the global pandemic has shown that travel restrictions from health emergencies can also impact the project team's ability to undertake fieldwork and now form an important element of risk assessing fieldwork.

Assumption 0.2 All target species can be reproduced from cuttings or produce enough seeds during the lifetime of the project to allow safe collection for storage and not impact the future survival of native populations

The species secured in *ex-situ* seed bank collections to date have all produced sufficient seeds while staying within safe collecting limits. This assumption still holds true for other species yet to be targeted.

Assumption 1.1 Team able to visit all sites to collect data unhampered by weather conditions

See Assumption 0.1 about sea swell. Unfortunately, extreme weather events (e.g. hurricanes) or inclement weather conditions are no longer the only threat to conducting data collection as the global pandemic has revealed. This risk continues to hold true for future fieldwork.

Assumption 1.2 NPTVI boat/local ferries operational and able to transport team to field sites

All known BVI subpopulations of *Zanthoxylum* have now been visited and samples successfully collected, with no transport problems.

Assumption 1.3 BVI NGIS continues to be maintained as the national GIS repository

The BVI NGIS has been maintained during the first 3 years of the project. This assumption still holds true through project completion.

Assumption 2.1 Team able to visit all sites to collect data unhampered by weather conditions

See responses to Assumptions 0.1 and 1.1.

Assumption 2.2 Adequate archives exist and are accessible.

No further direct access to physical archives is planned for the remainder of the project. However, access to digitised materials are planned in the coming year, so this assumption still holds. The historical aerial imagery that is held locally by the VI Government was impacted by the 2017 hurricanes and the surviving imagery were put into storage. The Survey Department have confirmed that NPTVI can utilise these and they will assist.

Assumption 2.3 BVI NGIS continues to be maintained as the national GIS repository

See response to Assumption 1.3.

Assumption 3.1 Adequate seed can be sourced for germination experiments

This assumption remains true for the project to be able to conduct future experiments and has been a factor in lack of progress in the past year.

Assumption 3.2 Target species can be reproduced from cuttings or produce sufficient seeds

Vegetative propagation and seed banking have proved to be appropriate *ex-situ* conservation approaches for the species targeted to date. The assumption still holds true for other species not yet targeted.

Assumption 4.1 ResearchGate website continues to be maintained and available for free public use

Reports pertaining to the progress of this project have been successfully uploaded to [ResearchGate](#) and remain accessible. This assumption still holds true through project completion.

Assumption 4.2 NPTVI staff available to attend training

This assumption remains true through project completion. Staff turnover has been a concern, however delivery of training has continued despite disruptions to the project. See Section 7, below. Training materials will be made accessible to NPTVI for any post-project training.

Assumption 4.3 Specialists and Steering Group able to agree training successfully delivered and capacity built

Documents and reports pertaining to the training provided to date have enabled the Steering Group to agree training successfully delivered and capacity built during Year 3. This assumption remains true through project completion.

Assumption 4.4 ResearchGate website continues to be maintained and available for free public use

See Assumption 4.1, above.

Assumption 5.1 ResearchGate website continues to be maintained and available for free public use

See Assumption 4.1, above.

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

The main stakeholder is the local project partner, NPTVI, which is BVI's statutory body with responsibility for managing terrestrial and marine biodiversity within protected areas. The outputs of this project will provide NPTVI with direct evidence and the tools required to advocate for the BVI's forest habitats to be actively and sustainably managed and protected in a way that delivers resilience. This can be through recommendations of new sites for inclusion in the protected area network, GIS mapping of sensitive forest habitats that provide ecosystem services to reduce the impacts of natural disasters, and the submission of technical advice to the Town and Country Planning (TCP) Department during the development planning process to reduce land clearance beyond the construction area and to assist in national land use planning initiatives that determine how land is allocated or utilised across the BVI.

The Ministry of Natural Resources, Labour and Immigration will benefit through access to updated occurrence information for globally threatened flora and fauna and locations of forest habitat critical for globally threatened flora and fauna to inform the development of the local biodiversity legislation. The project will benefit the VI Government as it provides information to the NGIS that is required across multiple departments for their management activities. The BVI Tourist Board will benefit as the variety of plants and collections at the J.R. O'Neal Botanic Garden will be enhanced to provide a unique visitor experience. The local community benefits as BVI Islanders have direct access to seeing and learning about the BVI's threatened plants by visiting the JRONBG where the conservation collections are planted. Students visit the JRONBG also, which raises local awareness of the role of plants within the BVI's steeply sloping landscape. Resilient forests strengthen the BVI's green economy.

The project is contributing to the [Global Strategy for Plant Conservation](#) (GSPC) targets, especially:

- Objective 1, Targets 1, 2 & 3;
- Objective 2, Targets 8 & 10;
- Objective 4, Target 14;
- Objective 5, Targets 15 & 16

The project is helping the BVI to achieve progress towards several of the [UN Sustainable Development Goals](#) related to the topics [Small Island Developing States](#) (SIDS), [Gender equality and women's empowerment](#), [Climate change](#), [Capacity Development](#), [Biodiversity and ecosystems](#), [Forests](#) and [Science](#):

- [Goal 5](#), particularly the targets 5.5 and 5.b;
- [Goal 13](#), particularly the targets 13.1, 13.3 & 13.b;
- [Goal 15](#), particularly the targets 15.5 & 15.6
- [Goal 17](#), particularly the targets 17.6, 17.9 & 17.8.

The project also contributes to NPTVI's legal obligations under the National Parks Act 2006, Section 4, namely its duties to carry out scientific research and promoting public understanding of the Virgin Islands' natural heritage.

5. OPTIONAL: Consideration of gender equality issues

The project team is well balanced in terms of gender, at all levels, across the Steering Group and the field team. The project is ensuring shared authorship of reports/outputs (see References) and shared responsibilities for undertaking and delivering project activities which are demonstrated in field reports available on [ResearchGate](#). The project team have modified the project M&E workbook to enable the disaggregation by gender for training delivered and we will also use identifiers across our project outputs (e.g., participants in activities and authors of reports) in response to the AR1R reviewer's comments.

6. Monitoring and evaluation

Monitoring and Evaluation has been explicitly included as an Output in the project logframe. One of the first activities of the project was to form a project Steering Group and agree a Monitoring and Evaluation plan that engages all partners in M&E. Quarterly meetings provide the opportunity to evaluate progress against the project logframe and make decisions on

project implementation, making changes as necessary to version-controlled documents, see also responses for Output 5 under sections 3.1 and 3.2. The M&E process has been designed to review progress quarterly enabling the implementation of the project to be adaptive. Outcome-level indicators and means of verification that are logically and directly linked to the outputs have been chosen to ensure the impact intended. We have visualised this as:

Accessible species and habitat data + *ex-situ* collections + capacity building → effective management of resilient habitats that support threatened species.

Although scheduling meetings when all members of the Steering Group are available and the technical hurdles of conducting effective meetings online can be challenging – particularly during the Covid-19 pandemic, the M&E system adopted by the project is proving to be effective and good communications and discussion fora have been maintained.

The Monitoring & Evaluation Plan agreed in Y1 has continued to serve the project and its Steering Group well, with regular updates to the [M&E workbook](#), documenting activities in reports and the [Training workbook](#). It is through this process that enabled the team to identify the need to reschedule fieldwork over the last two years of the project, brought about by the disruption of the Covid-19 pandemic (see Section 12 of this report).

7. Lessons learnt

As noted in HY3, staff turnover has been the biggest development unrelated to Covid-19 that the project team has had to adapt to in the delivery of this project.

The Project Leader, Dr Martin Hamilton, left employment at RBG Kew, with Thomas Heller taking his place in this role, and Dr Juan Viruel joining him as Co-PI (see [May 2021 Change Request](#)). While this has an impact of distribution of workload among the team, we do not anticipate that this will have an impact on the budget and timetable of project activities. Having a strong team and robust M&E system in place from the outset has been invaluable in ensuring continuity through this change of leadership.

At NPTVI there has been some significant staff turnover, inevitably leading to some dilution of skills and capacity. However, NPTVI have been successful in recruiting three new Terrestrial Wardens, all of whom are important contributors to the project's Outputs. During the past year they have proven to be diligent in the field and very quick learners. As noted for Output 4 in Sections 3.1 and 3.2, above, the effectiveness of peer-to-peer training within NPTVI has been effective and helped greatly in minimising the impact on progress towards this Output. Capacity building has been broadened to more members of staff (with nine staff participating in fieldwork training in January 2022, for example) as a measure to further bolster retention of skills in the long term. Furthermore, the project is responding to the opportunity presented by online teaching platforms, with adopting Kew's Microsoft Teams education platform enabling training resources to be uploaded and made more accessible, a focus for activities in the coming year.

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

Two comments were made by the reviewer in [AR2R](#), the second of which requires a response in this report.

“The AR mentioned a concern that several NPTVI staff are due to retire this year. It's not clear whether this may have an impact on the institutional retention of skills delivered by the project i.e. will the benefits of delivered training be diluted?”

Staff turnover at NPTVI has inevitably resulted in the loss of valuable skills and experience from the team. However, as noted in Section 7, above, the speedy recruitment of new staff and the effective passing on of knowledge from more experienced colleagues within the team has helped to minimise the impact on the project. Nevertheless, the concurrent disruption of Covid-19 (see Section 12, below) has required an adaptive approach to project management, supported by a robust M&E plan. The coming year of the project will seek to improve the efficiency of knowledge transfer through online access to training materials and revisiting some more fundamental aspects of conservation approaches for the benefit of new staff. This will

have the added benefit of enabling access beyond the lifetime of the project, helping to ensure a lasting impact.

9. Other comments on progress not covered elsewhere

No other comments.

10. Sustainability and legacy

The project activities that took place in Year 3 and all the project outputs will have a legacy impact beyond the life of the project, especially the work undertaken for Output 3: development of *ex-situ* collections and Output 4: capacity building. The legacy of Outputs 1 & 2 will be seen through the availability of species census and habitat data for making informed management decisions and informing recovery, mitigation and planning activities. This will be achieved through incorporation of project compiled data into the BVI National Geographic Information System (NGIS). The project outputs will also be invaluable in supporting the dissemination of information to the wider BVI community, with NPTVI's goal to make this research accessible to all sectors of society, from Government decision makers to students and visitors. New information is to be incorporated into pages of the NPTVI website and other educational materials. The annual Iguana Festival event on Anegada has been identified as an important outlet for communicating the project's outputs to the wider community. This is an all-day outdoor iguana ecology engagement event open to all citizens of the BVI, and an ideal forum for raising awareness of the project's activities.

The project Steering Group feel that the exit strategy is still valid.

11. Darwin identity

The Darwin Initiative has been acknowledged as the funder of this project wherever information on the project has been presented in the public domain. The Kew team make regular use of Twitter, from the [@KewUKOTs](#) account, and individual team member's accounts, tagging posts with @Darwin_Defra, #KewBVI and #DPLUS084 to ensure that the project has a distinct identity through that channel.

Likewise, all reports and documents produced for the project have the Darwin Initiative prominently acknowledged as the funder, including the Darwin Initiative logo. The project has an open access page on [ResearchGate](#), where project reports can be accessed and downloaded.

The Darwin Initiative has long been a supporter of environmental and conservation initiatives in the BVI, having funded several projects in the past 25 years. The role the Darwin Initiative has in enabling the positive impact of this work is well recognised, especially within government agencies, local NGOs and environmentally engaged members of the public. Kew, NPTVI and FWZ are pleased to ensure that this legacy is widely acknowledged.

12. Impact of COVID-19 on project delivery

The greater part of the impact was seen in Y2 of this project, with many activities impossible to carry out with Covid-19 control and safety measures in place, as reported in AR2. Pausing implementation of the project for that year was vital to protecting the project budget and allowing project delivery to resume as restrictions were gradually lifted over Y3 of the project. Darwin Initiative-funded project [CV19RR01 Impacts and consequences of Covid-19 on conservation in the BVI](#) during January to March 2021 was invaluable to identify where the greatest impacts of the pandemic have been on conservation activities in the BVI, and where to focus efforts as work on DPLUS084 resumed.

This year, the impact of Covid-19 has continued to be mainly in travel restrictions preventing travel by international partners to participate in fieldwork and in-person capacity building for the first nine months of this year of the project. With joint NPTVI-Kew fieldwork not able to resume until January 2022, it was clear that it would not be possible to make up for this delay by rescheduling fieldwork within this financial year and increased team size alone. A [Change Request](#) was therefore submitted to the Darwin Initiative in December 2021, requesting a portion of the Travel & Subsistence budget to be moved to Y4 of the project, approved in January 2022. Though this shifts more fieldwork activities into the last year of the project,

various mitigations of the last year have made this feasible: NPTVI continuing many of the field activities independently, rather than focused during joint fieldwork involving all project partners, ensuring good progress towards Outputs 1.1, 3.2 and 4.2 in particular. Once joint fieldwork was possible again, the Kew field team was larger than usual (with four Kew participants) to maximise the amount of data gathering possible within a narrow timeframe. We will also be making use of remote sensing data for vegetation in the islands (made possible through another Darwin project, DPLUS081) to supplement field data in our analysis. Additionally, the team plan to deliver some of the capacity building via online platform Microsoft Teams rather than in person, where the nature of the topics makes this practicable. Travel restrictions have continued to have an impact on FWZ participation in fieldwork, with [CDC guidance](#) placing the British Virgin Islands in a high risk category for a large proportion of the year, limiting permitted travel from the US under FWZ international travel policy.

13. Safeguarding

Please tick this box if any safeguarding violations have occurred during this financial year.

If you have ticked the box, please ensure these are reported to ODA.safeguarding@defra.gov.uk as indicated in the T&Cs.

Kew, the lead organisation for this project, has two policy documents pertinent to this matter: a staff Code of Conduct, which forms part of staff contract of employment at Kew, and a safeguarding policy. The latter is publicly available on Kew’s website: <https://www.kew.org/about-us/reports-and-policies/safeguarding>.

The Code of Conduct outlines Kew staff roles and responsibilities (professional, legal, ethical), and protocols for reporting improper conduct, with further guidance on Kew’s stance on bullying and harassment.

Though the main focus of Kew’s safeguarding policy is safeguarding children and vulnerable adults visiting Kew and Wakehurst, and furthermore, this project does not have a significant component that is working directly with communities or informant networks, there are a number of articles relevant to carrying out this project, namely: 5.6 (compulsory awareness training for all staff, volunteers and students); 5.11 (safeguarding and social media); 5.15 (overseas work and safeguarding). Since the last Annual Report, Kew has implemented a new requirement for a Safeguarding Risk Assessment for any overseas travel, completed in advance of the fieldwork in January/February 2022.

The project has not encountered any safeguarding issues nor have any concerns been raised. The steering group is aware of the safeguarding requirements including keeping a detailed register of safeguarding issues; have clear investigation and disciplinary procedures; have a whistle-blowing policy; and have in place a Code of Conduct for staff and volunteers. Kew’s safeguarding policy has been shared with our partners, NPTVI and FWZ in April 2021.

14. Project expenditure

Table 1: Project expenditure during the reporting period (1 April 2021 – 31 March 2022)

Project spend (indicative) in this financial year	2021/22 D+ Grant (£)	2021/22 Total actual D+ Costs (£)	Variance %	Comments (please explain significant variances)
Staff costs	██████	██████	██████	
Consultancy costs	██████	██████	██████	
Overhead Costs	██████	██████	██████	Underspend on overheads
Travel and subsistence	██████	██████	██████	Draft figure
Operating Costs	██████	██████	██████	Shipping costs included in T&S expenditure
Capital items	██████	██████	██████	Draft figure
Others (Please specify)	██████	██████	██████	Lab reagents and consumables
TOTAL	86989	85876		

Highlight any agreed changes to the budget and **fully** explain any variation in expenditure where this is +/- 10% of the budget. Have these changes been discussed with and approved by Darwin?

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

[Redacted text block]

[Redacted text block]

[Redacted text block]

Checklist for submission

	Check
Different reporting templates have different questions, and it is important you use the correct one. Have you checked you have used the correct template (checking fund, type of report (i.e. Annual or Final), and year) and deleted the blue guidance text before submission?	x
Is the report less than 10MB? If so, please email to Darwin-Projects@ltsi.co.uk putting the project number in the Subject line.	x
Is your report more than 10MB? If so, please discuss with Darwin-Projects@ltsi.co.uk about the best way to deliver the report, putting the project number in the Subject line.	

Have you included means of verification? You should not submit every project document, but the main outputs and a selection of the others would strengthen the report.	x
Do you have hard copies of material you need to submit with the report? If so, please make this clear in the covering email and ensure all material is marked with the project number. However, we would expect that most material will now be electronic.	
Have you involved your partners in preparation of the report and named the main contributors	x
Have you completed the Project Expenditure table fully?	x
Do not include claim forms or other communications with this report.	