Darwin Plus Main & Strategic: Annual Report

To be completed with reference to the "Project Reporting Information Note" (https://darwinplus.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 2025

Submit to: BCF-Reports@niras.com including your project ref in the subject line

Darwin Plus Project Information

Scheme (Main or Strategic)	Main
Project reference	DPLUS183
Project title	Biodiversity metrics in the British Virgin Islands
Territory(ies)	British Virgin Islands
Lead Organisation	Royal Botanic Gardens, Kew (Kew)
Project partner(s)	National Parks Trust of the Virgin Islands (NPTVI)
Darwin Plus grant value	396,655.00 GBP
Start/end dates of project	01/04/2023 - 31/03/2026
Reporting period (e.g. Apr 2024-Mar 2025) and number (e.g. Annual Report 1, 2)	Annual Report 1 (Apr 2024 – Mar 2025)
Project Leader name	Dr. Juan Viruel (he/him)
Project website/blog/social media	https://www.kew.org/science/our-science/projects/biodiversity-metrics-british-virgin-islands
Report author(s) and date	Juan Viruel, Sara Barrios, Amy Barker, Colin Clubbe, Freya Cornwell-Davison, Felix Forest, Keith Grant, Thomas Heller, Cassander O'Neal, Carolina Tovar, Nancy Woodfield-Pascoe, Elloise Budd, and 15th May 2025.

1. Project summary

The British Virgin Islands (BVI) belong to the Caribbean biodiversity hotspot, comprise ca. 650 angiosperms in an area of 153 km^2 and harbour 18 Tropical Important Plant Areas (TIPAs), key sites for the conservation of wild plants and threatened habitats, delimited by National Parks Trust of the Virgin Islands (NPTVI), the BVI Government and Kew in 2019. The main aim of the project is to identify plant species that contribute more to evolutionary diversity, heterogeneity and resilience of habitats using three biodiversity metrics: phylogenetic diversity, species richness and species threat assessments.

What environmental and/or climate change issue/s is the project designed to address? Ongoing threats to BVI biodiversity are urbanisation, invasive species, including feral ungulates, illegal clearance, and climate change. For example, the BVI are experiencing more extreme weather events, such as hurricane Irma in 2017, the first recorded Category 5 hurricane to strike the BVI, followed by Maria a few weeks later. The three biodiversity metrics that we will generate for the BVI angiosperms will constitute a baseline of scientific evidence to respond to threats in the territory and make informed decisions for biodiversity management.

Why are they relevant, and for whom? NPTVI is the statutory authority responsible for the conservation of terrestrial and marine protected areas, with management authority for 21 National Parks. A broad inventory of species and habitats present in the BVI is essential to develop

approaches to decrease biodiversity loss and climate change impacts. Conserving and restoring habitats by maintaining high biodiversity levels will enhance resilience to inevitable future threats and changes, especially in habitats identified as vulnerable to more intense weather events (DPLUS084) and other climate change related occurrences (DPLUS180). However, we lack knowledge required to identify key species that contribute more to the evolutionary diversity, heterogeneity and thus resilience of habitats, pivotal data for NPTVI to inform conservation action. Wider engagement will promote the value and cultivation of native plant species, which can contribute to habitats' resilience by increasing biodiversity, and community engagement activities (e.g., Arbour Day). These approaches have strong relevance to other Caribbean partners who could apply similar methodologies to their conservation action plans.

Briefly describe the location (with a map if possible) of the project. The BVI contain 61 islands and cays. Our project targets all native flowering plants in BVI. The BVI belongs to a biogeographic region named the Puerto Rican Bank, which includes BVI, the USVI (except St. Croix) and Puerto Rico and its adjacent islands of Culebra and Vieques.

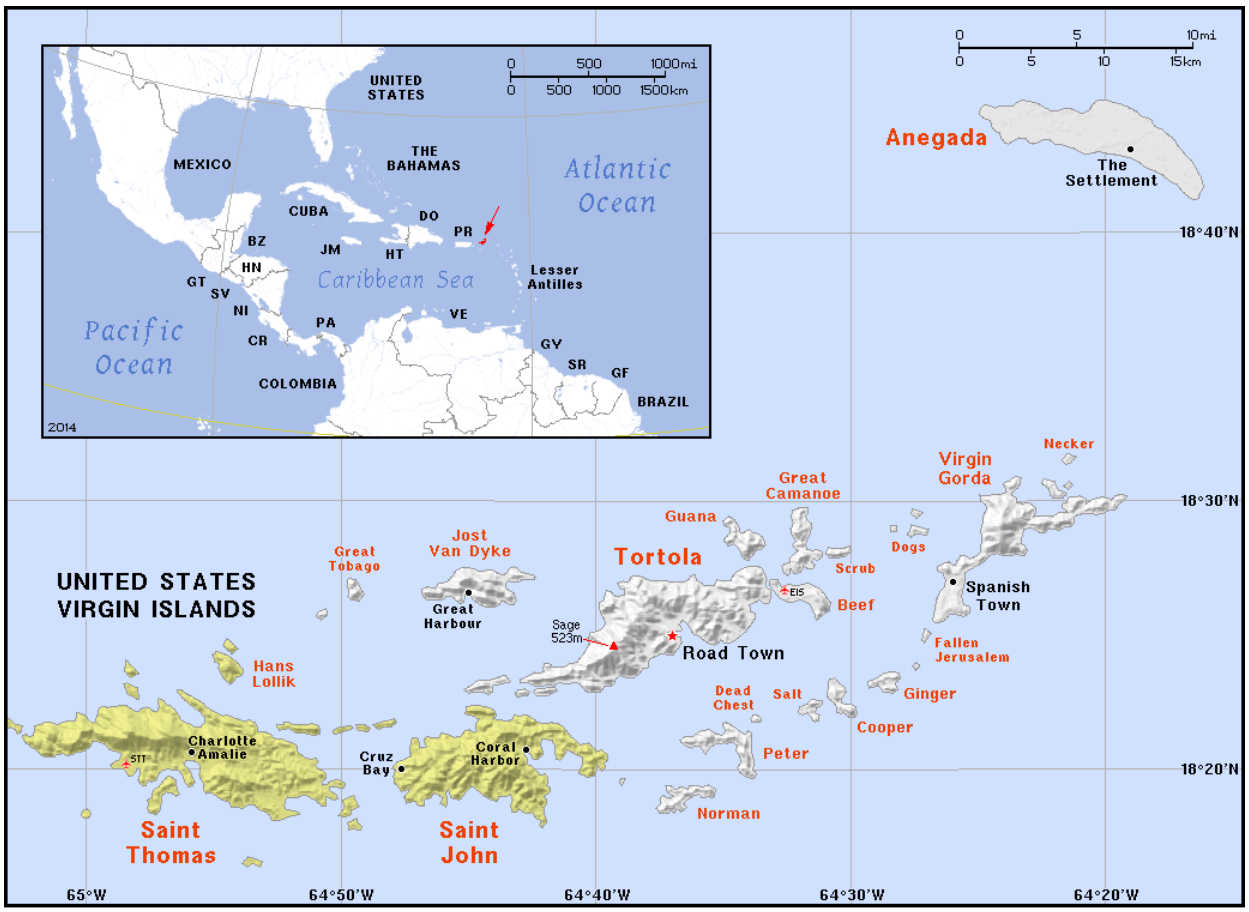

Figure 1. Map of the British Virgin Islands, source: https://ian.macky.net/pat/map/vg/vg_blu.gif

2. Project stakeholders/partners

The main stakeholder and main partner in this project is the NPTVI. NPTVI is the statutory authority responsible for protected areas in the BVI and the conservation actions and examples provided in the application represent the work NPTVI does daily. Kew and NPTVI have jointly delivered numerous projects over the last 25 years, and engagement between the two institutions is inherent to this project. Kew and NPTVI have jointly conducted fieldwork activities during Y1, and NPTVI was the beneficiary of most of the capacity building conducted during Y1 and for the remainder of the project. Both Kew and NPTVI have engaged with local government during the development of the proposal to better align the conservation plans and training that will be conducted at the local level. Local communities and school students will engage via Arbour Day and other outreach activities. Kew and NPTVI extended an existing Memorandum of Collaboration (MoC) to continue our partnership during this project and to allow the transfer of

collected plant materials to the UK. NPTVI has actively participated in all aspects of fieldwork and collection of plants and data, supporting these activities within national parks across the BVI.

Regionally, we have engaged with the US Fish and Wildlife Service Caribbean Ecological Services Field Office (Omar Monsegur) and the Herbarium of Mayaguez (MAPR, Biology Department, University of Puerto Rico) via its Head Curator and database manager, Jeanine Vélez Gavilán. MAPR is a recognised regional herbarium with collections from across the Puerto Rican Bank, which will play a key role to provide a regional dataset for all species which occur in the BVI and Puerto Rico, increasing the robustness of the dataset used for the species distribution models, as well as species included in the reconstruction of the Tree of Life. MAPR will also participate in the regional workshop which will take place in Y3 of the project, together with colleagues from Caribbean UK Overseas Territories. They will learn about Kew and NPTVI's experiences in producing and applying biodiversity metrics for conservation actions. Jeanine Vélez-Gavilán also contributed to the two fieldwork campaigns that took place in Y1 of this project and with herbarium samples during Y2.

We also engaged Octavio Rivera Hernandez, who is a botanist from Puerto Rico. He participated in fieldwork to share his knowledge of the regional flora by assisting with the identifications of native species.

This project has also the involvement of Clare Weaver from the Rare Plants Initiative. Clare has joined two field expeditions, sharing her knowledge on native and threatened plant species across the Virgin Islands.

3. Project progress

We compiled a draft list of native plant species for BVI at the start of the project, which is constantly being updated and modified, accommodating taxonomic changes, the discovery of new species during fieldwork or changes from native status to introduced for some species (results not shown in this report; this will be a final product for the project, Y3). This list of 650 species is the baseline for the comments towards progress for each activity and output below. However, our knowledge of the BVI flora has increased significantly during this project. We are now closer to having a complete checklist for the BVI, with verified vouchers and observations. Starting with 650 taxa, we have now added 123 more taxa to the list, as a result of new fieldwork findings, digital records newly available online as the world's herbaria make their data available, and new literature records are added to the Plants of the World Online (POWO; https://powo.science.kew.org/). Just our fieldwork alone added 25 new records to the list, demonstrating the value of survey work. From the original list, we have also discarded 54 species, since we now have evidence that these species are non-native or do not occur in the BVI, as initially thought. The current BVI list of native angiosperms contains 773 taxa.

3.1 Progress in carrying out project 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.

1.1 Collect tissue material from all specimens available at Kew and extract DNA. Quantify the DNA obtained to assess if it is suitable for sequencing methods (see activities in Output 2). This activity was scheduled for Q1-Q3 for Y1. Additional samples were secured during Y2 from various sources: 118 from the MAPR Herbarium, 59 from Andrew Gdaniec (Cactaceae), and 120 from two US herbaria (collected under Bentham-Moxon funding by Freya Cornwell-Davison). Using this funding (BMT-I3-2024), 61 samples were collected from the Steere Herbarium (NY Botanical Garden) and 59 from the US National Herbarium. In total, 80 species were collected from US herbaria, with 24 of these being duplicates and 56 from species for which we did not have a sample. We successfully extracted DNA from all samples (see Figures in Activity 1.3.1). A full list of specimens is available in Appendix 1.

1.2 Conduct fieldwork to collect plant material for ca. 150 native plant species not yet available at RBG Kew (Y1), and for any species not passing the DNA quality check in Activity 1.1 (Y2). Database all new herbarium and tissue samples. A three-week field campaign in November 2024 resulted in the collection of 49 herbarium specimens (three

duplicates each), comprising 13 target species and 10 new BVI records (Appendix 1). Furthermore, 45 specimens covered by the Convention on International Trade in Endangered Species (CITES) collected on past field trips for this project, arrived legally at Kew during this year and have also been sequenced. All samples were databased accordingly.

1.3.1 Extract DNA from newly collected materials. Confirm appropriate amounts of DNA were extracted as expected from recently collected materials. Planned for Q2–Q3, Y2, this activity was progressed substantially. DNA was extracted from 1627 samples, and genomic libraries were built for 1541 of them. These included 664 field-collected samples (Y1 and Y2) and 171 from herbarium and tissue collections (including repetitions; see Activity 1.1). A threshold of 5 ng/µL was applied, and only 70 samples fell below this benchmark (Figure 1). Extractions from November 2024 fieldwork and US herbaria are ongoing.

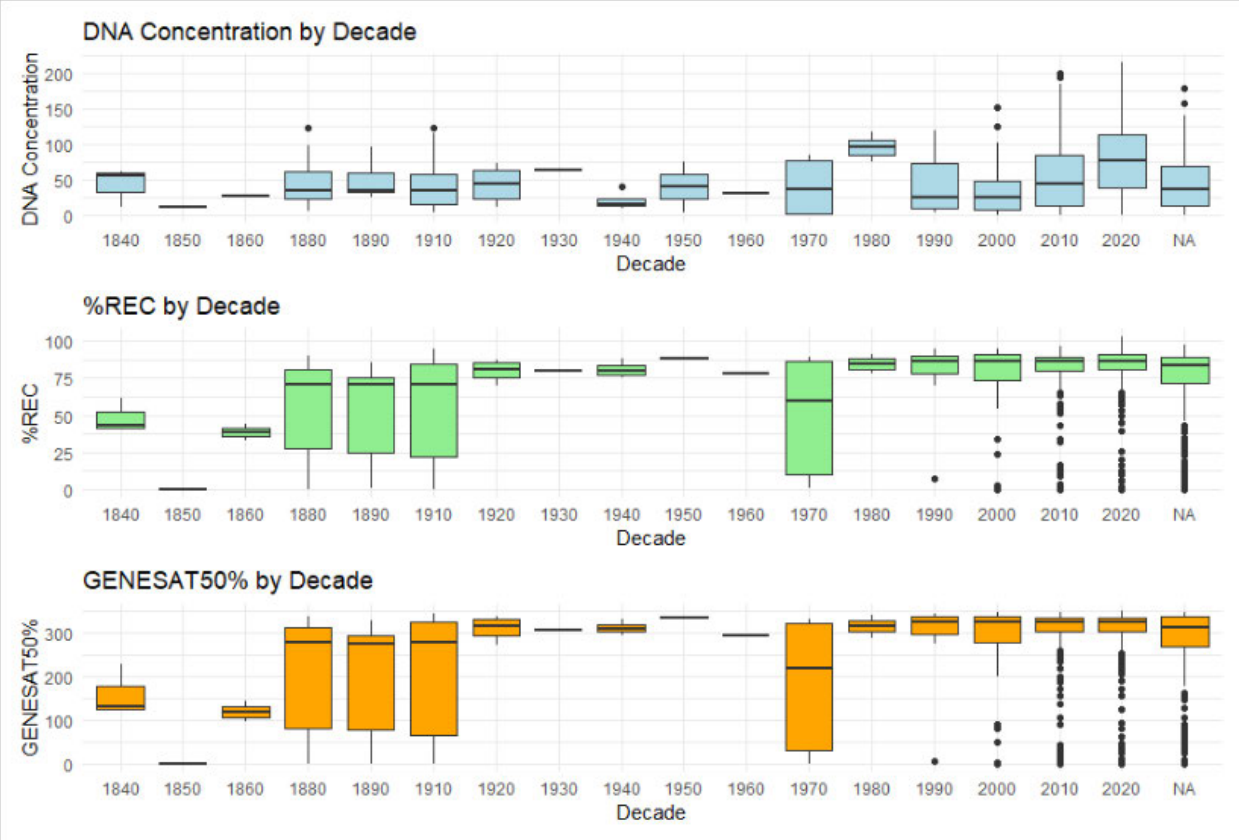

Figure 1. DNA concentration, percentage of gene recovery (%REC) and number of genes with at least 50% of their length recovered (GENESAT50%) for all specimens by decade in which they were collected. Number of samples per decade: 1840–1849 (3), 1850–1859 (3), 1860–1869 (4), 1870–1879 (0), 1880–1889 (10), 1890–1899 (11), 1900–1909 (0), 1910–1919 (83), 1920–1929 (5), 1930–1939 (1), 1940–1949 (4), 1950–1959 (2), 1960–1969 (1), 1970–1979 (3), 1980–1989 (2), 1990–1999 (17), 2000–2009 (95), 2010–2019 (253), 2020–2029 (427).

1.3.2 Database all DNAs and incorporate them in the DNA and Tissue Bank at RBG Kew. Activity planned for Q4, Y2. All DNAs extracted until Y2Q3 of the project have been submitted to Kew's DNA and Tissue Bank (DNA codes 51198-51966).

1.4 Conduct fieldwork and carry out inventory lists of species in areas with low number of occurence data, including areas that will be targeted for ecological restoration plans. Activity planned for Q1-Q4 Y1 and Q1-Q2 Y2. Fieldwork in November 2024 yielded 351 new occurrence points. Additional, synergies with DPLUS196 result in more observations being done for Great and Little Tobago Islands while on fieldwork for other projects. Overall, 7311 occurrence points have been incorporated into the Kew UKOTs database since the start of the project.

2.1.1 Process samples to generate genetic sequence data for all native plant species in BVI (ca. 650). Planned for Q1-Q4 Y2, this activity has been successful: 1541 samples were processed and yielded over 10 billion DNA sequences. This activity received help from an intern student from the Smith College, Adline Dely (Massachusetts, USA), who contributed to laboratory work for three months in summer 2024.

2.1.2 Conduct bioinformatic analysis and reconstruct a phylogenetic tree including all native plant species in BVI. Share the data with our colleagues from the Plant and Fungal Trees of Life project for eventual inclusion in the Tree of Life Explorer (https://treeoflife.kew.org/). This activity was scheduled for Q3–Q4 of Y2 and Q1–Q2 of Y3 and is currently well underway. We have reconstructed a phylogenetic tree incorporating 1,541 sequenced samples (Appendix 2), representing 785 taxa, including 640 of the 773 native angiosperm taxa currently confirmed for the BVI (Appendix 3). Additionally, the dataset includes 84 unidentified samples, of which 35 have been assigned to genus level, pending further taxonomic work. Of the current BVI flora list: 640 taxa are already represented in the tree, 38 taxa are currently being processed and will be incorporated in the next version of the tree, 9 taxa failed initial sequencing attempts but are being reprocessed, and 86 taxa are not yet represented, as no suitable specimen has been located or collected to date. Notably, 98 taxa that were sequenced but are no longer on the updated BVI native species list (e.g., reclassified as non-native or excluded after taxonomic review) will not be included in the final BVI tree. Nevertheless, these sequences remain valuable and will contribute to the development of a broader molecular reference library to support related biodiversity studies, including those conducted under the DPLUS215 project. DPLUS215 focuses on identifying seedlings emerging from soil samples collected on two islands in the BVI following threat removal, with the aim of assessing the prevalence of native versus non-native species in the soil seed bank. Consequently, any non-native species sequenced under DPLUS183 will enhance the reference database available for DPLUS215.

Phylogenetic reconstruction was based on high-throughput target capture sequencing using the Angiosperms353 gene set, recovering hundreds of nuclear genes per sample. The effectiveness of sequence recovery was assessed using two key metrics: percentage of total base pairs recovered (out of ~260,000 bp) and number of genes with at least 50% of their length recovered. Most samples met or exceeded the quality threshold (≥50% recovery and ≥200 genes at GENESat50%), indicating excellent sequencing success across the taxonomic breadth of BVI flora (Figure 2). These results confirm the robustness of our genomic pipeline for large-scale plant phylogenetics in tropical island systems.

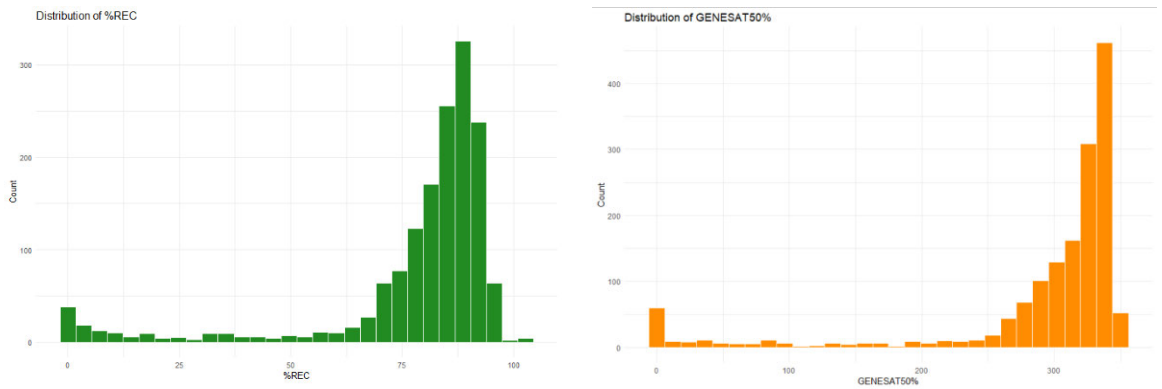

Figure 2. Bar plots showing the sequencing recovery results, %REC representing the percentage of the total length recoverable from a total of ca. 260K bp, and GENESat50% the number of genes recovered for at least 50% of their respective length.

2.2.1 Run species distribution models for all native plant species in BVI. This activity, planned for Q1-Q4 Y2, is well advanced. A new Research Assistant (Elloise Budd) was recruited and trained in species distribution modelling (SDM). Occurrence data have been compiled from our database and the Global Biodiversity Information Facility (GBIF). We decided to focus the modelling on the Puerto Rican Bank (BVI, USVI, Puerto Rico) to achieve a balance between a good representation of the environmental conditions of the BVI and enough number of occurrences to run the models. We collected a total of 42,979 non-duplicated occurrences records for 776 species for this study area. After rigorous data cleaning and removing records older than 1950, we run SDMs using an ensemble approach (integrating 3 different algorithms) for species which have at least 5 occurrence records (n = 703 species) which in total sum 36,939 records. SDMs have now been successfully generated for 653 species while, for species with fewer than five occurrence records, we applied a buffer method, assuming the species is present

within a buffer of 1km around the known localities. These models used global environmental layers at 1km resolution. However, we also trialled models using topographical variables in combination with remote sensing layers at 30-meter resolution (Figure 3), which has enhanced the precision of species distribution, particularly important in small island systems like the BVI. The modelling pipeline has been developed in R to enable reproducibility for when new occurrence records appear.

SDMs were calculated using two resolution climate models:

- 1 km climate model using CHELSA V2 Bioclimatic Variables (downloaded from here: https://chelsa-climate.org/downloads/), which consists of downscaled model output temperature and precipitation estimates at a horizontal resolution of 30 arc sec (1km) based on means of the time period 1981-2010. Five environmental variables were used in the final models selected by being the least correlated: BIO2: mean diurnal air temperature range, BIO5: mean daily maximum air temperature of the warmest month, BIO12: annual precipitation amount, BIO15: precipitation seasonality. We also added slope as a variable, which was calculated from the Digital Elevation Model and rescaled to 1km.
- 30 topographic model using seven environmental variables (slope, aspect, terrain ruggedness index, topographic wetness index, distance from coast) calculated from the Digital Elevation Model in ArcGIS Pro Software and the Normalized Difference Vegetation Index (NDVI) from Sentinel-2 satellite data. The Digital Elevation Model was downloaded from USGS Earth Explorer for Puerto Rican Bank (https://earthexplorer.usgs.gov/). NDVI was calculated in ESRI ArcGIS Pro Software from Sentinel-2 satellite data download via Google Earth Engine for a five-year cloud masked average for the years 2019-2024.

We used only 5 variables for the 1km model to allow us to model as many species as possible as you shouldn't have less environmental variables than presence points. This allowed us to model species with a minimum of 5 presence points. However for the 30m model, as the smaller scale meant that we had more occurrence points, using 8 environmental variables (thus only modelling species with 8 or above points) allowed us to model a similar number of species as the 1km model.

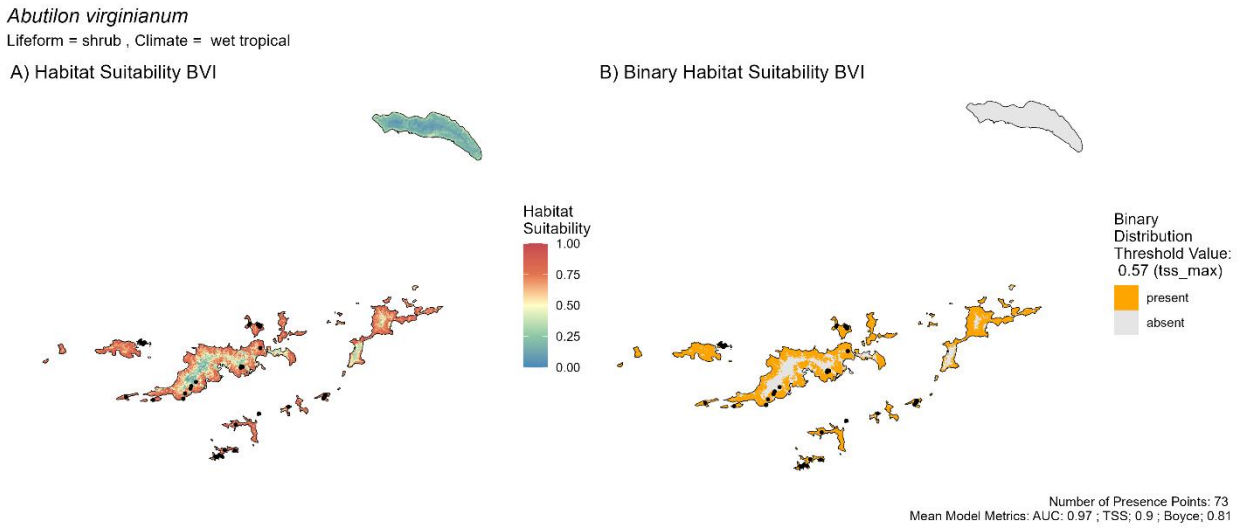

Figure 3. Example of species distribution models obtained for a BVI native plant species using occurrence records (black dots) with an optimised 30 m resolution. The habitat suitability describes the likelihood of a given species of having an optimum combination of environmental variables to survive. Note that human impact, dispersal and competition are not accounted for these models.

2.2.2 Generate a map layer with estimates of species richness using the output from 2.3.1. Scheduled for Q4 Y2 and Q1 Y3, preliminary analyses have been completed. Using the SDM

outputs (habitat suitability) from 2.2.1, we generated presence/absence maps for all species (e.g. Figure 3B) using statistically optimum thresholds from the habitat suitability maps (Figure 3A). Presence/absence maps were used to estimate species richness layers by summing the modelled species presence across grid cells. These maps provide a spatially explicit estimate of species richness across the BVI (Figure 4), enabling identification of plant diversity hotspots and under-surveyed areas. This output is foundational for subsequent conservation planning and restoration as the outputs represent the potential distribution of the species based on environmental conditions. The identified areas will be refined as phylogenetic and threat data are added. A 30-meter resolution layer of species richness will be the final product after finalising all SMDs analysis from 2.2.1.

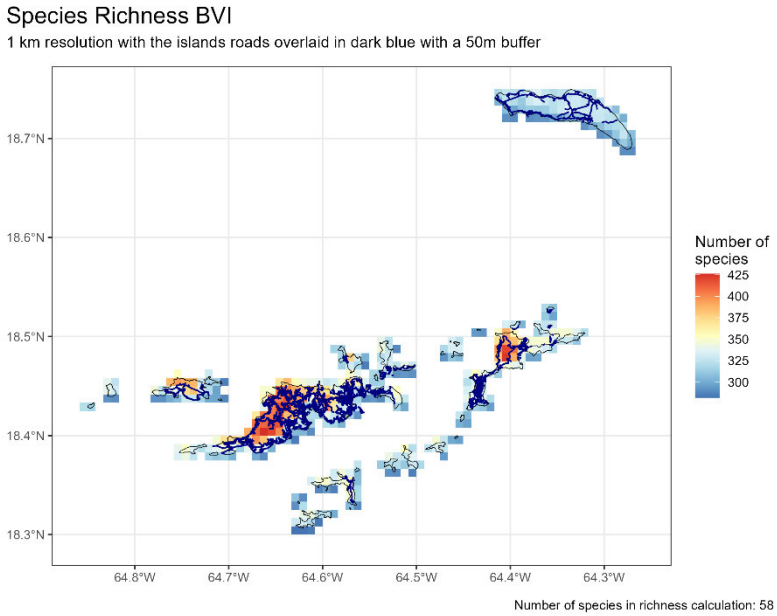

Figure 4. Preliminary results of potential species richness in BVI at 1-km resolution. Dark blue lines represent the road network

2.2.3 Conduct conservation assessments and write a full Red List for all native angiosperms in BVI. Progress toward this activity, planned for Q4 Y2 and Q1 Y3, has exceeded expectations. As of this report: 338 species have Red List assessments published on the IUCN Red List, 58 species assessments have been submitted to IUCN for publication, 132 species assessments have been drafted and peer-reviewed, and an additional 133 species assessments have been assessed using an automated tool for Least Concern species (e.g., Rapid Least Concern), and 112 species assessments remain to be compiled. In total, we now have IUCN Red List categories for approximately 85% of the BVI flora. Initial results show that 34 species (4%) of the BVI angiosperms are threatened, while 22 species (2.8%) are near threatened. These initial results show that 77% of the BVI angiosperms are not threatened in the wild (Least Concern; Figure 5).

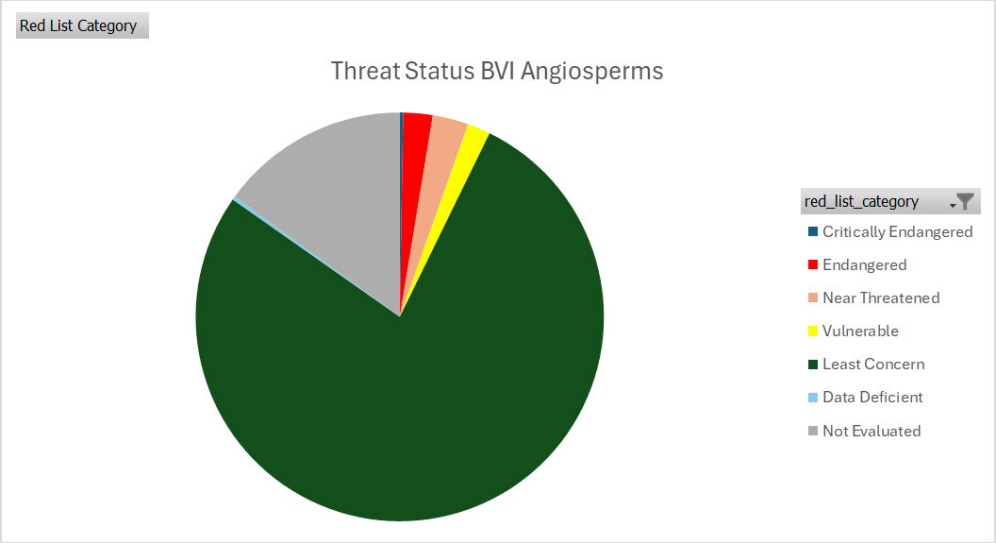

Figure 5. Preliminary results for threat status of the BVI Angiosperms species.

This is a substantial contribution to conservation in the region, offering a strong evidence base for future threat assessments and management decisions. Two intern students funded by internal budget from Kew contributed to this activity for three months during the summer 2024.

2.2.4 Integrate all data in the Biodiverse software to calculate phylogenetic diversity and expected loss of phylogenetic diversity across the territory. Planned for Q4 Y2 and Q1 Y3, this activity is currently in progress. The list of species with both SDMs and representation in the phylogenetic tree is being finalized. We are actively updating taxon names in the tree to reflect recent revisions to the BVI species list. Once harmonized, these data layers (distribution models, threat status, and phylogeny) will be loaded into Biodiverse software.

3.1 In-person training during Y1 fieldwork for tissue collection for DNA and herbarium. Activity planned for Q2 Y1 and Q4 Y1. This activity happened during Y1. During fieldwork activities in Y2, eight NPTVI staff contributed to tissue collection for DNA and herbarium (3 female, 5 male). Elloise Budd, Research Assistant from RBG Kew and Octavio Rivera (Puerto Rican researcher) received training during this expedition on herbarium samples and tissue collection.

3.2 In-person workshop with BVI staff for understanding biodiversity metrics use and interpretation of results. Activity planned for Q3-Q4 Y3. No changes.

3.3 In-person and online follow-up sessions in Y3 to train NPTVI staff responsible of conservation management decisions (Deputy Director) on using biodiversity metrics. Activity planned for Q2-Q4 Y3. No changes.

3.4 Organize an online workshop inviting colleagues and stakeholders from neighbouring islands. Activity planned for Q4 Y3. No changes.

4.1 GIS analysis to prepare maps with biodiversity metrics, and lists of species, split by island, Tropical Important Plant Area (TIPA) and protected area. Activity planned for Q1-Q4 Y3. No changes.

4.2 Presentation preparation by NPTVI Deputy Director for explaining to different government departments about using biodiversity metrics in development planning. Activity planned for Q3-Q4 Y3. No changes.

4.3.1 List inventories prepared for three sites withing National Parks targets. Activity planned for Q2-Q4 Y3. No changes.

4.3.2 Species richness and threatened species lists within these areas extracted from the main database. Activity planned for Q2-Q4 Y3. No changes.

4.3.3 Analysis of biodiversity metrics to produce a list of key species for ecological restoration for Gorda Peak National Park (NP), Great Tobago NP, and Sandy Cay NP; and others if identified by NPTVI. Activity planned for Q2-Q4 Y3. No changes.

4.4 Extract lists of species per island with those contributing more to biodiversity. Share these data with NPTVI for integration in the 2025/26 annual work plan for growing plants. Activity planned for Q2-Q4 Y3. No changes.

4.5.1 GIS analysis overlapping habitat resilience to climate change from DPLUS180 and to extreme weather events from DPLUS084 with the biodiversity metrics herein developed. Activity planned for Q4 Y3. No changes.

4.5.2 Produce a list of key species per habitat in the context of climate change and their contributions to biodiversity. Activity planned for Q4 Y3. No changes.

5.1.1 Preparation of report explaining step by step the practical for DNA extraction. Activity planned for Q2-Q4 Y3. No changes.

5.1.2 Demonstration with NPTVI staff and training session. Demonstration with school group at J.R. O'Neal Botanic Garden. Activity planned for Q2-Q4 Y3. No changes.

5.2 Script and story preparation for educational animated cartoon. Production of the cartoons. Activity planned for Q1-Q4 Y3. No changes.

3.2 Progress towards project Outputs

Please see below a description of the progress based on the indicators and means of verification defined for each output.

Output 1. Biobank for the BVI flora established: tissue and DNA of all native plant species from the BVI secured in accessioned collections.

1.1 New tissue samples (with verified herbarium vouchers) collected during fieldwork for the ca. 150 previously non-collected plant species in BVI by YR2 Q4, from a baseline of 75% available in Y1. [DPLUS-C09] *Means of verification: 1.1 Tissue material collected for at least 150 species and published in fieldwork reports. Data included in Y2 annual report and open access databases (dnabank.science.kew.org, brahmsonline.kew.org/ukot/).*

At the start of the project, our baseline indicated that approximately 75% of the 650 native angiosperm species of the British Virgin Islands (BVI) were represented in Kew's collections (herbarium, tissue, or DNA). A remaining ~150 species were flagged as priorities for fieldwork, either because they were not previously collected, lacked material of BVI origin, or yielded DNA of insufficient quality for sequencing. In Y1, 653 herbarium specimens and 37 additional tissue samples, totalling 690 newly accessioned samples, and 53 in Y2. These collections focused on underrepresented or previously undocumented species, and include 250 taxa from our original priority list, significantly surpassing our target of 150 species. Importantly, the BVI native flora list has grown during this period, expanding from an estimated 650 to 773 taxa, following taxonomic updates, verification of historical specimens, and the addition of 123 new species records. This dynamic revision, while increasing the overall target, confirms the necessity and value of comprehensive fieldwork. A total of 54 species documented for BVI still lack verified herbarium vouchers, and 97 species remain to be found in the field. Field collections were carried out in accordance with best practices for herbarium and DNA sample collection, including the use of silica gel for tissue preservation and the preparation of multiple duplicates for future deposition in local and international herbaria. All specimens have been databased and integrated into Kew's UKOTs database and DNAs incorporated in Kew's DNA and Tissue Bank (Appendix 1).

1.2 DNA bank created for all plant native species (ca. 650) in the BVI by YR2 Q4, increasing the available DNAs ten times from a baseline in Y1 of 10% of species. [DPLUS-C09] *Means of verification: 1.2 Report with the results of DNA extractions in Y2 annual report. Accession numbers created in the DNA & Tissue Bank at Kew (dnabank.science.kew.org).*

Prior to the project, only about 10% of BVI native species were represented in Kew's DNA bank. As of this reporting period, we have made substantial progress in achieving the target of securing DNA for all native species. DNA was extracted from 1627 samples, derived from a combination of field-collected samples, tissue bank and herbarium, and living collections (Appendix 1). These extractions produced usable DNA for 764 taxa, exceeding our goal of 650 species. All samples passed through quality control pipelines, with DNA concentrations assessed to ensure suitability

for downstream sequencing (Figure 1). Extractions from November 2024 fieldwork and US herbaria are ongoing, and we still have samples unidentified which will increase the final target.

1.3 Databasing completed for all newly collected materials by YR3 Q4 to achieve a full representation of all ca. 650 native plans in BVI. [DPLUS-C09] *Means of verification: 1.3 Herbarium vouchers data recorded and available in database (http://brahmsonline.kew.org/ukot/). Data shared with local partners.*

All newly collected materials from fieldwork have been fully databased, ensuring integration into both the UKOTs Species and Specimens Database and internal project datasets. Each specimen record includes species name, family, GPS coordinates, habitat information, collector details, and plant photographs. These records are accessible and are being shared with project partners, including NPTVI and MAPR. This activity directly contributes to the goal of achieving full digital representation of all native angiosperms of the BVI, including metadata for herbarium vouchers and associated DNA samples.

1.4 Collect native plant species presence points to increase our current database by 30% by YR2 Q2, from a baseline of 10,000 points. [DPLUS-C09] *Means of verification: 1.4 UKOTs Species and Specimens Database (http://brahmsonline.kew.org/ukot/) updated with new presence points and reported in Y2 annual report.*

The aim of increasing the species occurrence point database by 30% from a baseline of 10,000 records has been substantially surpassed. We integrated 6,000 occurrence points from the previous DPLUS084 project and added 571 occurrence points during fieldwork in November/December 2023, another 370 in March 2024, and 351 in November 2024; resulting in 1292 new, high-resolution records collected directly in DPLUS183. In total, the UKOTs database has been updated with 7,311 new occurrence points since the start of the project, more than double the target of 3,000 additional points. Each point includes taxonomic information, geospatial coordinates, habitat descriptions, observer information, and photographic evidence, further enhancing the quality and utility of the dataset. These data play a critical role in multiple downstream analyses, including species distribution modelling, threat assessments, conservation prioritisation, and restoration planning.

Output 2. A complete BVI Plant Tree of Life and biodiversity metrics calculated.

2.1 Generate DNA sequence data and complete the Tree of Life for all native plant species in BVI (ca. 650) by YR2 Q4, from a baseline of 36 species. *Means of verification: 2.1 DNA sequence data publicly available in SRA (https://www.ncbi.nlm.nih.gov/sra), and number of sequences produced in Y3 annual report. Phylogenetic analysis completed and a fully resolved phylogenetic tree for all native plants in BVI available. Data shared with Kew Tree of Life Explorer (https://treeoflife.kew.org/).*

The baseline for this output included DNA sequence data for only 36 native plant species of the BVI. The project aims to generate a complete set of high-throughput genomic data (targeting 353 nuclear genes per species) for all native angiosperms in the territory (now estimated at 773 taxa, up from the original 650 following field updates and taxonomic revisions).

By the end of Y2, we have made exceptional progress. Across both Y1 and Y2: 1627 samples were extracted for DNA and 1541 samples were successfully converted into genomic libraries and sequences. These represent 785 taxa, including 640 native BVI species (83% of the total native flora). An additional 98 taxa, though no longer considered to be native to BVI, were also sequenced and form a valuable reference dataset for regional flora and future work under DPLUS215; and 84 samples remain unidentified at the species level (35 are identified to genus) and are under expert review. We have successfully reached the target in terms of number of species to sequence, however, we are still missing 86 taxa for which no specimen is available either in herbarium collections or not located during Y2 fieldwork.

The sequencing protocol (Angiosperms353 target capture) has proven robust across material types, species and collection date, with a high success rate in gene recovery. The majority of samples recovered >50% of the total length (260K bp) and most samples yielded ≥200 with at least 50% coverage, well above quality thresholds (Figure 2). All generated data are being curated for publication on the NCBI Sequence Read Archive (SRA) and integration into the Kew Tree of Life Explorer platform. The reconstructed phylogenetic tree, already encompassing 640

BVI native taxa, serves as the foundational dataset for biodiversity metrics analyses and conservation applications, and we are preparing a scientific publication with these results.

2.2 Three biodiversity metrics calculated for the entire flora of the BVI: species richness, IUCN Red List assessments and phylogenetic diversity by YR3 Q2. [DPLUS-E03] *Means of verification: 2.2 GIS layers available for BVI National GIS containing biodiversity metrics and inputs to generate them. Red List assessments completed, ready to be reviewed and submitted to the IUCN Red List of Threatened Species.*

This component focuses on calculating and integrating three biodiversity metrics (species richness, extinction risk (Red List) and phylogenetic diversity) across the BVI. Significant strides have been made across all three areas during Y2.

Using the species presence data compiled in Activity 1.4 and data obtained from GBIF, we have developed SDMs for 653 native species, covering 93% of the current flora. These models are based on records from both the BVI and wider Caribbean (especially the Puerto Rican Bank), providing strong ecological context for modelling range and habitat preferences.

The high-resolution (30 m) environmental layer was applied to improve the accuracy of SDMs, an important methodological upgrade from previous projects. For species with fewer than five presence points, a buffering method was used to simulate potential habitat, ensuring inclusion in the modelling framework to calculate species richness.

Using the SDM outputs, we produced the first species richness maps for the BVI. These layers spatially quantify plant diversity across the territory and will form a critical part of conservation and restoration planning. These preliminary maps are now available in GIS format and will be refined during Y3 to incorporate updates to the species list and improved resolution (30 m).

We have now completed IUCN Red List assessments for 338 species and submitted an additional 58 to the IUCN Red List. Furthermore, 132 new assessments have been drafted during Y2 (including 28 by trained interns), 172 assessments are currently in review or final preparation stages, 133 assessments have been generated using automated assessment tools (e.g., Rapid Least Concern), 112 assessments remain to be undertaken. In total, we now have conservation status data (published, submitted, drafted, or generated via tools) for approximately 85% of the BVI flora. This work represents a significant contribution to regional and global knowledge on tropical island plant conservation.

Preparation for the calculation of phylogenetic diversity (PD) and expected PD loss is in progress. We are harmonising species names between the SDM outputs and the Tree of Life to ensure consistency and constructing species matrices for input into the Biodiverse software.

Output 3. Capacity built for integrating biodiversity metrics into conservation management, action and decision-making.

3.1 At least three NPTVI staff trained and actively collecting herbarium and tissue samples and associated data by YR1 Q4. [DPLUS-A01] *Means of verification: 3.1 List of specimens collected by NPTVI staff included in Y2 annual report. Gender balance measured per fieldwork activity.*

At the start of the project, there had been limited formal training of the new, young NPTVI staff in advanced plant collecting protocols and for molecular analysis. The aim was to train at least three staff to actively participate in tissue and herbarium specimen collection and ensure their sustained engagement across field campaigns. By the end of Y2, the project has far exceeded this target. A total of nine NPTVI staff members have now been trained and actively involved in both herbarium and DNA tissue collection. This includes: six Terrestrial Wardens, one Senior Terrestrial Warden, the Deputy Director and the Director of NPTVI. Gender balance has been maintained throughout, with four women and five men participating, reflecting the overall staffing composition of NPTVI. In addition, Elloise Budd, the newly appointed Research Assistant at RBG Kew, Freya Cornwell-Davison (Kew) and Octavio Rivera (Puerto Rico) have also received training during fieldwork, ensuring that both local and UK-based personnel are equipped with the same standards and approaches, strengthening future collaboration and mentoring potential.

All the following indicators correspond with outputs and activities planned to start in Y3 and we do not have yet progress towards them: 3.2 At least three NPTVI staff trained and

step by step manuals produced for interpreting biodiversity metrics data and designing ecological restoration plans by YR3 Q4. [DPLUS-A01]; 3.3 NPTVI Deputy Director trained to manage and update biodiversity metrics database and use it to design ecological restoration plans. [DPLUS-A01]: 3.4 End of project workshop to integrate biodiversity metrics in conservation shared with wider stakeholders, including partners from other Caribbean islands (including overseas territories) by YR3 Q4. [DPLUS-A01]. Output 4. Biodiversity metrics used to direct conservation action in the face of current and future threats. 4.1 Identify areas with the highest and lowest biodiversity levels and with the highest proportion of threatened plants, per island (Anegada, Tortola, Virgin Gorda), for the 18 Tropical Important Plant Areas (TIPAs) and protected areas to inform conservation management by local stakeholders by YR3 Q2. [DPLUS-B11] [DPLUS-C08]; 4.2 NPTVI use the biodiversity metrics generated to provide feedback on future land planning to at least four government departments (Town and Country Planning, Disaster Management and Agriculture and Fisheries Departments, and Environmental Ministry) by YR3 Q2. [DPLUS-A04] [DPLUS-A07]; 4.3 At least three ecological restoration plans developed within National Parks using map layers containing biodiversity metrics to respond to biodiversity loss by YR3 Q4. [DPLUS-B01]; 4.4 The 2025/26 annual work plan at the J.R. O'Neal Botanic Garden includes propagation of five species per island for ecological restoration that contribute the most to biodiversity. [DPLUS-B02]; 4.5 Identification of key plant species to increase habitat resilience based on GIS analysis overlapping biodiversity metrics and ecosystem services data from DPLUS180 and forest resilience by DPLUS084 by YR3 Q4. [DPLUS-B02]. Output 5. Outreach activities to reinforce the importance of conserving native plant species. 5.1 Educational workshop for schools taken place at JR O'Neal Botanic Garden, on how to extract DNA from plants by YR3 Q4; 5.2 Produce educational animated tools and activities about the importance of safeguarding native biodiversity and growing native plants instead of exotic plant species by YR3 Q4.

3.3 Progress towards the project Outcome

Outcome: An integrated suite of biodiversity metrics is routinely implemented across the territory to mitigate against current and future threats. The project remains firmly on track to achieve this Outcome by the end of the funding period, with significant progress made over the first two years in data collection, infrastructure development, and institutional capacity building. The indicators selected to measure progress towards this Outcome remain appropriate and effective for capturing both technical and institutional advances.

0.1 Curated collections and presence data enhanced to represent 100% of all known native plant species in BVI and stored as duplicates in Puerto Rico (MAPR) and UK (Kew) herbaria by YR3 Q4, from a baseline of 75% available in Y1. *Means of verification: 0.1 Database comprising BVI's specimens, tissue, and DNA collections at RBG Kew and supplemented with collections at regional herbaria (MAPR) for all ca. 650 native plant species in BVI.*

For Outcome Indicator 0.1, the baseline condition at the start of the project was that approximately 75% of the estimated 650 native angiosperm species of the BVI were represented in herbarium or tissue collections at RBG Kew, with limited verified duplicates available in regional herbaria such as MAPR (Puerto Rico), and a species occurrence database comprising around 10,000 occurrence points. Since then, substantial progress has been made. The working list of native BVI species has been expanded to 773 taxa, reflecting newly discovered species during fieldwork, taxonomic revisions and new digital collections available online. Two intensive field campaigns carried out during Y1 and Y2 yielded 690 new collections (herbarium specimens and DNA tissue samples), and DNA was extracted from a total of 1,627 samples, of which 1,541 have been sequenced. These include both field-collected and historical specimens. In addition, more than 7,300 new occurrence points have been added to the UKOTs Species and Specimens Database, exceeding our initial 30% target increase. Duplicate specimens have been collected as planned, ensuring regional representation. These achievements provide strong evidence that the project will achieve 100% representation of all native species found in curated collections by the end of Y3. The remaining gaps are being addressed to investigate the presence in BVI.

0.2 Three internationally recognized biodiversity metrics completed for approximately 650 BVI native angiosperms and publicly available by YR3, from a baseline of 5% available in

Y1. *Means of verification: 0.2 Map layers containing biodiversity metrics incorporated as GIS layers into NPTVI databases, on the BVI National GIS and other regional stakeholders.*

For Outcome Indicator 0.2, the baseline at project inception was that only 5% of the native flora had sufficient data to be included in biodiversity metric analyses. At that stage, the Tree of Life for BVI species included 36 taxa, and no comprehensive species distribution models or Red List assessments were available for the full flora. At the end of Y2, we have reconstructed a phylogenetic tree including 1,541 sequenced samples, covering 640 of the 773 native species in BVI. Species distribution models have been run for 653 species (over 93% of the flora) using over 1.1 million cleaned presence records from BVI and the wider Caribbean. Red List assessments have also progressed considerably: 338 species are now published on the IUCN Red List, an additional 58 assessments have been submitted, and 132 have been drafted and are currently under review. Only 112 species remain unassessed, most of which were recently added to the updated flora list. Preliminary maps of species richness across the territory have been generated, and work is underway to calculate phylogenetic diversity and expected loss using the Biodiverse software. All biodiversity metrics are expected to be completed, published, and made available in open-access platforms by the end of Y3. The metrics, both in their technical robustness and territorial coverage, are appropriate and well-aligned with the intended Outcome.

0.3 BVI conservation stakeholders use the biodiversity metrics produced in this project to manage local biodiversity, to guide conservation, responding to local threats, and used to inform conservation action planning by Y3. [DPLUS-A03] *Means of verification: 0.3 Published participant list and report for workshops, delivered for local stakeholders and regional partners. Change after training measured by the number of conservation plans developed by stakeholders using the biodiversity metrics. Assessment of gender inclusivity across workshops and outreach activities.*

For Outcome Indicator 0.3, which focuses on the actual application of biodiversity metrics by BVI conservation stakeholders, baseline engagement was limited. At the start of the project, no formal training had taken place and the use of biodiversity metrics in conservation planning was not yet embedded in institutional workflows. However, major strides have been made over the past two years. Nine staff from the NPTVI, including the Deputy Director and Director, have received practical training in herbarium and DNA sample collection. Their engagement in fieldwork was active and sustained, with NPTVI staff contributing collector numbers to nearly half of the herbarium specimens collected. The project will ensure full access to the species occurrence database, the updated native species list, and sample metadata. Preparations are underway for Y3 training workshops and a regional knowledge exchange event, which will further ensure that biodiversity metrics are not only calculated but also interpreted and applied by stakeholders in restoration planning, protected area management, and policy advising. The formal use of metrics in conservation decision-making is therefore expected to begin in earnest during Y3, in alignment with the project's timeline.

3.4 Monitoring of assumptions

Activities planned for Y2 are embedded in Outputs 1 and 2. The assumptions associated with each section remain true and there have not been changes in assumptions.

Outcome

Kew and BVI GIS specialists remain committed to the project, IT equipment, software and infrastructure are fit for purpose at Kew and in BVI. New Research Assistant recruited for spatial analysis, which included a change request to accommodate a delayed starting date to maintain the 1-year contract planned. This did not affect dates of planned activities.

Project partners able to get into the field to collect specimens. Fieldwork dates were planned and jointly agreed in advance to ensure availability of NPTVI, Kew staff and regional partners

Project is not disrupted by major environmental events e.g., hurricanes, pandemics. This assumption remains true, and it has not affected our activities so far.

Online resources are maintained during and beyond the life of the project. All online resources included in our proposal remain available to this date.

Output 1

Kew staff are able to travel to the BVI to collect materials. Fieldwork dates are agreed and discussed in advance to ensure availability, we prepare materials and health and safety documentation with enough time to obtain approval for fieldwork. Kew staff has successfully travelled and collected plant samples in BVI on one occasion during Y2.

Export and import (e.g., CITES) permits issued for all missing species. CITES samples collected during fieldwork are stored locally by NPTVI until CITES import permits are approved; this was achieved during Y2 of the project for the samples collected in Y1 and Y2 and specimens have successfully arrived at Kew. The remaining plant samples collected have been successfully sent to Kew under the Memorandum of Collaboration between the two institutions.

Being able to locate all the unstudied species. We are using all available information (e.g., Kew UKOTs presence database, Flora of the West Indies, regional databased and GBIF) to locate species documented to occur BVI but not available at herbarium collections, and we received help from colleagues in Puerto Rico and the US Virgin Islands who are experts in the local flora. We have requested samples of unstudied species from other regional herbaria (e.g., Mayagüez herbarium in Puerto Rico). We are also evaluating names in the species list of BVI to verify their authenticity or if their inclusion is supported by a reliable source (e.g., herbarium collection or verified observations). This assumption remains true.

Kew remain committed to maintain and enhance their specimen databases and making these publicly available. All newly sampled materials are being incorporated to Kew's collections, including Herbarium and DNA and Tissue Bank, and will be made available in online databases.

Kew's UKOTs team retains capacity to be able to maintain the UKOTs Species and Specimens Database. Kew's UKOTs capacity has changed in the last year (see Section 9). The database is currently maintained.

Output 2

DNA successfully extracted from problematic species (e.g., containing secondary metabolites, polysaccharides, etc.). We have successfully extracted good amounts of DNA for the majority of the species from BVI and done repetitions when DNA yield was not optimal. Our protocols have been successful at extracting DNA from the diversity of plant groups occurring in BVI.

The incorporation of new data and maintenance of the Kew Tree of Life Explorer continues at current levels. The current version of this portal is from April 2023, and it has been maintained during Y2 of our project. Next data release is planned for December 2025.

Sufficient presence points (10-15 per species) available from fieldwork activities and online resources (see methods) to adequately calculate species model distribution for each species. We have incorporated presence points collected during our fieldwork campaigns and from a previous project (DPLUS084) in our database, and we will be using the entire distribution range of the species (beyond BVI) to obtain all presence points available per species. This assumption remains true, and it has been assessed for rare species and scarcely studied species during the activities planned for Y2. A buffer zone approach (i.e., creating a radius around known occurrences) has been used for rare species.

Output 3.

NPTVI retains trained staff. Staff turnover is an important risk in our project (see Section 9). NPTVI staff who received training during our fieldwork campaigns in Y1 contributed to fieldwork in Y2.

Appropriate designer is selected to produce cartoon. This assumption remains true for this activity planned for Y3 of the project.

Output 4.

Kew staff are able to travel to the BVI to collect materials and new data. This assumption remains true.

We have continued access to high-capacity computing at Kew and capacity to maintain databases. This assumption remains true.

Biodiverse software is maintained. This assumption remains true.

Evidence bases successfully established from outputs 1 and 2. This assumption remains true.

BVI National GIS maintained by BVI Government. This assumption remains true.

J. R. O'Neal Botanic Garden maintains capacity (facilities and staff) to grow native plants in the nursery. This assumption remains true.

Output 5.

Kew staff are able to travel to the BVI for training and educational activities. This assumption remains true.

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

In summary, the design of our project includes three phases: 1) gathering and collecting all native plants in BVI, 2) generating data and calculating the three biodiversity metrics proposed in the project, 3) applying and integrating the biodiversity metrics in conservation management in BVI. During the third phase, planned for Y3 of the project, we will expect significant impact to support environmental outcomes for BVI. We are currently finishing phase 2. Phase 3, planned for Y3, will translate all the results produced during Y1 and Y2 to conservation planning and management, thus the outputs of the activities planned for Y3 will inform this section in future reports.

5. Gender Equality and Social Inclusion (GESI)

GESI Scale	Description	Put X where you think your project is on the scale
Not yet sensitive	The GESI context may have been considered but the project isn't quite meeting the requirements of a 'sensitive' approach	
Sensitive	The GESI context has been considered and project activities take this into account in their design and implementation. The project addresses basic needs and vulnerabilities of women and marginalised groups and the project will not contribute to or create further inequalities.	X
Empowering	The project has all the characteristics of a 'sensitive' approach whilst also increasing equal access to assets, resources and capabilities for women and marginalised groups	
Transformative	The project has all the characteristics of an 'empowering' approach whilst also addressing unequal power relationships and seeking institutional and societal change	

The steering group is co-chaired by Dr. Colin Clubbe (Kew) and Dr. Cassander Titley O'Neal (NPTVI), constituting 50% women. The members of the steering group are Nancy Woodfield-Pascoe (NPTVI), Keith Grant (NPTVI), Sara Barrios (Kew) & Dr. Juan Viruel (he/him, Kew). This constitutes 50% women, and 50% members from each institution.

The overall project team is gender balanced, with equal responsibilities shared among members of different genders. BVI staffing is an exemplar of gender inclusivity, with two women leading

the NPTVI. A mixed steering group will evaluate workshops and public engagement activities, to avoid gender stereotypes and promote gender equality and inclusivity. Workshops will target a gender balanced audience. We will measure attendance and participation based on age, culture and mobility and will, if needed, adjust our channels to approach the stakeholders. School engagement will aim to exclude any gender stereotype linked to any job within our project (i.e., by demonstrating that people from any gender are scientists, conservationists, etc.). This will be delivered by a gender-balanced team in the project. Kew has recently achieved the SWAN Bronze Athena award, in recognition of its good practices towards the advancement of gender equality. Research Assistant and intern students' recruitments were all done following Kew's guidelines on gender balanced interview panels.

6. Monitoring and evaluation

Quarterly team meetings are organized to officially report progress of activities in the context of the indicators defined for each output. In the first meeting of the project, roles and responsibilities were agreed for achieving each activity and output, and the people engaging in each of them. Minutes of these meetings are prepared by the PI and co-PI of the project and circulated with the rest of the team. We also updated our Monitoring and Evaluation table with a summary of the progress for each activity for each quarter (see Appendix 4). Colour code is used to track the status of activities: green, ongoing; blue, finished; pink, update after having finished; grey, not started as planned.

A steering group constituted by six members of the team is held quarterly, always following team meetings to discuss and assess the progress of activities and their contribution towards achieving outputs (see details of the composition of the steering group in Section 5). Steering group meetings preceding reports (i.e., half year or end of year reports) aim to discuss individually the indicators and means of verification to define the numbers or values that demonstrate progress towards outputs, using Appendix 4 as a continuously updated document to monitor progress. Minutes of these meetings are prepared by the PI and co-PI of the project and circulated with the rest of the Steering Group.

7. Lessons learnt

What worked well, and what didn't work well this past year? If you had to do it again, what would you do differently? The teams working on each biodiversity metric collaborated efficiently and independently, successfully completing both the analysis and laboratory work. We did not identify major areas of improvement to report.

What recommendations would you make to others doing similar projects, for example tackling the same issues or working in the same geographical area? How are you going to build this learning into the project and future plans? Team composition is critical to the success of similar projects. Collaborations with regional partners can be invaluable for plant identification and fieldwork, while laboratory expertise is essential to successfully extract DNA from a broad range of plant species and material types. We also suggest conducting a gap analysis of herbarium collections early on to identify potential sources of tissue material for DNA analysis and new unknow records for the native species list.

Are you going to change your plan next year as a result of this learning? Do you plan to submit a Change Request? At this stage, we do not plan to submit a Change Request.

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

NA.

9. Risk Management

Staff turnover was identified as a potential risk in our proposal. In line with this, Dr. Colin Clubbe, Senior Research Leader of the UKOTs team at Kew, retired in 2023. Although this position has not been replaced, which has long-term implications for the overall capacity of the Kew team, we do not anticipate significant impacts on this project. Colin has generously agreed to remain involved as a collaborator, continue serving on the steering group, and support fieldwork activities. Throughout Year 2, he has continued to chair the steering group, for which we are very grateful.

During Year 2, Kew's Communications team faced limited capacity, resulting in delays in producing and publishing project-related blogs posts. Additionally, the team decided to close all Twitter/X accounts affiliated with individual research groups, including the @KewUKOTs account, which had previously hosted all social media updates for the project. As a result, these updates are no longer accessible online. To mitigate this, we will submit future updates to the Kew Communications team and request that they be shared through the official Kew Gardens Bluesky account (@rbgkew.bsky.social).

10. Scalability and durability

During the first year, all NPTVI staff involved in the project received training on plant collecting and identification, which was well received by NPTVI. This is demonstrated by having actively participated in collecting all specimens during fieldwork (see section 3, part 3.1). Attention was received from BVI Governor John Rankin CMG who visited us at J.R. O'Neal Botanical Gardens (Tortola) during our fieldwork visit to BVI in November/December 2023 (see section 11). The data and applicability of the biodiversity metrics from this project will be usable by other regional stakeholders, as BVI belongs to the biogeographic region Puerto Rican Bank. We have established collaboration with Jeanine Vélez-Gavilán (curator of MAPR, Puerto Rico), and she actively contributed to the two fieldwork campaigns. Two new collaborations were established demonstrating the interest from regional stakeholders on this project (see sections 2 and 3): Omar Monsegur (US Fish and Wildlife Service - Caribbean Ecological Services) and Clare Weaver (Virgin Islands Rare Plants Initiative). During Y2, we also established collaboration with Octavio Rivera Hernandez, a botanist from Puerto Rico, who contributed to fieldwork in November and with identifications of plants in the field. We also established a new collaboration with Andrew Gnadiec (PhD student at University of Reading, UK), who is investigating Cactaceae across the Caribbean. This collaboration has been essential to ensure having access thorough representation of a taxonomically complex group, and we are collaborating towards defining species limits in some Cactaceae species from BVI.

Promotion of the project has been delivered in the academic sector of conservation science: Dr. Juan Viruel contributed with an oral presentation at Biodiversas Ecological Symposium (Universidad Rey Juan Carlos, Madrid, Spain; April 2024); an oral presentation at the XXth International Botanical Congress (Madrid, Spain; July 2024) and an invited seminar at Innsbruck University (November 2024).

An assessment of the interest of the outcomes will be more effective at the end of this project because it mostly relies on the application of the biodiversity metrics we will calculate on biodiversity management. NPTVI staff will incorporate the skills gained during this project into their programme of work pattern, i.e., extracting biodiversity metrics and using them to directly guide biodiversity conservation in the BVI and protected areas management, or for activities at JR O'Neal Botanical Gardens. Nancy Woodfield-Pascoe will receive training and oversee the use of the project generated data, as part of her role as Deputy Director for Science, Research and Environmental Policy at NPTVI, as well as a member of the Town and Country Planning Department technical review committee for development planning applications at the BVI Government. NPTVI will be trained to use and maintain the biodiversity metrics database. Equally, the knowledge generated during this project will remain in the form of written guidelines for using datasets and biodiversity metrics for on the ground conservation management of biodiversity. This manual will include step-by-step instructions to incorporate newly generated data that could be produced in the future (e.g., new species discovered, new localities discovered for species), thus allowing an update of the biodiversity metrics and the continual benefits of their use. This analysis will not require further funding, furthermore, the recommendations produced from biodiversity metrics will direct and guide future funding applications and on the ground conservation management. Our approach can be scaled up across other Caribbean islands, benefitting conservation management of neighbouring islands and for better understanding how BVI plants fit into the regional context. In this way, this innovative project will establish a new 'business as usual' for conservation management in the BVI and better prospects for its biodiversity and associate ecosystem services. The animated educational cartoon and the new DNA extraction activity at JR O'Neal Botanical Gardens will constitute permanent resources for engagement with school children and outreach interest in protecting BVI's floral diversity.

11. Darwin Plus identity

What effort has the project made to publicise Darwin Plus, e.g. where did the project use the Darwin Plus logo and promote Darwin Plus funding opportunities or projects? Our social media included links or tagged BCF and our DPLUS183 project (@KewUKOTs in Twitter/X). The logo is included in presentations in conferences and on the website of the project ("Funded by" section): https://www.kew.org/science/our-science/projects/biodiversity-metrics-british-virgin-islands. NPTVI promotes the project on their Facebook page (www.facebook.com/NPTVI/).

How has the UK Government's contribution to your project's work been recognised? NPTVI directly engages with local authorities and update of the progress of the project and the importance of the outputs for biodiversity management in the BVI. An example of the engagement and interest from local government was the visit of the BVI Governor John Rankin CMG to the J.R. O'Neal Botanical Gardens (Tortola) during our fieldwork visit to BVI in November/December 2023. This gave us the opportunity to talk about the project and its main objectives. Governor John Rankin CMG did his first herbarium collection after a training session delivered by NPTVI staff. We aim to continue this communication during the last year of the project.

Was the Darwin Plus funding recognised as a distinct project with a clear identity or did it form part of a larger programme? Darwin Plus funding has always been highlighted, recognised, and promoted by Kew and NPTVI staff involved in this project, and for having funded other Darwin Plus projects linked with our current programme (e.g., DPLUS030, DPLUS84).

To what extent is there understanding of Darwin Plus within the territory(ies) and who is likely to be familiar with Darwin Plus? NPTVI's public engagement programme has continuously promoted Darwin Plus funds and the importance of the research and conservation programmes that are delivered for BVI, for example, through their website (Project Highlights | National Parks Trust (bvinpt.org)) and Facebook: https://www.facebook.com/NPTVI/. NPTVI usually engage will local press to do public engagement of Darwin Plus projects, including DPLUS183, e.g., https://www.bvibeacon.com/herbarium-planned-after-3-year-study/ and https://www.bvibeacon.com/reporters-notebook-march-21-2024/.

If you have a X (Twitter)/Instagram/Flickr/Blog/YouTube etc. account is this effective and have you linked back to the Biodiversity Challenge Funds / Darwin Plus and its social media channels? https://twitter.com/kewukots, https://www.facebook.com/NPTVI/

@KewUKOTs Twitter/X account has been used to disseminate results and progress in several Darwin Plus funded projects in UK overseas territories, always tagging @BCF twitter account. However, due to RBG Kew policies established by Kew's Communication team, this account has now been discontinued aiming to centralize all social media to Kew Gardens Bluesky account (@rbgkew.bsky.social). We published social media during Y2; however, these posts are not available online anymore.

12. Safeguarding

[redacted]

13. Project expenditure

Table 1: Project expenditure during the reporting period (1 April 2024 – 31 March 2025)

Project spend (indicative in this financial year	2024/25 D+ Grant (£)	202/25 Total actual D+ Costs (£)	Variance %	Comments (please explain significant variances)
Staff costs	[redacted]			
Consultancy costs				
Overhead Costs				
Travel and subsistence				
Operating Costs				
Capital items				
Others (Please specify)				
TOTAL	**£144,155.5**	**£142,253.3**		

Table 2: Project mobilised or matched funding during the reporting period (1 April 2024 – 31 March 2025)

	Secured to date	Expected by end of project	Sources
Matched funding leveraged by the partners to deliver the project (£)	[redacted]		Matched funding time from project members and from

			partners; overheads; boat in kind.
Total additional finance mobilised for new activities occurring outside of the project, building on evidence, best practices and the project (£)	[redacted]		

14. Other comments on progress not covered elsewhere

DNA data and the Tree of Life produced in DPLUS183 will be a reference to a new DPLUS project started in 2024 (DPLUS215 Assessing BVI habitat recovery from soil seedbanks following invasives removal).

15. OPTIONAL: Outstanding achievements or progress of your project so far (300-400 words maximum). This section may be used for publicity purposes.

I agree for the Biodiversity Challenge Funds to edit and use the following for various promotional purposes.

Understanding and measuring biodiversity is essential for conserving nature and responding to climate change. For the first time, our project is generating comprehensive biodiversity metrics for the entire native flora of the British Virgin Islands (BVI), an archipelago of extraordinary diversity and ecological importance. Since the project began, we have collected 690 new herbarium and tissue specimens, many from under-surveyed islands and habitats, including over 120 species new to the BVI flora, while also correcting earlier records through updated taxonomy, field verification and DNA analysis. Our revised checklist now includes 773 native species, forming the basis for species richness mapping, threat assessments, and phylogenetic analyses. We have now successfully extracted DNA from 1627 plant samples, built genomic libraries for 1541, and reconstructed a large-scale Tree of Life for 640 BVI native species, a foundational tool for assessing evolutionary distinctiveness and conservation value. We have also developed high-resolution species distribution models for 653 native species and produced species richness maps that reveal biodiversity hotspots across the territory. In parallel, the project has achieved Red List assessments for 85% of the native flora, with 338 assessments published, 58 submitted, and many others in progress. These assessments offer the most complete picture yet of plant extinction risk in the BVI. Equally important is our investment in local capacity. Nine staff from the National Parks Trust of the Virgin Islands (NPTVI) have been trained in herbarium techniques, DNA sampling, and data collection. Their deep engagement is evidenced by their direct contribution to nearly half of all field collections. The outcomes of this work will directly guide ecological restoration and land-use planning in the BVI, and our methods are already attracting interest from conservation practitioners in Puerto Rico, the US Virgin Islands, and beyond. By the end of the project, the BVI will have a complete, accessible, and science-based framework for prioritising and protecting its native flora, an unprecedent achievement for a small-island biodiversity hotspot.

Annex 1: Report of progress and achievements against logframe for Financial Year 2024-2025

Project summary	Progress and Achievements April 2023 - March 2024	Actions required/planned for next period
Impact Plants and habitats of the BVI are better understood and conserved by using science-based management to increase their resilience to environmental change.	Progress towards a better understanding of BVI flora demonstrated by newly collected materials, including new records for BVI, and the Tree of Life of BVI flora reconstructed. NPTVI staff actively collecting local native flora and associated data, which will constitute the baseline for a future herbarium for the BVI.	
Outcome An integrated suite of biodiversity metrics is routinely implemented across the territory to mitigate against current and future threats.		
0.1 Curated collections and presence data enhanced to represent 100% of all known native plant species in BVI and stored as duplicates in Puerto Rico (MAPR) and UK (Kew) herbaria by YR3 Q4, from a baseline of 75% available in Y1.	Substantial progress has been made toward this target. The BVI native flora list has been updated from 650 to 773 species through new discoveries and taxonomic revisions. To date, 690 new herbarium and tissue samples have been collected through fieldwork in Y1 and Y2, complementing 533 DNA extractions from existing Kew collections. In total, 1,627 samples have been processed, and 1,541 have been successfully sequenced. Over 7,300 new presence points have been added to the UKOTs database, well beyond the targeted 30% increase.	
0.2 Three internationally recognized biodiversity metrics completed for approximately 650 BVI native angiosperms and publicly available by YR3, from a baseline of 5% available in Y1.	All three biodiversity metrics (species richness, extinction risk, and phylogenetic diversity) are either completed or in final stages of analysis. The Tree of Life now includes 640 native species, with 93% of the flora modelled through species distribution models. Red List assessments have been published for 338 species, submitted for 58, and drafted for an additional 132. Species richness maps have been produced, and preparation of data for calculating phylogenetic diversity and expected loss is underway. With these milestones, the project is on schedule to meet this outcome fully by Y3.	
0.3 BVI conservation stakeholders use the biodiversity metrics produced in this project to manage local biodiversity, to guide conservation, responding to local threats, and used to inform conservation action planning by Y3. [DPLUS-A03]	Foundational capacity building has been completed. Nine NPTVI staff, including Terrestrial Wardens, the Deputy Director, and the Director, have been trained in specimen collection and DNA sampling, directly contributing to nearly half of all collections. Training workshops and implementation activities are planned for Y3, and the project remains on track to meet this outcome as scheduled.	
Output 1 Biobank for the BVI flora established: tissue and DNA of all native plant species from the BVI secured in accessioned collections.		

Project summary	Progress and Achievements April 2023 - March 2024	Actions required/planned for next period
1.1 New tissue samples (with verified herbarium vouchers) collected during fieldwork for the ca. 150 previously non-collected plant species in BVI by YR2 Q4, from a baseline of 75% available in Y1. [DPLUS-C09]	Y2Q3: 118 samples were donated by MAPR Herbarium. Y2Q4: 59 samples were donated by Andrew Gnadiec (Cactaceae). 120 samples were collected from two US herbaria (funded by Bentham-Moxon to Freya Cornwell-Davison)	No further sampling planned.
1.2 DNA bank created for all plant native species (ca. 650) in the BVI by YR2 Q4, increasing the available DNAs ten times from a baseline in Y1 of 10% of species. [DPLUS-C09]	Y2Q1: 664 DNAs extracted from all samples collected in fieldwork. Y2Q2:118 DNAs extracted from samples received from MAPR herbarium. Y2Q3: Third fieldwork happened November 2024. 53 herbarium specimens with three duplicates and silica gel tissue collected Y2Q4: Activity 1.2. Completed	No further laboratory work planned.
1.3 Databasing completed for all newly collected materials by YR3 Q4 to achieve a full representation of all ca. 650 native plans in BVI. [DPLUS-C09]	Y2Q1: 664 DNAs extracted from all samples collected in fieldwork. Y2Q2: Herbarium samples being processed (identification, labels produced, data incorporated in the database). Y2Q3: DNA extracted and processed for all samples received from MAPR. Re-extraction of samples giving low sequencing quality in first round. Y2Q4: DNA extractions from fieldwork November 2024 and from US herbaria in progress. All DNA samples processed until Y2Q3 were submitted to Kew DNA and Tissue Bank	No further laboratory work planned.
1.4 Collect native plant species presence points to increase our current database by 30% by YR2 Q2, from a baseline of 10,000 points. [DPLUS-C09]	Y2Q1: Fieldwork planning underway for November 2024. On track. Y2Q2: Fieldwork planning underway for November 2024. On track. Y2Q3: 350 observations in fieldwork November 2024 Y2Q4: Activity 1.4. Completed	No further laboratory work planned.
Output 2. A complete BVI Plant Tree of Life and biodiversity metrics calculated.		
2.1 Generate DNA sequence data and complete the Tree of Life for all native plant species in BVI (ca. 650) by YR2 Q4, from a baseline of 36 species.	Y2Q1: 664 DNAs being processed in the lab in preparation to be sent for external company from sequencing by the end of summer. Introduction to bioinformatics training delivered to Adline, Smith's college intern student summer 2024. Y2Q2: 746 DNAs processed in the lab and sent for sequencing to an external company. Analysis planned for Q3 Y2. Y2Q3: Sequence data for the 746 received and processed. 1362 samples in the BVI phylogenetic tree with contains 583 species and 109 unidentified. Y2Q4: Sequence data for 96 samples received (CITES, MAPR and some repetitions). 83 additional samples sent for Sequencing (Cacti and some repetitions) Reidentification of samples using phylogenetic placement complete.	Incorporation of samples collected in US herbaria.

Project summary	Progress and Achievements April 2023 - March 2024	Actions required/planned for next period
2.2 Three biodiversity metrics calculated for the entire flora of the BVI: species richness, IUCN Red List assessments and phylogenetic diversity by YR3 Q2. [DPLUS-E03].	Y2Q1: New research assistant recruited. Training on Species distribution models delivered, and gathering the presence data required for this analysis. 336 assessments from BVI already on the IUCN Red List. Team working on 132 assessments. Two interns for two months each working on species conservation assessments ongoing as planned. Y2Q2: Assessment of presence points data availability for 716 species from our database and GBIF totalling 1,134,816 records. After cleaning, 702 species have more than 5 presence points across the Caribbean, and 650 species if we focus the analysis on the Puerto Rican Bank. 132 assessments drafted (28 done by interns and reviewed), 40 in prep. Y2Q3: SDMs have been run for 653 species (93% of the 707 species) and for the remaining using buffer points for those with less than 5 points. Preliminary analysis of species richness conducted. 172 species assessments drafted (52 now reviewed and submitted for publication). Y2Q4: Improvement of the environmental layers used to calculate the SDMs, increasing resolution to 30m pixel. Species richness layers elaborated. 338 assessments published on the IUCN Red List; 58 submitted to the Red List; 132 assessments done using predictive tools (LC tool); 133 waiting to be reviewed. 112 assessments remaining to be undertaken. In total, we have a Red List Categories for 85% of the BVI Flora. List of species having SDM and included in the phylogenetic tree in preparation.	Phylogenetic diversity calculation, preparation of scientific publications, preparation of layers for activities in Outputs 3 and 4.
Output 3: Capacity built for integrating biodiversity metrics into conservation management, action and decision-making, and public engagement		
3.1 In person training during Y1 fieldwork for tissue collection for DNA and herbarium.	Y2Q3: Reinforcing the training during November fieldwork, 8 NPTVI staff contributed to fieldwork (5M, 3F), and Elloise Budd (Kew) received training.	No further activities planned.

Project Summary	SMART Indicators	Means of Verification	Important Assumptions
Impact: (Max 30 words) Plants and habitats of the BVI are better understood and conserved by using science-based management to increase their resilience to environmental change.			
Outcome: (Max 30 words) An integrated suite of biodiversity metrics is routinely implemented across the territory to mitigate against current and future threats.	0.1 Curated collections and presence data enhanced to represent 100% of all known native plant species in BVI and stored as duplicates in Puerto Rico (MAPR) and UK (Kew) herbaria by YR3 Q4, from a baseline of 75% available in Y1. 0.2 Three internationally recognized biodiversity metrics completed for approximately 650 BVI native angiosperms and publicly available by YR3, from a baseline of 5% available in Y1. 0.3 BVI conservation stakeholders use the biodiversity metrics produced in this project to manage local biodiversity, to guide conservation, responding to local threats, and used to inform conservation action planning by Y3. [DPLUS-A03]	0.1 Database comprising BVI's specimens, tissue, and DNA collections at RBG Kew and supplemented with collections at regional herbaria (MAPR) for all ca. 650 native plant species in BVI. 0.2 Map layers containing biodiversity metrics incorporated as GIS layers into NPTVI databases, on the BVI National GIS and other regional stakeholders. 0.3 Published participant list and report for workshops, delivered for local stakeholders and regional partners. Change after training measured by the number of conservation plans developed by stakeholders using the biodiversity metrics. Assessment of gender inclusivity across workshops and outreach activities.	Kew and BVI GIS specialists remain committed to the project, IT equipment, software and infrastructure are fit for purpose at Kew and in BVI. Project partners able to get into the field to collect specimens. Project is not disrupted by major environmental events e.g., hurricanes, pandemics. Online resources are maintained during and beyond the life of the project.
Outputs: **1.** Biobank for the BVI flora established: tissue and DNA of all native plant species from the BVI secured in accessioned collections.	1.1 New tissue samples (with verified herbarium vouchers) collected during fieldwork for the ca. 150 previously non-collected plant	1.1 Tissue material collected for at least 150 species and published in fieldwork reports. Data included in Y2 annual report and open access	Kew staff are able to travel to the BVI to collect materials.

Project Summary	SMART Indicators	Means of Verification	Important Assumptions
	species in BVI by YR2 Q4, from a baseline of 75% available in Y1. [DPLUS-C09] 1.2 DNA bank created for all plant native species (ca. 650) in the BVI by YR2 Q4, increasing the available DNAs ten times from a baseline in Y1 of 10% of species. [DPLUS-C09] 1.3 Databasing completed for all newly collected materials by YR3 Q4 to achieve a full representation of all ca. 650 native plans in BVI. [DPLUS-C09] 1.4 Collect native plant species presence points to increase our current database by 30% by YR2 Q2, from a baseline of 10,000 points. [DPLUS-C09]	databases (dnabank.science.kew.org, brahmsonline.kew.org/ukot/). 1.2 Report with the results of DNA extractions in Y2 annual report. Accession numbers created in the DNA & Tissue Bank at Kew (dnabank.science.kew.org). 1.3 Herbarium vouchers data recorded and available in database (http://brahmsonline.kew.org/ukot/). Data shared with local partners. 1.4 UKOTs Species and Specimens Database (http://brahmsonline.kew.org/ukot/) updated with new presence points and reported in Y2 annual report.	Export and import (e.g., CITES) permits issued for all missing species. Being able to locate all the unstudied species. Kew remain committed to maintain and enhance their specimen databases and making these publicly available. Kew's UKOTs team retains capacity to be able to maintain the UKOTs Species and Specimens Database.
2. A complete BVI Plant Tree of Life and biodiversity metrics calculated.	2.1 Generate DNA sequence data and complete the Tree of Life for all native plant species in BVI (ca. 650) by YR2 Q4, from a baseline of 36 species.	2.1 DNA sequence data publicly available in SRA (https://www.ncbi.nlm.nih.gov/sra), and number of sequences produced in Y3 annual report. Phylogenetic analysis completed and a fully resolved phylogenetic tree for all native plants in BVI available. Data shared with Kew	DNA successfully extracted from problematic species (e.g., containing secondary metabolites, polysaccharides, etc.). The incorporation of new data and maintenance of the Kew Tree of Life Explorer continues at current levels.

Project Summary	SMART Indicators	Means of Verification	Important Assumptions
	2.2 Three biodiversity metrics calculated for the entire flora of the BVI: species richness, IUCN Red List assessments and phylogenetic diversity by YR3 Q2. [DPLUS-E03]	Tree of Life Explorer (https://treeoflife.kew.org/). 2.2 GIS layers available for BVI National GIS containing biodiversity metrics and inputs to generate them. Red List assessments completed, ready to be reviewed and submitted to the IUCN Red List of Threatened Species.	Sufficient presence points (10-15 per species) available from fieldwork activities and online resources (see methods) to adequately calculate species model distribution for each species.
3. Capacity built for integrating biodiversity metrics into conservation management, action and decision-making.	3.1 At least three NPTVI staff trained and actively collecting herbarium and tissue samples and associated data by YR1 Q4. [DPLUS-A01] 3.2 At least three NPTVI staff trained and step by step manuals produced for interpreting biodiversity metrics data and designing ecological	3.1 List of specimens collected by NPTVI staff included in Y2 annual report. Gender balance measured per fieldwork activity. 3.2 In person workshop conducted for interpretation of biodiversity metrics data. Knowledge change measured by	NPTVI retains trained staff.

Project Summary	SMART Indicators	Means of Verification	Important Assumptions
	restoration plans by YR3 Q4. [DPLUS-A01] 3.3 NPTVI Deputy Director trained to manage and update biodiversity metrics database and use it to design ecological restoration plans. [DPLUS-A01] 3.4 End of project workshop to integrate biodiversity metrics in conservation shared with wider stakeholders, including partners from other Caribbean islands (including overseas territories) by YR3 Q4. [DPLUS-A01]	pre- and post-questionnaire, and report of participation by gender. 3.3 Three GIS layers with biodiversity metrics incorporated in NPTVI´s workflow. NPTVI able to produce an ecological restoration plan independently at the end of the project as a result of in person and online support training. 3.4 Report produced assessing the attendance by gender and participation in workshops, inviting representatives from Anguilla, Bermuda, Puerto Rico, TCI, Cayman Islands and Montserrat. Report of a questionnaire on how to use our methods elsewhere.	
4. Biodiversity metrics used to direct conservation action in the face of current and future threats.	4.1 Identify areas with the highest and lowest biodiversity levels and with the highest proportion of threatened plants, per island (Anegada, Tortola, Virgin Gorda), for the 18 Tropical Important Plant Areas (TIPAs) and protected areas to inform conservation management by local stakeholders by YR3 Q2. [DPLUS-B11] [DPLUS-C08] 4.2 NPTVI use the biodiversity metrics generated to provide	4.1 Local stakeholders with access to newly generated map layers with all three biodiversity metrics (species richness, phylogenetic diversity and threatened species) per island, TIPA and protected area. 4.2 NPTVI give a presentation to the Development Planning Committee and the National GIS groups.	Kew staff are able to travel to the BVI to collect materials and new data. We have continued access to high-capacity computing at Kew and capacity to maintain databases. Biodiverse software is maintained. Evidence bases successfully established from outputs 1 and 2.

Project Summary	SMART Indicators	Means of Verification	Important Assumptions
	feedback on future land planning to at least four government departments (Town and Country Planning, Disaster Management and Agriculture and Fisheries Departments, and Environmental Ministry) by YR3 Q2. [DPLUS-A04] [DPLUS-A07] 4.3 At least three ecological restoration plans developed within National Parks using map layers containing biodiversity metrics to respond to biodiversity loss by YR3 Q4. [DPLUS-B01] 4.4 The 2025/26 annual work plan at the J.R. O'Neal Botanic Garden includes propagation of five species per island for ecological restoration that contribute the most to biodiversity. [DPLUS-B02] 4.5 Identification of key plant species to increase habitat resilience based on GIS analysis overlapping biodiversity metrics and ecosystem services data from DPLUS180 and forest resilience by	4.3 At least three ecological restoration plans available: Gorda Peak NP (illegal urbanisation and illegal agriculture), Great Tobago NP (invasive plants and feral goats), and Sandy Cay NP (hurricane impacted). Extract lists of key species from biodiversity metrics map layers to prioritise in ecological restoration produced. 4.4 Planning for 2026 Arbour Day propagation plant list incorporates the five species contributing the most to biodiversity per island. 4.5 At least three ecological restoration plans (lists with species suitable for ecological restoration) developed for areas where GIS layers overlap between this project, DPLUS180 and DPLUS084 layers.	BVI National GIS maintained by BVI Government. J. R. O'Neal Botanic Garden maintains capacity (facilities and staff) to grow native plants in the nursery.

Project Summary	SMART Indicators	Means of Verification	Important Assumptions
	DPLUS084 by YR3 Q4. [DPLUS-B02]		
5. Outreach activities to reinforce the importance of conserving native plant species.	5.1 Educational workshop for schools taken place at JRO'Neal Botanic Garden, on how to extract DNA from plants by YR3 Q4. 5.2 Produce educational animated tools and activities about the importance of safeguarding native biodiversity and growing native plants instead of exotic plant species by YR3 Q4.	5.1 At least three NPTVI staff trained to carry out an experiment with school children, on how to extract DNA from plants, gender balance reported. Demonstration delivered with at least one school group, and with community groups during the Arbour Day. Workshop materials made available for further use in the botanic garden outreach activities. 5.2 Educational animated cartoon to showcase the programme completed and shared on public channels in BVI (social media, local television, etc). Importance of growing native species in BVI the main theme of future Arbour Day activities. Participation report including gender balance attendance.	Kew staff are able to travel to the BVI for training and educational activities. Appropriate designer is selected to produce cartoon.

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. Each activity should start on a new line and be no more than approximately 25 words.)

1.1 Collect tissue material from all specimens available at Kew and extract DNA. Quantify the DNA obtained to assess if it is suitable for sequencing methods (see activities in Output 2).

1.2 Conduct fieldwork to collect plant material for ca. 150 native plant species not yet available at RBG Kew (Y1), and for any species not passing the DNA quality check in Activity 1.1 (Y2). Database all new herbarium and tissue samples.

1.3.1 Extract DNA from newly collected materials. Confirm appropriate amounts of DNA were extracted as expected from recently collected materials.

1.3.2 Database all DNAs and incorporate them in the DNA Bank and Tissue collection at RBG Kew.

1.4 Conduct fieldwork and carry out inventory lists of species in areas with low number of presence data, including areas that will be targeted for ecological restoration plans (Y1).

2.1.1 Process samples to generate genetic sequence data for all native plant species in BVI (ca. 650).

Project Summary	SMART Indicators	Means of Verification	Important Assumptions
2.1.2 Conduct bioinformatic analysis and reconstruct a phylogenetic tree including all native plant species in BVI. Share the data with our colleagues from the Tree of Life Explorer (https://treeoflife.kew.org/). 2.2.1 Run species distribution models for all native plant species in BVI. 2.2.2 Generate a map layer with estimates of species richness using the output from 2.3.1 2.2.3 Conduct conservation assessments and write a full Red List for all native angiosperms in BVI. 2.2.4 Integrate all data in the Biodiverse software to calculate phylogenetic diversity and expected loss of Phylogenetic Diversity across the territory. 3.1 In-person training during Y1 fieldwork for tissue collection for DNA and herbarium. 3.2 In-person workshop with BVI staff for understanding biodiversity metrics use and interpretation of results. 3.3 In-person and online follow-up sessions in Y3 to train NPTVI staff responsible of conservation management decisions (Deputy Director) on using biodiversity metrics. 3.4 Organize an online workshop inviting colleagues and stakeholders from neighbouring islands. Report preparation to assess the attendance by gender and participation in workshops. 4.1 GIS analysis to prepare maps with biodiversity metrics, and lists of species, split by island, Tropical Important Plant Area (TIPA) and protected area. 4.2 Presentation preparation by NPTVI Deputy Director for explaining to different government departments about using biodiversity metrics in development planning. 4.3.1 List inventories prepared for three sites withing National Parks targets. 4.3.2 Species richness and threatened species lists within these areas extracted from the main database. 4.3.3 Analysis of biodiversity metrics to produce a list of key species for ecological restoration for Gorda Peak National Park (NP), Great Tobago NP, and Sandy Cay NP; and others if identified by NPTVI. 4.4 Extract lists of species per island with those contributing more to biodiversity. Share these data with NPTVI for integration in the 2025/26 annual work plan for growing plants. 4.5.1 GIS analysis overlapping habitat resilience to climate change from DPLUS180 and to extreme weather events from DPLUS084 with the biodiversity metrics herein developed. 4.5.2 Produce a list of key species per habitat in the context of climate change and their contributions to biodiversity. 5.1.1 Preparation of report explaining step by step the practical for DNA extraction. 5.1.2 Demonstration with NPTVI staff and training session. Demonstration with school group at J.R. O'Neal Botanic Garden. 5.2 Script and story preparation for educational animated cartoon. Production of the cartoons.			

Table 1 Project Standard Indicators

Please see the Standard Indicator guidance for more information on how to report in this section, including appropriate disaggregation.

Standard indicator code	Standard indicator description	Original indicator in project	Units	Disaggregation	Y1	Y2	Y3	Total	Total planned
Group A: Capability and Capacity									
DPLUS-A01	Number of people from key national and local stakeholders completing structured and relevant training.	3.1 At least three NPTVI staff trained and actively collecting herbarium and tissue samples and associated data by YR1 Q4. 3.2 At least three NPTVI staff trained and step by step manuals produced for interpreting biodiversity metrics data and designing ecological restoration plans by YR3 Q4. 3.3 NPTVI Deputy Director trained to manage and update biodiversity metrics database and use it to design ecological restoration plans. 3.4 End of project workshop to integrate biodiversity metrics in conservation shared with wider stakeholders, including partners from other Caribbean islands (including overseas territories) by YR3 Q4.	People Proportion	Gender (female/male) Age Group; Stakeholder group: Local Communities, Nationals, public sector, civil society, private sector; Training typology (biodiversity, sustainable development, finance, programme management, safeguarding, gender etc.) Proportion of trained people employed by their host organisation at the end of the project.	4/5 NA NA NA	Same as Y1 NA NA NA		9 NA NA NA	3 3 1 TBD
DPLUS-A03	Number of local/national organisations with improved capability and capacity as a result of project.	0.3 BVI conservation stakeholders use biodiversity metrics to respond to different threats, directing their	Number of organisations	Organisation type	NA	NA		NA	1

		conservation action planning by Y3.							
DPLUS-A04	Number of people reporting that they are applying new capabilities (skills and knowledge) 6 (or more) months after training.	4.2 NPTVI provide feedback on future planning based on biodiversity metrics to at least three government departments (Town and Country Planning, Disaster Management and Agriculture and Fisheries Departments).	People	Gender; Age Group; Stakeholder group: Local Communities, Nationals, public sector, civil society, private sector; Training typology (biodiversity, sustainable development, finance, programme management, safeguarding, gender etc.).	NA	NA		NA	3
DPLUS-A07	Number of government institutions/departments with enhanced awareness and understanding of biodiversity and associated local community issues	Same as above: 4.2	Government institutions	Govt. Organisation Type (local, national, treasury, planning, environmental, agricultural, forestry)	NA	NA		NA	3
DPLUS -B01	Number of new/improved habitat management plans available and endorsed.	4.3 At least three ecological restoration plans developed within National Parks using map layers containing biodiversity metrics to respond to biodiversity loss by YR3 Q4.	Number	Languages (local/other); Biome/Ecosystem/Habitat; Typology of habitat management plans.	NA	NA		NA	3

DPLUS -B02	Number of new/improved species management plans available and endorsed	4.4 The 2025/26 annual work plan at the J.R. O'Neal Botanic Garden includes propagation of five species per island for ecological restoration that contribute the most to biodiversity. 4.5 Identification of key plant species to increase habitat resilience based on GIS analysis overlapping biodiversity metrics and ecosystem services data from DPLUS180 and forest resilience by DPLUS084 by YR3 Q4.	Number	Languages (local/other); Typology of species management plans; (Harvest, Trade, Invasive species management, recovery, reintroduction, ex-situ).	NA NA	NA NA		NA NA	3 TBD
DPLUS-B11	Area identified as important for biodiversity	4.1 Identify areas with the highest and lowest biodiversity levels and with the highest proportion of threatened plants, per island, Tropical Important Plant Area (TIPA) and protected areas to inform conservation management by local stakeholders by YR3 Q2.	Area (hectare)	Biome/Ecosystem/Habitat.	NA	NA		NA	TBD
Group C: Evidence and Best Practices									
DPLUS-C08	Areas of importance for biodiversity identified	Repeated, same as 4.1	Area (hectare)	Identified/Protected/Identified and Protected; Types/schemes: Key Biodiversity Areas (Important Bird and Biodiversity Areas, Important Plant Areas, Alliance for Zero Extinction sites), High Conservation Value	NA	NA		NA	TBD

				Areas, Vulnerable Marine Ecosystem, etc.					
DPLUS-C09	Species reference collections made (known to science, new to science).	1.1 New tissue samples (with verified herbarium vouchers) collected during fieldwork for the ca. 150 previously non-collected plant species in BVI by YR2 Q4, from a baseline of 75% available in Y1.	Number	Taxa (Flora/Fauna/Fungi)	690	53		743	150
		1.2 DNA bank created for all plant native species (ca. 650) in the BVI by YR2 Q4, increasing the available DNAs ten times from a baseline in Y1 of 10% of species.			533	928		1461	650
		1.3 Databasing completed for all newly collected materials by YR3 Q4 to achieve a full representation of all ca. 650 native plans in BVI.			690	53		743	At least 650
		1.4 Collect native plant species presence points to increase our current database by 30% by YR2 Q2, from a baseline of 10,000 points.			6941	350		7291	3000
Group D: Sustainable Benefits to People, Biodiversity and Climate									
Group E: Impact on Biodiversity and People									
DPLUS-E03	Status of Threatened Species (DEFRA KPI)	2.2 Three biodiversity metrics calculated for the entire flora of the BVI: species richness, IUCN Red List assessments and phylogenetic diversity by YR3 Q2.	tbc	Taxa, Biome/Ecosystem/Habitat, Treats reduced	NA	1		1	3

Table 2 Publications

Title	Type (e.g. journals, best practice manual, blog post, online videos, podcasts, CDs)	Detail (authors, year)	Gender of Lead Author	Nationality of Lead Author	Publishers (name, city)	Available from (e.g. weblink or publisher if not available online)
Plant diversity in the British Virgin Islands, linking the past with the present	Blog	Freya Cornwell-Davison 2025	Female	UK	Kew website, Richmond, UK	https://www.kew.org/read-and-watch/british-virgin-islands-biodiversity
How do herbarium specimens help save plants from extinction?	Blog	Paul Figg, Juan Viruel 2024	Male	UK	Kew website, Richmond, UK	https://www.kew.org/read-and-watch/saving-plants-with-herbarium-specimens

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, scheme, 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 BCF-Reports@niras.com putting the project number in the Subject line.	X
Is your report more than 10MB? If so, please consider the best way to submit. One zipped file, or a download option, is recommended. We can work with most online options and will be in touch if we have a problem accessing material. If unsure, please discuss with BCF-Reports@niras.com 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
Have you provided an updated risk register? If you have an existing risk register you should provide an updated version alongside your report. If your project was funded prior to this being a requirement, you are encourage to develop a risk register.	X
If you are submitting photos for publicity purposes, do these meet the outlined requirements (see section 15)?	
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.	