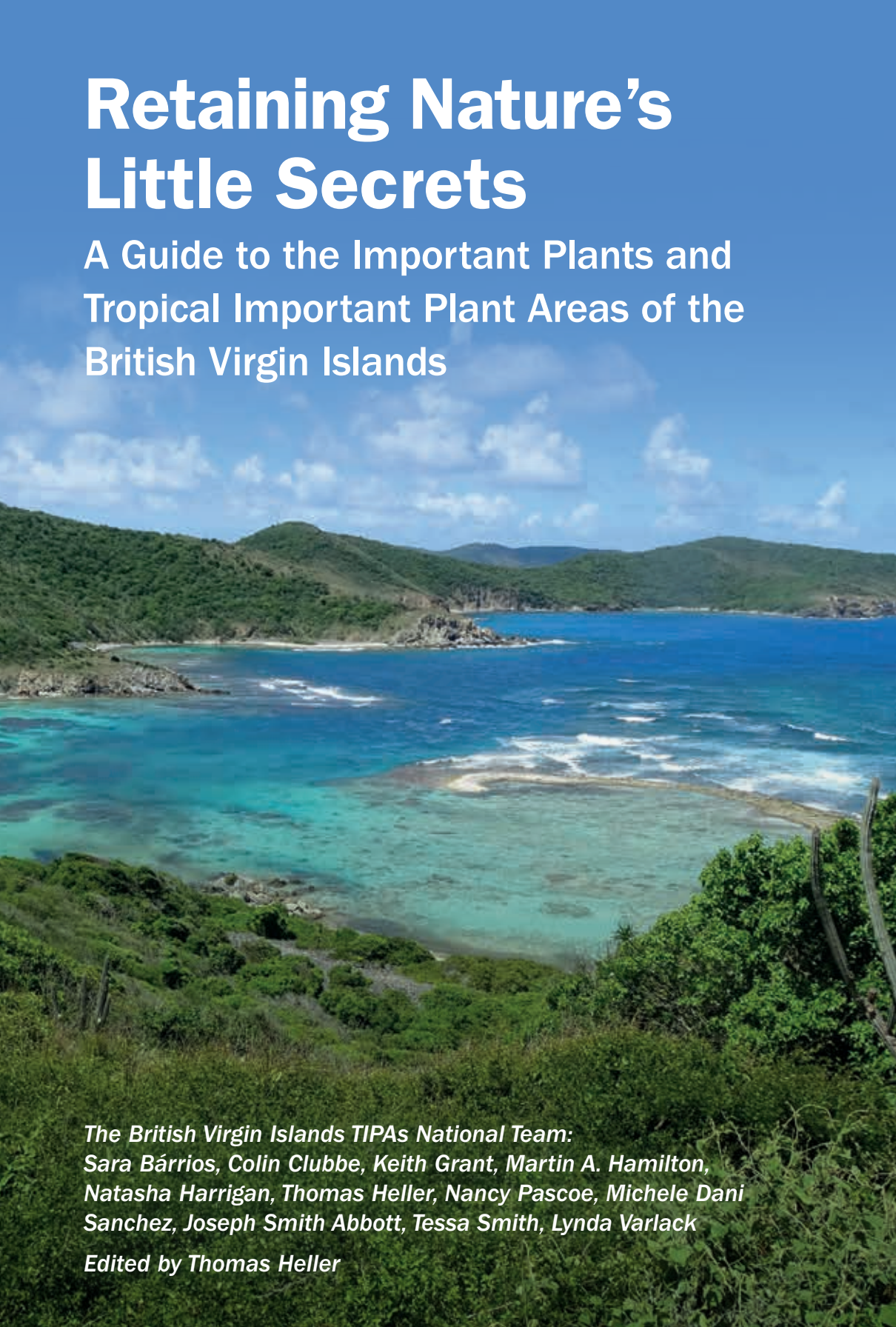
Retaining Nature's Little Secrets

A Guide to the Important Plants and Tropical Important Plant Areas of the British Virgin Islands



The British Virgin Islands TIPAs National Team:
Sara Bárrios, Colin Clubbe, Keith Grant, Martin A. Hamilton, Natasha Harrigan, Thomas Heller, Nancy Pascoe, Michele Dani Sanchez, Joseph Smith Abbott, Tessa Smith, Lynda Varlack

Edited by Thomas Heller

Network of TIPAs of the BVI

1. Great Tobago Island
2. Northeastern Jost van Dyke
3. Great Thatch Island
4. Mount Sage
5. Tortola North Shore
6. Norman Island
7. Guana Island
8. Hawks Nest
9. Sabbath Hill
10. Paraquita Bay and Bar Bay
11. Northern Great Camanoe
12. Eastern Scrub Island
13. Beef Island and the Channel

See inside back cover for the rest of the map.

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The British Virgin Islands TIPAs National Team: Sara Bárrios[1], Colin Clubbe[1], Keith Grant[2], Martin A. Hamilton[1], Natasha Harrigan[2], Thomas Heller[1], Nancy Pascoe[2], Michele Dani Sanchez[1], Joseph Smith Abbott[3], Tessa Smith[3], Lynda Varlack[2]

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Kew's mission is to be the global resource in plant and fungal knowledge, and the world's leading botanic garden.

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The National Parks Trust of the Virgin Islands (NPTVI) is a statutory body under the Ministry of Natural Resources and Labour, established in 1961. NPTVI currently manages 21 national parks and one marine park. The NPTVI mission is to preserve and manage designated natural and cultural areas in order to improve the quality of life in the British Virgin Islands.

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Royal Botanic Gardens, Kew (herbarium specimen image): *Parkinsonia aculeata*, br.

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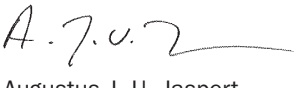
FOREWORD

The Important Plants and Tropical Important Plant Areas guide is a fantastic scientific work which will help many of us realise the rich diversity and importance of the Virgin Islands. This invaluable tool aims to inspire Virgin Islanders to become active in preserving our most important resources. It is incredible to learn that Anegada has species that are nowhere else in the world, which highlights how our natural flora should be celebrated and protected.

We all have a part to play, and excellent resources such as this guide help everyone to remain educated through clear photography, illustrations and clear information on the important plants and TIPAs location and biodiversity. Developing a clear understanding of the value of our native species allows all of us to make more informed decisions from landscapers and developers to our back gardens. The (J.R. O'Neal) Botanical Gardens showcase these rare species in plant collections, and anyone can view or even purchase seedlings encouraging our community to foster this natural environment. The many islands of the BVI have a unique array of tropical species that are not found in such abundance in many other Caribbean islands due to development, we have protected ours and need to keep doing so.

Researchers from the National Parks Trust and the Royal Botanic Gardens, Kew have spent many years working on creating this resource and identifying 18 areas across the archipelago which fit strict criteria. The value of important plant areas is characterised by their global importance for threatened native plants, their botanical richness and/or if the area is important for a natural habitat that is nationally threatened. These tenacious species show scientific value through their resilience which is developed over generations of adaption to the local conditions.

I sincerely hope you enjoy this journey through the rich natural landscape of rare and essential species in 'Retaining Nature's Little Secrets – A Guide to the Important Plants and Tropical Important Plant Areas of the British Virgin Islands'.



Augustus J. U. Jaspert
HM Governor

← **Gorda Peak National Park, Virgin Gorda** (M.D. Sanchez)

INTRODUCTION

Introduction to the British Virgin Islands

The British Virgin Islands (BVI) are popular with visitors for their beaches, sailing and diving sites, but behind the strapline 'Nature's Little Secrets' there is much more to the natural world in these islands to be appreciated and explored.

In the north-eastern part of the Caribbean Sea, the BVI is located about 96 km east of Puerto Rico and is a UK Overseas Territory (UKOT). The country has more than 50 rocks, keys and islands (16 inhabited) with a total area of about 153 km^2. The largest island is Tortola, where most of the population live, followed by Anegada, Virgin Gorda and Jost Van Dyke.

The climate is predominantly maritime and tropical, warm all year round and influenced by easterly trade winds. The wettest period from September to November coincides with the end of the hurricane season and the driest months are from January to April. Topographically, the islands are varied: most are of volcanic origin and their highest peak is Sage Mountain on Tortola, reaching 543 metres; in contrast, the island of Anegada is a flat coral limestone island reaching only 8 metres above sea level. The vegetation is mainly influenced by the landscape, wind exposure and water resources, varying from coastal shrubland to upland evergreen forests, mangroves and salt flats.

View across Cane Garden Bay, Tortola (M.A.Hamilton)

← **Scrub Island** (M.A. Hamilton)

Botanical importance of the BVI

Biodiversity hotspots are regions identified for having a great concentration of species found nowhere else ('endemic') and high rates of habitat loss; currently 35 are recognised across the world. The BVI is part of the Caribbean Islands biodiversity hotspot. The Caribbean flora has 13,000 plant species with half of these endemic to the region. In addition, this hotspot has lost many of its lowland habitats, particularly seasonally dry forests, due to past colonial agricultural practices. Despite these losses and subsequent modification, conversion and fragmentation, dry forests and shrubland are still the dominant vegetation across most of the Virgin Islands archipelago and new records of species are still being reported by botanists.

The BVI, together with the US Virgin Islands and Puerto Rico, form the Puerto Rican Bank Floristic Province. Almost all these islands used to form a single land mass during the low sea levels of the last Ice Age (also known as Last Glacial Maximum), which reached 120 metres below the sea levels of today. This explains the similarities in the plant life among the islands, with many of the BVI's threatened plant species found only within the Puerto Rican Bank. There are, to date, 911 plant species recorded for the BVI (not including ferns and other non-seed-bearing plants): 648 species considered native to the islands, and 263 exotic, owing their presence here to human activity. We currently know four species endemic to the BVI: poke-me-boy (*Vachellia anegadensis*), wire wist (*Metastelma anegadense*), Jarecki's pitcairnia (*Pitcairnia jareckii*) and *Senna polyphylla* var. *neglecta*.

Conservation issues

The Puerto Rican Bank has seen dramatic changes in its vegetation during the colonial era and continuing to the present day, with nowhere completely escaping the impact of human activity. The future of what remains of the BVI's natural heritage is uncertain. For those habitats and species already confined to small areas of the islands, extinction is a real risk if the threats are not recognised and managed. The main current threats to the BVI's native flora are explored below.

Agriculture

The native flora and habitats in the BVI were hugely impacted by clearing of land and intensive agriculture practiced during the European colonisation period in the 18th and 19th centuries. With the subsequent abandonment of many of the BVI's plantations, forests have regrown in many areas, although studies in Puerto Rico have shown that even after decades of recovery, the forests are still impaired in terms of numbers of endemic species, dominance of non-native species and altered soil structure. Today agriculture accounts for a small proportion of the islands' economy, though clearing for subsistence farming can still present a threat to key sites in the BVI.

Sage Mountain National Park, →
Tortola (M.A.Hamilton)


TO CENTRAL TRAIL

Invasive plants

The issue of invasive plants is a growing one, with far-reaching impacts. 263 exotic species have been recorded from the islands, several of them showing clear tendencies to spread uncontrollably and become invasive, with negative consequences for native biodiversity as well as the local economy. A thriving international trade in exotic plants for landscaping means new introductions are expected to arrive in the islands. Robust quarantine of plants coming into the BVI is essential and vastly more economical than tackling invasive plants once they are established. The subject is explored in more detail, with examples of some of the worst invasive non-native plants in the BVI, in the final chapter of this guide.

Pests and Diseases

The pests and diseases impacting native plants are varied, ranging from insects and other invertebrates, to microorganisms such as fungi, viruses and bacteria. The routes by which new pests and diseases arrive in the islands are similar to many invasive non-native plant species: as hitch-hikers on plants imported for landscaping or agriculture, or with other imported goods. Likewise, while not all pests become invasive, the ones that do are difficult to control and nearly impossible to eradicate. Islands are more vulnerable to the impact of invasive pest species as plant populations are usually smaller than on larger landmasses, many lack effective defence mechanisms due to their evolutionary history, and predators that can control pest numbers are often absent.

Puerto Rican Bank century plant (*Agave missionum*) showing the onset of rot caused by an infestation of Agave snout weevil (*Scyphophorus acupunctatus*) (M.A.Hamilton)

Pickly-web cactus (*Leptocereus quadricostatus*) with a heavy infestation of *Harrisia* cactus mealybug (*Hypogeococcus pungens*) in Puerto Rico (M.A.Hamilton)

For example, in the Virgin Islands, populations of the Puerto Rican Bank century plant (*Agave missionum*) have been decimated by the non-native invasive *Agave* snout weevil (*Scyphophorus acupunctatus*) in the past two decades. Adult weevils bore into the centre of mature plants to lay their eggs, causing damage which is soon exacerbated by bacterial rot attacking the leaf bases. When the weevil eggs hatch, the larvae will continue to spread the damage as they eat their way through the carbohydrate-rich tissue. As the Puerto Rican Bank century plant has not had a long history of exposure to this insect pest, it quickly succumbs to infestations and dies as the rot spreads. As a result, the Puerto Rican Bank century plant is disappearing across the Virgin Islands.

A new pest of concern in Puerto Rico is the *Harrisia* cactus mealybug (*Hypogeococcus pungens*) which is attacking plants of the cactus family (Cactaceae), resulting in deformation of the stem and ultimately, with heavy infestations, in the death of the plant. Already it is causing great harm to the cacti of the Guánica Forest Reserve in the south west of Puerto Rico; should it spread to the BVI it could have disastrous consequences for the survival of the native cacti of the islands. It has been reported that this pest has been attacking the Endangered prickly-web cactus (*Leptocereus quadricostatus*) in Puerto Rico. In the BVI, this cactus is found only in two places on Anegada, and so the arrival of the *Harrisia* cactus mealybug could result in the global extinction of this species.

Expert entomologist Dr Chris Malumphy (Fera Science Ltd, UK) observed and reported more than 40 insect plant pests during a visit to the BVI in 2017, seven of these presenting a significant threat to wild plant species and six serious pests of important crop plants. This highlights the need for vigilance and quarantine measures to avoid future biodiversity and economic loss in the region.

Feral ungulates

The introduction of feral cattle, donkeys and goats (referred to under the umbrella term 'ungulates') to many of the islands has had a severe impact especially on the dry forests of the region. The vegetation of the Caribbean has developed over millions of years in the absence of such animals, and so is not adapted to cope with grazing pressure of this kind. Free-roaming animals reduce existing ground cover by feeding on native plants and their seedlings, exposing the soil and contributing to erosion and the spread of invasive plant species' seeds.

The severe impact feral animals can have on the native vegetation in the BVI has been observed in Prickly Pear National Park and Great Tobago National Park. In both locations, the uncontrolled feral goats have resulted in reduced plant diversity, limited forest undergrowth and poor regeneration of native plants. Coinciding with feral animal control across the two islands by the National Parks Trust of the Virgin Islands (NPTVI), a monitoring programme has been set up to evaluate vegetation recovery.

Free-roaming livestock can cause great damage to natural vegetation (M.A.Hamilton)

Road Town has seen extensive expansion in recent decades, especially along the coastline. (M.A. Hamilton)

Urbanisation: infrastructure and tourism

Urbanisation, road development and land clearing are all major drivers of habitat loss, reducing the populations of native animals and plants and could ultimately cause their extinction. Such disturbance also helps to accelerate the spread of invasive non-native plants, pests and diseases, as well as exacerbate the problem of soil erosion.

In the BVI, like many other Caribbean islands, a large proportion of the population inhabits coastal areas which increases pressure on the habitats found there. The island of Tortola alone has suffered the loss of 84% of its salt ponds for coastal development and many of the mangrove systems previously identified as critically important are now partially or fully filled. These habitats are very important to those living close to the coast as they are very effective means of protection from the impacts of storms and coastal erosion. This is especially important in the face of existing predictions forecasting that the population in the Caribbean region will double by 2050.

Climate change

One of the major challenges for small islands is future sea level rise predicted with climate change. The Intergovernmental Panel on Climate Change (IPCC) report in 2013 forecast a rise in sea levels of between 0.28 and 0.98 m by 2100 depending on a range of scenarios. Such levels could cause flooding of low-lying coastal areas and subsequent displacement of millions of people in the Caribbean, Pacific Ocean and Indian Ocean. The Caribbean is particularly vulnerable, with 63 islands expected to be entirely submerged with a 1 m increase in sea level. In the Puerto Rican Bank, endemic plants which grow at lower altitudes could be especially at risk from rising sea levels, such as *Varronia rupicola* and other threatened plants found on Anegada. The displacement of human populations away from the coast would also have an impact on vegetation and biodiversity inland.

Additionally, intense droughts, an increase in heavy precipitation events and higher wind speeds in tropical cyclones are likely to occur with a global temperature rise in the future. While any one of these changes by themselves will have impacts on the extent and composition of the forests and other habitats, in combination, the effects become much more difficult to predict.

Prickly Pear National Park is one of 21 National Parks across the British Virgin Islands (M.A. Hamilton)

Site protection and environmental legislation

Conservation and protection of the natural environment in the BVI have been included in the BVI Environmental Legislation since 1941 through several ordinances and acts (see Appendix 4). Many National Parks have been declared since 1964 (see Appendix 5). The UK's commitment to the international Convention on Biological Diversity (CBD) extends to the BVI. A requirement of the CBD is to develop a national strategy for the conservation and sustainable use of biodiversity. Likewise, the Ramsar Convention, which works for the conservation and sustainable use of wetlands globally, is extended to the BVI through the UK's ratification. In 2001, the BVI and UK Governments agreed an Environment Charter for the BVI, laying out the principles against which both parties have responsibility to protect the environment.

The BVI Protected Areas System Plan 2007-2017 lists as some of its main goals: to preserve important populations of indigenous and endangered flora and fauna, protect unique threatened ecosystems, and protect important natural areas for the local flora and fauna.

Currently there are 21 terrestrial National Parks across the BVI, with additional protected areas proposed. These include forest habitats, as well as several mangrove forests and salt ponds. However, the Protected Areas System Plan leaves the majority of the native flora under-represented, with fauna and marine diversity somewhat better protected. This is due in large part to gaps in botanical survey coverage and available data, a deficiency which also limits the effectiveness of evaluating development proposals and other land use changes that impact on biodiversity.

Tropical Important Plant Areas (TIPAs)

To address this important gap in our knowledge of the distribution and status of plant life across the BVI, NPTVI in collaboration with Kew, has been conducting extensive botanical surveys across the islands. Over a period of nearly two decades, a large body of data has been assembled, providing valuable insights into the diversity and distribution of plants, and identifying many threats that are putting these species at risk.

One output that these data are being used for is undertaking conservation assessments of extinction risk using the criteria of the IUCN's Red List of Threatened Species. This topic is described in more detail in the next chapter.

The IUCN Red List of Threatened Species is an invaluable tool to inform conservation action. A parallel site-based programme has also been underway in the BVI. The Tropical Important Plant Areas (TIPAs) project applies all the available data on the BVI's flora to identify those areas of the territory that support globally important concentrations of plants and habitats under threat, developing a network of TIPAs in the BVI using scientifically sound and verifiable criteria. These are not legal site designations; rather they are a means of identifying and communicating the importance of a national or regional network of key sites for wild plants and habitats that together can help to conserve global plant diversity.

Three different criteria are used to assess potential TIPAs in the BVI*: A) the presence of globally important populations of threatened species; B) an exceptional diversity of native plant species, particularly those of conservation or cultural importance; C) the largest and most intact areas of threatened or extremely restricted habitats. To qualify as a TIPA, the site must meet one or more of these criteria according to defined thresholds.

As an illustration, the first TIPA identified in the BVI, indeed in the whole of the tropics, is the island of Anegada. Under criterion A, it is home to (often considerably) more than 1% of the global populations of several different threatened plants: *Senna polyphylla* var. *neglecta*, *Metastelma anegadense*, *Vachellia anegadensis*, and *Varronia rupicola*, as well as more than 5% of the national population of several other threatened species. Each of these species is described in more detail in the next chapter. Meanwhile, under criterion B, Anegada is home to 14 of the species identified as being of conservation importance. As well as globally threatened species, these include the orchids *Psychilis macconnelliae* and *Tolumnia prionochila*, among other important plants. Under criterion C, Anegada is among the best sites in the BVI for mangroves, coastal shrubland and dry salt flats, all three of which are threatened habitats in the archipelago.

Anegada is the first of a network of Tropical Important Plant Areas to be identified in the BVI for its exceptional plant life. (M.D. Sanchez)

← **Plant surveying involves collecting data,photos, and samples of plants.** (M.A. Hamilton)

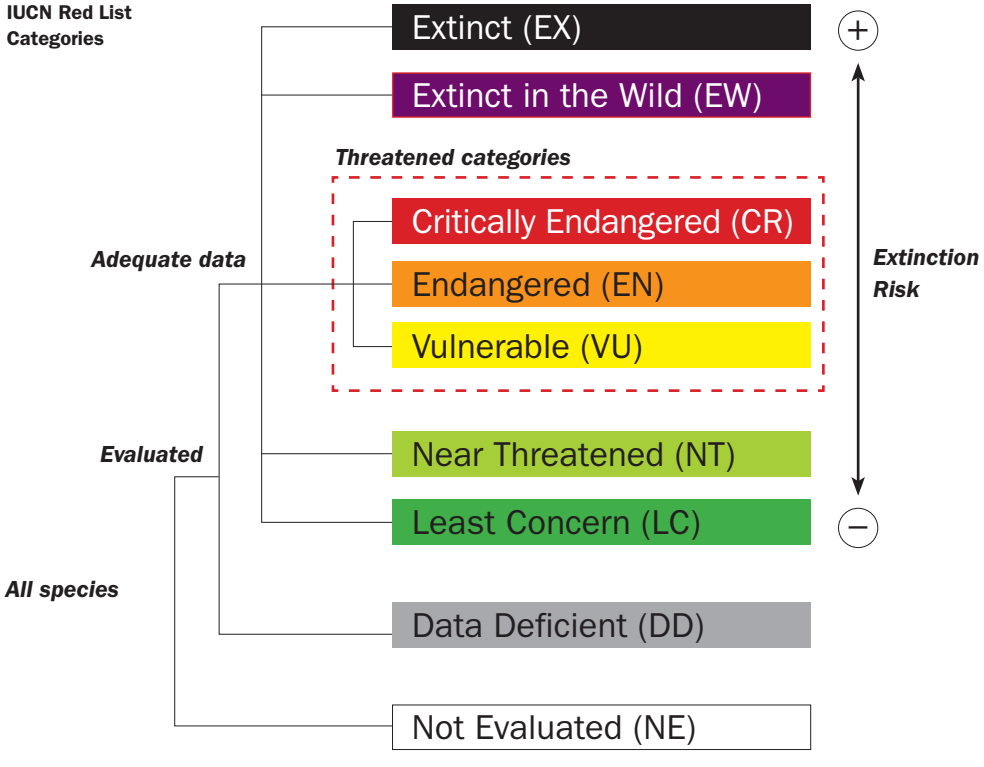
* As per Darbyshire, I. *et al.* (2017) 'Important Plant Areas: Revised selection criteria for a global approach to plant conservation', *Biodiversity and Conservation*, pp. 1–43. doi: 10.1007/s10531-017-1336-6.

IUCN Red List assessments

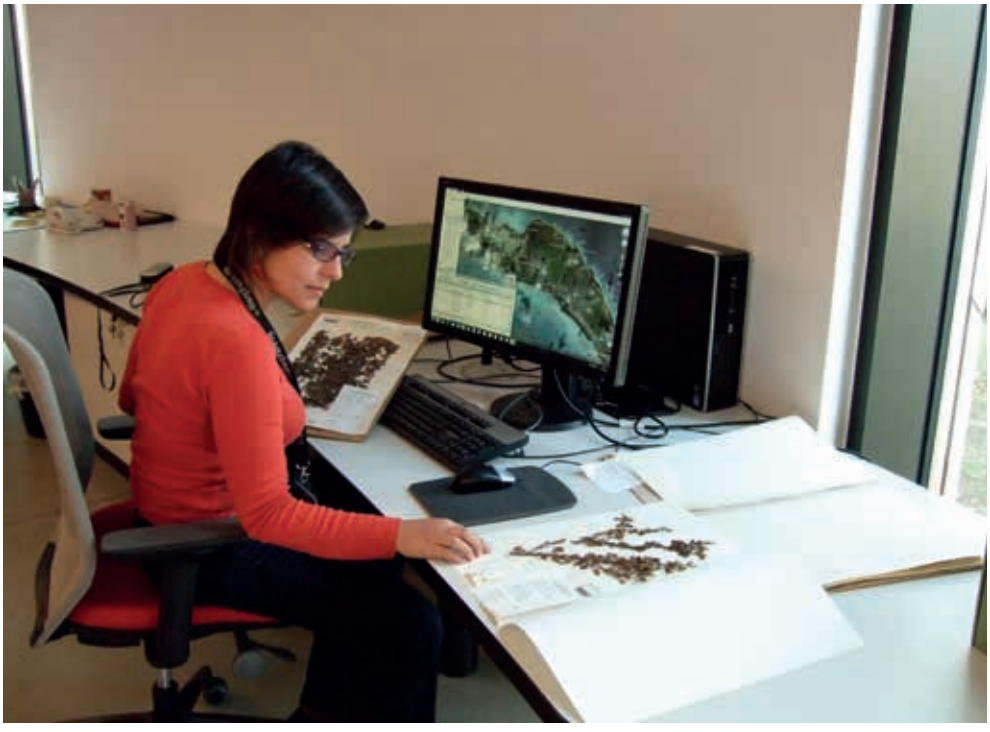
To effectively direct conservation efforts it is important that practitioners can objectively identify those organisms which require action most urgently. To address this need, the International Union for Conservation of Nature (IUCN) developed the Red List of Threatened Species, which provides a scientific methodology for evaluating the risk of extinction for species and raising awareness of those most threatened.

While all the world's known mammals and birds have had their extinction risk evaluated for the IUCN Red List, many other groups of organisms, including insects, plants and fungi, have only had a small proportion of their species assessed. To help remedy this situation, botanists at Kew have been compiling data on plants from around the world, including the BVI, and undertaking assessments with local partners and international experts.

For the plants of the BVI, Kew has assessed all plant species endemic to the BVI, plus those native to the BVI but with a very narrow distribution, which may include the US Virgin Islands (USVI), Puerto Rico, Dominican Republic, Haiti or the Lesser Antilles.



← **Josiah's Bay, Tortola** (M.A. Hamilton)



Undertaking conservation assessments for the IUCN Red List of Threatened Species involves a synthesis of data gathered in the field with a desk-based Geographic Information System (GIS). (P.Griggs)

Detailed information on geographic distribution, population size and trends, habitat, ecology, use and trade, threats and conservation measures are assembled for each species. Sources of such information include Kew's herbarium (a library of over 7 million dried and pressed plant samples), plant records from various online databases (mostly of other herbaria or natural history institutions) and field data. Published and unpublished literature, national Red Lists, reports and expert knowledge are all important additional sources of information.

Those data are then applied to one or more of five IUCN Red List criteria* that focus on: population size reduction over time (Criterion A), restricted geographical range (Criterion B), small population size and decline (Criterion C), very small or restricted population (Criterion D) and quantitative analysis giving a probability of extinction (Criterion E). Depending on which criteria thresholds are met, species are assigned to one of eight Red List categories: Extinct (EX), Extinct in the Wild (EW), Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT), Least Concern (LC) and Data Deficient (DD).

* IUCN Standards and Petitions Subcommittee (2017) *Guidelines for using the IUCN Red List Categories and Criteria. Version 13*. Prepared by the Standards and Petitions Subcommittee. Available at: http://www.iucnredlist.org/documents/RedListGuidelines.pdf.

Completed assessments are reviewed by a specialist with knowledge of the region or plants concerned, to ensure that the evaluations are robust and consistently applied. Finally, the reviewed assessments are submitted for publication on the IUCN Red List website (www.iucnredlist.org).

Understanding the species accounts

This guide includes the 25 native species that have been assessed and fall under a threatened category (VU, EN or CR). Most of these have very narrow ranges, often found only in the Virgin Islands archipelago or the Puerto Rican Bank. Three species, satinwood (*Zanthoxylum flavum*), lignum vitae (*Guaiacum officinale*), and Spanish cedar (*Cedrela odorata*) are rather more widely distributed but have had such a history of overexploitation for their timber that they are now under threat across their ranges.

Ten other species are included in this chapter because of their local importance. These are plants that, while not being placed in an IUCN threatened category (i.e. NT or LC), are nevertheless considered to be species of conservation importance because of their narrow range (less than 10,000km^2). Two species are naturally occurring hybrids, which are not included on the IUCN Red List, but would qualify under a threatened category when the same criteria are applied to them.

View towards St John from Great Thatch (S. Bárrios)

The species accounts for the threatened plants are in alphabetical order by family name, followed by species name, and laid out to a standard format.

Scientific name. Based on Latin and Latin grammar, the scientific name may also incorporate words from classical Greek, as well as the names of people or places being commemorated. While often felt to be difficult to understand or pronounce, the scientific name is the only name that is widely recognised internationally.

Local name. Wherever possible, the name used in the BVI is given. In some cases, there is no known local name, often because the plant is unfamiliar to many people in the islands. In these cases, the English name from another source is given, such as the United States Department of Agriculture Plants database (https://plants.usda.gov), which covers plants found in the US Virgin Islands and Puerto Rico. While often easier to remember for those not used to scientific plant names, they are sometimes used inconsistently, with the same name frequently applied to different species. In these cases, no common name is provided.

Family name. All plants are grouped into families, along with others closely related on the Tree of Life. The scientific family name is given, along with an English equivalent. As with the local plant name, the English name is less precise in the way it is used but it may help to convey what other familiar plants are closely related.

Description. This is a short paragraph outlining some of the important features of the plant that will help with recognising it in the field. It starts with the overall habit of the plant, followed by a description of the leaves, flowers and fruits.

Habitat. This lists the types of vegetation the plant tends to be found in within the BVI. For a more detailed explanation of these habitat types, see the Habitats chapter of this guide.

Global distribution. This lists the other countries or regions the species has also been recorded as naturally occurring.

Recorded in the BVI. This lists which of the islands in the BVI the species has been recorded as naturally occurring. As recent fieldwork has demonstrated, our knowledge of plant distributions in the BVI is incomplete, with new populations of threatened plants sure to be discovered in the future.

Threats. Details of any factors which place the species under threat of extinction.

Conservation. Details of measures taken to conserve the species, such as in legally protected areas, or in *ex-situ* collections at the J.R. O'Neal Botanic Garden (JR O'Neal BG) on Tortola or Royal Botanic Gardens, Kew ("Kew") in the UK.

Notes. This section includes any other useful information, such as how to tell the plant apart from other very similar ones.

Red List status. This is the category assigned to the species using the IUCN Red List.

Photographs. The photos aim to illustrate the various aspects of the plant useful in recognising them, such as overall habit, leaves, flowers and fruit.

***Coccothrinax barbadensis* on Guana Island** (M.A. Hamilton) →

Metastelma anegadense

Wire wist

APOCYNACEAE (PERIWINKLE FAMILY)

Description: Twining herbaceous vine. Cut surfaces exude a white sap. Leaves in opposite pairs along the stem, with a tiny point at the tip. Flowers tiny, cream coloured, in clusters close to the stem. Fruit split to release a mass of fluffy hairs.

Habitat: Found in coastal shrubland and seasonally deciduous woodland.

Global distribution: BVI only.

Recorded in the BVI: Anegada and Virgin Gorda only.

Threats: Threatened by habitat loss through urbanisation, illegal sand mining, and encroachment of whistling pine (*Casuarina equisetifolia*). Climate change may have a significant impact, through severe droughts, more intensive hurricanes and sea level rise.

Conservation: This species is conserved in *ex-situ* collections at the JR O'Neal BG and Kew. This species may be included in legally protected areas in the future.

Notes: The name 'wire wist' was chosen after a naming competition held for school children on Anegada, referring to its use as a twine for mending fishing nets. 'Wist' is a local name for a vine. Easily confused with *Metastelma decipiens*, which tends to have broader, more oval leaves. The sap can be irritating to some people's skin.

Plant habit

Plant in flower

Immature fruit

Seeds released from fruit with fluffy hairs

Ilex urbaniana

Urban's holly

AQUIFOLIACEAE (HOLLY FAMILY)

Description: Small tree to 8 m tall, with smooth bark when mature. Leaves 2.5 to 8 cm long, oval-shaped, rounded and often notched at the tip, leathery, the edges strongly rolled back. Flowers solitary or in few-flowered clusters, with 4 to 5 white petals. Fruit 4 mm across, red.

Habitat: Found in upland evergreen forest.

Global distribution: BVI, Puerto Rico and USVI (St John) only.

Recorded in the BVI: Tortola only.

Threats: Threatened by urbanisation and disturbance near hiking trails.

Conservation: This species is conserved in *ex-situ* collections at the JR O'Neal BG and Kew. Wild populations are included within designated protected areas.

Notes: The leaves and fruit together are fairly distinctive, and this species is unlikely to be found other than in upland evergreen forest.

Bark

Foliage

Branch with immature fruit

Fruiting branch

Anthurium x selloum

Virgin Islands laceleaf

ARACEAE (ARUM FAMILY)

Description: Large herb, with stem forming a short 'trunk' covered in a thatch of fibres. Leaves lance-shaped, thick, glossy, dark green with wavy edges. Flowers minute on a dark purplish-brown spike.

Habitat: Found in seasonally deciduous forest and woodland and upland evergreen forest.

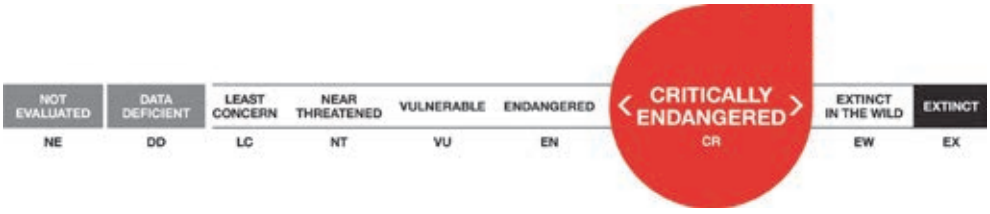
Global distribution: BVI and USVI (St John) only.

Recorded in the BVI: Tortola only.

Threats: Threatened by loss of habitat suitable for both parent species.

Conservation: Wild populations are included within designated protected areas. As a hybrid, it is not included on the IUCN Red List, but would be considered Critically Endangered using Red List criteria.

Notes: A natural cross between *Anthurium cordatum* and *A. crenatum*, this hybrid does not produce fruits and only occurs where the parent species are found.



'Trunk' of plant, showing thatch of fibres and leaf stalks

Leaves

Base of leaf blade at top of leaf stalk

Flowering spike, showing the leafy bract at its base

Sabal causiarum

Puerto Rican hat palm

ARECACEAE (PALM FAMILY)

Description: Palm tree to 16 m tall, with a trunk to c. 40 cm wide, faintly ringed with leaf-scars. Leaf blades 2 to 3 m across, divided into 60 to 120 segments radiating from a short midrib. Flowers small, on large many-branched clusters about as long as the leaves. Fruits about 1 cm across, dark brown.

Habitat: Found in coastal shrubland, seasonally deciduous forest and woodland, and coastal rock.

Global distribution: BVI, Dominican Republic, Haiti, Puerto Rico and USVI.

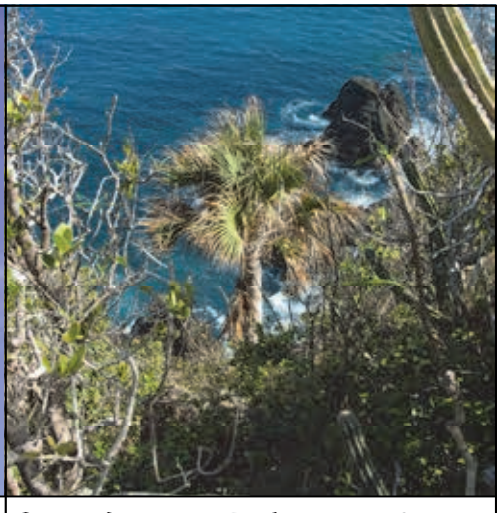
Recorded in the BVI: Anegada, Guana Island, Scrub Island and Tortola.

Threats: Threatened by habitat loss and collecting for the horticultural trade.

Conservation: This species is conserved in *ex-situ* collections at the JR O'Neal BG and Kew. Wild populations are included within designated protected areas.

Notes: The short midrib from which the leaf segments radiate and stout trunk help to differentiate this palm from others in the BVI. Coconut palms (*Cocos nucifera*) have a long midrib, while *Coccothrinax barbadensis* and *Leucothrinax morrisii* do not have a midrib at all and have a narrower trunk.

Crown of tree from below



Crown of tree emerging from vegetation

Flowering branch

Seedling

Agave missionum

Puerto Rican Bank century plant

ASPARAGACEAE (ASPARAGUS FAMILY)

Description: Succulent plant forming a large rosette. Leaves are lance-shaped, 1 to 3 m long, spine-tipped and with sharp teeth along the edge. Flowers yellow, held in dense clusters towards the top of a thick stalk to 7 m tall. The entire plant dies after fruiting.

Habitat: Found in a wide range of habitats, including seasonally deciduous forest and woodland, coastal shrubland, coastal and interior rock, and coastal grassland.

Global distribution: BVI, Puerto Rico (including Culebra and Vieques) and USVI (St John, St Thomas).

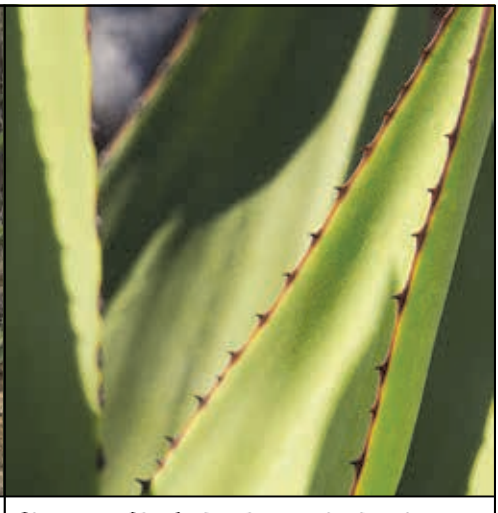
Recorded in the BVI: Anegada, Beef Island, Great Camanoe, Great Thatch, Great Tobago, Guana, Norman Island, Prickly Pear Island, Scrub Island, Tortola and Virgin Gorda.

Threats: Threatened by the *Agave* snout weevil attacking mature plants, as well as by feral livestock and habitat loss through urbanisation.

Conservation: This species is conserved in *ex-situ* collections at the JR O'Neal BG and Kew. Wild populations are included within designated protected areas.

Notes: Differs from the introduced and invasive *Agave sisalana* by its spiny leaf margins. *A. americana*, with somewhat larger spines, is sometimes planted in the BVI, but is not known in the wild here. The flowering stalk is used as a Christmas tree in some homes in the BVI.

Whole plant



Close up of leaf, showing toothed egde

Plant in fruit, showing the rest of the plant already dying

Seeds, with empty seeds paler brown

Piptocoma antillana

Antilles velvetshrub

ASTERACEAE (DAISY FAMILY)

Description: An erect shrub 4 m tall (usually much shorter), much branched. Leaves narrowly oval, grey-green and velvety in texture. Flowers small, purple and grouped into many-flowered dense heads at the ends of branches. Fruit tiny, each with a tuft of cream-coloured hairs to 5 mm long.

Habitat: Found in coastal shrubland and seasonally deciduous forest and woodland.

Global distribution: BVI, Puerto Rico and USVI (St Thomas).

Recorded in the BVI: Cooper Island, Great Tobago, Norman Island, Peter Island, Salt Island, Scrub Island and Virgin Gorda.

Threats: Threatened by habitat loss caused by urbanisation, and disturbance by feral animals.

Conservation: Wild populations are included within designated protected areas.

Notes: This species can be quite common in places, and is recognised by its grey-green foliage and clusters of purple flowers.

Habit of plant

Foliage

Clusters of flowering heads

Flowering head gone to seed

Varronia rupicola

BORAGINACEAE (BORAGE FAMILY)

Description: A shrub to 5 m tall. Leaves alternately arranged, with a rough texture to the upper surface, oval with a more or less pointed tip. Flowers in clusters on stalks to 4 cm long. Petals white. Fruit a small red berry with fairly thin flesh covering a single stony seed.

Habitat: Found in coastal shrubland, seasonally deciduous forest and woodland, and coastal grassland.

Global distribution: BVI and Puerto Rico (mainland and Vieques Island) only.

Recorded in the BVI: Anegada only.

Threats: Threatened by loss of habitat through urbanisation and feral livestock, as well as damage by introduced insect pests. Climate change may impact the species through more severe droughts, more intensive hurricanes, and sea level rise.

Conservation: This species is conserved in *ex-situ* collections at the JR O'Neal BG and Kew. This species may be included in legally protected areas in the future.

Notes: The rough, 'sandpapery', feel to the leaves is one of the characters which helps in recognising this species.

NOT EVALUATED	DATA DEFICIENT	LEAST CONCERN	NEAR THREATENED	VULNERABLE	ENDANGERED	CRITICALLY ENDANGERED	EXTINCT IN THE WILD	EXTINCT
NE	DD	LC	NT	VU	EN	CR	EW	EX

Plant habit

Branches showing arrangement of leaves

Branch tip showing open flowers

Branch tip showing ripe fruit

Pitcairnia jareckii

Jarecki's pitcairnia

BROMELIACEAE (BROMELIAD FAMILY)

Description: A large herb. Leaves in a rosette, each about 1 m long and narrow, with minute sharp teeth pointing towards the leaf tip. Flowers arranged along a long stalk from the centre of the plant, petals pale yellow. Fruit a small dry capsule with tiny seeds.

Habitat: Found in seasonally deciduous forest and woodland.

Global distribution: BVI only.

Recorded in the BVI: Great Camanoe, Guana Island and Tortola.

Threats: Threatened by grazing by feral livestock, urbanisation and disturbance where growing close to trails.

Conservation: This species is conserved in *ex-situ* collections at the JR O'Neal BG and Kew.

Notes: Distinguished from the more common *Pitcairnia angustifolia* by its yellow, rather than red, flowers.

Whole plant

Close up of leaf showing toothed edges

Tip of flower spike showing buds, open flower and spent flower

Old fruit

Tillandsia x lineatispica

Puerto Rican Bank piñon

BROMELIACEAE (BROMELIAD FAMILY)

Description: Ground-dwelling herb, with the short stem concealed by the dense rosette of narrow, leathery leaves 60 to 95 cm long. Flowers held on a long, branching stalk, emerging from overlapping ranks of purplish-red leaf-scales, branches 17 to 30 cm long. Petals 3, white, c. 3 cm long.

Habitat: Found in seasonally deciduous forest and woodland.

Global distribution: BVI, Puerto Rico (including Vieques and Culebra) and USVI (St John) only.

Recorded in the BVI: Beef Island, Tortola and Virgin Gorda only.

Threats: Threatened by habitat loss through urbanisation and disturbance by feral animals.

Conservation: As a hybrid, it is not included on the IUCN Red List, but would be considered Vulnerable using Red List criteria.

Notes: A hybrid between *T. utriculata* and *T. fasciculata*, this plant does not produce seeds. *T. utriculata* has the flowers more widely spaced along the stalks, with the scales not overlapping. *T. fasciculata* has a shorter (to 15 cm long) and broader flowering spike, with greenish scales.

Habit of plant in flower

Habit of plant

Branching structure of flowering stems

Close up of overlapping scales

Leptocereus quadricostatus

Prickly web

CACTACEAE (CACTUS FAMILY)

Description: Erect or arching cactus to 4 m tall, with numerous elongated branches, often forming extensive thickets. Stems 4-angled with clusters of rigid grey spines to 4 cm long along the angles. Flowers 4 cm across, with many white petals. Fruit green, ripening to red.

Habitat: Found in seasonally deciduous forest and woodland.

Global distribution: BVI and Puerto Rico only.

Recorded in the BVI: Anegada only.

Threats: Threatened on Anegada by urbanisation and feral livestock damaging plants and habitat. May also be threatened by *Harrisia* cactus mealy bug should it arrive in the islands. Climate change may impact the species, especially through sea level rise.

Conservation: This species is conserved in *ex-situ* collections at the JR O'Neal BG and Kew. This species may be included in legally protected areas in the future.

Notes: The name 'prickly web' was chosen after a naming competition held for school children on Anegada, with the name reflecting its spiny, scrambling habit. Differs from other scrambling cacti in having longer spines and thicker stems.

Plant habit

Close up of stems

Partially open flower

Fruit (not fully ripe)

Maytenus cymosa

Caribbean mayten

CELASTRACEAE (BITTERSWEET FAMILY)

Description: A tree to 9 m tall, with rough, grey bark. Leaves are oval, 3 to 4 cm long, smooth and leathery, with the edges curled backwards. Flowers small, clustered along twigs, petals 6, orange-brown. Fruit about 1 cm long, yellowish green, splitting to reveal a single large seed.

Habitat: Found in seasonally deciduous forest and woodland, semi-deciduous gallery forest and upland evergreen forest.

Global distribution: BVI, Puerto Rico (including Vieques and Culebra) and USVI (St Croix and St Thomas).

Recorded in the BVI: Virgin Gorda only.

Threats: Threatened by habitat fragmentation through urbanisation, fires and illegal agricultural activities.

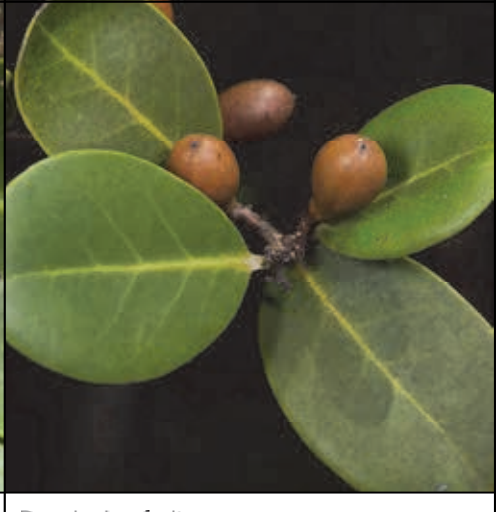
Conservation: Wild populations are included within designated protected areas.

Notes: The rough bark can be helpful in spotting this tree in forests, when the crown is hard to see in the canopy.

Branch tip showing arrangement of leaves

Bark

Close up of branch showing open flowers



Developing fruit

Argythamnia stahlii

Stahl's silverbush

EUPHORBIACEAE (SPURGE FAMILY)

Description: Low-growing subshrub. Leaves oval-shaped, 1 to 3.5 cm long, covered in minute T-shaped hairs. Flowers small in clusters 1 cm long, without petals. Fruit about 5 mm across, 3-lobed, hairy, splitting to release up to 3 seeds.

Habitat: Typically found in coastal shrubland and seasonally deciduous forest and woodland.

Global distribution: BVI, Puerto Rico and USVI (St John).

Recorded in the BVI: Anegada, Great Thatch, Guana and Tortola.

Threats: Threatened by habitats loss through urbanisation, fire, and feral livestock.

Conservation: This species is conserved in *ex-situ* collections at the JR O'Neal BG and Kew. This species may be included in legally protected areas in the future.

Notes: Differs from close relatives, *A. candicans* and *A. fasciculata*, in being more low-growing (rather than erect) and the flowers lacking petals.

Whole plant

Plant in flower and with a green fruit

Female flower

Developing fruit

Croton fishlockii

Fishlock's croton

EUPHORBIACEAE (SPURGE FAMILY)

Description: Shrub. Leaves a broad oval shape, the surface minutely dotted with tufts of short rusty-coloured hairs. Flowers small, white or greenish-white, in clusters of at the ends of branches, with only 1 to 3 open at any one time.

Habitat: Found in seasonally deciduous forest and woodland, and coastal shrubland.

Global distribution: BVI and USVI only.

Recorded in the BVI: Beef Island, Great Camanoe, Guana Island, Prickly Pear Island, Scrub Island, Virgin Gorda and Tortola.

Threats: Threatened by degradation of suitable habitat through urbanisation, and grazing by feral animals.

Conservation: This species is conserved in *ex-situ* collections at the JR O'Neal BG and Kew. Some wild populations are partly included within designated protected areas.

Notes: Its scientific name commemorates Walter Charles Fishlock, a Kew-trained horticulturalist who established an Agricultural Station on the site now occupied by the J.R. O'Neal Botanic Garden on Tortola. Fishlock was the first person to collect specimens of this species, in 1919.

Plant habit

Close up of leaf

Branch tip showing female flower

Branch tip showing male flower

Erythrina eggersii

Puerto Rican Bank cockspur

LEGUMINOSAE (PEA FAMILY)

Description: Small tree, trunk almost vine-like, to 7 m tall. Conical spines on trunk and branches. Leaves divided into three triangular leaflets, with spines on both surfaces and stalk. Flowers clustered at branch tips, red, developing into woody pods 12 cm long.

Habitat: Found in seasonally deciduous forest and woodland.

Global distribution: BVI, Puerto Rico (including Culebra and Vieques) and USVI.

Recorded in the BVI: Great Thatch, Jost van Dyke and Tortola.

Threats: Threatened by feral livestock damaging plants and habitats, and urbanisation. It may also be threatened should the *Erythrina* gall wasp arrive on the islands. Only recently found growing on Tortola.

Conservation: This species is conserved in *ex-situ* collections at the JR O'Neal BG and Kew. This species may be included in legally protected areas in the future.

Notes: The three leaflets with spiny stalk help to identify this species when in leaf, while the bright red flowers often appearing in the absence of leaves is very striking.

Plant habit, showing lower portion of trunk

Foliage

Base of leaflet, showing small prickles

Cluster of flowers

Galactia eggersii

Eggers' milkpea

LEGUMINOSAE (PEA FAMILY)

Description: Herbaceous twining vine. Leaves alternately arranged along the stem, each with three oval leaflets, the tips often slightly notched with a tiny point in the middle. Flowers a bright red pea flower. Fruit a flat pea-pod, drying to brown and splitting open.

Habitat: Found in seasonally deciduous forest and woodland.

Global distribution: BVI and USVI (St John and St Thomas) only.

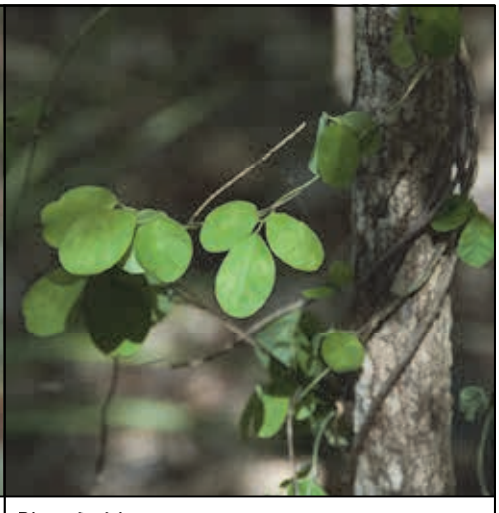
Recorded in the BVI: Beef Island, Great Thatch, Guana Island, Tortola and Virgin Gorda.

Threats: Its habitat is threatened by urbanisation and feral livestock.

Conservation: This species is conserved in *ex-situ* collections at the JR O'Neal BG and Kew. This species may be included in legally protected areas in the future.

Notes: Distinguished from closely related *Galactia dubia* by its red, rather than pink or lavender, flowers, and less hairy leaves and stems.

Plant habit



Plant habit

Plant habit, showing an open flower

Developing fruit, close to ripeness

Senna polyphylla var. *neglecta*

LEGUMINOSAE (PEA FAMILY)

Description: Shrub or small tree with arching branches. Leaves arranged in clusters along branches, each divided into 3 to 5 pairs of small oval leaflets. Flowers arranged singly or in pairs, with yellow petals. Fruit a brown papery pea-pod.

Habitat: Found in coastal shrubland and seasonally deciduous forest and woodland.

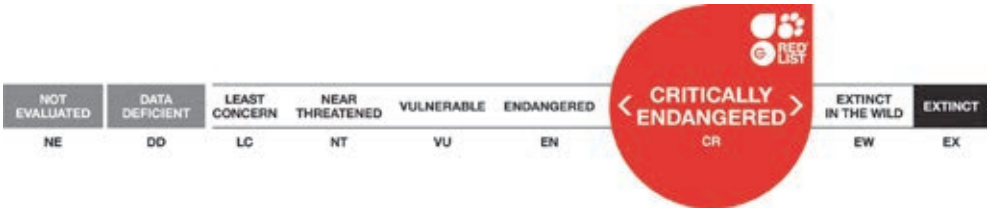
Global distribution: BVI only.

Recorded in the BVI: Anegada only.

Threats: Its habitat is threatened by grazing by feral livestock, urbanisation and spread of rubber vine. The seeds show evidence of attack by an insect pest. Climate change may impact this variety through more severe droughts, more intensive hurricanes and sea level rise.

Conservation: This species is conserved in *ex-situ* collections at the JR O'Neal BG and Kew.

Notes: Differs from closely related *Senna polyphylla* var. *polyphylla* by having fewer pairs of leaflets per leaf.



Plant habit

Branches

Open flowers

Seed pods

Vachellia anegadensis

Poke-me-boy

LEGUMINOSAE (PEA FAMILY)

Description: Tree to 8 m tall, with bunches of many sharp spines on the trunk and branches. Leaves divided into pairs of leaflets, with a pair of sharp yellow spines where the leaf attaches to the stem. Flowers in a stalked, small, yellow 'powder puff'. Fruit a tough bean pod.

Habitat: Found in seasonally deciduous forest and woodland, coastal shrubland and coastal grassland.

Global distribution: BVI only.

Recorded in the BVI: Anegada and Fallen Jerusalem only.

Threats: Threatened by grazing by feral livestock, damaging plants and habitat, as well as urbanisation.

Conservation: This species is conserved in *ex-situ* collections at the JR O'Neal BG and Kew. Wild populations are included within designated protected areas.

Notes: The thick, glossy green leaflets and clusters of spines on the trunk help in recognising this species. Historically, this was known as *Acacia anegadensis*; in 2006 many species of *Acacia* were re-classified in the genus *Vachellia*.

Branch showing arrangement of leaves

Close up of trunk showing clusters of spines

Clusters of flowers

Seed pods

Malpighia woodburyana

Mad dog

MALPIGHIACEAE (BARBADOS CHERRY FAMILY)

Description: Shrub with erect, or often arching, stems 1 to 2.5 m (or more) tall. Leaves in pairs, oval-shaped, 6 to 8 cm long, covered in bristly V- and T-shaped reddish hairs. Flowers in loose clusters of 2 to 4, with 5 whitish petals with a narrow basal section. Fruit to 2 cm across, ridged, red.

Habitat: Found in seasonally deciduous forest and woodland, semi-deciduous gallery forest, coastal shrubland, and coastal grassland.

Global distribution: BVI, Puerto Rico (including Magueyes, Culebra and Vieques) and USVI.

Recorded in the BVI: Across the BVI on most of the islands, though notably absent from Tortola.

Threats: Its habitat is threatened by urbanisation and feral livestock, as well as being specifically targeted for control by humans because of the irritant hairs.

Conservation: This species is conserved in *ex-situ* collections at the JR O'Neal BG and Kew. Wild populations are included within designated protected areas.

Notes: *M. infestissima* differs in not having bristles at the leaf edges, and having no V-shaped hairs, though some populations may be difficult to identify with confidence.

Arrangement of leaves at branch tips

Close up of leaves showing t-shaped hairs along leaf margins

Flowers

Ripe fruit

Bastardiopsis eggersii

Jost Van Dyke's Indian mallow

MALVACEAE (MALLOW FAMILY)

Description: Small tree to 4 m tall. Leaves heart-shaped, softly hairy, with 5 main veins radiating from end of leaf stalk. Flowers small, in clusters, yellow.

Habitat: Typically found in seasonally deciduous forest and woodland.

Global distribution: BVI, Puerto Rico (Culebra only) and USVI (St John).

Recorded in the BVI: Dead Chest, Ginger Island, Great Thatch, Guana Island, Jost van Dyke, Little Jost van Dyke, Norman Island, Peter Island, Salt Island and Tortola.

Threats: Threatened by grazing by feral livestock and an introduced scale insect damaging plants, and habitat loss through urbanisation.

Conservation: This species is conserved in *ex-situ* collections at the JR O'Neal BG and Kew.

Notes: This species is distinguished from plants with similar leaves (such as *Bastardia* and *Sida*) by growing as a tree, rather than a herb or shrub.

Whole plant

Close up of bark on the trunk

Leaves

Cluster of flowers

Miconia thomasiana

Puerto Rican Bank camassey

MELASTOMATACEAE (MELASTOME FAMILY)

Description: Shrub or small tree to 5 m tall. Leaves leathery, oval-shaped, 5 to 15 cm long, with 5 main veins running lengthwise. Flowers several in loose clusters, with 5 pink petals. Fruit a purplish-black berry.

Habitat: Found in upland evergreen forest.

Global distribution: BVI and Puerto Rico only.

Recorded in the BVI: Tortola only.

Threats: Threatened by habitat fragmentation as a result of urbanisation and illegal farming within protected areas. Grazing by feral animals and infestation by an introduced insect pest are also having an impact on this species.

Conservation: This species is conserved in *ex-situ* collections at the JR O'Neal BG and Kew. Wild populations are included within designated protected areas.

Notes: Its name comes from a mistaken belief that it occurs on the island of St Thomas, now thought to be a misidentification.

Plant habit

Arrangement of leaves on branches

Close up of flowers

Developing fruit

Cedrela odorata

Spanish cedar

MELIACEAE (MAHOGANY FAMILY)

Description: Tree to 15 m tall. Leaves divided into 6 to 12 pairs of leaflets, without a terminal leaflet, the bases asymmetrical and the margins not toothed, usually with a strong fetid smell. Flowers in many-branched inflorescences, small with greenish-white petals. Fruit splitting into five parts to release the winged seeds.

Habitat: Found in upland evergreen forest.

Global distribution: Mexico, throughout Central America to northern Argentina, and the Caribbean.

Recorded in the BVI: Tortola only.

Threats: Globally, the species is threatened by unsustainable harvest of the timber. In the BVI, it is rare and vulnerable to felling and habitat loss.

Conservation: Wild populations are included within designated protected areas.

Notes: One of the world's most important timber species. Though relatively widespread, it has been selectively cut for at least 250 years, and its distribution fragmented by deforestation. Its international trade is controlled by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

Leafy branch of tree

Leaves

Branching cluster of flowers

Fruit split open

Calyptranthes kiaerskovii

Kiaerskov's lidflower

MYRTACEAE (MYRTLE FAMILY)

Description: A small tree, with branches and twigs with very regular and evenly divided forks. Leaves a broad tear-drop shape, with faint veins, arranged in pairs. Flowers in stalked clusters of 3 to 5, each a tuft of white stamens. Fruit a small, 1- to 2-seeded berry.

Habitat: Found in upland evergreen forest and seasonally deciduous forest and woodland.

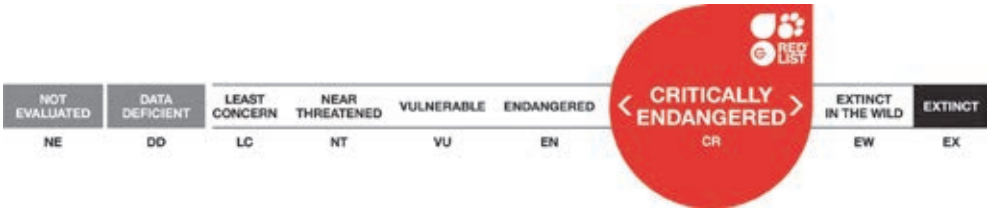
Global distribution: BVI and Puerto Rico only.

Recorded in the BVI: Tortola and Virgin Gorda only.

Threats: Threatened by several species of introduced insect pest, causing the weakening and death of susceptible plants. Populations are also vulnerable to illegal agricultural practices within protected areas, as well as disturbance close to maintained trails.

Conservation: This species is conserved in *ex-situ* collections at the JR O'Neal BG and Kew. Wild populations are included within designated protected areas.

Notes: The forked branching pattern to the twigs and the shape of the leaves help in recognising this species.



General habit of this species

Branch showing arrangement of twigs and leaves

Branch tip showing flower buds

Branch tip with open flowers

Calyptranthes thomasiana

St Thomas lidflower

MYRTACEAE (MYRTLE FAMILY)

Description: A small tree, with branches and twigs with very regular and even forking. Leaves a narrow oval shape, with obvious mid-vein, arranged in pairs. Flowers in clusters on red, furry, branching stalks, lacking petals, but each bearing a tuft of white stamens. Fruit a small, 1- to 2-seeded berry.

Habitat: Found in upland evergreen forest and seasonally deciduous forest and woodland.

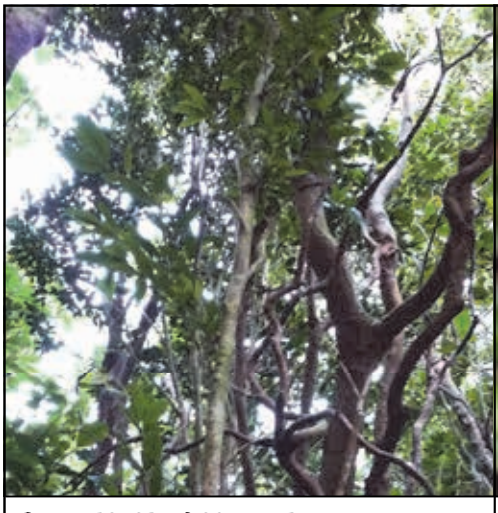
Global distribution: BVI and USVI only.

Recorded in the BVI: Tortola and Virgin Gorda only.

Threats: Threatened by several species of introduced insect pest, causing the weakening and death of susceptible plants. Populations are also vulnerable to illegal agricultural practices within protected areas, as well as disturbance close to maintained trails.

Conservation: This species is conserved in *ex-situ* collections at the JR O'Neal BG and Kew. Wild populations are included within designated protected areas.

Notes: The leaves of this species narrow to a point, in contrast to the broad, rounded leaves of *Calyptranthes kiaerskovii*.



General habit of this species

Branch tip showing arrangement of leaves

Branch with open flowers

Branch with ripe fruit

Psychilis macconnelliae

Island peacock orchid

ORCHIDACEAE (ORCHID FAMILY)

Description: Herb with fleshy roots and wrinkled bulb exposed to the air. Leaves tough and leathery, strap-shaped, to 28 cm long. Flowers up to 3 at a time on a long stalk 0.5 to 1.5 m long. Petals of various shades of red to lavender.

Habitat: Found in coastal shrubland, seasonally deciduous forest and woodland, and semi-deciduous gallery forest.

Global distribution: BVI, Puerto Rico (including Vieques and Culebra) and USVI only.

Recorded in the BVI: Anegada, Beef Island, Great Camanoe, Great Thatch, Guana, Peter Island, Prickly Pear, Scrub Island, Tortola and Virgin Gorda

Threats: Its habitat is threatened by urbanisation, as well as unauthorised agriculture on sensitive sites.

Conservation: This species is conserved in *ex-situ* collections at the JR O'Neal BG and Kew. Wild populations are included within designated protected areas.

Notes: Usually found growing on or at the base of tree trunks.

Flowering stems emerging over the top of surrounding vegetation

Plant habit

Cluster of flowers

Close up of a flower

Tolumnia prionochila

Puerto Rican Bank dancing-lady orchid

ORCHIDACEAE (ORCHID FAMILY)

Description: Small herb growing on trunks of trees and cacti. Roots white, wiry. Leaves narrow and leathery, folded lengthwise and overlapping with leaves above. Flowers produced in sprays on long, wiry stalks to 40 cm long, bright yellow.

Habitat: Found in coastal shrubland, coastal grassland, seasonally deciduous forest and woodland, and semi-deciduous gallery forest.

Global distribution: BVI, Puerto Rico (Culebra and Vieques) and USVI (St John and St Thomas) only.

Recorded in the BVI: Anegada, Great Camanoe, Great Dog, Guana Island, Necker Island, Prickly Pear, Scrub Island, Tortola and Virgin Gorda.

Threats: Its habitat is threatened by urbanisation.

Conservation: This species is conserved in *ex-situ* collections at the JR O'Neal BG and Kew. Wild populations are included within designated protected areas.

Notes: The yellow flowers held on long slender stalks are very distinctive.

Plant habit

Cluster of plantlets, showing epiphytic habit

Foliage

Cluster of flowers

Peperomia wheeleri

Wheeler's peperomia

PIPERACEAE (PEPPER FAMILY)

Description: An erect herb to 1 m tall, with fleshy cylindrical stems, often with a zig-zag formation and tinged reddish. Leaves fleshy, oval and three to five main veins from the base. Flowers minute along the surface of a fleshy spike emerging from joints in the stem.

Habitat: Found growing on rocks in pockets of leaf litter and thin soil, in seasonally deciduous forest and woodland.

Global distribution: BVI and Puerto Rico (Culebra) only.

Recorded in the BVI: Tortola and Virgin Gorda only.

Threats: This species prefers less disturbed forests, which are increasingly rare, and so is threatened by urbanisation and disturbance by feral animals.

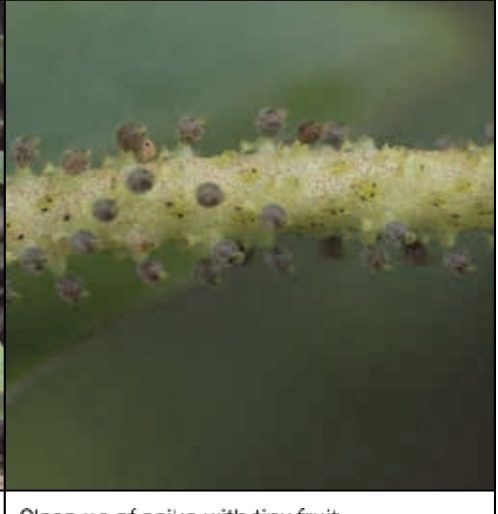
Conservation: This species is conserved in *ex-situ* collections at the JR O'Neal BG and Kew. Wild populations are included within designated protected areas.

Notes: Has for a long time been confused with *Peperomia myrtifolia*, and is thought by some not to be a different species. More study is required.

Whole plant

Stems showing arrangement of leaves

Branch tip showing spikes of minute flowers



Close up of spike with tiny fruit

Reynosia guama

Guamá

RHAMNACEAE (BUCKTHORN FAMILY)

Description: A shrub or small tree. Leaves arranged in opposite pairs, stiff and leathery, oval-shaped with a notch at the tip. Flowers in clusters where the leaves join the stem, with five creamy-white triangular petals. Ripe fruit purplish-black, with one large seed and a thin covering of flesh.

Habitat: Found in seasonally deciduous forest and woodland.

Global distribution: BVI, Puerto Rico and USVI only.

Recorded in the BVI: Beef Island, Great Camanoe, Guana Island, Jost van Dyke, Peter Island, Tortola and Virgin Gorda.

Threats: Threatened by habitat loss through urbanisation.

Conservation: Wild populations are included within designated protected areas, though most populations occur outside them.

Notes: The leaves in opposite pairs with a notch at the tip, combined with the clusters of creamy-white flowers help to recognise this species.

Trunk showing bark

Branch tip showing clusters of open flowers

Close up of flower cluster

Branch tip with developing fruit

Machaonia woodburyana

Woodbury's machaonia

RUBIACEAE (COFFEE FAMILY)

Description: A shrub, with many branches arching up from ground-level. Many short side branches bear pairs of spines. Leaves small, thick, tear drop-shaped. Flowers small, in clusters towards the ends of branches, with four white petals.

Habitat: Found in seasonally deciduous forest and woodland, semi-deciduous gallery forest and coastal shrubland.

Global distribution: BVI and USVI (St John) only.

Recorded in the BVI: Virgin Gorda only.

Threats: Threatened by habitat fragmentation as a result of urbanisation and clearing land for farming, as well as by grazing by feral livestock.

Conservation: This species is conserved in *ex-situ* collections at the JR O'Neal BG and Kew. Wild populations are included within designated protected areas, though most populations occur outside them.

Notes: This plant may be confused with others that also have small leaves borne in clusters on the stem. The clusters of white, four-petalled flowers help to distinguish it.

Branches showing general habit of plant

Closer view of branch

Branch tip with open flowers and developing fruit

Close up of flower

Mitracarpus polycladus

Caña Gorda girdlepod

RUBIACEAE (COFFEE FAMILY)

Description: An annual herb, erect to creeping, much branched from the base, to 25 cm tall. Leaves arranged in opposite pairs on the stem, narrow and pointed at both ends. Flowers in many-flowered heads at the ends of stems, petals 4, tiny.

Habitat: Found in coastal shrubland and seasonally deciduous woodland.

Global distribution: BVI, Puerto Rico (Guánica) and Saba.

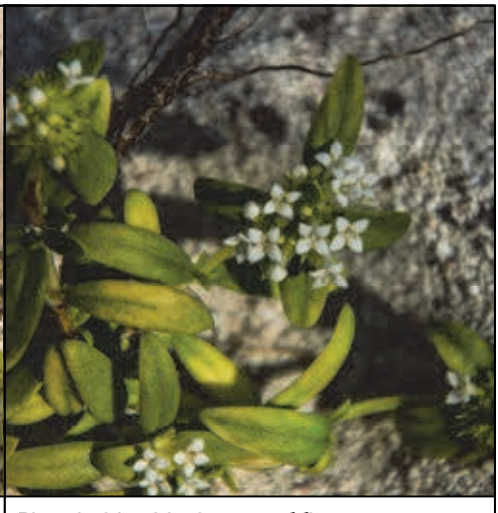
Recorded in the BVI: Anegada only.

Threats: Its habitats are threatened by habitat fragmentation as a result of urbanisation, especially in coastal areas where pressure from tourist developments is high. Feral livestock are also a threat. Climate change may impact the species through more severe droughts and sea level rise.

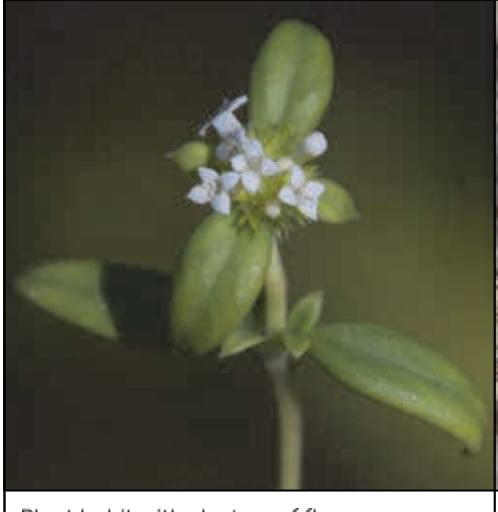
Conservation: This species is conserved in *ex-situ* collections at the JR O'Neal BG and Kew.

Notes: This and related species need further study, with plants across its range having been identified inconsistently.

Plant habit, with open flowers and developing flowers



Plant habit with clusters of flowers



Plant habit with clusters of flowers

Flowering head with seeds developing after flowering

Rondeletia pilosa

Hairy rondeletia

RUBIACEAE (COFFEE FAMILY)

Description: Shrub to 4 m tall, many branched from the base. Leaves in opposite pairs, 4 to 8 cm long, narrowly oval, softly hairy, the margins rolled back. Flowers in clusters of 1 to 3 on stalks shorter than the leaves. Petals 4, pink, joined into a trumpet-shaped tube below, c. 6 mm across.

Habitat: Found in seasonally deciduous forest and woodland, semi-deciduous gallery forest and upland evergreen forest.

Global distribution: BVI, Puerto Rico and USVI only.

Recorded in the BVI: Beef Island, Great Thatch, Guana Island, Great Tobago, Tortola and Virgin Gorda.

Threats: Threatened by habitat loss through urbanisation and erosion caused by feral livestock.

Conservation: This species is conserved in *ex-situ* collections at the JR O'Neal BG and Kew. Wild populations are included within designated protected areas, though most populations occur outside them.

Notes: Can be relatively frequent in those forests where it is found, and may be an indication of species-rich forest.

Habit of plant

Foliage

Flowering branch

Close-up of flowers

Zanthoxylum flavum

Satinwood

RUTACEAE (CITRUS FAMILY)

Description: Tree to 10 m tall with smooth grey bark. Leaves 15 to 30 cm long, divided into 5 to 7 leathery, oval leaflets with scalloped edges and a blunt or rounded tip. Flowers many, in branched clusters, with 4 white petals to c. 3 mm long. Fruit spherical, about 5 mm across, opening to release a shiny black seed.

Habitat: Found in seasonally deciduous forest and woodland.

Global distribution: In scattered locations in Florida, the Bahamas, Greater and Lesser Antilles, and Mexico, Honduras and Brazil.

Recorded in the BVI: Anegada only.

Threats: Its habitats are threatened by habitat fragmentation as a result of urbanisation, especially in coastal areas where pressure from tourist developments is high. Feral livestock are also a threat. Climate change may impact the species through more severe droughts and sea level rise.

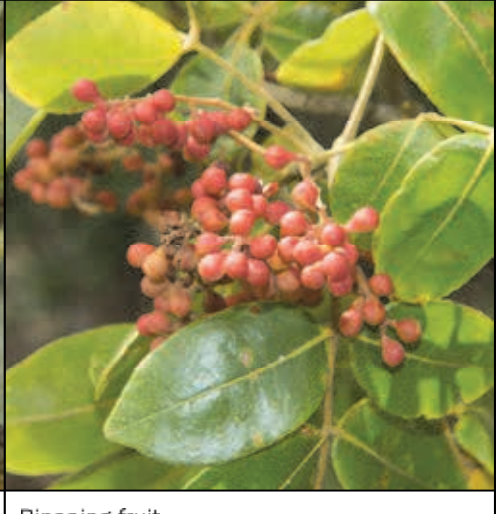
Conservation: This species may be included in legally protected areas in the future.

Notes: The species has been heavily exploited for its timber over a long period on all the West Indian islands.

Habit of plant

Leaf

Cluster of flowers



Ripening fruit

Zanthoxylum thomasianum

St Thomas prickly-ash

RUTACEAE (CITRUS FAMILY)

Description: Shrub 3 to 4 m tall, spiny on twigs. Leaves leathery, divided into 5 to 9 leaflets with spines where they attach to the leaf stalk and along the vein on the underside. Flowers small, white, clustered along stems. Fruit splitting to release a single shiny black seed.

Habitat: Found in seasonally deciduous forest and woodland, and semi-deciduous gallery forest.

Global distribution: BVI, Puerto Rico and USVI only.

Recorded in the BVI: Tortola and Virgin Gorda only.

Threats: Its habitat is threatened by fragmentation as a result of urbanisation, illegal farming and fires within protected areas.

Conservation: This species is conserved in *ex-situ* collections at the JR O'Neal BG and Kew. Wild populations are included within designated protected areas.

Notes: The spines on the underside of the midrib are useful characters in recognising this species.

Bark

Branch tip showing arrangement of leaves and leaflets

Flowers and spines on undersides of leaves and stems

Fruit splitting open to expose shiny black seed

Picrasma excelsa

Bitter ash

SIMAROUBACEAE (QUASSIA FAMILY)

Description: Tree to 12 m tall. Leaves to 25 cm long, divided into 7 to 13 oval leaflets with smooth edges and a pointed tip, finely downy on the lower surface. Flowers tiny, in branched clusters, with 5 yellowish-green petals to 4 mm long. Fruit more or less spherical, 9 mm long, purplish-black when ripe.

Habitat: Found in upland evergreen forest.

Global distribution: In scattered locations across the Greater and Lesser Antilles, Guyana and Venezuela.

Recorded in the BVI: Tortola only.

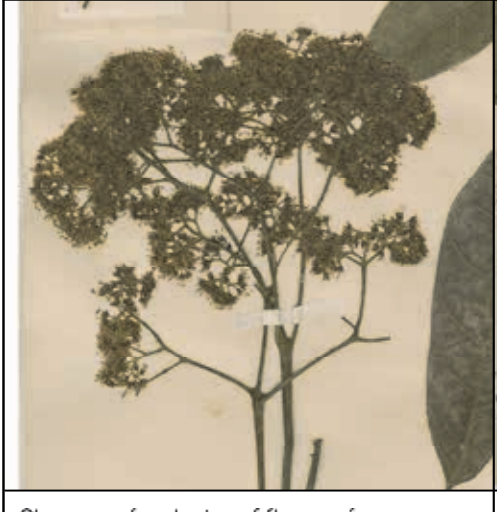
Threats: Threatened by urbanisation and disturbance near hiking trails.

Conservation: The only known BVI population is within a designated protected area.

Notes: Very rarely encountered in the BVI.

Foliage and clusters of flowers on a preserved herbarium specimen

Foliage



Close-up of a cluster of flowers from a preserved herbarium specimen

Fruits from a preserved herbarium specimen

Pilea sanctae-crucis

Virgin Islands clearweed

URTICACEAE (NETTLE FAMILY)

Description: Herb to 35 cm tall with rather fleshy stems. Leaf blades 5 to 10 cm long, finely hairy, with 3 to 5 main veins from the base, the margins irregularly toothed. Flowers minute, male flowers in dense head-like clusters on a long stalk, females in more branched clusters.

Habitat: Found in seasonally deciduous forest and woodland, and upland evergreen forest.

Global distribution: BVI and USVI only.

Recorded in the BVI: Tortola only.

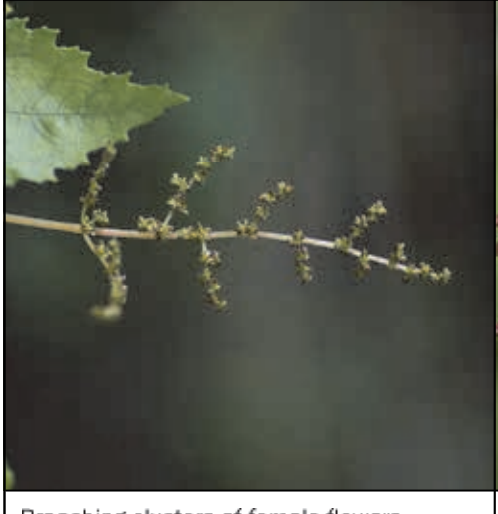
Threats: Threatened by habitat fragmentation through urbanisation, and disturbance by feral livestock.

Conservation: This species is conserved in *ex-situ* collections at the JR O'Neal BG and Kew. Wild populations are included within designated protected areas.

Notes: This species is short-lived, often disappearing during dry times of the year.

Habit of plant

Habit of plant



Branching clusters of female flowers

Tight clusters of male flowers

Guaiacum officinale

Lignum vitae

ZYGOPHYLLACEAE (TWINLEAF FAMILY)

Description: Tree to 10 m tall. Bark peeling off in thickened plates. Leaves in opposite pairs and divided into 6 leaflets. Flowers to 2 cm across, with 5 violet or bluish petals. Fruit somewhat heart-shaped, orange, splitting to reveal 1 bright red seed.

Habitat: Found in coastal shrubland and seasonally deciduous forest and woodland.

Global distribution: Lesser and Greater Antilles, Central and South America.

Recorded in the BVI: Anegada, Guana Island, Jost van Dyke, Tortola and Virgin Gorda.

Threats: Its rarity caused by historic over-exploitation means that this species is now much more vulnerable to habitat loss.

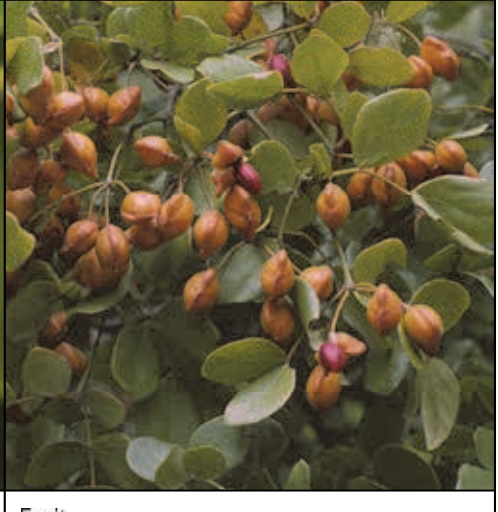
Conservation: This species may be included in legally protected areas in the future.

Notes: Though this species has a relatively wide distribution, it has long been prized for its dense and hard wood, and greatly overexploited. Trees are very slow-growing, and large plants that have escaped logging are rare.

Trunk of a large tree, showing flaking bark

Foliage

Flower



Fruit

PLANT HABITATS

Introduction

The vegetation of the BVI is the product of a complex interaction between the plant life and the surrounding environment, and as such, its characteristics are strongly influenced by local conditions and past events. Topography, temperature, soil drainage, prevailing wind, rainfall, storm events, and underlying geology are all important factors in determining the nature of the vegetation, not to mention the influence of human activity, both past and present. This is reflected in the kinds of plants growing in different locations, their size, and adaptations to different environments.

Several attempts to classify and map the different vegetation types found in the islands of this region have been made, using a variety of methods to gather data (field surveys, satellite imagery), and each emphasising different aspects. However, no single classification

A wide variety of factors determines the kind of vegetation found growing at any particular location. (C.Clubbe)

← **Scrub Island** (M.A. Hamilton)

has been adopted as a widely-used standard for mapping. In the following account of the different habitat types in the USVI and BVI, we have adopted a modification of the categories used by Kennaway and co-authors in their 2008 work to map landcover and forest structure across the Virgin Islands, along with data and ground truthing observations gathered in the field by Kew and NPTVI in the past decade. The result is the simplified and updated habitat types presented in this guide. While further subdivision of the vegetation may be possible, data to support a robust narrow categorisation is lacking, though more up-to-date satellite imagery is being acquired. The following descriptions are further illustrated by the Tropical Important Plant Areas (TIPAs) identified for the BVI, where those vegetation types are particularly well-represented.

The BVI is relatively well vegetated, with 83% of the terrestrial environment with some form of natural or semi-natural vegetation cover in 2008. The remaining 17% of land is dominated by human activity, including built infrastructure and agriculture, as well as natural features such as standing water (e.g. salt ponds) and sandy beaches, all of which are effectively lacking vegetation.

Forests and woodland

Forest habitats are by far the most abundant in the BVI, with 80% of the vegetated area of the islands dominated by trees. Forests are those areas where the crowns of individual trees are interlocking and shading most of the ground below. In contrast, woodland, while still being dominated by trees, has a more open canopy, with the crowns shading a relatively smaller proportion of the ground.

Several different categories of forests and woodland have been identified in the BVI by various authors. Here we summarise the broadest and easily recognised formations.

Evergreen forest – upland

Evergreen forests are those where at least 75% of the tree cover is in leaf all year round. In the BVI, these are nevertheless seasonal in nature, with some leaves dropping at drier times of the year, though trees never become bare. Typically, they occur in places that are not subjected to extremes of temperature nor regularly experience severe drought. In the BVI, the relatively cooler and moister conditions found at higher elevations on Tortola (and, to a lesser extent, Virgin Gorda) enable this kind of forest to develop. It is largely limited to land above about 250 m (though extends lower on north-facing slopes and in sheltered ghuts). Consequently, evergreen forests occupy just 5.9% of the land area, and is considered a vegetation type under threat in the BVI as a result of its small and declining extent.

Some common trees found in this forest include trumpet tree (*Cecropia schreberiana*), Spanish oak (*Inga laurina*) and white manjack (*Cordia sulcata*), as well as smaller trees and shrubs such as wild coffee (*Faramea occidentalis*), the giant herb, elephant ear (*Philodendron giganteum*), and a number of bromeliads and fern species.

TIPAs HIGHLIGHT: Mount Sage, Tortola

Identified as a TIPA on account of being one of the best examples of upland evergreen forest in the archipelago, the area includes Sage Mountain National Park and the mountain's summit, at 543 m above sea level, as well as the surrounding forests. Though most of the area historically was cleared for agriculture, much has since grown back. However, this fact is still apparent from the structure and diversity of much of the forest, in comparison with the rare fragments thought to be original vegetation.

As well as being important for the threatened habitat type, this TIPA has significant populations of several globally threatened plants: *Cedrela odorata*, *Picrasma excelsa*, *Pilea sanctae-crucis*, *Ilex urbaniana*, *Calyptranthes thomasiana*, and *C. kiaerskovii*; with several other species of conservation importance also present.

Sage Mountain is home to the largest area of upland evergreen forest in the BVI. (M.D.Sanchez)

TIPAs HIGHLIGHT: Central Virgin Gorda

This TIPA encompasses much of the forested area of Virgin Gorda, north of Pond Bay to North Sound, excluding most of the urbanised areas.

Like Mount Sage, the upland areas of Virgin Gorda have a well-developed, though smaller, area of evergreen forest, almost all contained within Gorda Peak National Park. While this forest has some species in common with Mount Sage, it is somewhat different in species composition and character, with the trees generally of a smaller stature. In places, the more open canopy has resulted in a more diverse ground-layer, including terrestrial orchids and peperomias.

As a TIPA, Central Virgin Gorda is also noteworthy for its semi-deciduous gallery forests and important populations of threatened plants occurring in several of the habitat types in the area, especially the seasonally deciduous forests of middle elevations. These include *Calyptranthes thomasiana*, *C. kiaerskovii*, *Machaonia woodburyana*, *Malpighia woodburyana*, *Maytenus cymosa*, *Peperomia wheeleri*, and *Zanthoxylum thomasianum*.

The forest at higher elevations on Gorda Peak is particularly diverse, and home to many important plant species. (M.A.Hamilton)

TIPAs HIGHLIGHT: Tortola North Shore

Encompassing the northern coastline from Anderson Point eastwards to Carrot Bay, and the forested hillsides above, this TIPA is home to several areas of upland evergreen forest extending down the ghuts towards the coast.

As well as being identified as a TIPA for this threatened habitat, the site is home to important populations of globally threatened *Agave missionum*, *Pilea sanctae-crucis*, and *Sabal causiarum*.

The ghuts of the northern side of Tortola provide the protection required for upland evergreen forest to develop. (M.Corcoran)

Evergreen forest and woodland – lowland

At lower elevations, forests of predominantly evergreen trees can only develop where water is not such a limiting factor. In the BVI, this is seen along coastlines, and is where the mangroves can be found, especially in sheltered bays. A most distinctive and well-defined type of vegetation, mangroves are evergreen forests that are tidally flooded. As the plants that grow here need to be tolerant of saline water, a narrow range of tree species with ecological adaptations to this extreme environment are found. Mangroves are a unique habitat in many ways, supporting a wide variety of animal life. Globally it is a highly threatened habitat, with many forests having been cleared for coastal developments over the last century, including in the BVI. Only 1.1% of the area of the BVI have mangroves, most of which are found on the coasts of Anegada and Tortola. How much was present before humans arrived in the islands is unknown.

Four tree species are characteristic of the mangrove forests in the BVI: red mangrove (*Rhizophora mangle*), black mangrove (*Avicennia germinans*), white mangrove (*Laguncularia racemosa*) and buttonwood (*Conocarpus erectus*). Red mangrove tends to be the most abundant closest to the sea, recognised by its arching prop roots providing stability for the plant against waves and wind as well as an oxygen supply to the roots below ground and underwater. Black mangrove is less common in the BVI, and typically grows where the ground is exposed by the retreating tide, while white mangrove and buttonwood grow on somewhat higher ground still, occurring at the landward side of the mangrove community.

While most of the lowland evergreen forest in the BVI consists of mangrove species in saline areas, there are also very small areas of disturbed forested wetland in low-lying places on Tortola, where the ground is subjected to seasonal flooding or soil saturation. Non-native species dominate here, such as coconut palms (*Cocos nucifera*) and Indian almond (*Terminalia catappa*).

Red mangrove is one of the most characteristic species of mangrove habitat, with distinctive arching prop roots. (M.D.Sanchez)

TIPAs HIGHLIGHT: Beef Island and the Channel, Tortola

At the eastern extremity of Tortola, and connected to it by a road bridge, lies Beef Island. The coastline of Beef Island supports several good examples of mangrove forests, often sheltering a salt pond or lagoon inland of the belt of trees.

Beef Island, and the adjacent coastline of Tortola along the channel have been identified as a TIPA as it is home to some of the BVIs best examples of this threatened habitat, as well as its dry salt flats. Also, the seasonally deciduous forests of Mount Alma hold important populations of globally threatened *Agave missionum*, *Malpighia woodburyana*, and *Tillandsia x lineatispica*, as well as having a high diversity of other species of conservation importance.

TIPAs HIGHLIGHT: Paraquita Bay and Bar Bay, Tortola

Along the southern coast towards the eastern end of Tortola is a system of mangroves encompassing Paraquita Bay and Bar Bay. Their role in protecting the coastlines are clear, providing a buffer against stormy seas, and are popular boat mooring sites for this reason.

This area has been identified as a TIPA in recognition of its mangroves being among the most important of this threatened habitat type in the BVI.

The mangroves of Paraquita Bay provides an important buffer against stormy seas. (T.M.Heller)

Seasonally deciduous forests and woodland

In much of the BVI, availability of water for the growth of plants can be limited, especially during the drier months of the year and on rocky, exposed hillsides. As a result, many of the trees able to survive in these places are those that shed their leaves during times of drought. The proportion of such deciduous trees in a forested area can vary a great deal and depends on local conditions. For the most part, they are closed-canopy forests, but in areas on Anegada they take on a more open woodland aspect, allowing an understory of herbs and shrubs to develop. Seasonally deciduous forests and woodland are the most extensive vegetation type, with 59% of the BVI's land occupied by these habitats, across most of the islands of the archipelago. Within this category is a great deal of variation in structure and species composition.

Common species of seasonally deciduous forests and woodland include gumbo limbo (*Bursera simarouba*), loblolly (*Pisonia subcordata*), birch berry (*Eugenia ligustrina*) and fiddlewood (*Citharexylum spinosum*).

As a broad category, seasonally deciduous forests and woodland are not considered a threatened vegetation type within BVI but are nevertheless home to many of the globally threatened plant species. The following sites have been identified as TIPAs on account of holding important populations of several threatened plants within the habitat.

TIPAs HIGHLIGHT: Eastern Scrub Island

North of Beef Island is a group of sister islands, the three largest of which have sites identified as TIPAs: Scrub Island, Great Camanoe and Guana Island.

On Scrub Island, the area encompassing the part of the island east of the isthmus, also known as Big Scrub, has been identified as a TIPA. This is for the significant populations of globally threatened *Agave missionum* and *Malpighia woodburyana* found in the seasonally deciduous woodlands and coastal shrublands, in addition to four other species of conservation interest.

TIPAs HIGHLIGHT: Hawks Nest

Occupying the hillside in the north-eastern corner of Tortola, overlooking Guana Island, is Hawks Nest. The seasonally deciduous forest here is especially diverse, with twelve plant species of conservation importance, including important populations of globally threatened *Agave missionum*, *Erythrina eggersii*, *Pilea sanctae-crucis*, *Zanthoxylum thomasianum* and *Pitcairnia jareckii*. The large boulder fields that cover many parts of the slopes produces a varied terrain that has helped to protect the forest from grazing animals, clear cutting and development in the past.

Scrub Island is home to an important population of globally threatened *Malpighia woodburyana*. (O.Monsegur)

The difficult terrain of Hawks Nest has offered some degree of protection from disturbance by human activity. (M.A.Hamilton)

Cam Bay National Park lies at the southern end of the Northern Great Camanoe TIPA. (M.A.Hamilton)

The varied terrain of Guana Island supports a relatively wide diversity of vegetation types. (M.A.Hamilton)

TIPAs HIGHLIGHT: Northern Great Camanoe

West of Scrub Island is the island of Great Camanoe. The TIPA identified here encompasses Cam Bay National Park at the central isthmus and the entire northern portion of the island. It is largely covered in seasonally deciduous forest and woodland and is notable for being home to an important population of the threatened bromeliad, *Pitcairnia jareckii*. Three other species of conservation importance are also present, including *Psychillis macconnelliae*.

TIPAs HIGHLIGHT: Guana Island

Close to the northern coast of Tortola is Guana Island, privately-owned, and managed as a tourist destination and conserved for its biodiversity. For a relatively small island, it is topographically diverse, supporting seasonally deciduous forest and woodland, with some areas of coastal shrubland and mangroves along parts of the coastline.

Guana Island has been identified as a TIPA on account of its important populations of *Pitcairnia jareckii* and *Bastardiopis eggersii*, as well as being home to a high diversity of other plants of conservation importance, such as *Reynosia guama*.

TIPAs HIGHLIGHT: Great Thatch Island

Just to the west of Tortola, and close to the north coast of St John is Great Thatch. The vegetation is predominantly seasonally deciduous forest and woodland, though there are small areas of mangrove, coastal shrubland and dry salt flats.

As a TIPA, it is home to important populations of two globally threatened species: *Agave missionum* and *Erythrina eggersii*, as well as four other species of conservation importance. As with many of the sister islands, feral goats are a major impediment to the natural regeneration of the forest.

Great Thatch Island. (M.A.Hamilton)

TIPAs HIGHLIGHT: Great Tobago Island

To the west of Jost van Dyke lies Great Tobago. It is an uninhabited island and designated as a National Park, with important colonies of nesting seabirds: magnificent frigatebird and brown boobies. Most of the vegetation is coastal shrubland and seasonally deciduous woodland, though severely degraded by feral goats. The control of these animals will help give the native vegetation an opportunity to recover over time.

The whole island has been identified as a TIPA for its significant population of the globally threatened *Agave missionum*, as well as home to other species of conservation importance such as *Rondeletia pilosa* and *Malpighia woodburyana*.

Great Tobago Island is an important site for globally threatened *Agave missionum*. (M.A. Hamilton)

Semi-deciduous gallery forest

A particular variation of seasonally deciduous forest and woodland is threatened in the BVI: semi-deciduous gallery forest, found growing along ghuts (drainages and seasonal steams). As with other forests within the broader class, a significant proportion of the trees lose their leaves during dry periods. However, a combination of the more sheltered aspect (and thus less exposed to damage by strong winds), and better availability of water, encourages a somewhat wider array of species to grow that are also able to attain a greater size. In the BVI, this is a very threatened vegetation type, with just 0.3% of the land area occupied by semi-deciduous gallery forest, equivalent to just 50 hectares across the BVI. The difficult terrain encountered within ghuts may well have offered a certain amount of protection from clearing, and those small remnants are now an important refugia for plant diversity. However, urbanisation continues to encroach on this habitat, despite the protection that planning regulations affords to drainages.

TIPAs HIGHLIGHT: Sabbath Hill

Encompassing much of the western part of the drainage that comes down into Paraquita Bay, this hillside supports some of the best areas of semi-deciduous gallery forest in the BVI, sheltered by the ghuts cutting down-slope.

The site is also important for its populations of *Agave missionum* and *Bastardiopsis eggersii*, both of which are globally threatened, as well as being home to four other species of conservation interest.

The slopes below Sabbath hill are important for their remaining semi-deciduous gallery forest. (M.A. Hamilton)

TIPAs HIGHLIGHT: Northeastern Jost van Dyke

The fourth largest of the BVI archipelago, Jost van Dyke, while relatively undeveloped, has been severely impacted by feral goats, which have been preventing the natural regeneration of forest and contributing to soil erosion. Nevertheless, the north eastern portion of the island has been identified as a TIPA, with Brown Ghut and Great Ghut among the best examples of semi-deciduous gallery forest in the BVI. In addition, the mangroves of East End Harbour and Cape Wright are important examples of this threatened habitat within the TIPA.

Jost van Dyke, as viewed from Tortola. (M.A.Hamilton)

Coastal Shrubland

The coastlines of the BVI are where plants experience some of the more extreme conditions in the islands: high temperatures, strong and salt-laden winds and low rainfall. It is not an environment where forests or woodlands can easily develop, and smaller stature shrubs are generally better adapted to survive these conditions. Many of the woody plants found here are deciduous during dry periods, while those that are evergreen tend to have thickened, tough leaves, better able to tolerate droughts, desiccating winds and salt spray. Cacti and other succulent plants are also often abundant in these areas, their thickened, fleshy and thick-skinned leaves or stems perfectly adapted to retain precious moisture in hot and dry places, and spines protect them from most grazing animals.

The threatened coastal shrubland occupies only 8.5% of the land area across the BVI. Much has been lost in recent centuries, and today is still under pressure from coastal development.

Underlying substrate has a very important influence over the nature of the vegetation in this zone, with sand, limestone pavement or volcanic rock influencing which plants may be found at an individual location, as the following examples illustrate.

TIPAs HIGHLIGHT: Anegada Island

Anegada was the first TIPA to be identified in the BVI and the world, meeting several criteria for inclusion. These include important populations of 11 globally threatened species: *Agave missionum*, *Argythamnia stahlii*, *Guaiacum officinale*, *Leptocereus quadricostatus*, *Malpighia woodburyana*, *Metastelma anegadense*, *Mitracarpus polycladus*, *Senna polyphylla* var. *neglecta*, *Vachellia anegadensis*, *Varronia rupicola* and *Zanthoxylum flavum*. It also holds among the best examples of several vegetation types threatened in the BVI: coastal shrubland, mangroves and dry salt flats.

With regard to coastal shrubland, Anegada has two forms, one occurring on the dune system and the other on the limestone pavement.

Along the north coast of Anegada are some extensive vegetated sand dunes, with a diverse range of shrubs, such as boxwood (*Sideroxylon obovatum*), whitewood (*Coccoloba krugii*) and clam cherry (*Byrsonima lucida*). Herbs of the dune system include West Indian milkwort (*Polygala hecatantha*) and the orchid *Tetramicra canaliculata*. The demand for sand for building projects makes this a habitat vulnerable to serious damage from illegal sand mining.

A little further to the east of Anegada's sand dunes, the coastal vegetation sits on a substrate of limestone. This habitat has many species in common with the seasonally deciduous woodlands it intergrades with inland, but individual plants rarely reach tree stature. Additionally, species such as wild frangipani (*Plumeria alba*), century plant (*Agave missionum*) and nothing nut (*Elaeodendron xylocarpum*) are common. Among the herbaceous plants found here are the threatened *Argythamnia stahlii* and *Mitracarpus polycladus*.

Anegada is home to some of the best examples of coastal shrubland in the BVI. (C.Clubbe)

The south-facing slopes of eastern Virgin Gorda support important examples of coastal shrubland. (S.Barrios)

Threatened coastal shrubland habitat on Norman Island. (M.A.Hamilton)

TIPAs HIGHLIGHT: Eastern Virgin Gorda

The peninsula projecting east from Gun Creek is the site for this Virgin Gorda TIPA. Encompassing Great Hill to Biras Hill, excluding the most developed sites such as at Bitter End and Carato Bay, this TIPA is home to some of the best examples of coastal shrubland, predominantly along the south-facing slopes.

In addition to its high-quality coastal shrubland, there are also good examples of mangrove vegetation in places, as well as important populations of globally threatened *Machaonia woodburyana* and *Maytenus cymosa*, plus several other species of conservation interest.

TIPAs HIGHLIGHT: Norman Island

The southernmost of the BVI is Norman Island, lying to the east of St John. Though privately-owned with some development, it is not permanently inhabited. It is among the best sites in the BVI for coastal shrubland, where it occupies many of the south-facing slopes as well as exposed headlands. It is for this habitat and the important populations of threatened *Bastardiopsis eggersii* and *Malpighia woodburyana*, that the entire island is recognised as a TIPA.

TIPAs HIGHLIGHT: Ginger Island

Like Norman Island, Ginger is a privately-owned, uninhabited island south of the Sir Francis Drake Channel, and similarly identified as a TIPA for its coastal shrubland, which covers more than ¼ of the island and important populations of *Bastardiopsis eggersii* and *Malpighia woodburyana*. The island was declared a bird sanctuary in 1959.

Ginger Island is home to an important population of globally threatened *Bastardiopsis eggersii*. (M.D.Sanchez)

Sparse vegetation

Coastal and interior rock and coastal grassland

In places across the Islands, conditions are such that not even shrublands can develop, leaving the land sparsely vegetated. The circumstances that lead to this can vary from situation to situation.

Relatively common is exposed rock, where only the most tenacious plants are able to persist. This is particularly so along coastlines, where the vegetation must be able to withstand salt spray and strong winds. Plants such as the bromeliad *Pitcairnia angustifolia* and woolly nipple cactus (*Mammillaria nivosa*) are good examples. Exposed rock may be found away from the coastline, particularly where the terrain is rugged. Shrubs such as bread-and-cheese (*Pithecellobium unguis-cati*) are able to get a foot-hold here, as well as rock dwelling orchids, such as Christmas orchid (*Epidendrum ciliare*).

Shark Bay National Park on Tortola has good examples of coastal rock vegetation. (T.M.Heller)

Grassland in the BVI is typically a highly disturbed vegetation type, such as here on Jost van Dyke. (M.Sanchez)

While there is some evidence that natural grasslands may have been present on islands of the archipelago, it seems that their sensitivity to disturbance has meant that they have largely been destroyed by the activities of humans and feral livestock. However, where the pressure of grazing animals is high, a different form of grassland can develop, often associated with introduced species. In these situations, only certain species of grasses are able to survive, resulting in the replacement of woodlands with disturbed grassland, especially close to the coast.

Dry salt flats

Dry salt flats are considered a threatened habitat, covering just 3.9% of the land area of the BVI, with much having been lost to coastal urbanisation. A characteristic plant of salt flats, saltwort (*Batis maritima*), is frequently seen along the drier margins of salt ponds. Other plants include bay flower (*Blutaparon vermiculare*), seashore dropseed (*Sporobolus virginicus*) and sea purslane (*Sesuvium portulacastrum*).

TIPAs HIGHLIGHT: Prickly Pear Island

Just north of Virgin Gorda is Prickly Pear, an uninhabited island that has been designated as a National Park. It has been identified as a TIPA on account of its dry salt flat vegetation, found at the margins of the three salt ponds on the island, where saltwort is abundant.

The island is also home to a high diversity of species of conservation interest, including *Agave missionum* and *Croton fishlockii*.

The salt ponds of Prickly Pear have important examples of dry salt flat vegetation around the margins. (R.Newton)

Other habitats

Several other habitats may be found in the BVI, some of which may be important for biodiversity, but are not treated here as a vegetation type.

Places such as urban areas, dominated by roads, buildings and other infrastructure are not home to many wild-growing native plants. The plants that do survive are typically non-native weeds and cultivated plants as part of planned landscaping. Likewise, plants on agricultural land are usually limited to sown grasses or crops and adventitious weeds.

Natural habitats such as sandy beaches and salt ponds are extremely valuable for biodiversity. For example, salt ponds are an important habitat for birds, and is the reason a large part of Anegada is designated a RAMSAR site of global significance for its wetlands. Likewise, sandy beaches are an important habitat for sea turtles, with leatherback, green, and hawksbill turtles known to nest in the BVI. However, such places don't support a significant cover of higher plants (flowering plants or ferns, for example), so are not considered in detail here.

Road Town is the largest urban area in the BVI, but few inhabited islands have escaped some degree of urbanisation. (M.Corcoran)

The BVI is famous for its beautiful beaches. An important habitat for nesting turtles and other fauna, sandy beaches do not support much vegetation. (M.D.Sanchez)

INVASIVE PLANTS

What are invasive plants?

One of the most serious threats to the survival of wild plants in the BVI is invasive, non-native ('alien') plants.

The BVI is home to almost 650 native plant species; these are plants which owe their presence on the islands to natural dispersal, in many cases in the distant geological past, whether blown in on the wind, drifted over the seas or carried by birds or other animals. In the case of some of these early arrivals, the process of evolution has given rise to endemic species, for example poke-me-boy (*Vachellia anegadensis*), which has evolved on the archipelago from an earlier ancestor.

In contrast, non-native plants are those that have arrived in the islands through human activities, either intentionally or accidentally. Over 260 have been recorded in the BVI to date. For example, many have been introduced for cultivation as food plants or ornamentals but have subsequently escaped cultivation and are now found growing in the wild. An example is the mango tree (*Mangifera indica*), familiar to most in the BVI. Found growing as a native plant on the Indian Subcontinent, domesticated varieties have been cultivated for thousands of years. It is thought to have been introduced to the Caribbean in the 18th century. Though still cultivated, it is also able to establish in the wild in the BVI and is often found at the edges of forests close to human habitation. Similarly, some species of plants have been introduced inadvertently, perhaps as weeds associated with agricultural imports or attached to the clothing of unwitting travellers. While there are many such examples of non-native plant species in the BVI, most are thought to present a relatively low threat. In some cases, this is because they have not shown any great tendency to increase in numbers or are only found in urban environments. However, of great concern are those that cause damage to the environment, the economy or human health: these we term invasive, non-native plant species. A recent study of the non-native flora of Puerto Rico and the Virgin Islands reported 177 invasive species and 463 naturalised species (non-native species established in the wild) of plants in the region. The number of non-native plant species is increasing, linked to the greater movement of people through international travel and the global trade in goods, particularly exotic plants for landscaping.

In the pages that follow, details of some of the most serious invasive plant species in the BVI are presented, though other species are likely to become problematic over time, and new species will undoubtedly arrive in the islands with the movement of people and goods. This highlights the need for improved biosecurity and quarantine facilities to reduce this on-going threat.

← **Vegetation on Anegada** (M.A. Hamilton)

The vigorous growth of purple allamanda (*Cryptostegia madagascariensis*) smothers surrounding vegetation. (M.A.Hamilton)

Impacts of invasive plants

There are several reasons why invasive plants give us cause for concern. Invasive plants can have serious impacts on human activities and the economy, such as weeds of agricultural systems affecting crop yields, and invasive aquatic plants blocking ditches and water courses. Invasive plants pose a major threat to the wider environment, altering and degrading natural habitats and impacting negatively on the native plants and animals found there. Often, this is through the vigorous growth of the invasive species, whereby they are better able to compete for space and nutrients than native species. For example, in places where the vegetation has been disturbed by fire or cleared by people, invasive species are often faster at colonising the area than native species and, once established, prevent the seeds and seedlings of native species from growing.

Management of invasive plants

The first line of defence in protecting against the harm caused by invasive plants is to prevent their arrival in the first place. This is achieved through strong biosecurity at the point of entry into the BVI, whereby imports of goods are carefully checked, so that species known to be a problem elsewhere in the world cannot be imported, and to protect against unwelcome stowaways. The public have a role to play in this, through an awareness of plant health regulations when importing plant material, as well as ensuring that there is little chance of seeds coming in on dirty footwear or in luggage.

When a non-native plant begins to spread in the wild, it is imperative that control methods are employed early. Once invasive plants are established, it becomes considerably more labour-intensive and expensive to control them. Methods for controlling invasive plant species can be broadly classified into three categories: physical (or mechanical), chemical, and biological control. Physical control involves manual or mechanical removal of part or all of the plant, such as through cutting, ring-barking (removal of all bark around the stem at a given point) or hand-pulling; chemical control includes foliar spraying and treating cut stumps with herbicides; biological control involves the release of specially introduced natural enemies (e.g. fungal pathogens and insects) that reduce plant vigour or seed production. Often, successful management requires integrated control, deploying a combination of at least two of these methods. Physical and chemical control methods tend to be short-term activities suitable for smaller plant invasions that, with repeated follow-up, can result in complete eradication of the target species. In contrast, biological control is much more suited to large-scale invasions and aims to control (rather than eradicate) invasive plant species where other methods are impractical.

Cutting and uprooting can be very labour intensive, practical only in the early stages of invasion. (M.D.Sanchez)

Further advice

While it is important to act quickly to stop the spread of an invasive plant species, care must also be taken not to cause unwitting damage to the natural environment, such as removal of a native plant misidentified as a non-native species, or misuse of herbicides. Irresponsible disposal of plants can also help to spread the species to more sites. If you encounter plants in the BVI you suspect are potentially invasive and require confirmation or further guidance on their identification and control, contact NPTVI using the details found at the beginning of this guide.

Understanding the species accounts

The layout of the following species accounts is broadly the same as for the threatened species in the previous chapter and as explained in the introduction to that chapter. In addition, the following sections are included:

Impacts. This section describes some of the ways in which the invasive species has an impact, whether it be directly on human activity (such as agriculture), native biodiversity, or the wider environment. Where the invasive species has been recorded close (less than 250 m) to populations of threatened plants described in the previous chapter, the relevant species are listed here.

Control measures. Methods likely to be most successful in the control of this species are given. They typically consider the habit and lifecycle of the plant. For example, those plants which are capable of regrowth from cut stumps would need mechanical removal of the root-ball or treatment with a systemic herbicide.

Notes. This section gives information on any economic, cultural or medicinal uses of the plant described, dispersal mechanisms relevant to their spread as an invasive species as well as the earliest date it was recorded from the Puerto Rican Bank.

← **Invasive *Casuarina equisetifolia* on Anegada** (S. Bárrios)

Calotropis procera

Cabbage plant

APOCYNACEAE (PERIWINKLE FAMILY)

Description: Erect shrub to 4 m tall. Leaves in opposite pairs, usually rounded, 12 to 20 cm long, pale grey-green coloured. Flowers about 2 cm across, with fleshy petals deep violet, white toward the centre of the flower. Fruit an inflated 'pod', 8 to 13 cm long. Seeds with a tuft of silky hairs.

Habitat: Favouring dry places, especially in disturbed areas and along roadsides.

Global distribution: Native from Africa to Indo-China. Introduced to the Caribbean, Central and Southern America, and Australia.

Recorded in the BVI: Anegada, Great Tobago, Jost van Dyke, Little Thatch, Salt Island, Tortola, and Virgin Gorda.

Impacts: Highly competitive with native species and forms dense thickets. Currently found close to populations of *Agave missionum*, *Cedrela odorata*, *Machaonia woodburyana*, *Maytenus cymosa*, *Psychilis macconnelliae*, *Rondeletia pilosa*, *Tolumnia prionochila*, *Vachellia anegadensis*, and *Varronia rupicola*.

Control measures: Deep roots make this species hard to control. Cutting and herbicide have proved successful methods.

Notes: A medicinal and ornamental plant. The seeds are wind dispersed.

First recorded in the Puerto Rican Bank: 1879.

Plant habit

Young sapling

Cluster of flowers

Fruiting branch

Cryptostegia madagascariensis

Purple allamanda

APOCYNACEAE (PERIWINKLE FAMILY)

Description: A shrub or liana to 10 m long. Leaves in opposite pairs, 4 to 10 cm long, oval-shaped, tough, dark green with a pale midvein. Petals joined to form a 4 to 6 cm long funnel-shaped tube, violet. Fruit a pair of pointed 'pods' 10 to 13 cm long. Seeds with a long tuft of silky hairs.

Habitat: Favours dry areas, especially open woodland and disturbed areas.

Global distribution: Native to Madagascar. Introduced to Australia, Central & Southern America, USA, and Caribbean.

Recorded in the BVI: Anegada, Cooper Island, Great Camanoe, Great Thatch, Guana, Jost van Dyke, Marina Cay, Mosquito Island, Peter Island, Salt Island, Tortola, and Virgin Gorda.

Impacts: A Brazilian study shows significant impact on plant community composition. Currently found close to populations of *Agave missionum*, *Argythamnia stahlii*, *Bastardiopsis eggersii*, *Guaiacum officinale*, *Leptocereus quadricostatus*, *Malpighia woodburyana*, *Metastelma anegadense*, *Pitcairnia jareckii*, *Senna polyphylla* var. *neglecta*, *Tillandsia x lineatispica*, *Vachellia anegadensis*, *Varronia rupicola*, and *Zanthoxylum flavum*.

Control measures: Cutting, uprooting, and chemical control have been met with limited success.

Notes: Introduced for rubber production and ornamental purposes.

First recorded in the Puerto Rican Bank: 1915.

Plant habit

Plant habit

Flower

Unripe fruit

Agave sisalana

Sisal

ASPARAGACEAE (ASPARAGUS FAMILY)

Description: Trunk up to 1 m tall. Leaves arranged in a dense crown at the top of the trunk, to 1.5 m long, sword-shaped, grey-green, with a sharp point. Flowers on leafless, erect stem up to 6 m tall, branching in the upper half. Individual flowers are 4 to 6 cm long, yellowish-green. Fruit are rarely formed, with small plantlets instead often forming at the top of the stem.

Habitat: Found particularly in areas close to abandoned agriculture and disturbed areas.

Global distribution: Native to Mexico. Introduced to the Caribbean, Africa, Asia, Europe, North and South America and Australia.

Recorded in the BVI: Virgin Gorda.

Impacts: In areas where it has invaded, it reduces native biodiversity and inhibits the growth of other species. It is an alternate host for the *agave* snout weevil, which is having a serious impact on native *Agave missionum*.

Control measures: Difficult to control physically due to deep roots. Application of herbicide to cut stems of the plant provides an effective control.

Notes: Spreads vegetatively. Differs from the native *Agave missionum* by having leaves gray-green when young, with smooth edges or very few small prickles. Ornamental and spread around the world as a plantation plant in the fibre production industry.

First recorded in the Puerto Rican Bank: 1902.

Plant habit

Crown of stem with leaf bases

Cluster of flowers

Flowering stem, with flowers developing into plantlets, rather than fruit

Asparagus aethiopicus

Asparagus fern

ASPARAGACEAE (ASPARAGUS FAMILY)

Description: A sub-shrub with scrambling stems to 3 m long, very densely branched, with clusters of needle-like 'leaves', 8 to 30 mm long, and short scale-like spines. Flowers in clusters of 5 to 9, about 3 mm across, white to pale pink. The fruit are red berries 5 to 10 mm in diameter.

Habitat: Found particularly in disturbed areas, especially roadsides.

Global distribution: Native to Southern Africa. Introduced to the Caribbean, Americas, Australia & Pacific Islands.

Recorded in the BVI: Guana Island and in gardens on Tortola.

Impacts: This plant can displace native species. Currently found close to populations of *Agave missionum*, *Bastardiopsis eggersii*, *Guaiacum officinale*, and *Pitcairnia jareckii*.

Control measures: Digging out plants, including the whole root ball. Application of herbicide can help prevent regrowth.

Notes: Ornamental with fruit that are attractive to birds, aiding its dispersal.

First recorded in the Puerto Rican Bank: 1922.

Plant habit

Close up of branch, showing needle-like "leaves"

Branch showing open flowers

Branch with ripe red fruit

Sansevieria hyacinthoides

Mother-in-law's tongue

ASPARAGACEAE (ASPARAGUS FAMILY)

Description: A robust herb spreading by undergorund rhizomes. The leaves are sword-shaped, erect, 30 to 100 cm long, dull green, mottled pale green, and a red margin to the blade. The flowers are clustered in a dense spike 30 to 70 cm long, greenish-white.

Habitat: Found particularly in disturbed areas.

Global distribution: Native to Southern and East Africa. Introduced to the Caribbean and North and Central America.

Recorded in the BVI: Beef Island, Cooper Island, Jost van Dyke, Little Thatch, Norman Island, Peter Island, and Tortola.

Impacts: Can form dense patches, displacing native species. Currently found close to populations of *Agave missionum*. It is an alternate host for the *Agave* snout weevil, which is having a serious impact on native *Agave missionum*.

Control measures: Physical removal of plants, including rhizomes is necessary. Plants require careful disposal, as uprooted segments can help spread the plant to new sites.

Notes: Ornamental plant and fibre crop.

First recorded in the Puerto Rican Bank: 1886.

Plant habit

Leaves

Flowering head

Close up of flowers

Spathodea campanulata

African tulip tree

BIGNONIACEAE (TRUMPETVINE FAMILY)

Description: Tree to 30 m tall, the bark smooth and greyish. Leaves in opposite pairs, divided into 9 to 15 leaflets 5 to 12 cm long. The flowers are bell-shaped, 6 to 9 cm long, bright orange. Fruit woody, 17 to 25 cm long, opening along one side. Seeds with membranous wings.

Habitat: Invading natural forests, particularly on rich soils.

Global distribution: Native to tropical Africa. Introduced in the Caribbean, Americas, Southern Africa, Asia, and Australia.

Recorded in the BVI: Tortola and Virgin Gorda.

Impacts: Spreads rapidly when allowed to fruit. Can invade native forest as well as agriculture, shading out native plants (including other trees). A serious invasive problem elsewhere in the tropics, including Puerto Rico. Currently found close to populations of *Croton fishlockii*, *Galactia eggersii*, *Machaonia woodburyana*, *Metastelma anegadense*, *Reynosia guama*, *Rondeletia pilosa*, and *Zanthoxylum thomasianum*.

Control measures: Very easily regrows from the roots, so chemical control is needed to treat cut stems, where uprooting is not possible.

Notes: Widely introduced as an ornamental.

First recorded in the Puerto Rican Bank: 1883.

Habit

Sapling

Leaves

Close up of flower

Casuarina equisetifolia

Whistling pine

CASUARINACEAE (SHE-OAK FAMILY)

Description: A large tree to 30 m tall, bark greyish brown and scaly. Branches slender and pendulous towards the tips. Leaves tiny, scale-like and pressed against the drooping twigs. Male and female flowers tiny, in separate clusters. Fruit woody, cone-like, to 2 cm long.

Habitat: Found along sandy coastlines, especially close to the strand line of sandy beaches.

Global distribution: Native to Australia through South East Asia and Pacific Islands to India. Introduced to the Caribbean, Americas, Africa, Asia & Southern Europe.

Recorded in the BVI: Anegada, Guana, Necker, Tortola, and Virgin Gorda.

Impacts: Spreads quickly by wind-blown seed. Can quickly form dense stands, drastically altering the biodiversity and soils of coastal habitats, including turtle nesting grounds. The leaf-litter impedes the germination of native plant seeds. Currently found close to populations of *Malpighia woodburyana*, *Metastelma anegadense*, *Sabal causiarum*, *Vachellia anegadensis*, and *Varronia rupicola*.

Control measures: Seedlings and saplings can be removed manually, while the stumps of larger trees need to be treated to prevent regrowth.

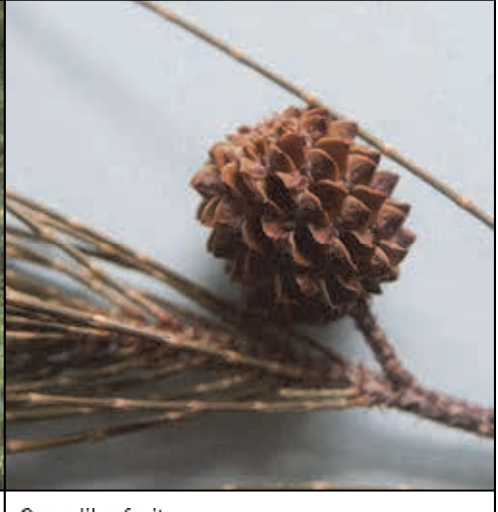
Notes: A plantation species that was used for its timber as well as for environmental reasons such as dune stabilization and as a shade tree.

First recorded in the Puerto Rican Bank: 1886.

Plant habit

Bark

Foliage



Cone-like fruit

Arivela viscosa

Asian spiderflower

CLEOMACEAE (SPIDERFLOWER FAMILY)

Description: Herb or small shrub to 1 m tall. Leaves divided into 3 or 5 leaflets, 1 to 7 cm long, covered with minute, sticky hairs. Flowers with 4 yellow petals, 1 cm long, with a gap in the lower half of the flower. The fruit is 6 to 8 cm long, splitting on drying to release the tiny seeds.

Habitat: Found especially in open, dry areas grazed by feral livestock.

Global distribution: Native to Southern Asia (and possibly Africa and Australia). Introduced to the Caribbean, the Americas, Eastern Asia, and Pacific Islands.

Recorded in the BVI: Beef Island, Cooper Island, Great Tobago, Guana, Jost van Dyke, Norman Island, Peter Island, Prickly Pear Island, Salt Island, and Tortola.

Impacts: The species can impact crops and has the potential to outcompete native vegetation. Currently found close to populations of *Agave missionum*, *Bastardiopsis eggersii*, *Croton fishlockii*, *Galactia eggersii*, *Guaiacum officinale*, *Malpighia woodburyana*, *Pitcairnia jareckii*, *Psychilis macconnelliae*, *Reynosia guama*, *Rondeletia pilosa*, *Tillandsia x lineatispica*, and *Tolumnia prionochila*.

Control measures: Small colonies can be controlled by pulling out plants manually.

Notes: Uncertain how it arrived in the region, but probably a contaminant in nursery materials. The large numbers of sticky seeds are easily dispersed.

First recorded in the Puerto Rican Bank: 1880.

Plant habit

Sprouting shoot, showing foliage

Flowering shoot

Plant with immature fruit

Bryophyllum pinnatum

Leaf of life

CRASSULACEAE (STONECROP FAMILY)

Description: A fleshy herb to 1 m tall. Leaves in opposite pairs, sometimes divided into 3 to 5 leaflets, to 13 cm long, with scalloped edges often producing tiny plantlets. Flowers hang in loosely branched clusters at the top of the plant. The sepals are joined into an inflated tube.

Habitat: Often in open, disturbed areas, but also spreading into naturally open woodland.

Global distribution: Native to Madagascar. Introduced to the Caribbean, Americas, Africa, Asia, Oceania and Pacific Islands.

Recorded in the BVI: Anegada, Guana, Jost van Dyke, Tortola, and Virgin Gorda.

Impacts: Can form dense stands which displace native vegetation. It is also poisonous to cattle. Currently found close to populations of *Agave missionum*, *Anthurium x selloum*, *Galactia eggersii*, *Malpighia woodburyana*, *Metastelma anegadense*, *Psychilis macconnelliae*, *Reynosia guama*, *Rondeletia pilosa*, *Sabal causiarum*, and *Vachellia anegadensis*.

Control measures: Can be controlled by manual removal, but care must be taken to remove completely and disposed of carefully. Some kinds of herbicide, but not all, are effective against this species.

Notes: An ornamental and medicinal plant.

First recorded in the Puerto Rican Bank: 1876.

Habitat, showing spread of plants

Plant habit

Foliage

Flowers, showing inflated tube formed by the sepals

Scaevola taccada

Beach cabbage

GOODENIACEAE (HALF-FLOWER FAMILY)

Description: A shrub up to 3 m tall. Leaves often densely crowded, oblong, 15 cm long or more. Flowers white, with five petals joined at the base into a narrow tube 10 to 15 mm long, split down one side and opening out into a broad funnel shape. Fruit white, fleshy.

Habitat: Found along sandy coasts, just above the strandline.

Global distribution: Native to East and Southern Africa, Indian Ocean to Pacific Ocean. Introduced to the Caribbean and Americas.

Recorded in the BVI: Anegada, Beef Island, Cooper Island, Dead Chest Island, Great Camanoe, Guana, Jost van Dyke, Little Thatch, Marina Cay, Necker Island, Peter Island, Tortola, and Virgin Gorda.

Impacts: An aggressive invader, out-competing and displacing native vegetation. Diverse native coastal plant communities can rapidly be turned into a uniform mass of exotic foliage which supports little native biodiversity.

Control measures: Plants can be manually controlled, but can easily regrow from any underground stems. Use of chemical control measures only advisable under exceptional circumstances due to the pollution risk associated with using herbicides close to water.

Notes: Introduced outside its native range to stop coastal erosion and as an ornamental, the buoyant and salt-tolerant seeds can travel large distances in ocean currents.

First recorded in the Puerto Rican Bank: 1995.

Plant habit

Foliage

Flowering branch

Fruit

Abrus precatorius

Jumbie beads

LEGUMINOSAE (PEA FAMILY)

Description: A twining vine to 3 m long. Leaves divided into 8 to 15 pairs of oblong leaflets, each to 1.5 cm long. Flowers pea-like, pink, to 1 cm long, grouped in an elongated cluster. Pods 2 to 3.5 cm long, splitting open to reveal bright red seeds with a black spot.

Habitat: A weed of disturbed areas, especially roadsides.

Global distribution: Native to the Old World. Introduced to the New World tropics and Pacific regions.

Recorded in the BVI: Anegada, Guana, Jost van Dyke, Tortola, and Virgin Gorda.

Impacts: The seeds are poisonous. Plants spread quickly, dominating native flora and alters soil nutrients. Currently found close to populations of *Agave missionum*, *Anthurium x selloum*, *Pilea sanctae-crucis*, *Reynosia guama*, and *Sabal causiarum*.

Control measures: Deep roots mean *A. precatorius* is difficult to eradicate using mechanical means, but herbicides have proven useful in controlling this species. Subsequent control of seedlings through hand-pulling is essential.

Notes: Used for ornamental and medicinal purposes. The seeds, though sometimes used as decorative beads, are extremely poisonous when ingested.

First recorded in the Puerto Rican Bank: 1874.

Plant scrambling over shrubs

Foliage and fruits

Cluster of flowers

Fruit, showing split pods and seeds within

Leucaena leucocephala

Wild tamarind

LEGUMINOSAE (PEA FAMILY)

Description: A small tree to 5 m tall. Leaves 14 to 22 cm long, twice-divided into 5 to 7 paired groups of 9 to 14 pairs of small leaflets, 7 to 14 mm long. Flowers small, grouped into spherical 'powder-puff' heads to 2 cm across, white. Pods 15 to 20 cm long, flattened with thickened edges.

Habitat: In many habitats, including moist forest and dry coastal scrub, especially where disturbed e.g. along roads.

Global distribution: Native to Central America. Introduced widely in the New and Old World Tropics.

Recorded in the BVI: Anegada, Beef Island, Cooper Island, Great Camanoe, Great Thatch, Great Tobago, Guana, Jost van Dyke, Little Thatch, Marina Cay, Norman Island, Peter Island, Prickly Pear Island, Scrub Island, Tortola, and Virgin Gorda.

Impacts: An aggressive invader of open and disturbed sites, modifying soil nutrients and preventing regrowth of native species. Currently found close to populations of many of BVI's threatened plants, including *Agave missionum*, *Bastardiopsis eggersii*, *Guaiacum officinale*, *Machaonia woodburyana*, *Pitcairnia jareckii*, *Senna polyphylla* var. *neglecta*, *Vachellia anegadensis*, *Varronia rupicola*, and *Zanthoxylum thomasianum*.

Control measures: Very difficult to control, with vigorous regrowth from cut tree stumps. The entire root system must be removed, or stumps treated with herbicide.

Notes: One of the major fodder trees in the tropics and promoted for use in agriculture.

First recorded in the Puerto Rican Bank: 1881.

Plant habit

Tree in fruit

Flowering branch

Ripe fruit

Parkinsonia aculeata

Jerusalem thorn

LEGUMINOSAE (PEA FAMILY)

Description: Small tree to 8 m tall. Branches with spines 7 to 12 mm long. Leaves 15 to 30 cm long, with numerous leaflets 2 to 5 mm long, which fall in dry weather, leaving the green leaf stalk bare. The flowers are yellow, with one petal with a reddish-orange spot. The seed pod is 4 to 14 cm long.

Habitat: A common shrub of dry areas.

Global distribution: Mexico, but also possibly the wider New World tropics. Cultivated throughout the Caribbean. Introduced to southern Europe, Middle East, Africa, Asia, and Oceania.

Recorded in the BVI: Anegada, Beef Island, Guana Island, Jost van Dyke, Norman Island, Tortola and Virgin Gorda.

Impacts: Forms dense impenetrable thickets, with impacts on livestock grazing, and encroaching on native vegetation. Currently found close to populations of *Agave missionum*, *Bastardiopsis eggersii*, *Croton fishlockii*, *Guaiacum officinale*, *Maytenus cymosa*, *Peperomia wheeleri*, *Pitcairnia jareckii*, *Psychilis macconnelliae*, *Reynosia guama*, *Rondeletia pilosa*, *Tillandsia x lineatispica*, *Tolumnia prionochila*, and *Zanthoxylum thomasianum*.

Control measures: Manual pulling of smaller plants is effective, though care must be taken with spines. Machinery is required when uprooting larger plants. Chemical control is effective on cut tree stumps.

Notes: Spread widely as an ornamental, forestry, fodder, stabilising and hedging plant.

First recorded in the Puerto Rican Bank: 1874.

Plant habit

Young plant

Flowers

Fruit

Azadirachta indica

Neem tree

MELIACEAE (MAHOGANY FAMILY)

Description: A tree to 10 m tall. Bark gray with scaly plates. Leaves over 30 cm long, divided into 9 to 15 leaflets with toothed margins. Flowers in narrow, branched clusters. Petals white, 4 mm long. Fruit yellow, fleshy, 10 to 13 mm long, with a single hard stone.

Habitat: Spreading into natural vegetation from trees planted in urban areas and gardens.

Global distribution: Probably native from India to Cambodia and into parts of Indonesia. Introduced to the Caribbean, Americas, Africa and Australia.

Recorded in the BVI: Anegada, Beef Island, Cooper Island, Guana, Necker Island, Peter Island, Virgin Gorda, and Tortola.

Impacts: Outcompetes native vegetation in dry habitats. Currently found close to populations of *Agave missionum*, *Anthurium x selloum*, *Bastardiopsis eggersii*, *Calyptranthes thomasiana*, *Croton fishlockii*, *Galactia eggersii*, *Guaiacum officinale*, *Machaonia woodburyana*, *Malpighia woodburyana*, *Maytenus cymosa*, *Pitcairnia jareckii*, *Rondeletia pilosa*, and *Sabal causiarum*.

Control measures: Manual pulling of saplings, while larger trees will need cut stumps treated with herbicide to prevent regrowth.

Notes: Differs from West Indian mahogany (*Swietenia mahagoni*) in having toothed, not smooth-edged leaflets. Planted for landscaping purposes, and widely used for its medicinal qualities.

First recorded in the Puerto Rican Bank: 1983.

Sapling and relatively young tree

Foliage

Flowering branch

Fruiting branch

Melia azedarach

Pride of India

MELIACEAE (MAHOGANY FAMILY)

Description: A shrub or small tree to 10 m tall, bark reddish-brown, fissured. Leaves two to three times divided, 2 to 6 pairs of leaflets 3 to 8 cm long, tapering gradually at the tip, the margins toothed. Flowers in branching inflorescences, the petals 8 to 12 mm long, white to light violet. Fruit 1 to 1.5 cm long, yellow, fleshy, with a single hard stone.

Habitat: Spreading from trees planted in urban areas and gardens.

Global distribution: Native range uncertain, apparently India through South East Asia to Australia. Introduced to the Caribbean, Americas, Africa, Asia, Southern Europe and Pacific Islands.

Recorded in the BVI: Tortola.

Impacts: Can prevent the regeneration of native plants in areas it invades. The flowers can cause respiratory problems, and all parts of the plant are toxic.

Control measures: Saplings can be manually removed. Larger trees should have the stump treated chemically, though this may not always be effective.

Notes: Ornamental shade tree and also used in reforestation as it is fast growing. A multi-purpose tree that has been used for medicine and timber.

First recorded in the Puerto Rican Bank: 1874.

Plant habit

Flowering branch

Closer view of flower

Fruiting branch

Syzygium jambos

Rose apple

MYRTACEAE (MYRTLE FAMILY)

Description: A small tree to 10 m tall. Leaves 9 to 20 cm long, narrow, with 14 to 20 pairs of veins. Flowers in clusters of around 6, petals 4, white, soon falling, stamens numerous, up to 3 cm long, giving the flower a showy, 'powder-puff' appearance. Fruit white, to 2.5 cm long.

Habitat: Common in thickets and woodlands.

Global distribution: Native to South East Asia. Introduced to the Caribbean, Americas, Africa, and Oceania.

Recorded in the BVI: Tortola.

Impacts: This species is an alternate host for various species of fruit fly, which attacks several kinds of tropical fruit trees. It can form dense stands, preventing the regeneration of native vegetation. Currently found close to populations of *Calyptranthes kiaerskovii*, *C. thomasiana*, *Ilex urbaniana*, *Miconia thomasiana*, and *Pilea sanctae-crucis*.

Control measures: Seedlings can be controlled by hand-pulling. Application of herbicide to cut surfaces can be an effective chemical control.

Notes: Introduced for wood and its fruit. Also ornamental.

First recorded in the Puerto Rican Bank: 1874.

VIRGIN ISLANDS INVASIVES

Many-stemmed base to tree

Leaves and developing fruit

Flowers

Fruit

Antigonon leptopus

Cemetery vine

POLYGONACEAE (KNOTWEED FAMILY)

Description: A vine to 13 m long. Leaves oval to triangular or lance-shaped, with wavy margins, to 14 cm long. Flowers in loose, branching clusters which end in a coiled tendril. Petals 5, bright pink (rarely white).

Habitat: Found particularly in disturbed areas, especially roadsides.

Global distribution: Native to Central America. Introduced to the Caribbean, North and South America, Asia and Africa.

Recorded in the BVI: Anegada, Guana Island, Tortola, and Virgin Gorda.

Impacts: Fast growing vine that can rapidly out compete native species and smother vegetation. Currently found close to populations of *Agave missionum*, *Bastardiopsis eggersii*, *Guaiacum officinale*, and *Pitcairnia jareckii*.

Control measures: Small invasions can be managed manually, while larger plants need to be followed up with chemical control once signs of regrowth are seen.

Notes: Ornamental & medicinal uses. Produces large numbers of seeds that are easily dispersed.

First recorded in the Puerto Rican Bank: 1882.

VIRGIN ISLANDS INVASIVES

Plant habit, scrambling over other vegetation

Foliage

Flowers

Developing fruit

Triphasia trifolia

Sweet lime

RUTACEAE (CITRUS FAMILY)

Description: Shrub to 2 m tall, with a pair of spines at the base of the leaf stalks. Leaves divided into 3 leaflets, notched at the tip and the margins scalloped, the side leaflets smaller. Flowers fragrant, with 3 petals, 8 to 9 mm long, white. Fruit a berry with lemon-scented red or orange skin.

Habitat: A common understory shrub of coastal dry forests and open coastal areas.

Global distribution: Native to South East Asia, also possibly into the Indian subcontinent. Introduced to the Caribbean, Americas, and Southern Indian Ocean islands.

Recorded in the BVI: Tortola.

Impacts: The dispersal of its fruits is by birds, promoting its spread into native forests, where it can form dense thickets. It is also an alternate host for Asian citrus psyllid, a vector for citrus greening disease, with serious impacts on commercial citrus crops. Currently found close to populations of *Agave missionum* and *Cedrela odorata*.

Control measures: A difficult species to control, because of its flexible, spiny stems. Best controlled by a combination of mechanical and chemical methods.

Notes: Ornamental.

First recorded in the Puerto Rican Bank: 1881.

Plant habit

Foliage

Flowering branch

Fruit

APPENDIX 1

THREATENED PLANTS AND SPECIES OF CONSERVATION CONCERN

Species (Family)	Common name	IUCN assessment	TIPA criterion species			
			A(i)	A(iii)	A(iv)	B(ii)
Agave missionum Trel. (Asparagaceae)	Puerto Rican Bank century plant	VU (B1ab (ii,iii,v) +2ab (ii,iii,v))	Y	N	N	Y
Anthurium x *selloum* K.Koch (Araceae)	Virgin Islands laceleaf	Not assessed as hybrid.	N	Y	N	Y
Argythamnia stahlii Urb. (Euphorbiaceae)	Stahl's silverbush	VU (B1ab(iii,v) + 2ab(iii,v))	Y	N	N	Y
Bastardiopsis eggersii (Baker f.) Fuertes & Fryxell (Malvaceae)	Jost Van Dyke's Indian mallow	EN (C2a(i))	Y	N	N	Y
Calyptranthes kiaerskovii Krug & Urb. (Myrtaceae)	Kiaerskov's lidflower	CR (C2a(i))	Y	N	N	Y
Calyptranthes thomasiana O.Berg (Myrtaceae)	St Thomas lidflower	EN (B1ab(iii,v)+2ab(iii,v))	Y	N	N	Y
Cedrela odorata L. (Meliaceae)	Spanish cedar	VU (A3bcd+4bcd)	Y	N	N	Y
Croton fishlockii Britton (Euphorbiaceae)	Fishlock's croton	NT	N	N	N	Y
Erythrina eggersii Krukoff & Moldenke (Leguminosae)	Puerto Rican Bank cock's spur	EN (C2a(i))	Y	N	N	Y
Galactia eggersii Urb. (Leguminosae)	Eggers' milkpea	NT	N	N	N	Y
Guaiacum officinale L. (Zygophyllaceae)	Lignum vitae	EN (C2a)	Y	N	N	Y
Ilex urbaniana Loes. ex Urb. (Aquifoliaceae)	Urban's holly	VU (C2a(i))	Y	N	N	Y
Leptocereus quadricostatus (Bello) Britton & Rose (Cactaceae)	Prickly web	EN (B1ab(iii))	Y	N	N	Y
Machaonia woodburyana Acev.-Rodr. (Rubiaceae)	Woodbury's machaonia	EN (B1ab(iii,iv,v)+ 2ab(iii,iv,v); C2a(i))	Y	N	N	Y
Malpighia woodburyana Vivaldi (Malpighiaceae)	Mad dog	VU (B2ab(ii,iii,v); C2a(i))	Y	N	N	Y
Maytenus cymosa Krug & Urb. (Celastraceae)	Caribbean mayten	EN (B2ab(ii,iii,iv,v); C2a(i))	Y	N	N	Y
Metastelma anegadense Britton (Apocynaceae)	Wire wist	EN (B1ab(ii,iii,v)+2ab(ii,iii,v))	Y	N	N	Y

← ***Senna polyphylla* var. *neglecta*, found only on Anegada and threatened with extinction** (T.M. Heller)

THREATENED PLANTS AND SPECIES OF CONSERVATION CONCERN

Species (Family)	Common name	IUCN assessment	TIPA criterion species			
			A(i)	A(iii)	A(iv)	B(ii)
Miconia thomasiana DC. (Melastomataceae)	Puerto Rican Bank camassey	NT B1ab(iii,v)+ 2ab(iii,v); C2a(i)	N	N	N	Y
Mitracarpus polycladus Urb. (Rubiaceae)	Caña Gorda girdlepod	EN (B2ab(iii,v))	Y	N	N	Y
Peperomia wheeleri Britton (Piperaceae)	Wheeler's peperomia	EN (B2ab(iii,v))	Y	N	N	Y
Picrasma excelsa (Sw.) Planch. (Simaroubaceae)	Bitter ash	VU (A1cd)	Y	N	N	Y
Pilea sanctae-crucis Liebm. (Urticaceae)	Virgin Island clearweed	EN (B1ab(iii), B2ab(iii))	Y	N	N	Y
Piptocoma antillana Urb. (Asteraceae)	Antilles velvetshrub	LC	N	N	N	Y
Pitcairnia jareckii Proctor & Cedeño-Mald. (Bromeliaceae)	Jarecki's pitcairnia	EN (B1ab(iii,v)+ 2ab(iii,v); C2a(i))	Y	N	N	Y
Psychilis macconnelliae Sauleda (Orchidaceae)	Island peacock orchid	NT	N	N	N	Y
Reynosia guama Urb. (Rhamnaceae)	Guamá	NT	N	N	N	Y
Rondeletia pilosa Sw. (Rubiaceae)	Hairy rondeletia	NT	N	N	N	Y
Sabal causiarum (O.F.Cook) Becc. (Arecaceae)	Puerto Rican hat palm	VU (C2a(i))	Y	N	N	Y
Senna polyphylla var. *neglecta* H.S.Irwin & Barneby (Leguminosae)		CR (B1ab(ii,iii,v))	Y	N	N	Y
Tillandsia x *lineatispica* Mez (Bromeliaceae)	Puerto Rican Bank piñon	Not assessed as hybrid.	N	N	Y	Y
Tolumnia prionochila (Kraenzl.) Braem (Orchidaceae)	Puerto Rican Bank dancing-lady orchid	NT	N	N	N	Y
Vachellia anegadensis (Britton) Seigler & Ebinger (Leguminosae)	Poke-me-boy	EN (B1ab(iii,v)+ 2ab(iii,v))	Y	N	N	Y
Varronia rupicola (Urb.) Britton (Boraginaceae)		EN (B2ab(ii,iii,v))	Y	N	N	Y
Zanthoxylum flavum Vahl (Rutaceae)	St Thomas prickly-ash	VU (A1c)	Y	N	N	Y
Zanthoxylum thomasianum Krug & Urb. (Rutaceae)	Satinwood	EN (B2ab(ii,iii,v); C2a(i))	Y	N	N	Y

APPENDIX 2

INVASIVE PLANTS

Species (Family)	Common name	Global Invasive Species Database page
Calotropis procera (Aiton) W.T.Aiton (Apocynaceae)	Cabbage plant	
Cryptostegia madagascariensis Bojer ex Decne. (Apocynaceae)	Purple allamanda	http://www.iucngisd.org/gisd/speciesname/Cryptostegia+madagascariensis
Agave sisalana Perrine (Asparagaceae)	Sisal	http://www.iucngisd.org/gisd/speciesname/Agave+sisalana
Asparagus aethiopicus L. (Asparagaceae)	Asparagus fern	http://www.iucngisd.org/gisd/speciesname/Asparagus+densiflorus
Sansevieria hyacinthoides (L.) Druce (Asparagaceae)	Mother-in-law's tongue	http://www.iucngisd.org/gisd/speciesname/Sansevieria+hyacinthoides
Spathodea campanulata P.Beauv. (Bignoniaceae)	African tulip tree	http://www.iucngisd.org/gisd/speciesname/Spathodea+campanulata
Casuarina equisetifolia L. (Casuarinaceae)	Whistling pine	http://www.iucngisd.org/gisd/speciesname/Casuarina+equisetifolia
Arivela viscosa (L.) Raf. (Cleomaceae)	Asian spiderflower	
Bryophyllum pinnatum (Lam.) Oken (Crassulaceae)	Leaf of life	http://www.iucngisd.org/gisd/speciesname/Kalanchoe+pinnata
Scaevola taccada (Gaertn.) Roxb. (Goodeniaceae)	Beach cabbage	http://www.iucngisd.org/gisd/speciesname/Scaevola+sericea
Abrus precatorius L. (Leguminosae)	Jumbie beads	http://www.iucngisd.org/gisd/speciesname/Abrus+precatorius
Leucaena leucocephala (Lam.) de Wit (Leguminosae)	Wild tamarind	http://www.iucngisd.org/gisd/speciesname/Leucaena+leucocephala
Parkinsonia aculeata L. (Leguminosae)	Jerusalem thorn	
Azadirachta indica A.Juss. (Meliaceae)	Neem tree	
Melia azedarach L. (Meliaceae)	Pride of India	http://www.iucngisd.org/gisd/speciesname/Melia+azedarach
Syzygium jambos (L.) Alston (Myrtaceae)	Rose apple	http://www.iucngisd.org/gisd/speciesname/Syzygium+jambos
Antigonon leptopus Hook. & Arn. (Polygonaceae)	Cemetery vine	http://www.iucngisd.org/gisd/speciesname/Antigonon+leptopus
Triphasia trifolia (Burm. f.) P. Wilson (Rutaceae)	Sweet lime	http://www.iucngisd.org/gisd/speciesname/Triphasia+trifolia

APPENDIX 3

TABLE OF VEGETATION CLASSIFICATIONS

Class Name	Class Division	Class Subheadings	Classification according to Kennaway *et al* 2008 *
Forest and woodland (103.6 km^2) 66.5% of terrestrial landcover	**Evergreen forest and woodland** (11.1 km^2) 7.2% of terrestrial landcover	**Lowland evergreen forest and woodland** (1.98 km^2) 1.3% of terrestrial landcover	Seasonal Evergreen Forest with Coconut Palm; Seasonally Flooded Woodland; Emergent Wetland and Mangrove
		Upland evergreen forest (9.13 km^2) 5.9% of terrestrial landcover	Seasonal Evergreen Forest and Forest Shrub; Seasonal Evergreen Young Forest and Forest Shrub; Seasonal Evergreen Gallery Forest and Forest Shrub
	Seasonally deciduous gallery forest, mixed forest and woodland (92.5 km^2) 59.3% of terrestrial landcover	**Seasonally deciduous forest and woodland** (91.94 km^2) 59% of terrestrial landcover	Drought Deciduous Young Forest and Forest Shrub; Drought Deciduous Woodland; Semi-Deciduous Forest and Forest Shrub; Deciduous, Evergreen and Mixed Forest and Shrubland with or without Succulents
		Semi-deciduous gallery forest (0.53 km^2) 0.3% of terrestrial landcover	Semi-Deciduous Gallery Forest
Coastal shrubland (13.24 km^2) 8.5% of terrestrial landcover			Evergreen Coastal Shrubland; Drought Deciduous Xeric Coastal Shrubland with or without Succulents
Sparse vegetation (12.52 km^2) 8% of terrestrial landcover	**Dry salt flats, coastal and interior rock and coastal grassland** (12.52 km^2)	**Coastal and interior rock and coastal grassland** (6.47 km^2) 4.1% of terrestrial landcover	Coastal Rock; Inland Rock Outcrops (Virgin Gorda); Coastal Grassland
		Dry salt flats (6.05 km^2) 3.9% of terrestrial landcover	Dry Salt Flats (includes mud flats)
Anthropogenic (18.75 km^2) 12% of terrestrial landcover			High-Medium Density Urban; Low Density Urban; Pasture, Hay, Abandoned Agriculture or Other Grassy Areas; Golf Course; Bare Soil (including bulldozed land); Quarries; Herbaceous Agriculture
Inland Water and Coastal Sand (7.67 km^2) 5% of terrestrial landcover			Surface Water; Salt Pond; Coastal Sand

* Kennaway TA, Helmer EH, Lefsky MA, Brandeis TA, Sherrill KR. Mapping land cover and estimating forest structure using satellite imagery and coarse resolution lidar in the Virgin Islands. J Appl Remote Sens [Internet]. 2008;2(023551):1–27. Available from: http://www.fs.fed.us/global/iitf/pubs/ja_iitf_2008_kennaway001x.pdf

APPENDIX 4

TABLE OF BVI ENVIRONMENTAL LEGISLATION

BVI Environmental Legislation

Legislation	Date
Plant Protection Ordinance	1941
Protection of Trees and Conservation of Soil and Water Ordinance	1954
Wild Birds Protection Ordinance	1959
Government Salt Ponds	1959
National Parks Ordinance	1961
Mining Ordinance	1972
Marine Parks and Protected Areas Ordinance	1979
Fisheries Ordinance	1979
Beach Protection Ordinance	1985
Turtles Ordinance	1986
Marine Pollution Environment Protection Order	1988
Marine Parks and Prohibited Areas Regulations	1991
Turtles Act	1992
Merchant Shipping Act	1995
Fisheries Act	1997
National Parks Act	2005
Physical Planning Act	2005

APPENDIX 5

TABLE OF BVI NATIONAL PARKS

Terrestrial National Parks in BVI

List of terrestrial National Parks in BVI.

* Proposed new terrestrial National Parks. Modification of table in Gardner, Smith-Abbott & Woodfield (2008).

Site	Date Declared	Area (acres)
Sage Mountain, Tortola	1964	86
Spring Bay, Virgin Gorda	1969	5.5
Devil's Bay, Virgin Gorda	1969	58
Queen Elizabeth II Park, Tortola	1974	0.7
Gorda Peak, Virgin Gorda	1974	260
West Dog, The Dogs	1974	24
Fallen Jerusalem Island	1974	48
Dead Chest Island	1977	34
Little Fort, Virgin Gorda	1978	36
JR O'Neal Botanic Gardens	1979	2.87
Mt. Healthy, Tortola	1983	1
Prickly Pear Island	1988	180
The Baths, Virgin Gorda	1990	6.91
Diamond Cay	1991	1.25
Great Tobago	1995	210
Cable Rock (Watson's Rock)	1995	N/A
Little Tobago	1998	55
Cam Bay, Great Camanoe	1999	19.6
Shark Bay, Tortola	1999	18.4
The Coppermine, Virgin Gorda	2003	31.93
Sandy Cay	2008	13.57
Belmont, Tortola	Proposed*	
Great Mountain, Beef island	Proposed*	
Broken Jerusalem	Proposed*	
Eastern Ponds, Anegada	Proposed*	
Great Thatch	Proposed*	
Pelican Island	Proposed*	
George Dog, The Dogs	Proposed*	
Great Dog, The Dogs	Proposed*	

APPENDIX 6

SUMMARY OF REVISED IPA CRITERIA AND SUB-CRITERIA

From Darbyshire *et al.* 2017

SUB-CRITERION	THRESHOLD
A: THREATENED SPECIES	
A(i). Site contains one or more **globally threatened** species	Site known, thought or inferred to contain ≥**1%** of the global population AND/OR ≥**5%** of the national population OR the **5 "best sites"** for that species nationally, whichever is most appropriate
A(ii). Site contains one or more **regionally threatened** species	Site known, thought or inferred to contain ≥**5%** of the national population, OR the **5 "best sites"** for that species nationally, whichever is most appropriate
A(iii). Site contains one or more **highly restricted endemic** species that are potentially threatened	Site known, thought or inferred to contain ≥**1%** of the global population AND/OR ≥**5%** of the national population, OR the **5 "best sites"** for that species nationally, whichever is most appropriate
A(iv). Site contains one or more **range restricted endemic** species that are potentially threatened	Site known, thought or inferred to contain ≥**1%** of the global population AND/OR ≥**5%** of the national population, OR the **5 "best sites"** for that species nationally, whichever is most appropriate
B: BOTANICAL RICHNESS	
B(i). Site contains a **high number of species** within **defined habitat or vegetation types**	For each habitat or vegetation type: Up to 10% of the national resource can be selected within the whole national IPA network OR the **5 "best sites"** nationally, whichever is the most appropriate.
B(ii). Site contains an **exceptional number of species of high conservation importance**	Site known to contain ≥**3%** of the selected national list of species of conservation importance OR the **15 richest sites** nationally, whichever is most appropriate.
B(iii). Site contains an **exceptional number of socially, economically or culturally valuable species**	Site known to contain ≥**3%** of the selected national list of socially, economically or culturally valuable species OR the **15 richest sites** nationally, whichever is most appropriate
C: THREATENED HABITAT	
C(i). Site contains **globally threatened or restricted** habitat / vegetation type	Site known, thought or inferred to contain ≥**5%** of the national resource (area) of the threatened habitat type OR site is among the best quality examples required to collectively prioritise **20-60%** of the national resource OR the **5 "best sites"** for that habitat nationally, whichever is the most appropriate
C(ii). Site contains **regionally threatened or restricted** habitat/ vegetation type	Site known, thought or inferred to contain ≥**5%** of the national resource (area) of the threatened habitat type, OR site is among the best quality examples required to collectively prioritise **20-60%** of the national resource OR the **5 "best sites"** for that habitat nationally, whichever is the most appropriate
C(iii). Site contains **nationally threatened or restricted** habitat/ vegetation type, AND/OR habitats that have **severely declined in extent** nationally	Site known, thought or inferred to contain ≥**10%** of the national resource (area) of the threatened habitat type OR site is among the best quality examples required to collectively prioritise up to **20%** of the national resource OR the **5 "best sites"** for that habitat nationally, whichever is most appropriate

APPENDIX 7

TABLE OF BVI TROPICAL IMPORTANT PLANT AREAS NETWORK

TIPA	TIPAs sub-criterion (number of species*)				Threatened habitat types* (sub-criterion Ciii)					
	Ai	Aiii	Aiv	Bii	Coastal shrub-land	Dry salt flats	Man-groves	Semi-decid-uous gallery forest	Upland ever-green forest	Total threat-ened habitats
Anegada Island	11	0	0	14	Y	Y	Y	N	N	3
Beef Island and the Channel	2	0	1	8	N	Y	Y	N	N	2
Ginger Island	2	0	0	0	Y	N	N	N	N	1
Northern Great Camanoe	1	0	0	4	N	N	N	N	N	0
Great Thatch Island	2	0	0	6	N	N	N	N	N	0
Great Tobago Island	1	0	0	4	N	N	N	N	N	0
Guana Island	2	0	0	10	N	N	N	N	N	0
Northeastern Jost van Dyke	0	0	0	0	N	N	Y	Y	N	2
Norman Island	2	0	0	4	Y	N	N	N	N	1
Prickly Pear Island	0	0	0	5	N	Y	N	N	N	1
Eastern Scrub Island	2	0	0	6	N	N	N	N	N	0
Hawks Nest	4	0	1	12	N	N	N	N	N	0
Mount Sage	6	1	0	9	N	N	N	N	Y	1
Paraquita Bay and Bar Bay	0	0	0	0	N	N	Y	N	N	1
Sabbath Hill	2	1	0	6	N	N	N	Y	N	1
Tortola North Shore	3	1	0	5	N	N	N	N	Y	1
Central Virgin Gorda	7	0	1	17	N	N	N	Y	Y	2
Eastern Virgin Gorda	2	0	0	8	Y	N	Y	N	N	2

*Only those species or habitats passing the respective threshold for each sub-criterion, see Appendix 6 for details.

Scrub Island (M.A. Hamilton) →

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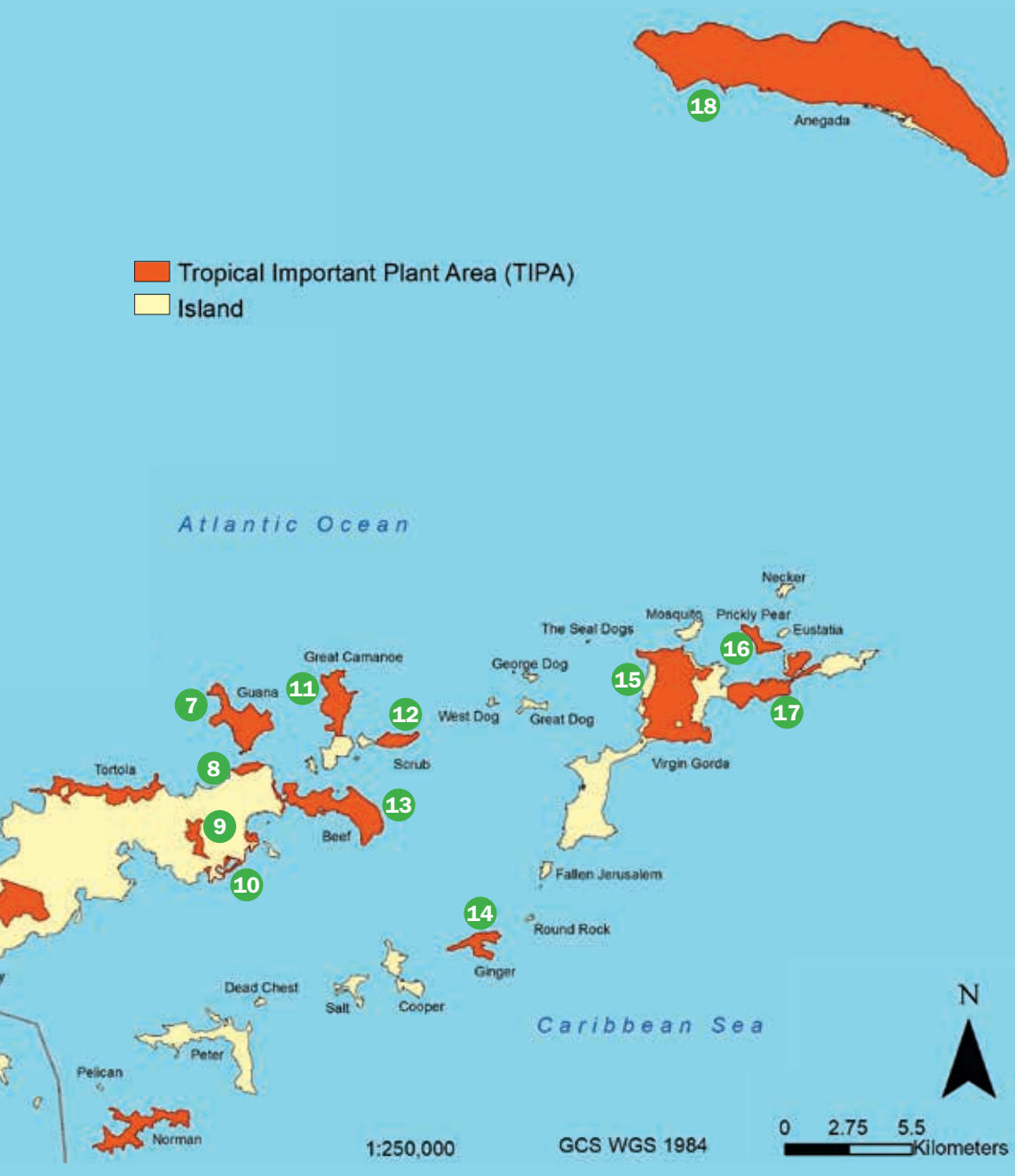

Network of TIPAs of the BVI

7 Guana Island
8 Hawks Nest
9 Sabbath Hill
10 Paraquita Bay and Bar Bay
11 Northern Great Camanoe
12 Eastern Scrub Island
13 Beef Island and the Channel
14 Ginger Island
15 Central Virgin Gorda
16 Prickly Pear Island
17 Eastern Virgin Gorda
18 Anegada Island

See inside front cover for the rest of the map.

Royal Botanic Gardens Kew

Located in the heart of the Caribbean, the British Virgin Islands (BVI) are popular with visitors for their beaches, sailing and diving sites, but behind the strapline 'Nature's Little Secrets' there is much more to the natural world of these islands to be appreciated, explored and valued.

This guide details 53 of the BVI's most important plants, including 35 native species that are either globally threatened with extinction or otherwise unique to the region. All plants are fully described and illustrated to aid field identification. Non-native invasive species are a serious threat to the BVI's natural diversity and 18 of the worst invasive plants are described and illustrated. Also highlighted are BVI's 18 Tropical Important Plant Areas (TIPAs), those places that are globally significant in terms of the plants that are found there, in the hope that it leads to these places being valued and conserved for future generations.

This authoritative guide is the result of many years of collaborative field work and has been compiled by the BVI National TIPAs team and edited by Thomas Heller.

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