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A Natural History Characterisation of TORTOLA's Sister Islands — British Virgin Islands



CARVAL ROCK • COOPER ISLAND • DEAD CHEST • GINGER ISLAND • GREAT CAMANOE •
GREAT THATCH • GREAT TOBAGO • GUANA ISLAND • LITTLE CAMANOE • LITTLE THATCH • LITTLE TOBAGO •
MARINA CAY • NORMAN ISLAND • PELICAN ISLAND • PETER ISLAND • SALT ISLAND • SCRUB ISLAND



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From Salt Island, Cooper Island in the foreground and Ginger Island behind. Photo credit: Jean-Pierre Bacle.

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All BVI Environmental Profiles can be downloaded at www.irf.org or as follows:

http://j.mp/BVI_sisterislands

http://j.mp/BVI_Tortola

http://j.mp/BVI_Anegada

http://j.mp/BVI_VirginGorda

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A Natural History Characterisation of TORTOLA's Sister Islands — British Virgin Islands

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PREFACE and ACKNOWLEDGEMENTS

This publication is a product of the Environmental Profile Programme for the British Virgin Islands (BVI) launched by Island Resources Foundation (IRF) in 2008 to provide an expanded environmental information base for the BVI. Four primary documents have been produced to date: *An Environmental Profile of the Island of Jost Van Dyke* (2009); *An Environmental Profile of the Island of Virgin Gorda* (2012); *An Environmental Profile of the Island of Anegada* (2013); and *An Environmental Profile of the Island of Tortola* (2015), plus a number of technical addenda that accompanied the profiles for Virgin Gorda, Anegada, and Tortola.

The Tortola Profile is the first in the series to include a companion document focused on the “Sister Islands” of Tortola. Discussion of the satellite islands surrounding Jost Van Dyke and Virgin Gorda was included within the main island profiles. However, in the case of Tortola, the profile document itself was so extensive that IRF chose to create a stand-alone study to focus in its entirety on 17 of Tortola’s Sister Islands. This is that document.

The co-authors of *A Natural History Characterisation of Tortola’s Sister Islands* are the following IRF staffers:

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- Melvin Stoutt for Salt Island

A NATURAL HISTORY OF TORTOLA'S SISTER ISLANDS



*The calm and tranquility of the Sister Islands:
First light over Guana Island viewed from Great Camanoe*

(photo: K. Lindsay).

INTRODUCTION

If the islands of the British Virgin Islands (BVI) lie like a necklace of jewels across the Caribbean Sea, unfolding from the Tobago Cays in the west to Anegada and its isolated landscape in the north-east, then the glittering gems in that chain have to be the weightier stones—the larger islands of Tortola, Virgin Gorda, Anegada and Jost Van Dyke. Yet, with the exception of Anegada, lesser jewels surround each of the pivotal “mother” islands, both reflecting and enhancing the larger islands.

Called at times “outer” islands, “offshore” islands, “satellite” islands or—as in the case of this publication—“sister” islands, this varied assortment of populated and uninhabited, isolated and developed, close and afar islets, cays, rocks, and outcrops add to the totality of the British Virgin Islands and complete its size, resources, and attributes.

In the case of Tortola—heavily developed, densely populated, modernised and urbanite—there are 17 smaller, quieter, less developed and mostly uninhabited Sister Islands surrounding the larger island. They are the focus of this overview study characterising the natural history of Tortola’s Sister Islands.

Admittedly, there is an arbitrariness in our selection of Tortola’s Sister Islands. Island Resources Foundation (IRF) has chosen to concentrate on the cays and islands that lie further offshore of Tortola, rather than those more intimately linked with Tortola; thus, cays and islands such as Nanny Cay, Buck Island, Frenchman’s Cay or even Beef Island have been considered part of the larger *Tortola Environmental Profile*. At the other end of the spectrum, IRF has not included all of the smaller islets, rocks and outcroppings that surround Tortola—and indeed surround some of the Sister Islands.

The 17 Sister Islands included in this study are the following (see also **Figure 1**):

THE WESTERN ISLANDS

- 1. Great Tobago
- 2. Little Tobago
- 3. Great Thatch
- 4. Little Thatch

THE SOUTHERN ISLANDS

- 5. Pelican Island
- 6. Norman Island
- 7. Peter Island
- 8. Dead Chest
- 9. Salt Island
- 10. Cooper Island
- 11. Carval Rock
- 12. Ginger Island

THE EASTERN ISLANDS

- 13. Guana Island
- 14. Great Camanoe
- 15. Little Camanoe
- 16. Marina Cay
- 17. Scrub Island

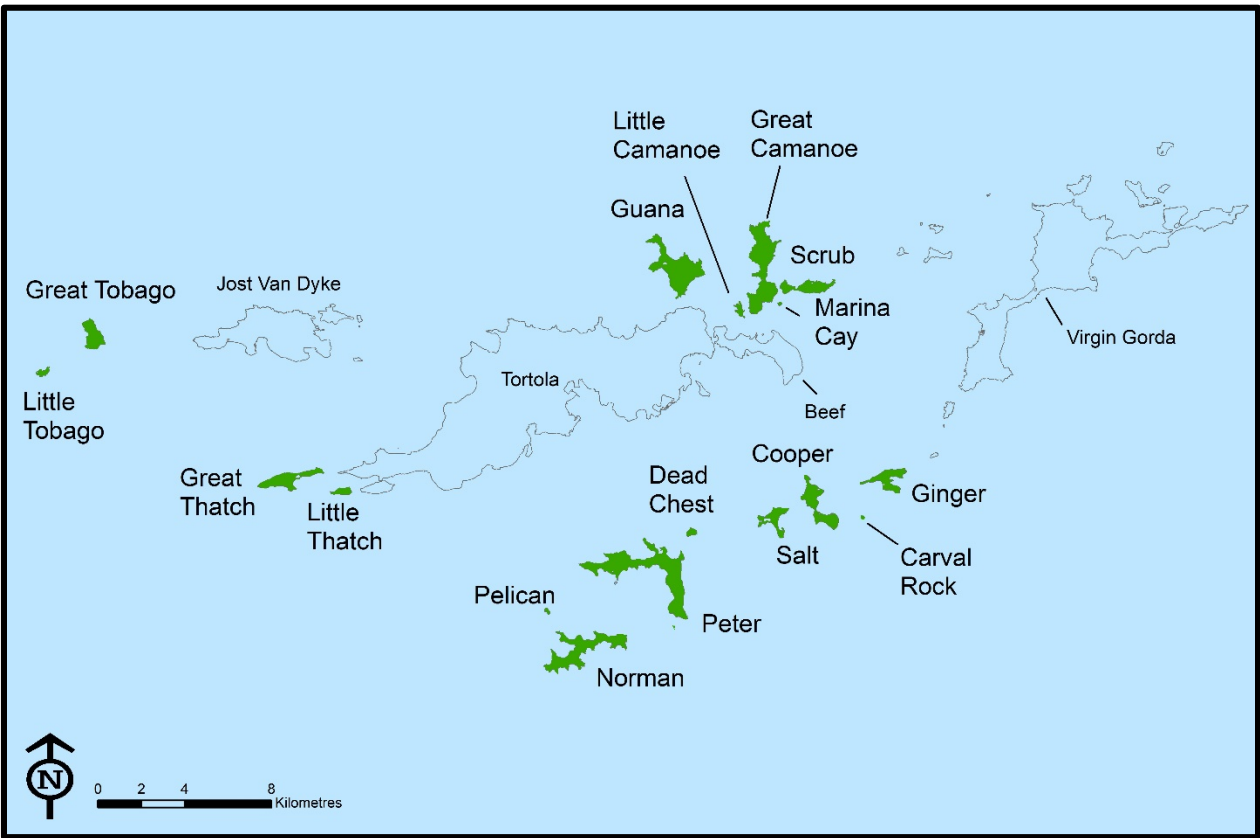


Figure 1. Tortola’s Sister Islands (highlighted in green) as featured in this Natural History Characterisation.

The Sister Islands tell a varied story (see **Table 1** for their varied dimensions). Some are important tourism destinations; some are isolated bird sanctuaries; some shelter small residential communities or up-scale resorts; some are national parks or protected fisheries areas (**Table 2**); some are privately owned

and some are still held as Crown Land. Some are little used and almost abandoned; others are being rapidly modernised.

There is a remoteness about the Sister Islands. Step ashore on any of them and one feels removed from

Table 1.
Size of Tortola's Sister Islands, by Data Source.

	Sister Island	Size in HECTARES BVI Survey	Size in ACRES BVI Survey	Size in HECTARES NGIS	Size in ACRES NGIS	Size in HECTARES Other	Size in ACRES Other	Other Source
1	Peter Island	429	1,061	409	1,011			
2	Great Camanoe	337	833	306	756			
3	Guana Island	297	733	264	653	344	850	www.guana.com
4	Norman Island	255	630	230	568	247	610	www.normanisland.com
5	Cooper Island	138	340	127	313			
6	Great Thatch	123	304	108	267			
7	Ginger Island	105	259	85	211	104	258	www.sothebysrealty.com
8	Scrub Island	97	240	89	220			
9	Great Tobago	89	219	82	203	85	210	National Parks Trust of the VI
10	Salt Island	78	193	65	161			
11	Little Thatch	23	58	22	54			
12	Little Tobago	22	55	14	34			
13	Little Camanoe	16	40	15	36			
14	Dead Chest	14	35	12	29			
15	Pelican Island	N/A	N/A	4	10			
16	Marina Cay	N/A	N/A	2	5	3	8	www.wikipedia.org
17	Carval Rock	N/A	N/A	N/A	N/A	<1	2	www.wikipedia.org

BVI Survey in columns 3 and 4 refers to the BVI Survey Department as the source of data in these columns.

NGIS in Columns 5 and 6 refers to the BVI National Geographical Information System as the source of data in these columns.

All figures rounded to the nearest whole number.

NOTE TO TABLE 1:

The two Government sources consulted to secure size figures for Tortola's Sister Islands (the BVI Survey Department and the National Geographical Information System) do not display consistency of data, as shown in the table above. Additionally, third-party sources consulted often report still other figures. In order to maintain consistency in relating size data in the Island Characterisations beginning on page 23 of this document, Island Resources Foundation has determined to use data from the Survey Department, except when not available, in which case data from the NGIS or other sources have been applied. These figures are highlighted in Table 1.

Table 2.
Tortola's Sister Islands: Protected Area Status.

	Sister Island	Declared Bird Sanctuaries ¹	Declared Fisheries Protected Areas ²	Declared National Parks ³	Proposed Terrestrial Protected Areas ⁴	Proposed Marine Protected Areas ⁴
1	Great Tobago	✓		✓		✓
2	Little Tobago	✓		✓		
3	Great Thatch				✓	✓
4	Little Thatch					
5	Norman Island		✓		✓	✓
6	Pelican Island				✓	
7	Peter Island	✓	✓			✓
8	Dead Chest	✓	✓	✓		✓
9	Salt Island	✓	✓			✓
10	Cooper Island	✓				✓
11	Carval Rock					
12	Ginger Island	✓	✓			✓
13	Guana Island		✓			✓
14	Great Camanoe			✓		✓
15	Little Camanoe					
16	Marina Cay					
17	Scrub Island					✓

¹ Declared under Bird Sanctuaries Order (S.R.O. 20/1959).

² Declared under Fisheries Regulations (2003) to the Fisheries Act (1997).

³ Great Tobago National Park established in 1995; Little Tobago National Park established in 1998; Dead Chest National Park established in 1974; Cam Bay National Park (Great Camanoe) established in 1999. The territory's only marine national park—the Wreck of the RMS Rhone Marine Park—was established in 1980 and is located between Peter and Salt Islands.

⁴ Proposed in the *BVI Protected Areas System Plan (2007-2017)*. See the *Tortola Environmental Profile*, Chapter 8, for detailed information on the proposed protected areas for the Sister Islands.

the larger island of Tortola. Yet all enhance the scenic beauty of Tortola and the larger British Virgin Islands. They provide a retreat of sorts for habitat and species that have been diminished or are disappearing on the larger, more developed Tortola. Many provide recreational amenities and access to marine resources that are also at risk on the larger island.

All have a natural history that has been impacted by human history. And all are precious resources,

which—as small land masses removed from Tortola—offer escape, possibilities, and choices.

This companion document to the *Tortola Environmental Profile* is offered as a summary compilation of information on the natural history of Tortola's Sister Islands and is intended as an encouragement for sustainable decision-making about their future.

The Importance of the Sister Islands

The Sister Islands of Tortola are relatively secluded, offering a certain level of solitude and shelter from the fast pace of life on the “mother” island. And there, among the cacti, cliffs, and isolated beaches, this seems to suit nature just fine.

A Sanctuary and Retreat

Firstly, consider the Sister Islands as places of refuge—sanctuaries and retreats for species of birds and animals, plants and vegetation.

Tortola’s Sister Islands harbour some of the Virgin Islands’ most important nesting and roosting seabird colonies. The mainland has lost most of its nesting seabirds primarily due to coastal development, road construction, deforestation, and human presence. On the more isolated and less developed off-shore islands, these species can find the space and harmony they require to nest and rest.

In the Western Islands are colonies of nesting terns, the Laughing Gull (*Leucophaeus atricilla*), the Brown Pelican (*Pelecanus occidentalis*), the Brown Booby (*Sula leucogaster*) and the Magnificent Frigatebird (*Fregata magnificens*). The greater Virgin Islands’ only nesting colony of the Frigatebird is found on Great Tobago, along with small colonies of the Brown Booby; on the island’s steep cliffs, a few nesting pairs of the Red-billed Tropicbird (*Phaethon aethereus*) have found success. On Little Tobago, Brown Boobies may nest periodically, Pelicans roost, and Brown Noddies (*Anous stolidus*) and Bridled Terns (*Onychoprion anaethetus*) roost and find respite. So too, on the sheer and dark conical fortress of Watson’s Rock—located between Little and Great Tobago—the Noddies, Bridled Terns and Roseate Terns (*Sterna dougallii*) roost and find security during the nesting season.

On the Eastern and Southern Islands, smaller numbers of seabirds nest. The White-tailed Tropicbird (*Phaethon lepturus*) is known to nest on Cooper and Guana Islands, while its close cousin, the Red-billed Tropicbird, nests on Carrot Rock (just south of Peter

Island), Carval Rock, Great Camanoe, Ginger and Guana Islands. Laughing Gulls nest on Guana, Great Camanoe and many islands within the southern group of Sister Islands, including Cooper. Roseate Terns sometimes nest in small numbers on Cooper Island. A rare species, Audubon’s Shearwater (*Puffinus lherminieri*), is suspected to nest on Great Camanoe, Cooper, Peter and Norman Islands. It has been heard on Great Tobago.

For native reptiles, many species are limited in distribution to the Sister Islands. The rare *richardii* subspecies of the Puerto Rican Racer Snake (*Borikenophis portoricensis*) is known to occur only from the Sister Islands in the southern group, including Cooper, Ginger, Peter and Salt Islands. The territory’s largest snake, the rare and endangered Virgin Islands Tree Boa (*Chilabothrus grantii*), has fairly sizeable and important populations on Great Camanoe and Guana Islands.

Four endemic lizards are found only within the isolation of the Sister Islands. (1) The Anole (*Anolis ernesti-williamsi*) and (2) the Carrot Rock Skink (*Spondylurus macleani*) are both endemic to Carrot Rock, south of Peter Island—the entire world’s population! On Carval Rock, (3) a small Least Gecko (*Sphaerodactylus* sp.) continues to challenge herpetologists, and may be an unknown endemic species according to Perry and Gerber (2006)*. Its taxonomy and relationships are still being studied. In all of the British Virgin Islands, (4) a Bronze Skink (*Spondylurus sloanii*) is found only on Little Tobago, Norman Island, Peter Island, and possibly Cooper Island.

A rare Virgin Islands endemic frog, the VI Coqui (*Eleutherodactylus schwartzii*) is known from a small population on Little Thatch. The species is declining throughout its range, and therefore this population is important to the long-term conservation of the species in the Virgin Islands.

For rare and endangered native plants, especially those that are endemics, the Sister Islands offer an opportunity for conservationists to ensure that at-risk species do not become extinct in the Virgin Islands.

* G. Perry and G.P. Gerber, 2006. “Conservation of Amphibians and Reptiles in the British Virgin Islands: Status and Patterns.” *Applied Herpetology*, 3.

Most of the Sister Islands are sanctuaries for the rare Tree Cactus (*Consolea rubescens*), with the highest concentrations in the British and US Virgin Islands on Little Thatch, Great Thatch and Great Tobago. Another large cactus species, *Stenocereus fimbriatus*, can be found on the Western, Southern and Eastern Sister Islands, but it is Ginger Island that has the largest colonies and densest concentrations of this species. Other rare cacti include: *Melocactus intortus* and *Mammillaria nivosa* (with Great Thatch having some of the largest populations within the area of Tortola) and *Opuntia elatior*, a species with bright pink or orange flowers, which, in the British and US Virgin Islands, is known only from Little Tobago.

The rare regional endemic, Jost Van Dyke's Indian Mallow (*Bastardiopsis eggertii*), is known from sizable populations on Dead Chest, Ginger, Peter and Norman Islands; one individual has been recorded for Salt Island. Also on Ginger Island is one of the rarest trees on the Puerto Rico Bank, the Brazilian Rain Tree (*Chloroleucon tortum*). This is the only confirmed population in the Greater and Lesser Antilles, first discovered by the IRF biodiversity research team in 2014.

Guana Island is covered with extensive forests and woods that shelter two rare bromeliads: the Antilles Lacebark (*Hohenbergia antillana*) and Jarecki's Pitcairnia (*Pitcairnia jareckii*), a species that is also found on nearby Great Camanoe. These forests also shelter the rare Underwood's Stopper (*Eugenia underwoodii*). It is known from a small population on St. John in the US Virgin Islands (USVI), Puerto Rico, and now possibly Great Camanoe as well.

Additionally, Great Camanoe may now be a last refuge for the largest population of the rare tree, Lignum Vitae (*Guaiacum officinale*), a species that almost went extinct in the Virgin Islands. The VI endemic *Croton fishlockii* is also found on the island, as well as *Eugenia sessiliflora*, a Puerto Rico Bank endemic.

History, Culture and Identity

Undoubtedly, the Amerindians used some of the Sister Islands as shelter, to find food and perhaps even cultivate crops. Their stories are still hidden in the soil

and small coves of these islands, waiting for someone to peel back the ancient layers lost to time and bring their memory back to life. Likewise, the arrival of European settlers is not readily visible on the Sister Islands, although some islands—Great Thatch, Norman, Guana and Great Camanoe—boast substantial remains that are worthy of further survey and preservation. In fact, because of their relative inaccessibility, Sister Island ruins may be better preserved than those on Tortola.

A quick glance at a detailed map of the islands surrounding Tortola reveals old place names, many of which suggest important events, peculiar language habits, cultural practices and activities—such as Throw Way Wife Bay on the northeastern coast of Great Camanoe, John James Point on eastern Ginger Island, Quart-a-Nancy Point on the northernmost extreme of Cooper Island, Dig A Low Beach on Guana, Pull and be Damn Point on Little Camanoe, and Dead Chest Island, to name just a few.

But it is not only place and geographic names that tell a tale for a few historical events have been recorded for the Sister Islands. For example, on Great Thatch, located close to the Danish (now US) Virgin Islands, British authorities once sought to control smuggling between the territories by reportedly erecting a customs house, post office and lookout to monitor goods from the nearby Danish West Indies. When, in 1856, attempts were made to seize a boat belonging to a Thatch Island resident who was operating without a licence, an insurrection ensued, during which British officers were badly beaten and driven off. Although the culprits were later arrested, it is events such as this that point to the early independent spirit that came to characterise BVIslanders.

Smuggling—and its close cousin piracy—were not endemic to Great Thatch alone, for many of the names and places associated with the southern and western Sister Islands are linked, whether in fact or fantasy, to a supposedly golden era of buccaneering and privateering. Despite little evidence that he actually sailed in the Virgin Islands, the pirate Blackbeard, has long been associated with the Thatch Islands as his real name was Edward Teach—or, as has been speculated, Edward Thatch. Norman Island, correctly or not, has long been identified as the inspiration for Robert Louis

Stevenson's classic tale, *Treasure Island*. And the Sir Francis Drake Passage, which separates the BVI's southern and northern chain of islands, was named for the English sea captain who, during the Elizabethan era, was a noted explorer, privateer, and tormentor of Spanish fleets and possessions. All such tales and traditional lore have added to a sense of mystery and drama that surrounds the mythos of Tortola's Sister Islands.

What is found below the water makes the history of the Sister Islands equally intriguing. Near Salt Island are the remains of the wreck of the *Royal Mail Ship (RMS) Rhone*, one of the most popular dive attractions in the BVI and the territory's only officially declared marine park. The steam ship, part of the Royal Mail Steam Packet Company, was wrecked and then sank in the hurricane of 1867, resulting in the death of over 100 persons.

Today, at certain times of the year, residents from the larger islands of the BVI gather at Sister Islands such as Salt Island and Great Camanoe for holidays, family events and other special occasions, to celebrate familial history and relationships and to reconnect with their past and the ancestors who once inhabited these islands.

Signature Landscapes

The Sister Islands almost seem to be punctuation marks that help to balance the landscape of the

British Virgin Islands. From one end of Tortola to the other, these smaller islands and cays dot the wider scenery of this region much like commas or parentheses, each providing cadence and subtle intonation. Without the backdrop that the Southern Islands provide to the reaches of St. John and the call of Virgin Gorda, or the send-off that Great Camanoe, Scrub Island and Marina Cay provide as an introduction to the outer islands of Virgin Gorda, or the landmark that the Western Islands such as Great and Little Thatch signal to those arriving from the US Virgin Islands, Tortola would seem more ordinary, less unique and special. The Sister Islands transform the land and seascape into a very recognisable and exceptionally beautiful fabric that additionally, peculiarly and uniquely defines Tortola.

Research and Conservation

Yet, it must not be assumed that, despite their familiarity, we understand all we need to know about the Sister Islands. Indeed, we have only begun to scratch the surface. Many years of research, exploration and study lie ahead as we continue to inform our understanding of the Sister Islands and their natural history. The BVI has only begun to define the conservation needs of the Sister Islands or identify strategies that will ensure the continued availability of their rich environments and experience.

THE FLORA AND PLANTS OF TORTOLA'S SISTER ISLANDS

During the last Ice Age, some 100,000 years ago as sea levels were lowered to 120 metres (393 feet) below today's level, the Sister Islands were part of the larger Puerto Rico Bank landmass. The BVI and most of the US Virgin Islands, excluding St. Croix, formed a singular insular mass and shared many common features, species and events. Tortola's Sister Islands are not only relicts of a past in which bits and pieces of a natural jigsaw puzzle have now come undone—with many bits missing—but they are geologically, biologically, and ecologically, part of the nearby US Virgin Islands, and are even impacted by the wider influences of St. Croix and Puerto Rico.

The earliest humans to explore the Sister Islands, the Amerindians, would have encountered a landscape much changed from the extensive landmass that once existed. The smaller islands surrounding Tortola would have been wooded, with patches of grasslands, freshwater wetlands, mangroves, salt ponds and salt flats, extensive beaches, coastal cliffs, steep valleys and areas of coastal, desert-like environments dominated by native cacti.

The Amerindians of course began to influence that natural landscape through hunting, deforestation, agriculture, the use of fires, and cultural practices. The Europeans who followed oversaw a period of

even greater physical change to the natural environment, and so—from our modern-day perspective—it is difficult to know the “truly natural” Sister Islands. Yet we can still recognise what of their natural history survives and what can be done to better ensure its continued survival.

VEGETATION TYPES

There are 17 vegetation communities and land cover types found on Tortola’s Sister Islands. These types are listed in **Table 3**.

The vegetation of Tortola’s Sister Islands has been altered and impacted by human activities for millennia, but more so since the arrival of Europeans. Only mangroves, salt ponds (salt and mud flats), coastal cliffs and some beaches can be considered original landscape, although erosion, sedimentation and other human factors have influenced these habitats.

The most extensive and widespread of the vegetation types on the Sister Islands are:

1. [Deciduous, Evergreen Coastal and Mixed Forest](#)
2. [Drought Deciduous Forest/Shrub](#)
3. [Pasture](#)
4. [Coastal Sand and Rock](#).

Several of the islands—Great Camanoe, Guana Island and Great Thatch—continue to harbour extensive [Forests and Woodlands](#). On the other hand, on islands such as Great Tobago and Little Tobago, the [Forests and Woodlands](#) have been severely impacted and compromised by feral goats. The consumption of plants by these freely roaming goats, as well as their constant movement across the landscape, have reduced the extent of plant cover and the number of species on the Tobagos, while also increasing erosion and reducing overall biodiversity.

For example, one of the last patches of [Drought Deciduous Forest/Shrub](#) on Great Tobago is found along the slopes of Camp Bay on the west side of

the island. Generally widespread throughout most Sister Islands, it is only a matter of time—if the goats remain—before this vegetation type on Great Tobago is completely ravaged.

Where [Wetlands and Mangroves](#) exist on the Sister Islands, these are relatively small, with the exception of those on Great Thatch, Salt, Scrub and Guana Islands. The largest wetland, on Salt Island, has no mangrove vegetation due to land use and goat impact. By contrast, the wetland on the eastern area of Great Thatch is fringed with Red Mangroves (*R. mangle*) with a permanently flooded basin (although this may dry out in drought-intensive years). In total, 10 of the 17 Sister Islands have wetlands, although these may have few or no mangroves, or, when they do, they show signs that the system is maturing and being transformed to more terrestrial plant communities.

There are two salt ponds on Salt Island. Both are connected by a man-made channel to control water levels. The larger of the two, located behind the “abandoned” settlement, is still mined for salt, although only in very small amounts. According to Stuart Danforth, in a report of his visit to Salt Island in 1935[†], another wetland was then present on the island. A freshwater marsh and bog area existed just behind the high berm of the beach of The Sound, on the eastern side of the island. This site is now a patch of woodland dominated by Manchioneel (*H. mancinella*), having rapidly silted up after the 1930s as a result of the introduction of feral goats, resulting deforestation, and increased erosion.

Where [Bare Soil, Sand and Rock](#) persist along the coastlines of Sister Islands, drought-adapted species including cacti and forb vegetation may occur, although nowhere is this common. Species of barrel cacti may be found, such as—on Great Thatch—the Turk’s Cap (*M. intortus*) and the Woolly Nipple (*M. nivosa*). These species are on a sharp decline in the Virgin Islands, due in part to the impacts of feral livestock, coastal development, and horticultural collecting. In the past, great colonies of these species would have been found all along the coast and inland on the rocky cliffs of most Sister

[†] Stuart T. Danforth, 1935. “Supplementary Account of the Birds of the Virgin Islands, including Culebra and Adjacent Islets Pertaining to Puerto Rico, with Notes on their Food Habits.” *Journal of Agriculture of the University of Puerto Rico*, Vol. XIX, No. 4.

Table 3.
Vegetation and Community Land Cover Types for Tortola's Sister Islands, by Island.

VEGETATION AND COMMUNITY TYPES	Watson Rock †	Carrot Rock ♦	Carval Rock	Cooper Island	Dead Chest	Ginger Island	Great Camanoe	Great Thatch	Great Tobago	Guana Island	Little Camanoe	Little Thatch	Little Tobago	Marina Cay	Norman Island	Pelican Island	Peter Island	Salt Island	Scrub Island
Forests																			
Evergreen Coastal Shrubland		✓		✓	✓	✓	✓	✓							✓	✓	✓	✓	
Drought Deciduous Xeric Coastal Shrubland with Succulents		?			✓	✓			✓		✓		✓	✓	✓		✓	✓	✓
Deciduous, Evergreen Coastal and Mixed Forest and Shrubland with Succulents				✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	
Drought Deciduous Forest/Shrub				✓	✓	✓	✓	✓		✓					✓		✓	✓	✓
Semi-Deciduous Forest and Forest Shrub						✓	✓	✓	✓	✓			✓						✓
Seasonal Evergreen Forest with Coconut Palm							✓											✓	
Seasonally Flooded Woodland							✓											✓	
Forested and Herbaceous Wetlands																			
Emergent Wetland				✓	✓	✓	✓			✓					✓		✓	✓	✓
Mangrove				✓	✓	✓	✓	✓		✓					✓		✓		✓
Herbaceous Communities																			
Pasture, Hay or Inactive Agriculture				✓	✓					✓	✓	✓			✓		✓	✓	✓
Pasture, Hay or Other Grassy Areas (including coastal grassland)	✓	✓		✓		✓		✓	✓	?		✓	✓	✓	✓	✓	✓	✓	✓
Sparse Vegetation																			
Bare Soil	✓	✓		✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Salt and Mud Flats		✓		✓			✓	✓		✓					✓		✓	✓	
Quarries										✓							✓		
Coastal Sand and Rock	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Water - Permanent							✓												
Urban/Developed Areas																			
Low-Medium Density Urban				✓			✓			✓		✓		✓	✓		✓	✓	✓

Source: Adapted from Todd Kennaway, et al., 2008. "Mapping Land Cover and Estimating Forest Structure Using Satellite Imagery and Coarse Resolution Lidar in the Virgin Islands." *Journal of Applied Remote Sensing*, Vol. 2, 023551 (12 December 2008).

† Watson's Rock is located between Great and Little Tobago.

♦ Carrot Rock is located south of Peter Island.

✓ Present on the island.

Islands. As these unique desert-like plant associations have declined, they are more restricted to isolated locations.

Patches of native grasslands are one of the rarest plant communities found on the Sister Islands. However, these are usually very small in size, some only one or two square metres in cover, some a bit larger. Because of the nature of current vegetation mapping and classification, these native grasslands are classified as [Pasture, Hay, Inactive Agriculture or Other Grassy Areas](#). However, this designation, which groups them with recent human-created and altered environments, lessens their biodiversity value. They are micro-floral communities and native habitats that are inhabited by rare grasses and forb species. Whenever they are present, they often indicate fairly undisturbed situations and are therefore worthy of study.

On some of the Sister Islands, the non-presence (or reduction) of goats has shifted the natural balance and created opportunities for one or more native grass species to spread. This is particularly the case where goats have been eliminated such as on Little Thatch, Norman and Guana Islands.

Of the Sister Islands largest in size and elevation, all—except Great Tobago (a national park), Great Thatch (Crown Land), and Ginger—have settlements and/or commercial/tourism development activities. Of these, Salt Island has the least activity, with only seasonal occupation and encampments. Cooper, Guana, Norman, Peter, and Scrub Islands have residences, resorts or tourism infrastructure. Residences are also found on Great Camanoe. Ginger Island is uninhabited. The presence of such infrastructure has created artificial vegetation communities and associations, and these are classified in Table 3 as [Urban/Developed Areas](#) and [Low-Medium Density Urban](#).

PLANT SPECIES

The Sister Islands of Tortola harbour at least 645 species of native, naturalised and cultivated plant species. **Tables 4 and 5** provide a breakdown of the types of plants, including origin, status and totals per island.

Table 4.
Total Number of Plant Species by Island,
as compiled by Island Resources Foundation.

Island	No. of Species
Carval Rock	5
Cooper Island	112
Dead Chest	16
Ginger Island	110
Great Camanoe	270
Great Thatch	117
Great Tobago (including Watson's Rock)	53
Guana Island	402
Little Camanoe	63
Little Thatch	195
Little Tobago	40
Marina Cay	85
Norman Island	135
Pelican Island	14
Peter Island (including Carrot Rock)	199
Salt Island	88
Scrub Island	144

Overall, the islands are drier in nature than nearby Tortola, which is larger, steeper and of higher elevation. With such dry conditions, the types of species present on the Sister Islands represent those that have adapted to survive in highly stressed environments. Only Guana Island at 246 metres (806 feet) in elevation approaches Tortola in geography and complexity. Some of its moist ghuts harbour tall trees and the humid conditions necessary for their growth, thereby accounting for a greater number of species.

Some of the Sister Islands offer sanctuary to several rare and endangered plants. For example, on Ginger Island, the IRF biodiversity research team discovered a population of what has been preliminarily identified by experts as *Chloroleucon tortum* or Brazilian Rain Tree. This species was once considered endemic to Brazil, but a small population is now believed to exist in the West Indies. It is listed as Critically Endangered by the IUCN since only a few wild adult plants are known from the coast of Rio de

Table 5.
Physiognomic Categories of Plants Found
on Tortola’s Sister Islands, as Compiled by IRF.

Category	Numbers	Percentage
Herbs	254	39%
shrubs	118	18%
Trees	193	30%
Vines	80	13%
Total	645	100%
Families	94	
Origin	Numbers	Percentage
Native	422	65%
Introduced	223	35%
Total	645	100%
Status	Numbers	Percentage
Common	156	24%
Cultivated	144	23%
Localised	111	17%
Naturalised	85	13%
Rare	116	18%
Uncommon	33	5%
Total	645	100%

Janeiro. The plants on Ginger are gnarled and seem ancient, with the bark peeling off in great chunks. The branches are thorny, and it produces great ear-like pods, which contain small seeds (see photo in Ginger Island characterisation).

Also on Ginger Island are some of the largest groves and specimens of the rare columnar cactus *Stenocereus fimbriatus*, or Spanish Stenocereus. It is the largest species of cactus in the Greater Virgin Islands. The population on Ginger Island is fairly robust, and specimens are healthy, showing few signs of damage from storms and coastal land erosion.

Other rare and endangered species on Ginger Island include the following:

- Egger’s/Jost Van Dyke’s Indian Mallow (*Bastardiopsis eggersii*), which the Royal Botanic Gardens Kew reports is the largest known global population;
- The Tree Cactus (*Consolea rubescens*);
- The Stinging Cherry (*Malpighia woodburyana*), and
- Several species of native grasses.

To a variable extent, these species are also found on most of Ginger’s nearby Sister Islands. However, the presence of goats on Cooper, Salt, and Peter Islands has reduced numbers to mere handfuls.

Peter Island has an extensive network of roads and paths, as well as a small resort and a few residences. Even though goats are also present on the island, Peter has a few well-wooded hills and small valleys, and in one such woodland, the IRF biodiversity research team encountered an unusual form of the widespread tree that is locally called Black Willow (*Quadralla indica*). On Peter Island, it seems to be a dwarfish form of the species (see photo in Peter Island characterisation), with large white and showy petals and an unusually short *gynophore* (the stalk that supports the female reproductive structure that produces seeds in a plant). Further field studies may locate others and help shed light on the form.

The Thatch or Tyre Palm (*Coccothrinax barbadensis*) is an important native species in local BVI culture and history, where the leaves were used to thatch roofs and to make baskets, hats, mats and brooms. It is now rare in most of the Sister Islands, with the exception of Great Thatch where an extensive population remains. Elsewhere, overharvesting, habitat loss and goats have reduced the plants to a few individuals or single plants.

BELONGER PLANT SPECIES

Endemic plant species are those that are unique to the BVI, to both the BVI and the USVI, to the Puerto Rico Bank, or to the West Indies. They can be thought of as Belonger Species because they are indigenous or “born-here” species. **Annex A** provides a list of almost 100 Belonger Plant Species of the Sister Islands.

None of these species are limited in their distribution to the Sister Islands, but their numbers offer a range of variety, beauty, forms, and differing conservation status. One such Belonger is the bromeliad *Pitcairnia jareckii* or Jarecki's Wild Pine, so named because it was first discovered on Guana Island and was named in honor of the island's owner. This species has showy lemon-yellow to whitish-yellow flowers (see photo in Guana Island Characterisation).

PLANT SPECIES OF SPECIAL CONSERVATION CONCERN

There are 56 plant species of Special Conservation Concern on the Sister Islands of Tortola. Many of these are also found on Tortola, but some populations on the smaller islands are very significant. These additional groups of plants offer conservationists, researchers, and resource managers options to ensure the long-term protection of the species. **Annex B** lists the native plant species that are of Special Conservation Concern on the Sister Islands. The list includes *Chloroleucon tortum* or Brazilian Rain Tree, many of the islands' cacti, several species of grasses and sedges, ferns, orchids and most of the territory's mangrove species.

INVASIVE PLANTS

Invasive plants are species that are usually exotic, that is, introduced from somewhere else, which may result in adverse environmental, economic, and/or health impacts. These plants are not native to the

BVI. **Annex C** provides a list of the invasive plants of the Sister Islands.

There are at least 31 species of invasive or potentially invasive plants found on the Sister Islands. Many of these are plants currently under cultivation, but could potentially escape and become naturalised. An example of this is the Neem (*Azadirachta indica*), seen around hotels and residences on inhabited Sister Islands such as Cooper Island. Neem can become a severe pest tree if allowed to grow in the wild, creating monotypic stands that sometimes cover many hectares, thereby crowding out native plants and changing local soil, water and moisture regimes.

Another such plant is the Beach Cabbage/Beach Naupaka (*Scaevola taccada*), a native of the Pacific, which was first introduced to the Greater Virgin Islands by hotels as a hedge and beach ornamental plant. It soon escaped and has become naturalised on many beaches of the Virgin Islands. It also hybridises with the native *S. plumieri*, crowding out this rare native in its own habitat.

To reduce the likelihood of introduced plants becoming invasive, it is important that touristic, commercial and residential property owners become more aware of the potential adverse impacts of the plant species they import and grow in their gardens, including on the Sister Islands. While it is difficult to always predict the behaviours of a species in a new environment, many of the invasives are already well known.

THE TERRESTRIAL FAUNA OF TORTOLA'S SISTER ISLANDS

BIRDS

The birds of the Sister Islands are a mixed avian fauna, consisting of small passerines—birds such as the Black-faced Grassquit (*Tiaris bicolor*), the Bananaquit (*Coereba flaveola*) and the Lesser Antillean Bullfinch (*Loxigilla noctis*)—doves and pigeons, shorebirds, waterfowl and seabirds.

Approximately 107 species are recorded for the Sister Islands; **Annex D** provides a list of these species.

Note that the list is by no means complete, but is ongoing as new records come to light, old but unknown records are discovered and decoded, and new taxonomic changes come to the fore.

Given the absence of the Small Indian Mongoose (*Herpestes javanicus*) from most of the Sister Islands, many bird species nest on or near the ground or use the islands to breed in relatively large flocks or small colonies, safe from the voracious predation of this introduced mammal. Additionally, since many of

the Sister Islands are uninhabited, they provide important sites for nesting seabirds, including the only colony of Magnificent Frigatebird (*Fregata magnificens*) in the Virgin Islands at Great Tobago. The colony is found on the eastern shore of the island, where, among the Frigates, are nesting Brown Boobies (*Sula leucogaster*), forming one of the largest such sites in the Eastern Caribbean.

During the northern spring months beginning in early April, thousands of pelagic seabirds arrive from their far-flung journeys across Caribbean and Atlantic waters and along the South American coast. They compete for nesting habitats on many of the Sister Islands, such as the Tobagos. Some small cays like Watson's Rock, southwest of Great Tobago, provide day and night sanctuary for resting and sleeping birds. Terns, boobies and pelicans spend a great deal of their time there, preening, socialising, displaying and even mating.

Seabirds in the BVI are in decline, a serious concern given that seabirds are considered an indicator species, and their decline can signal important changes, for example, in the health of marine ecosystems. In order to improve our understanding of change in the BVI's marine environment, seabird breeding areas, including those on Tortola's Sister Islands, need to be stabilised and invasive threats removed.

One of the most important but imperiled seabird species of the Sister Islands is the Roseate Tern (*Sterna dougalli*). Its scarcity warrants more attention and planning to secure its survival.

Some species of Sister Island seabirds remain a mystery. One such species is Audubon's Shearwater (*Puffinus lherminieri*), a bird that spends most of its life on the open ocean, but which returns to coastal burrows in steep cliffs to breed. Birds arrive after dark, and because of this, very few people have ever seen or even know about them. Evidence for their presence include burrows with signs of bird occupancy, shearwater calls near the cliffs of some of the southern Sister Islands, and injured birds that, disoriented by the noise and bright lights of Tortola, have crashed onto beaches and in yards or other areas of human occupation. The Audubon's Shearwater has been observed on Cooper, Ginger,

Great Camanoe, Great Tobago, Norman, and Peter Islands.

On Salt Island, with its relatively large salt flats and much denuded landscape, Common Ground Doves (*Columbina passerina*), Northern Mockingbirds (*Mimus polyglottos*), and numerous seabirds have found a home. The salt flats of this island often host fairly large numbers of several species of wading and shorebirds, and its wetlands become especially important during the dry season from January to April when food and habitat are critically important but scarce.

On some of the Sister Islands to the west of Tortola (Little Thatch and Great Tobago) and to the south (Cooper and Peter Islands), the Lesser Antillean Bullfinch (*Loxigilla noctis*) may be more common than initially thought. Males can often be heard calling from their tree-top perches. This Bullfinch is a relatively recent arrival in the Virgin Islands and Puerto Rico, first observed in the 1970s as it has made its way from the Lesser Antilles.

A relatively common sight on the Sister Islands is the presence of individuals or mated pairs of the American Kestrel (*Falco sparverius*), locally called Killi Hawk because of its call. This is the smallest of the Virgin Islands' birds of prey. It feeds mainly on lizards and large insects, but will also take small birds and small snakes. It is often found perched on the tops of tall trees from which it can survey its territory, look out for potential danger and spy for prey. A mated pair often calls to one another, sometimes from atop respective perches, keeping in touch when separated. These birds also nest on most of the Sister Islands where prey is readily available.

REPTILES

The reptiles of Tortola's Sister Islands include several species of lizards, snakes, a tortoise and marine turtles. Twenty-three reptile species are recorded for the Sister Islands. **Annex E** provides a summary of species distribution per island.

The lizards include many of those typical of Tortola, including the three species of Anoles, as well as the Virgin Islands Ground Lizard (*Ameiva exsul*) and the House Gecko (*Hemidactylus mabouia*). The latter is

an introduced species originally from Africa and is found wherever humans are present for any considerable duration since it occupies homes and other facilities and is quite easily transported from place to place.

Another typical species is the Green Iguana (*Iguana iguana*), although it is limited in its distribution and so far known only from Guana and Peter Islands. Its recent introduction on Peter Island may pose a problem for native wildlife. One of the BVI's rarest species, the Anegada Rock Iguana (*Cyclura pinguis*), was successfully introduced from Anegada to Guana Island in the 1980s to start a second population in a part of the species' former range. More recently, the Anegada Iguana was introduced from Guana Island to Little Thatch by the island's owners, where it is reported to be doing well.

Not so typical is the endemic Ernest Williams' Crested Anole (*Anolis ernestwilliamsi*), endemic to tiny Carrot Rock, lying to the south of Peter Island. Also endemic to Carrot Rock is a skink species commonly called the Maclean's or Carrot Rock Skink (*Spondylurus macleani*).

Aside from the Carrot Rock Skink, there are two other species found on several of the Sister Islands. The *Spondylurus semitaeniatus* is also found on Tortola, Beef Island and several other islands in the BVI. The *S. sloanii*, is endemic to a handful of the Sister Islands, such as Little Tobago, Salt, Peter and Norman Islands, as well as to a few outer islands of nearby St. Thomas.

The seldom seen Virgin Islands Worm Lizard (*Amphisbaena fenestrata*) is endemic to the Virgin Islands. It is a small but fierce predator capable of biting off pieces from any small animal that crosses its path. It is recorded on Guana, Great Camanoe, and Great Thatch.

Of the small lizard species, in addition to the yet-to-be-named Sphaerodactylus of Carrot Rock, the ubiquitous Virgin Islands Eye-spot Gecko (*Sphaerodactylus macrolepis*) is widely distributed across the Sister Islands. It is a variable species, with many having yellowish heads with few dark markings and more obscure eye-spots. On some Sister Islands, it is

quite rare, for example, on Salt, where leaf-litter is quite sparse due to erosion caused by goats.

Of the snakes or serpents, five species are recorded for the Sister Islands, with the Puerto Rican Racer (*Borikenophis portoricensis*) having two distinct populations. One subspecies, *B. p. anegadae* is more widely distributed throughout the Virgin Islands, including on Tortola. The other, *B. p. richardii*, is found on Cooper, Peter, Ginger, and Salt Islands and in parts of the USVI.

Many of the specimens of *B. p. anegadae* observed by the IRF biodiversity research team showed signs of severe injury as a result of bites by introduced rats. This can be evidenced by stubby or amputated tails, and/or further scars and injury to the lower, mid and upper parts of the body where sharp bites are evident.

The largest snake of the BVI, reaching over one metre (3 feet), is the Virgin Islands Tree Boa (*Chilabothrus grantii*), reported only for Great Camanoe and Guana Island. It is also found on Tortola, Jost Van Dyke, Virgin Gorda (reported) and many of the islands of the USVI. Great Camanoe may have a significant population of this species since it is seen regularly, although nothing is known about distribution across the island, habitat preferences and other important characteristics.

The second smallest of the snakes is the Virgin Islands Racerlet (*Magliophis exiguus*), which grows to about 0.5 metres (1.5 feet) and has become very rare. Conversations with persons familiar with the species on Great Camanoe, Cooper, and Peter Islands suggest that it is now quite rare and hardly seen, suggesting a decline. Future research efforts should concentrate on conducting field surveys to determine population numbers, cause of decline, and effective conservation strategies.

The Virgin Islands' smallest snake is the Virgin Islands Blind Worm (*Typhlops richardii*). Dr. James (Skip) Lazell, in his *British Virgin Islands Faunal Survey* (1980), suggested that some populations—for example on Salt Island—appeared different, but provided no details. However, he did acknowledge that given the paucity of specimens and studies, more work is needed on this species.

The other reptiles of the Sister Islands include the Red-footed Tortoise (*Chelonoidis carbonaria*), which is believed to have been introduced during early Amerindian occupation as mobile livestock. The Tortoise has become very rare in the Sister Islands, with Little Thatch, Peter Island and Guana Island having the only confirmed records.

Of the marine turtles, three species are recorded breeding in the BVI. The Hawksbill is reported to nest on Scrub, Peter and Cooper Islands, while the Green Turtle nests on Scrub. The Green Turtle is reported to forage around most of the Sister Islands to the south of Tortola, as well as the eastern Sister Islands and Little Thatch.

All of the marine turtles of the BVI are threatened with extinction and should be considered Endangered.

AMPHIBIANS

The amphibians of the Sister Islands are quite limited, perhaps as result of the relatively dry nature of the islands, or perhaps there have been periods of extinctions as human presence increased, exotic pests spread, or necessary native plant and aquatic habitats disappeared. Islands such as Great Camanoe and Guana should have more dynamic amphibian fauna given their size, habitats, elevation, and diversity. Nevertheless, there are at least five amphibian species found on the Sister Islands, with one being non-native. **Annex E** lists these species, including the few island-specific occurrences.

One factor affecting understanding of the distribution of each species and its status is a lack of ongoing surveys and research studies, which, if available, would increase the appreciation of how native amphibians adapt and thrive in their limited habitats.

The only introduced species of the Sister Islands is the Cuban Tree Frog (*Osteopilus septentrionalis*), which, so far, is limited to Peter Island. It is also found on Tortola and several other of the Virgin Islands. Cuban Tree Frogs are easily transported between islands by the movement of people, boats and their cargos.

One species endemic to Puerto Rico, the USVI and the BVI is the White-lipped Frog (*Leptodactylus albilabris*). However, it is not recorded for any Sister Island, but given the available habitats that are present on several of the Sister Islands, it is listed in Annex E as possible.

MAMMALS

Aside from humans and farmed livestock, the wild-occurring terrestrial mammals of the Sister Islands include native bats and feral and free-roaming goats. Two species have become extinct in the last century—the Caribbean Manatee (*Trichechus manatus*) and the West Indian Monk Seal (*Neomonachus tropicalis*)—both of which once roamed the waters of the BVI, including the Sister Islands.

The species of mammals for the Sister Islands are listed in **Annex E**.

Of the bats, several new records are known from some of the Sister Islands. On Great Camanoe, no previous bats were confirmed from the island. However, in October 2014, the IRF biodiversity team recorded three species: the Antillean Cave Bat (*Brachyphylla cavernarum*), the Velvety Free-tailed Bat (*Molossus molossus*), and the Fishing Bat (*Noctilio leporinus*). This confirms new distribution records, thereby revealing important new conservation considerations for bat species in the BVI.

There are three introduced rodents, as well as domesticated goats that are fairly common and widespread across many of the Sister Islands. They are discussed in the Invasive Fauna section below.

INVERTEBRATES

Invertebrates, by definition, are animals without a backbone. They include insects (those that have six legs, three on each side), Arachnids (those with eight legs, four on each side), Myriapods (those with many legs and segmented bodies like the centipedes and millipedes), snails and slugs, and worms.

Invertebrates make up the largest group of animals in the BVI, outside of bacteria and viruses. Given their populations and number of species (the total number of species found in the British Virgin Islands

is not yet known), these “spineless” animals are fundamentally important to the balance of life in nature and to the survival of sustainable populations of native plants and animals.

Bright sunny days on the Sister Islands are dominated by the more obvious habits of birds or lizards, with the occasional butterfly or some brightly-coloured insect, a spider or a giant millipede scrambling about. But at night the islands come to life in ways that might leave some squeamish or easily unsettled, as the “creepy-crawlies” (along with the winged denizens of the night, the bats) emerge to feast and to mate.

With the exception of Guana Island, knowledge of the invertebrates of the Sister Islands is relatively poor with respect to their populations, the number of species, their biology, ecology and connections to other animals and plants. For several decades, scientists have visited Guana Island to study its flora and fauna (including invertebrates), thanks to the sponsorship and support of the island’s owner and his family and in cooperation with the US-based Conservation Agency.

FAUNA OF SPECIAL CONSERVATION CONCERN

Because the Sister Islands are relatively small compared to Tortola, virtually all of its native fauna is of concern. Any major disturbance or event can have a negative impact on faunal populations.

However, particular attention should be paid to the nesting seabirds of the Sister Islands, including the nesting colony of the Magnificent Frigatebird on Great Tobago. Also of major concern are all native snakes, as well as the endemic skinks, the Carrot Rock Anole, its yet-to-be-named *Sphaerodactylus*, and the Virgin Islands Worm Lizard (see **Annex E**).

Although introduced deliberately, the Anegada Iguana on Little Thatch and Guana Island remains of importance to the future survival of the species. It is listed as Critically Endangered internationally.

Also on Guana, Little Thatch, and Peter Islands is a small population of the Red-footed Tortoise, among

the few remaining on the Sister Islands. It is very rare throughout the BVI.

The bats, the only native mammals that remain in the BVI today, require particular conservation intervention because many of the territory’s bat cave roosts are found on the Sister Islands, including Norman, Great Camanoe and Guana. Despite this, very little is known about the species and their habitats.

INVASIVE FAUNA

Invasive animals are those that have been introduced deliberately or accidentally, which may cause harm to the economy, culture, health, and environment.

These include the rats, such as the Black Rat (*Rattus rattus*), which is common throughout the Sister Islands. It was inadvertently brought to the Caribbean by early European colonists as stowaways on ships, soon escaping onshore to become a major pest across the region. It preys on native insects, birds, reptiles and plants and often attacks the native Puerto Rican Racer’s tail, biting off the end or even the head or other parts of the body, even sometimes killing the animal outright.

The Brown Rat (*Rattus norvegicus*), similar to the Black Rat, also arrived as a stowaway on European ships. It is usually larger and more closely associated with human habitation. Its behavior is similar to its smaller cousin, and it will destroy native animals and plants. The Brown Rat usually inhabits urban areas, and there are no records indicating it occurs on the Sister Islands.

Although the House Mouse (*Mus musculus*) is not confirmed for the Sister Islands, it is likely present, especially around residences and resorts. It also can cause considerable damage to native species.

Among the Sister Islands, the Small Indian Mongoose (*Herpestes javanicus*) is only known on Great Thatch, but because it is a pest on Tortola and other islands such as Jost Van Dyke, it remains a potential threat, particularly since it was deliberately introduced to Jost Van Dyke to rid the island of its snakes. A similar occurrence could potentially occur on any of the Sister Islands, and the BVI should ban the

movement and deliberate introduction of this pest to any of the offshore islands.

Another deliberate introduction is the domestic goat (*Capra aegagrus hircus*). Populations have been released on most of the Sister Islands, including Cooper, Great and Little Tobago, Peter Island, Great and Little Camanoe, Great Thatch, Salt Island and Scrub Island. Where present, goats are destroying plant cover, while the islands themselves are rapidly eroding and becoming drier. This in turn has a significant impact on seabird nesting areas. The goat needs to be humanely removed from all Sister

Islands, and limited efforts are currently being employed to do so (see “Invasive Concerns” below).

The domestic cat (*Felis catus*) has either escaped or been released on some Sister Islands, including Peter and Great Camanoe. Like the rat and the mongoose, this mammalian predator eats and destroys native animal species.

The Cuban Tree Frog (*Osteopilus septentrionalis*) was introduced to the Virgin Islands via Miami, arriving in shipments and plants. It eats native frogs, lizards, small birds, insects and snakes. Thus far, it has only been recorded for Peter Island.

THE ENVIRONMENTAL FUTURE OF TORTOLA’S SISTER ISLANDS

Within a small island, no problem or area of study can stand by itself, no piece of life remains isolated; every living and non-living thing forms an integral part of a structured whole. Similarly, an island chain is a delicate and fragile network, representing a set of highly interdependent relationships— island to island, system to sub-system, island to sea.

[Edward Towle, 1972]

The above words, written in the early 1970s as the rationale for the founding of Island Resources Foundation, seem to have a particular relevance for the Sister Islands of Tortola during the second decade of the twenty-first century. The close proximity of Sister Island to Sister Island—as well as to the mainland of Tortola—emphasises their physical interconnectedness. At the same time, this interconnectedness is a contrast to the separateness and seclusion of individual Sister Islands, each an isolated, water-enclosed community of natural and sometimes human habitation.

Thus, while the living and non-living components of each Sister Island form an integral part of that island’s structured whole, the entirety of the Sister Islands characterises a delicate chain of highly interdependent relationships that add to the totality of Tortola—and the British Virgin Islands.

As we highlight issues of environmental degradation or conservation priorities or development options for the Sister Islands, these may seem similar—albeit at a lesser scale—to many of the same issues manifested and magnified on Tortola. Yet, we also recognise the apartness of the Sister Islands from the

more rapid development patterns of the main island—their clocks are running slower, many species and habitats are not disappearing as quickly, and the Sister Islands could—by creating self-styled “mini-island laboratories of the possible”—buy more time for all of the BVI.

Given this duality of interconnectedness and seclusion, what then are some of the challenges ahead for Tortola’s Sister Islands?

INVASIVE CONCERNS

Free-roaming and feral goats on many of the Sister Islands have contributed to land deterioration through soil loss and erosion. In addition, the unchecked presence of these animals causes biodiversity reduction—particularly of vegetation land cover—and degradation of wildlife habitat. Feral goats are a problem particularly on the Tobagos and the Camanoes and on Peter, Cooper, and Salt Islands. For example, on Great Camanoe, the impact of feral goats (and cats) has resulted in considerable loss of species, evidenced by low or limited plant regeneration and the death of mature

trees. In contrast, the vegetation on Ginger Island is relatively undisturbed largely due to the island being goat-free.

The presence of introduced mammals such as rats and feral cats poses a further threat to wildlife habitat, plant biodiversity, endemic reptiles, and the many species of birds on the Sister Islands. They are a particular problem on the Tobagos, Great Camanoe and Peter Island.

Goat eradication has been the target of a European Union-funded project for Great and Little Tobago since 2012. Local capacity was built by the training of a warden from the National Parks Trust in the use of firearms to ensure long-term invasive species control. The project is scheduled to end in 2015, when eradication should be 100 percent complete.

Goat removal was also carried out at Norman Island more than a decade ago when the island's owner hired an expert, who had worked on similar issues in Pacific islands, to direct the effort. Actual removal of the goats was carried out by members of the Royal Virgin Islands Police Force. Goats were entirely eradicated from the island, and this remains the situation to the present time.

Another invasive species—a population of sheep—is present on Guana Island, where hunters from the East End of Tortola have been used to control the animals. For a time, sheep were cleared from the western end of the island, but more recently the sheep population has again expanded throughout the island. Another concerted removal effort is planned to reduce, and perhaps even eradicate, the population.

In the BVI, a rat eradication-and-control programme has been successfully employed at Sandy Cay, offshore of Jost Van Dyke, since 2002. A rat control programme has been carried out at Mosquito Island in the North Sound of Virgin Gorda, and feasibility studies for the removal of rats from Green Cay, Great Tobago and Little Tobago have been completed. Similar effort could be employed at impacted Sister Islands. Privately owned Sister Islands with residential communities and/or resorts, villas and other tourism amenities need to control these rodents for public health and biodiversity protection.

Invasive issues focus not only on animals. The introduction of invasive plant species and cultivars, via the horticultural trade for landscaping, is potentially harmful to native plants on those Sister Islands that include human habitation. Imported plant species pose a threat to native plants by directly competing with them, by changing ecological dynamics and processes, and by encouraging the introduction of other invasives.

Given that many of these invasive species issues—whether faunal or floral—are common to multiple Sister Islands, solutions may have a commonality, whether the island is inhabited, such as Great Camanoe, or still relatively wild, such as Great Tobago. Moreover, biodiversity elsewhere in the BVI is similarly threatened by free-roaming and feral animals and by the use of cultivated invasive plants. Solutions must therefore be widespread with an emphasis on building public awareness about short- and long-term impacts on the environment and ultimately reaching community consensus for control.

NATIVE BIODIVERSITY

The overall range and distribution of native vegetation on the Sister Islands is not well known or extensively studied. However, since 2013, a collaborative effort of the National Parks Trust of the Virgin Islands and the Royal Botanic Gardens Kew has sought to identify the composition of terrestrial ecosystems and diversity of plants across the Virgin Islands, including several of the Sister Islands. This research and vegetation mapping, along with the field research of IRF's biodiversity team for the BVI Environmental Profile Programme, will produce comprehensive plant lists for surveyed islands and national parks and will provide a plant layer for use in territorial GIS mapping.

These efforts are important for the Sister Islands because they will increase understanding about the status of plant biodiversity on the islands studied. Moreover, as our understanding increases about the current status and distribution of rare, threatened, endangered and endemic plant species throughout the British Virgin Islands, the importance of the less-developed Sister Islands for biodiversity planning and as refuge for at-risk and declining species will become clearer.

Information on the current status, distribution and population of wildlife on the Sister Islands—including rare, threatened and endangered species—is largely unknown. This is a challenge not only for the Sister Islands but for Tortola and the entire territory, which currently lacks a comprehensive territorial policy and updated legislative authority for wildlife research and management. Without research, policy directives and legislation, native wildlife will continue to decline, with attendant loss and extinction. Thus, identifying and providing appropriate research and conservation for the native faunal species of the Sister Islands is necessary, and, as with planning for plant biodiversity, the Sister Islands' importance for wildlife biodiversity planning may well increase over time.

SANCTUARY or RESORT

Bird sanctuary status has been afforded to seven of Tortola's Sister Islands, with three (the **Tobagos** and **Dead Chest**) also more formally designated as national parks. The three national park islands are uninhabited and largely managed as wildlife refuges. The other Sister Islands declared bird sanctuaries are privately owned—Salt, Ginger, Peter, and Cooper Islands. Of these, **Salt** and **Ginger** are uninhabited; **Peter** has been developed as an exclusive resort with much of the island still in an undeveloped state; **Cooper** is also inhabited with residential and commercial development largely centred on the Manchioneel Bay beach area.

Other inhabited islands include: Little Thatch, Guana, Great Camanoë, and Scrub Islands, plus Marina Cay. Tourism accommodations on **Little Thatch** and **Guana** are relatively modest, while private residences occupy the southern portion of **Great Camanoë**. **Norman Island**, a well-known destination for yachters and other marine recreational enthusiasts, is uninhabited at present, although future development planning might be foreseen in the network of roads already in place and the clearing of certain areas for land surveys. **Scrub Island** is the most developed of the Sister Islands, home to a major resort, spa and marina. **Marina Cay**, although much smaller in size than Scrub Island, is also heavily developed with villas and other visitor amenities.

Of the remaining Sister Islands not mentioned above, **Great Thatch**, **Little Camanoë**, and **Pelican Island** plus **Carval Rock** are uninhabited.

Thus, there is no “one size fits all” land use strategy for Tortola's Sister Islands, ranging as they do from tourist meccas to research outposts, from occupied to deserted, from modernised to rustic. While there is no negating what has already transpired on each Sister Island, there are options, trade-offs, priorities, and unknowns that will yet determine the direction and future of Tortola's Sister Islands.

For example, consider the future of Ginger Island. Undisturbed by free-roaming or feral goats and with several globally important plant species, Ginger Island is an excellent candidate for biodiversity protection objectives. The waters surrounding the island have already been proposed as two marine protected areas, one a marine park and the second a protected seascape.

Yet, Ginger is privately owned and has been for sale for some time. Environmentalists have sought to identify donors for its purchase for conservation purposes, but its unspoiled beauty also makes it attractive for tourism development. And so the future for the 259-acre island in the northern most corner of the southern Sister Islands remains unknown, while competing influences continue to vie for its future.

The remainder of this natural history study will focus on a characterisation of each of the 17 Sister Islands, including a general descriptive overview, delineation of important natural and physical features, and a statement of preliminary issues and recommendations for each island's future (a summary overview of key features and issues is provided in **Tables 6 and 7**). While this information will be useful, the ultimate direction for each island will be the result of public and private sector priorities and the determination of those goals, benefits, and responsibilities that reflect how BVI Islanders wish to convey the Sister Islands to future generations.

Table 6.
Selected Features of Tortola's Sister Islands
 (see also Tables 1 and 2).

Sister Island	Ownership	Inhabited?	Developed?	Type of Development	Salt Ponds
Carval Rock	Crown	No	No		None
Cooper Island	Private	Yes	Yes	Resort and beach club	4 salt ponds
Dead Chest	National Park	No	No		1 salt pond
Ginger Island	Private	No	No		1 salt pond
Great Camanoe	Private †	Yes	Yes	Two residential communities	1 salt pond
Great Thatch	Crown	No	No		1 salt pond
Great Tobago	National Park	No	No		None
Guana Island	Private	Yes	Yes	Hilltop cottages and scattered villas	1 salt pond
Little Camanoe	Private	No	No		None
Little Thatch	Private	Yes	Yes	Small number of cottages/residences	None
Little Tobago	National Park	No	No		None
Marina Cay	Private	Yes	Yes	Small hotel, restaurant, villas	None
Norman Island	Private	No	Yes	Beach bar and restaurant complex	4 salt ponds
Pelican Island	Crown	No	No		None
Peter Island	Private	Yes	Yes	Resort, marina, villas	7 salt ponds
Salt Island	Private	No	Yes	Small settlement, no longer occupied	2 salt ponds
Scrub Island	Private	Yes	Yes	Resort, marina, villas	4 salt ponds

† There is a national park at Cam Bay on Great Camanoe.

Table 7.
Key Issues of Concern for Tortola’s Sister Islands.

Sister Island	Invasive Species: Fauna	Invasive Species: Flora	Erosion, Exposed Soils	Species/Areas of Conservation Concern	Deforestation, Open Woodland, Degraded Grasslands	Insufficient Biodiversity Data	Impact of Future Development	Proposed (but still pending) Protected Area Designation	Selected Comments (see island-by-island characterisations for details)
Carval Rock				✓		✓			Protected area status should be considered for this tiny and rocky islet.
Cooper Island	✓	✓	✓	✓	✓	✓	✓	✓	Despite impact of goats, a small forested area is intact and worthy of protection. Elsewhere, reforestation of hillsides eroded by goats is required.
Dead Chest				✓		✓		✓	The island has been a national park since 1974.
Ginger Island		✓		✓		✓	✓	✓	Ginger’s rare and endangered plant species are threatened by the possible development of this privately owned island, which has remained goat-free.
Great Camanoe	✓	✓	✓	✓	✓	✓	✓	✓	Invasive fauna—goats and rats—are an issue and need to be controlled and perhaps eradicated. The national park at Cam Bay protects a near full range of habitats.
Great Thatch	✓	✓	✓	✓	✓	✓		✓	Goats need to be removed to restore landscape. The introduced mongoose needs to be controlled. Eroded hillsides need to be reforested.
Great Tobago	✓		✓	✓	✓	✓		✓	Goats are currently being removed. Landscape has been ravaged by goats; reforestation needed following goat eradication. Only BVI nesting site for the Magnificent Frigatebird.
Guana Island	✓	✓		✓			✓	✓	The unique programme of scientific research that has been carried out at Guana for more than 30 years should be continued and expanded if possible.
Little Camanoe	✓		✓	✓	✓	✓			Although small and uninhabited, much of the island’s vegetation has been devastated by a small herd of goats. If controlled, reforestation is needed.
Little Thatch		✓		✓		✓	✓		The island was recently sold; development plans unknown.
Little Tobago	✓		✓	✓	✓	✓		✓	Goats are currently being removed. Landscape has been ravaged by this invasive species and should be reforested following goat eradication.
Marina Cay	✓	✓			✓				Although extensively developed, coastal woodlands could be restored to protect the coastline and provide shelter and roosts for seabirds.
Norman Island		✓		✓	✓	✓	✓	✓	Any future development should consider protection of endangered species. Reforestation should be considered for areas still in pasture.
Pelican Island						✓	✓	✓	Proposed protected area status for Pelican Island, and for the nearby rocky islets known as The Indians, should be fully executed by Government.
Peter Island	✓	✓	✓	✓	✓	✓	✓	✓	The presence of goats and feral cats is causing considerable environmental damage to vegetation and wildlife.
Salt Island	✓	✓	✓	✓	✓	✓		✓	The island is named for its salt ponds that once were an important resource for salt harvesting. Significant environmental damage has been caused by feral goats.
Scrub Island	✓	✓		✓	✓		✓		Western Scrub is extensively developed, while key areas in the relatively undeveloped eastern area (such as the salt ponds) could still be designated as nature reserves.



The southern shore of Great Thatch (left), looking east toward Tortola with Little Thatch on the right (photo: JP Bacle).

CHARACTERISATIONS of the SISTER ISLANDS

THE WESTERN ISLANDS GROUP

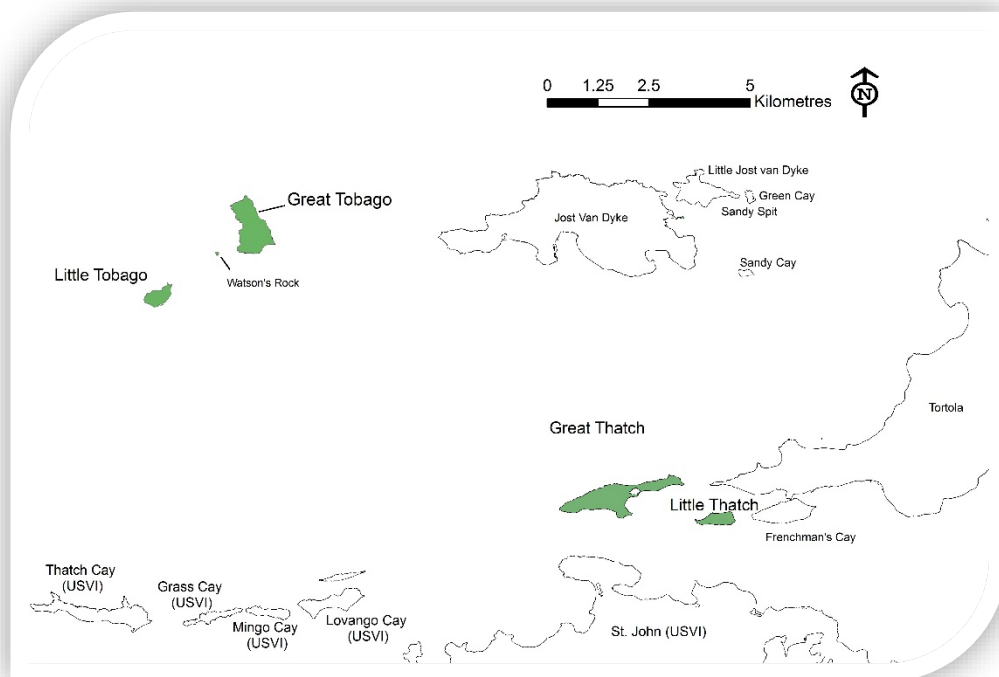


Figure 2.

The Sister Islands of the Western Group (highlighted in green): Great and Little Tobago, Great and Little Thatch.

The Western Group of Tortola's Sister Islands includes two pairs of "cousin" islands—one located west of Tortola (the Thatch islands) and the other west of Jost Van Dyke (the Tobago islands).

Closest to Tortola are Little Thatch and Great Thatch. Both are elongated in profile and densely covered with vegetation, giving them a verdant appearance.

Closer to Jost Van Dyke than to Tortola are the Tobagos. From an aerial perspective, the two are more rounded in contour than the Thatch Islands and characterised by steeper and more rugged cliffs. Their isolation and size contribute to their very dry environments. Thus, the vegetation of these two Sister Islands is xerophytic, mainly consisting of thicket and cacti scrub.



The summit of Great Thatch [photo: K. Lindsay].



A male Magnificent Frigatebird with gular pouch on Great Tobago (photo: S. Zaluski).



Nesting Frigatebirds on Great Tobago (photo: K. Lindsay).



The native Southern Lipfern, a species of semi-deciduous woodlands, is rare on Great Tobago and often falls victim to the ravages of goats (photo: K. Lindsay).



One of the last patches of Drought Deciduous Forest/Shrub on Great Tobago (photo: K. Lindsay).



The VI Ground Lizard sunning itself on Great Tobago (photo: K. Lindsay).



Camp Bay on the west side of Great Tobago with Watson's Rock and Little Tobago in the distance (photo: JP Bacle).



The brilliant flower of the hybrid cactus *Opuntia dillenii* x *repens*, common on the slopes of Great Tobago (photo: K. Lindsay).

GREAT TOBAGO



GENERAL DESCRIPTION. Along with Little Tobago (and Watson’s Rock lying between the Tobagos), uninhabited Great Tobago lies in the northwestern corner of the BVI, 4 kilometres (2.5 miles) west of Jost Van Dyke and 11 kilometres (7 miles) north of St. John, USVI. Steep cliffs make the island difficult to access, but provide excellent habitat for nesting seabirds. The rugged cliffs encircling the island extend into adjacent ocean waters where the seabed dramatically slopes to depths up to 50 metres (165 feet).

VEGETATIONAL AND FLORAL FEATURES. The island features steep cliffs with sparse vegetation, bare ground, and cobblestone and rocky beaches. Its landscape has been ravaged by goats, and much of the island is covered by thick and open scrub, this dominated by the shrub *Croton flavens* and the cactus *Opuntia repens*. Taller woodland and forest include evergreen and semi-deciduous types, especially in shallow valleys and on the eastern shore. Important plant species include the Tree Cactus, *Stenocereus* cactus, a hybrid *Opuntia*, the Turk’s Cap and Woolly Nipple cacti, the Southern Lipfern, and the Silverback Fern.

FAUNAL FEATURES. Fauna include small denizens such as the Ground Lizard, the Crested Anole and the Eye-spot Gecko. The island is the only nesting site in the BVI for the Magnificent Frigatebird; additionally, a small colony of Brown Boobies nests there. Other birds include the Red-tailed Hawk, the Lesser Antillean Bullfinch, and the Red-billed Tropicbird.

NOTE ON WATSON’S ROCK. This large pinnacle is situated west of Great Tobago. It is mainly bare, but there are patches of grasses, herbs, and a handful of perennial species. During the spring into early fall, the islet provides roosting and limited nesting habitat for Brown Noddies and terns, as well as Brown Boobies.

Great Tobago	
Location:	N18° 26' 43" W64° 49' 28"
Ownership:	National Park (uninhabited)
Size:	89 hectares (219 acres)
Elevation:	160 metres (525 feet)

GEOLOGICAL FEATURES. From a distance, Great Tobago looks like a massive dome-shaped structure, encircled by steep rugged slopes. The rock types are volcanic in origin with erosion-resistant andesite being the dominant type. Other volcanic rock types include breccias and tuffs, which are more erodible. Landslides are common along steep northeast-facing slopes. These events are usually attributed to the destruction of hillside vegetation by the goats present on the island.

NEARSHORE FEATURES. Along the steep north- and east-facing cliffs, the seabed slopes dramatically to great depth. The nearshore substrate is limited to coral rock. The island’s shoreline is exposed to constant heavy swells, and, as a result, the few beaches that occur are composed of coral cobble and rock rubble. Soft coral communities with patches of mixed coral and sand flats cover the seabed to the south and leeward side of the island.

WETLANDS. None.

MANMADE FEATURES. Since historical records indicate past settlement, there may be historical ruins. Low rock walls are present on the west central ridge.

PROTECTED AREA STATUS. Great Tobago was established as a national park in 1995, and the waters surrounding the island are proposed as a Protected Seascape under the *BVI Protected Areas System Plan (2007-2017)*. The island was declared a bird sanctuary in 1959 and is one of only three sites in the BVI classified as an Important Bird Area (IBA), an international designation for priority bird conservation.

ISSUES AND RECOMMENDATIONS. The island is essentially managed as a wildlife refuge by the National Parks Trust of the VI, which, with the Jost Van Dykes Preservation Society (JVDPS), monitors the site and bird colonies several times a year. If recent goat eradication efforts control this invasive population over time, severely impacted areas should be reforested and stabilised. A recent collaborative project by the JVDPS and the NPTVI focused on removal of synthetic fishing line from the nesting habitat of Great Tobago’s Frigatebird colony; monitoring of the colony should continue as well as public outreach to the fishing community.



Little Tobago landscape (photo: National Parks Trust of the Virgin Islands).



Little Tobago's rocky coastline attracts seabirds as evidenced by the guano-covered rocks (photo: JP Bacle).



Protruding Watson's Rock with Little Tobago to the right (photo: JP Bacle).



Juvenile (left) and adult Brown Boobies, a species that nests on the Tobago Islands (photo: S. Zaluski).

LITTLE TOBAGO



GENERAL DESCRIPTION. Little Tobago lies two kilometres (1.2 miles) southwest of Great Tobago, with the rocky islet, Watson’s Rock, lying between the two. Like Great Tobago, it is characterised by a rocky coastline and sparse vegetation. The island does not have an embayment or sheltered cove for a comfortable landing from sea.

VEGETATIONAL AND FLORAL FEATURES. Vegetation characteristics and cover, although similar to Great Tobago, are sparser due to Little Tobago’s smaller size and lesser elevation. Like its larger Sister Island, Little Tobago’s natural vegetation has been heavily ravaged by goats. Obvious signs of serious erosion are visible even from offshore. The island has patches of semi-evergreen woodlands and forests, extensive exposed cliffs, bare soil, and coastal xeric scrub—including cacti such as the Tree Cactus (*Opuntia rubescens*), Prickly Pear (*Opuntia dillenii*), and Turk’s Cap (*Melocactus intortus*). Large specimens of what could be the cactus *Opuntia elatior*, a very rare species in the Virgin Islands, might be present. *Opuntia repens* and *Agave missionum* are also present.

FAUNAL FEATURES. Little Tobago’s fauna species include the Ground Lizard, the Crested Anole, the Eye-spot Gecko and the VI Bronze Skink. The island is also home to nesting seabirds, including Brown Boobies, Brown Pelicans, Brown Noddies, Red-billed Tropicbirds, and terns. The island is fringed by steep coastal cliffs with jagged ledges that provide opportunity for roosting and nesting bird colonies.

Little Tobago	
Location:	N18° 25' 46" W64° 50' 47"
Ownership:	National Park (uninhabited)
Size:	22 hectares (55 acres)
Elevation:	76 metres (250 feet)

GEOLOGICAL FEATURES. Little Tobago is of similar geology to Great Tobago despite being a quarter its size and half its elevation. Volcanic andesitic, breccias and tuffs are the predominant rock types. The entire coastline is steep and rugged, and erosional features do occur. However, these are not as prominent as those on Great Tobago, due to less goat activity.

NEARSHORE FEATURES. A mostly mixed coral substrate is found on the windward side of Little Tobago with scattered assemblies of *Montastrea* coral. Along the north and leeward side, a mixture of soft coral is scattered throughout the nearshore seafloor. Strong currents and constant swells contribute to good water quality around the island.

WETLANDS. None.

MANMADE FEATURES. None.

PROTECTED AREA STATUS. Little Tobago was declared a bird sanctuary in 1959 and was established as a national park in 1998. The waters surrounding the two Tobagos are proposed as the Great Tobago Protected Seascape in the *BVI Protected Areas System Plan (2007-2017)*.

ISSUES AND RECOMMENDATIONS. With Great Tobago and Watson’s Rock, the island is essentially managed as a single unit by the National Parks Trust. Once the invasive goat population is eradicated from Little Tobago (anticipated by late 2015), the island’s flora and fauna should be more comprehensively surveyed. Additionally, in the medium-to-long term, the areas most impacted by goats should be reforested—once the island is invasive-free.



Mangrove salt pond on Great Thatch (photo: K. Lindsay).



Great Thatch Island, showing mangrove salt pond and sheltered southern bay (photo: S. Gore).



Flowers on the Stinging Cherry found growing along the shore of Great Thatch (photo: K. Lindsay).



A large number of Thatch Palms cover the highest peak of Great Thatch (photo: JP Bacle).



The American Brunfelsia, or Lady of the Night, on Great Thatch. The plant produces a powerful scent at night to attract large sphinx moths to pollinate it (photo: K. Lindsay).



The rare Woolly Nipple cactus in the foreground (yellow-orange) with a few Turk's Cap cactus (green) on Great Thatch (photo: JP Bacle).



This Great Thatch photo displays mostly bare ground devoid of vegetation due to the presence of goats. The photo was taken inland and below tree cover (photo: JP Bacle).

GREAT THATCH



GENERAL DESCRIPTION. Great Thatch lies just north of St. John, USVI (approximately 2.4 kilometres/1.5 miles) and 0.7 kilometres (0.4 miles) from West End, Tortola. The island was presumably named for its abundance of tall thatch trees that can be seen from a distance. It still includes extensive forests and woodlands. The southern side (facing St. John) has a large and protected bay. Despite its size and diverse landscape, Great Thatch's floral and faunal diversity is declining due to the presence of goats, this evidenced by sparse ground vegetation and exposed soils, especially along steep slopes both inland and along the coast.

VEGETATIONAL AND FLORAL FEATURES. Great Thatch is heavily wooded, but this appearance is misleading since goats abound on the island and have stripped the undergrowth and much of the coastline of shrubbery and herbaceous growth, causing serious erosion. The vegetation includes semi-deciduous and evergreen woodlands and forests, and coastal xeric cactus scrub. Of the native plants, the rare endemics include the Turk's Cap, the Woolly Nipple, *Opuntia* cacti and the Tree Cactus, as well as the Stinging Cherry, the Silverback Fern, and the largest tract of Thatch Palm on any of the Sister Islands.

FAUNAL FEATURES. The forests and woodlands of Great Thatch provide habitat for a number of species of reptiles, including the Crested Anole, the Eye-spot Gecko and the VI Worm Lizard. However, deteriorating vegetation cover has had an impact on reptiles, and populations of some species appear low. A frog, possibly the Antillean Coqui, is known. Birds include the Red-tailed Hawk, White-cheeked Pintail, Black-necked Stilt, Little Blue Heron, Oystercatcher, Green-throated Carib, Mangrove Cuckoo, and Pearly-eyed Thrasher. Invertebrates include crabs—such as the Sally Light Foot, the Soldier Crab and the Giant Land Crab—terrestrial snails, arachnids including spiders and a Tailless Whip Scorpion, and several species of termites.

GEOLOGICAL FEATURES. The island has a geology similar to Little Thatch and the west end of Tortola. Its elongated shape is attributed to a complex metamorphic history. The layering and subsequent compression of volcanic wake, shale, conglomerate and calcareous siltstone have produced a distinctive rugged topography following an east-west trend.

NEARSHORE FEATURES. Along the north side of the island, large expanses of soft and hard coral cover the nearshore seafloor.

Included is an array of colourful sponges, sea fans and coral (including Fire and Elkhorn Coral). A sandy bottom substrate wraps the northwest side of Great Thatch and extends considerably offshore. Landing on the island is difficult due to sheer cliffs and mostly strong swells and currents. The exception is the sheltered bays on the south side.

WETLANDS. The only salt pond on the island lies between two topographical highs. At almost three hectares (seven acres) in size, it is the second largest of the Sister Islands. The entire pond is fringed with mangrove species. Red mangroves are present as well as black, white and buttonwood mangroves.

MANMADE FEATURES. Because of its close proximity to the US (former Danish) Virgin Islands, Great Thatch once boasted a customs house and military fortification as well as a community of permanent residents who occupied the island in the nineteenth into possibly the early twentieth century. Substantial ruins remain and require further study. Interest has been expressed by the H. Lavity Stoutt Community College in supporting such an endeavor.

PROTECTED AREA STATUS. As per the *BVI Protected Areas System Plan (2007-2017)*, Great Thatch is intended as both a national park (terrestrial) and a marine park; additionally, waters to the north are proposed as the Great Thatch North Marine Managed Resource Area. At present, the island is not protected.

ISSUES AND RECOMMENDATIONS. Protected area designation should be finalised. Goats need to be permanently removed to restore vegetation cover and prevent further damage to historical ruins. There is confirmation that the Small Indian Mongoose was introduced to the island. An invasive species control programme should be developed to minimise its impact. Study of the island's flora and fauna should be carried out before and after the invasives are removed. The historical ruins could be preserved, particularly if the island is declared a national park.

Great Thatch	
Location:	N18° 23' 10" W64° 44' 23"
Ownership:	Crown (uninhabited)
Size:	123 hectares (304 acres)
Elevation:	188 metres (617 feet)

Flowering Tree Cactus on Little Thatch (photo: JP Bacle).



Sandy beach at the far western end of Little Thatch, with Great Thatch and Jost Van Dyke in the distance (photo: JP Bacle).

Laughing Gull adult on Little Thatch (photo: K. Lindsay).



The Pricklybush on Little Thatch (photo: K. Lindsay).



Male Lesser Antillean Bullfinch on Little Thatch (photo: K. Lindsay).



Hatchling Red-footed Tortoise in the wild on Little Thatch, where it has been reintroduced (photo: K. Lindsay).

LITTLE THATCH



GENERAL DESCRIPTION. Little Thatch is privately owned and easily accessible by sea from Soper's Hole at the West End of Tortola (0.4 kilometres/0.25 miles separate its eastern end from Frenchman's Cay, see Figure 2). Tourism amenities on the island are very exclusive with only one guest cottage at the island's western end. Seagrape Cottage is on the shore facing a pristine sandy beach and aquamarine shallow waters.

VEGETATIONAL AND FLORAL FEATURES. Little Thatch is the smaller sister of its close neighbour, Great Thatch, with similar vegetation types. Most of the island is covered with semi-evergreen and evergreen woodland, coastal xeric scrub and patches of grassland. Some of the important native plants include the Tree Cactus, the Turk's Cap Cactus, the rare trees *Savia sessiliflora* and Coral Erythrina (*Erythrina* cf. *coralodendron*), the native Agave and the Eyelash Orchid. The island has a high occurrence (perhaps the highest concentration in the BVI) of the rare Tree Cactus, many of which are young seedlings, a sign of healthy regeneration.

Of the four western Sister Islands, the vegetation of Little Thatch has been least detrimentally impacted, although, ironically, it is the only one of the four that is developed. This is primarily due to the absence of goats and a well-structured rat-control programme first implemented in the early 2000s.

FAUNAL FEATURES. Little Thatch is home to the Red-footed Tortoise (introduced), the Anegada Iguana (introduced), the Lesser Virgin Islands Skink, the Puerto Rican Racer, the Ground Lizard, two species of Anoles, the Eye-spot Gecko, and the Virgin Islands Coqui Frog, an endemic. Birds include the Lesser Antillean Bullfinch, the Laughing Gull, the Yellow-crowned Night Heron, the Grey Kingbird, the Ground Dove and roosting

Brown Pelicans. There are numerous invertebrates, including the Tarantula Hawk Moth, readily identifiable by its red wings.

GEOLOGICAL FEATURES. The island's elongated shape reflects its underlying geological history. Bedrock type is mostly metamorphic from the Tutu Formation. Volcanic wake, shale, conglomerate, and calcareous siltstone are present. Their formation is characterised by a thin to thick layering that trends east to west in near vertical layering. Unconsolidated sediment deposit is limited to a sandy beach at the far northwest end of the island.

NEARSHORE FEATURES. For most of the island, the shore drops off quickly. The only relatively shallow area is off the main sandy beach. Here, as well as throughout the north shore, the substrate is dominantly composed of soft coral. On the east-facing side and along the southern coastline, a narrow fringe of coral rock and mixed coral can be found. Strong currents assure good water circulation favourable to coral health. Montastrea coral dominates the western edge of the island.

WETLANDS. None.

MANMADE FEATURES. A dock, two beach cottages (only one with overnight accommodations), and the manager's facility are located at the western end of the island. The owner's residence and accommodations are in the centre, most elevated part of the island. A paved road leads from the west end of Little Thatch to the owner's residence, with a dirt road then following the island's contours eastward to a cobble beach in the northeast. A navigational light signal has been installed here at the water's edge.

PROTECTED AREA STATUS. None.

ISSUES AND RECOMMENDATIONS. Successful introduction to Little Thatch of two faunal species—the Anegada Rock Iguana and the Red-footed/Red-legged Tortoise—warrants further habitat and population studies. Invasive plant species on the northwest coast are slowly spreading; before they become problematic, they should be controlled (or removed), and the area restocked with native cacti and Agave.

Little Thatch	
Location:	N18° 22' 53" W64° 42' 55"
Ownership:	Private (inhabited, partially developed)
Size:	23 hectares (58 acres)
Elevation:	86 metres (281 feet)



Little Thatch Island, British Virgin Islands (photo: www.seagrapecottage.net).

CHARACTERISATIONS of the SISTER ISLANDS

THE SOUTHERN ISLANDS GROUP

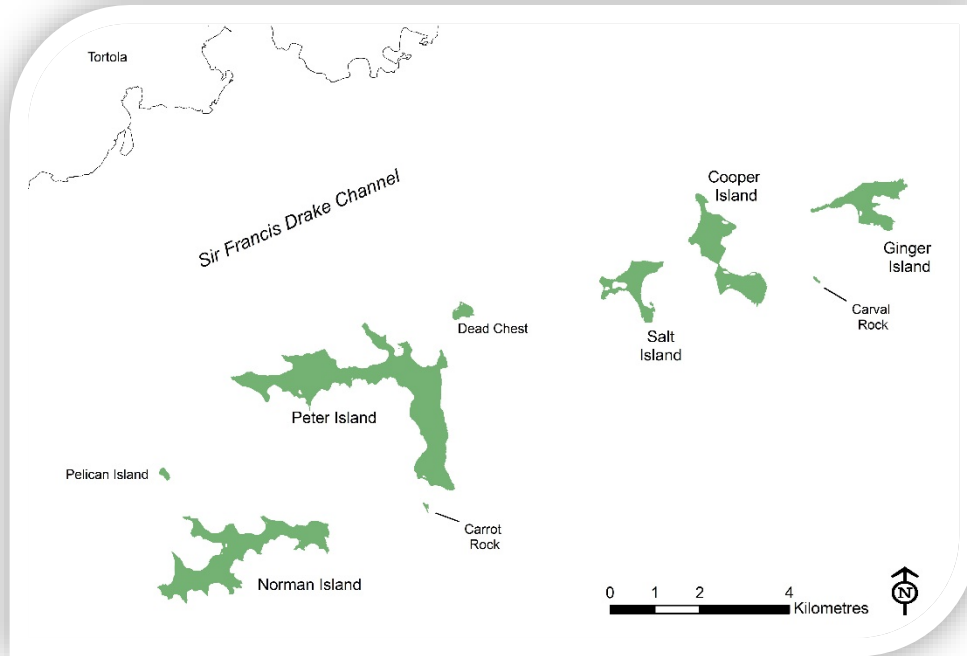


Figure 3.

The Sister Islands of the Southern Group: Pelican Rock, Norman Island, Peter Island, Dead Chest, Salt Island, Cooper Island, Carval Rock, and Ginger Island.

The Southern Group of Tortola's Sister Islands comprises a chain of islands that is situated approximately five kilometres (three miles) to the south-southeast of Tortola's southern coastline. The group is roughly parallel to Tortola's south shore and is oriented in a southwest-to-northeast direction. Between Tortola and the southern islands flows the mighty Sir Frances Drake Channel.



Wedge Bay, Ginger Island.

The narrow channel across the barrier reef is the main access to Ginger Island (photo: JP Bacle).

The group embraces eight islands of varying size, ranging from less than one hectare (2 acres) to over 400 hectares (1,000 acres). From west to east they are: Pelican Rock, Norman Island, Peter Island, Dead Chest, Salt Island, Cooper Island, Carval Rock, and Ginger Island.

The distance from the western tip of Norman Island to the eastern tip of Ginger is approximately 19 kilometres (12 miles).



Two views (above and right) of The Indians, west of Pelican Island. In the photo above, Tortola is in the background.



In the photo above, Pelican Island is on the right, The Indians in the centre, and Water Point on Norman Island to the left. Tortola is in the background (photo: JP Bacle).



The VI Crested Anole, one of two lizard species found on Pelican Island (photo: JP Bacle).



A Brown Bobby, one of the common seabirds that frequent Pelican Island (photo: T. Baily).

PELICAN ISLAND



GENERAL DESCRIPTION. Pelican Island is located a little less than one kilometre (approximately one-half mile) north of Water Point, the northern most tip of Norman Island (Figure 3). The island is about 400 metres (1,300 feet) long and barely 150 metres (490 feet) wide. It is marked by sheer rock cliffs plunging into the sea on its leeward side. The windward side is more gently sloping and conducive to vegetational growth. Pelican Island is linked by a reef system to The Indians, an uninhabited group of rocky islets west of Pelican. This area is second only to the wreck of the *RMS Rhone* as a popular dive site in the BVI.

VEGETATIONAL AND FLORAL FEATURES. Pelican is covered with low dry vegetation. The island's steep cliffs are mostly bare, but provide habitat for xeric shrubs. *Melocactus intortus* and *Opuntia dillenii* are present in this xerophytic landscape. The more gently sloping areas are grassy in many parts. Low semi-deciduous woodlands are confined to a few small patches along east-facing slopes. Beach community habitats are found along the northern and eastern shores.

FAUNAL FEATURES. The island is likely named after the Brown Pelican, which has made the island its roost on and off for centuries. Other common seabirds that visit the island include the Laughing Gull, the Brown Booby, the Bridled Tern and the Magnificent Frigatebird. There are two lizard species: the VI Crested Anole and the Eye-spot Gecko.

GEOLOGICAL FEATURES. This rugged island is entirely formed of igneous rocks from the Water Island Formation, some of the oldest rocks in the BVI. The Indians to the west of Pelican Island

consist of four distinctive rock outcrops that spike out of the water and line up in a row parallel to Pelican Island. They are of similar geology to Pelican.

NEARSHORE FEATURES. The mixed coral cover that surrounds the southern half of Pelican Island is composed mostly of *Montastrea* species. A great variety of soft coral and hard coral is distributed along the northern and particularly the western areas around The Indians. The location is host to spectacularly colourful sponges, sea fans, and a wide variety of reef fish.

WETLANDS. None.

MANMADE FEATURES. None.

PROTECTED AREA STATUS. Pelican Island currently enjoys no protected status, although it is Crown land. Under the *BVI Protected Areas System Plan (2007-2017)*, Pelican Island and the nearby Indians have been proposed as protected areas as follows: The Indians National Park (terrestrial), Pelican Island National Park (terrestrial), and the Caves (Norman Island) and Indians Marine Park.

ISSUES AND RECOMMENDATIONS. Proposed protected area status for Pelican Island and The Indians should be executed by the BVI Government without undue delay. There have been past applications to Government to develop a bar/restaurant on the island. Such development would increase boat traffic, impacting surrounding corals and possibly altering coastal dynamics.

Pelican Island	
<i>Location:</i>	N18° 19' 56" W64° 37' 32"
<i>Ownership:</i>	Crown (uninhabited)
<i>Size:</i>	4 hectares (10 acres)
<i>Elevation:</i>	50 metres (164 feet)



Above, two of the water-level caves at the lower tip of The Bight, Norman Island. A cave entrance is displayed in the photo to the right. The Caves have been proposed as a future BVI national park.



The rare Tree Cactus (*Consolea rubescens*) with a Gulf Fritillary Butterfly (*Agraulis vanillae*) tasting the nectar of its flower, Norman Island (photo: K. Lindsay).



Salt pond behind the dock and restaurant at The Bight, Norman Island (photo: JP Bacle).



Most exposed beaches along the southern coast of Norman Island are composed of coral rubble, such as this one at Bluff Bay (photo: JP Bacle).

NORMAN ISLAND



GENERAL DESCRIPTION. Norman Island is a steep, hilly island with a central ridge extending along its length. Norman Hill in the southwest is the highest point at 130 metres (427 feet) above sea level. The island is approximately four-and-one-half kilometres (almost three miles) in length from west to east and half a kilometre (0.3 mile) in width from north to south. The Bight, facing St. John, USVI on Norman's western coast, is one of the most protected anchorages in the territory; it is also the main entry point to the island.

Many of the place names on Norman Island (e.g., Privateer Bay, Treasure Point, Money Bay) conjure tales of pirate booty long associated with the island. It is one of the sites thought to have been the model for Robert Louis Stevenson's novel, *Treasure Island*.

VEGETATIONAL AND FLORAL FEATURES. The island once harboured herds of goats, cattle and a drove of donkeys. Today, although these have been removed, the extensive grasslands and open woodlands they created still persist. The island also has semi-deciduous and evergreen woodlands and forests, coastal vegetation communities and cactus scrub, as well as mangrove habitats. Of the native plants, the rare endemics include the *Stenocereus* cactus, the Tree Cactus and the Stinging Cherry. *Bastardiopsis eggersii* and *Mammillaria nivosa* have also been recorded for the island.

FAUNAL FEATURES. The wildlife of Norman is similar to many of Tortola's southern Sister Islands, including the two common

species of Anoles, the VI Bronze Skink, the Ground Lizard and the Eye-spot Gecko. Birdlife includes the Thrasher, nesting White-tailed Tropicbirds, Brown Pelicans, and occasionally nesting Bridled Terns. A small colony of Antillean Cave Bats is believed to roost in one of the caves along the southern coast. The Greater Fishing Bat (Bulldog Bat) is also recorded for the island.

GEOLOGICAL FEATURES. Norman is almost entirely comprised of igneous rocks from the Water Island Formation, the oldest unit recognised in the Greater Virgin Islands.

Treasure Point, at the southern entrance to The Bight, comprises a rocky headland where the well-known and much-visited Caves are located at the base of the cliffs. Long explored by snorkelers, the water-level caves are a little more than one metre (slightly more than three feet) deep, dropping to 12 metres (40 feet) near the cave entrances, which are partly underwater.

NEARSHORE FEATURES. The coastline comprises a number of bays (Privateer, Soldier, Benures, Money, Bluff, and Sabu Mathila Bays), in addition to The Bight, Norman Island's largest bay. The Bight is very deep, as much as 18 metres (59 feet) in some areas, with a predominantly sandy bottom and seagrass in shallow areas. The Island is surrounded by a variety of marine communities, comprising sandy bottoms and seagrasses on the northern side and soft and fringing coral reef communities on the southern side.

Norman Island	
Location:	N18° 19' 05" W64° 36' 34"
Ownership:	Private (uninhabited, partially developed)
Size:	255 hectares (630 acres)
Elevation:	130 metres (427 feet)



The popular restaurant and bar on Norman Island, a frequent stop for sailors cruising the southern Sister Islands (photo: JP Bacle).



The Stinging Cherry, widespread along the south-facing slopes on the western half of Norman Island (photo: JP Bacle).



The columnar cactus, *Stenocereus fimbriatus*, overlooking Bluff Bay on Norman Island (photo: K. Lindsay).



A Virgin Islands Ground Lizard (*Ameiva exsul*) stalks the undergrowth of the woods on Norman Island (photo: K. Lindsay).



The Pearly-eyed Thrasher (*Margarops fuscatus*), common throughout most of the Sister Islands, is at home amongst the visitors and tourism facilities on Norman Island (photo: K. Lindsay).

NORMAN ISLAND (continued)



WETLANDS. There are four salt ponds on the island of which two are located in The Bight, and the others at Money Bay and Bluff Bay.

The largest pond, located in the northeast corner of The Bight, is 0.4 hectare in size (close to 1 acre). The others are less than 0.2 hectare (less than half an acre) in size. During the dry season, there is little water in the large pond, while the other three ponds have no water. At least two mangrove species are present at all the ponds.

MANMADE FEATURES. Although Norman is not inhabited with permanent residents, along the northeast side of The Bight are located the only modern buildings on the island, a popular bar and restaurant complex that is a major stopping-off point for yachters cruising the southern islands.

There are also substantial and well-preserved historical remains on Norman Island, including a site known as “Blackbeard’s castle,” a multi-phase plantation house dating from the late 1700s to the middle of the 1800s. An 1823 report states the island had a population of 41, and, undoubtedly, more remains may be present.



The Bight, Norman Island (photo: www.bvivacation.com).

PROTECTED AREA STATUS. Currently, there is one protected area associated with Norman Island, the Money Bay Fisheries Protected Area, established in 2003 under Regulations to the Fisheries Act (1997).

Lying 1.3 kilometres (0.8 miles) southwest of Norman Island is Santa Monica Rock, which is also a declared Fisheries Protected Area.

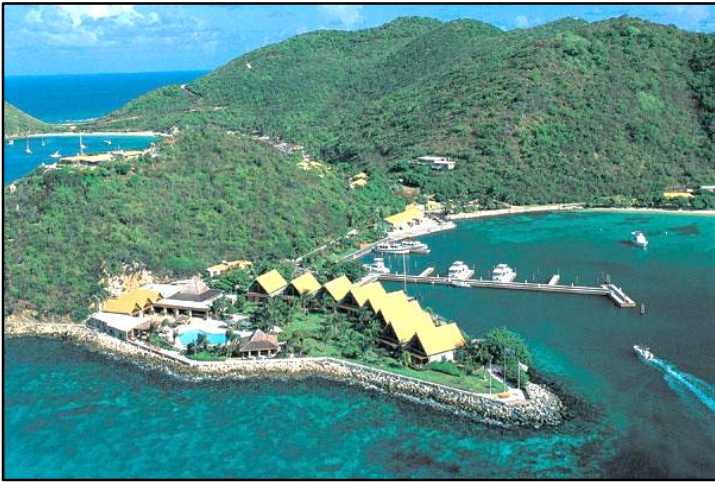
Several Norman Island sites have been proposed for protection as part of the *BVI Protected Areas System Plan (2007-2017)*. They are:

- The Caves National Park.
- The Norman Island Marine Park.
- The Caves and Indians Marine Park.
- The Soldier Bay Protected Seascape.

See the *Tortola Environmental Profile (2015)*, Chapter 8, for the location of the proposed park sites.

ISSUES AND RECOMMENDATIONS. Although feral livestock have been removed from the island, their impact has been long-term, and there are large parts of Norman that remain in pasture. Attempts should be made to reforest some of these spaces. Additionally, any future development of the island should take into consideration the location of endangered species of plants as these are currently being mapped by the National Parks Trust of the Virgin Islands and the Royal Botanic Gardens, Kew.

The caves reported for Norman Island are said to include bats. These need to be assessed to determine the species present and their conservation status. Dependent on these findings, there may be a need for long-term management.



Peter Island Resort in the foreground. On the right is Sprat Bay with the island's main dock.



The rare and unusual dwarfish form of *Quadrella indica* on Peter Island (photo: K. Lindsay).



Two large wind turbines located near Little Reef Bay are the main source of electrical power for the Peter Island Resort (photo: JP Bacle).



Macconnell's Psychilis Orchid (*Psychilis macconnelliae*) growing amongst the cacti on Peter Island (photo: JP Bacle).



Turk's Cap Cactus along the exposed hillsides of the southern peninsula on Peter Island (photo: JP Bacle).



The rare Roseate Tern has been recorded for Peter Island (photo: T. Bally).

PETER ISLAND



GENERAL DESCRIPTION. Peter Island is the largest privately owned island in the territory, and, at 429 hectares (1,061 acres), it is the largest of Tortola's Sister Islands and the fifth largest island in all of the British Virgin Islands. From a bird's eye view, the island resembles a right angle square, formed by an east-west and a north-south oriented land mass. Hilly topography dominates the landscape with six peaks exceeding 110 metres (360 feet) in elevation, the highest at 162 metres (533 feet).

The island is primarily undeveloped with only 120 hectares (just under 300 acres) developed. Prior to modern development, Peter Island supported a thriving fishing community with subsistence farming of livestock and produce. It is now the home of the Peter Island Resort, first established in the late 1960s and now one of the BVI's premier luxury resorts.

VEGETATIONAL AND FLORAL FEATURES. The higher slopes and sheltered valleys of Peter Island are dominated by semi-evergreen forest and woodland. On the more exposed slopes, vegetation is limited to a variety of cacti scrub communities, especially colonies of *O. rubescens*, *M. intortus*, and *S. fimbriatus*, as well as extensive grassland cover. Other noteworthy plants are *M. woodburyana* and *B. eggertii*. The Island continues to be impacted by the presence of goats, and, as a result, there are large areas of open woodland, degraded grasslands, extensive patches of bare soils, and exposed bedrock.

FAUNAL FEATURES. Among important wildlife species are the Green Iguana, the VI Bronze Skink, the Ground Lizard, and

snakes—the Anegada (Puerto Rican) Racer and the Racelet. Also included are two species of Anoles and the Eye-spot Gecko. Hawksbill Turtles reportedly nest on the island. The Cuban Tree Frog has recently been introduced. At least 40 species of birds have been recorded. Noteworthy are the rare Red-billed Tropicbird and the Roseate Tern.

A NOTE ON CARROT ROCK.

Just half a kilometre (0.3 mile) off the southern tip of Peter Island is Carrot Rock. It is home to an endemic anole (*Anolis ernest-williamsi*) and an endemic skink (*Spondylurus macleani*), both found only on this tiny cay. Red-billed Tropicbirds and Bridled Terns are also reported to breed.



Carrot Rock (photo: S. Gore).

GEOLOGICAL FEATURES. Igneous rocks from the Water Island Formation dominate the northern half of Peter Island. Here keratophyre flows, flow breccias, and tuffs are the main bedrock types. From White Bay south, except for the southern-most tip, granitic rock is found—predominantly diorite, tonalite and granodiorite. Numerous porphyritic dikes are found throughout the island particularly along the north-south peninsula.

NEARSHORE FEATURES. A variety of marine benthic features surround this huge island. On the north side, the major bays are comprised of sand and seagrass substrate, while the near-shore rocky coastline is fringed with coral species. The south side of the east-west peninsula is dominantly soft coral. Major seagrass beds cover the west side of the north-south peninsula, whilst a rocky coral platform and soft coral cover the island's east side.

Peter Island	
Location:	N18° 21' 05" W64° 34' 18"
Ownership:	Private (inhabited, partially developed)
Size:	429 hectares (1,061 acres)
Elevation:	162 metres (533 feet)



Goat herds are present on Peter Island along the southern portion of the south peninsula (photo: K. Lindsay).



The Puerto Rican Racer Snake subspecies (*Borikenophis portoricensis* subsp. *richardii*) found near the White Bay Beach on Peter Island. The species is becoming rare on Peter Island due to the presence of feral cats (photo: JP Bacle).



Deadman Bay, Peter Island: pristine coralline sandy beach, calm shallow waters, and seagrass covering deeper waters, with Dead Chest in the background (photo: K. Lindsay).



Big Reef Bay on the eastern side of Peter Island, with forereef and narrow lagoon along the coast and Salt Island on the horizon (photo: JP Bacle).



Constant breezes along this windswept hillside on the southeast coast of Peter Island limit the height of vegetation (photo: JP Bacle).

PETER ISLAND (continued)



In the foreground is Great Harbour Point with Great Harbour on the right (west side). Peter Island Resort is to the east of Great Harbour Point, on the left in the photo. It includes Sprat Bay (dock facility) and Deadman Bay beyond that.

WETLANDS. No fewer than seven salt ponds are found on Peter Island, although many are small and dry most of the year. One pond on the north side is located near the marina and another is adjacent to Cabey Point. Four isolated and inaccessible salt ponds are scattered along the south side of the east-west peninsula from Sprat Bay to Sand Pierre Bay, the largest being over 0.4 hectare (one acre) in size. Near the southern tip of the island at Stoney Bay lies another large salt pond, this one approximately half a hectare (1.3 acres) in size.

Many of these salt ponds appear to be in a late succession stage, meaning that they are gradually filling up with sediments and slowly being covered with terrestrial vegetation.

MANMADE FEATURES. The five-star Peter Island Resort on Sprat Bay also includes a marina—popular with mega yachts—a spa, and luxury villas. In an environmentally friendly move, the resort now boasts two large wind turbines that supply most of its electrical energy requirements. Except for the footprint of the resort and its facilities, Peter Island is almost uninhabited. Its marina, dining, and spa facilities make the resort a popular stop on the sailing circuit of the southern Sister Islands.

PROTECTED AREA STATUS. Peter Island was declared a Bird Sanctuary under the Wild Birds Protection Ordinance in 1959. The Big Reef Fisheries Protected Area, along the eastern side of Peter Island's north-south peninsula, was declared in 2003 under Regulations to the Fisheries Act (1997).

As part of the *BVI Protected Areas System Plan (2007-2017)*, three additional marine protected areas have been proposed for the environs of Peter Island:

- (1) The Peter Island West Marine Park.
- (2) The Dead Chest to James George Bay (Peter Island) Protected Seascape.

- (3) The Great Harbour (Peter Island) Protected Seascape.

See the *Tortola Environmental Profile*, Chapter 8, for the location of the proposed protected area sites.

ISSUES AND RECOMMENDATIONS. The presence of goats and feral cats on Peter Island is causing considerable environmental damage to vegetation and wildlife. Although the island's owners have made concerted efforts to control both, these invasives still persist. As with other of Tortola's Sister Islands, a more formal, multi-island approach appears to be necessary, perhaps developed with the assistance and counsel of those BVI experts and private/public agencies that have successfully executed invasive species control-and-eradication undertakings elsewhere in the BVI.

Most of the marine environment surrounding Peter Island has been proposed for protected area status, which should be fully executed by the BVI Government without undue delay.

Like Norman Island, caves are also reported for Peter Island. These need to be assessed to determine the presence of bat species, their populations and conservation status, as well as any need for long-term management.

For the small rocky cay of Carrot Rock, the National Parks Trust with support from the Department of Conservation and Fisheries should undertake a survey of flora and invertebrates, preliminary to developing a conservation plan to protect the endemic skink and endemic anole and their habitats.

Utilising staff and visitors to the island, the Peter Island Resort should consider participation in periodic seabird census surveys as part of a volunteer "citizen science" programme. Such an initiative would improve data collection for the island's wetlands.



The southern coast of Dead Chest is mostly steep cliffs with the exception of the central portion of shoreline which is marked by a long and narrow coral cobble beach (photo: JP Bacle).



Dead Chest Island, from Peter Island with Salt and Cooper Islands in the background (photo: www.paradise-islands.org).

DEAD CHEST



GENERAL DESCRIPTION. This 14 hectare (35 acre) island is located less than a kilometre north of Cabey Point on Peter Island. The island appears imposing and desolate as it emerges above the waterline. At a distance, the rounded top and steep sides of Dead Chest make it look like a coffin, which may have given rise to its name—a dead man's chest. Others link the island's name to pirate lore.

VEGETATIONAL AND FLORAL FEATURES. The vegetation consists of low evergreen and semi-deciduous coastal woodland and small patches of forests. Cactus scrub and grasslands are present along the coastal cliffs. On the north side of the island lies a salt pond that has fringing mangroves. Some of the more interesting species include small populations of the rare endemic Jost van Dyke's Indian Mallow, the *Stenocereus cactus*, *Euphorbia articulata*, *Tournefortia volubilis*, *M. nivosa*, and *M. woodburyana*.

FAUNAL FEATURES. Terrestrial reptiles include the Ground Lizard, one Anole and the Eye-spot Gecko. Common seabirds that visit the island include the Brown Pelican, the Brown Bobby, the Magnificent Frigatebird, the Laughing Gull, and a few species of Terns.

GEOLOGICAL FEATURES. This volcanic island is comprised entirely of igneous rocks from the Water Island Formation. Common rock features include some keratophyre flows, flow breccias, and tuffs, with spilites flows and minor radiolarites. On the north side, a prominent coral cobble berm is the most contemporary geomorphological feature. Behind it lies the island's only salt pond.

NEARSHORE FEATURES. The nearshore waters west of Dead Chest are well represented by *Montastrea* coral and soft coral. The entire east side of the island is composed of mixed coral substrate. A terrigenous rock substrate forms the southern nearshore portion of the island.

Surrounding Dead Chest are several popular dive sites, including the Coral Gardens, named for its massive heads of brain, star and sheet coral resembling an aquatic garden, and Dead Chest West, which includes a series of archways, caves, and mazes of coral formation. Most of its east side is a scatter of mixed hard and soft coral.

WETLANDS. There is one salt pond along the northwest-facing side of the island. The pond is 0.4 hectare in size (one acre) and confined within a prominent coral berm on its seaward side and steep bedrock cliffs along its land side. Water levels are affected by storm surges through the berm and runoff from the hillside. During the dry season, the pond is reduced to two smaller ponds, located east and west within the wetland system.

MANMADE FEATURES. The island is used as a firing range by the Royal Virgin Islands Police Force, with permission of the NPTVI.

PROTECTED AREA STATUS. Despite its small size, several protected sites are located within the area including and surrounding Dead Chest. The Dead Chest National Park was established in 1974; the site was earlier designated a Bird Sanctuary in 1959 under the Wild Birds Protection Ordinance. Additionally, the Dead Chest Fisheries Protected Area was established in 2003 under Regulations to the Fisheries Act (1997). Lastly, the Wreck of the *RMS Rhone* Marine Park is located immediately east of the Dead Chest Fisheries Protected Area. (See the *Tortola Environmental Profile*, Chapter 8, for more detail.)

The *BVI Protected Areas System Plan (2007-2017)* proposes that the area from James George Bay (Peter Island) to Dead Chest be established as a Protected Seascape.

ISSUES AND RECOMMENDATIONS. Establishment of the Protected Seascape should move forward without undue delay.

Dead Chest	
Location:	N18° 21' 55" W64° 33' 47"
Ownership:	National Park (uninhabited)
Size:	14 hectares (35 acres)
Elevation:	62 metres (205 feet)



Looking north across Salt Island's main pond, with the former community settlement in the background (photo: JP Bacle).

Unknown *Yucca* species near the settlement, Salt Island (photo: JP Bacle).



Man-made channel connecting both of Salt Island's ponds (photo: JP Bacle).



Short-billed Dowitchers (*Limnodromus griseus*) at the western salt pond on Salt Island. The pond is a haven for shorebirds during the fall, winter and spring months (photo: K. Lindsay).



Photo taken from Cottage Hill looking westward to the main salt pond. Further west (left side of photo) is Peter Island. On the right in the background is Tortola (photo: K. Lindsay).

SALT ISLAND



GENERAL DESCRIPTION. Salt Island lies about a kilometre west of Cooper Island. From a bird's eye view, the island takes the shape of the letter "T". A mile long and a mile wide, Salt Island is rather rugged with at least six distinctive hills, the tallest being Estain Hill in the north of the island at 116 metres (381 feet). Flat, low-lying areas are limited to the salt ponds and their surroundings and to a prominent drainage basin on the east side that drains into The Sound, which lies along most of the eastern coastline. The Sound is highlighted by an extensive shallow lagoon bound offshore by a barrier reef system.

The island is named for its salt ponds that once were an important resource for salt harvesting, a livelihood that sustained a small settlement along Salt Island Bay. Today Salt Island is uninhabited, although at least once a year descendants of Salt Islanders gather to celebrate the culture and customs of yesteryears. The island is also known for the wreck of the Royal Mail packet steamer, *RMS Rhone*, which sank in a hurricane in 1867 after being driven onto the rocks at Lee Bay. The Wreck of the Rhone is now a marine park and one of the best dive sites in the BVI.

VEGETATIONAL AND FLORAL FEATURES. Salt Island suffers from extensive goat damage that has reduced most of the island's landscape to low croton scrub. Goat damage has caused severe erosion and gulying along eastern-facing slopes in the northeast section of The Sound. Exposed earth and rock are common throughout the island. Cactus scrub, semi-deciduous and evergreen woodlands and forests also occur but usually in small patches. The exception is a large Manchioneel forest that occupies the lower reaches of a drainage basin on the east side of the island. A handful of *Stenocereus fimbriatus*

and Woolly Nipple cacti remain on the island. Turk's Cap and Prickly Pear cacti are slightly more common. A *Bastardiopsis eggersii* was recently recorded by the NPTVI.

FAUNAL FEATURES. Several small herds of goats roam Salt Island. The estimated population is between 25 to 40 animals. The island is also home to the VI Bronze Skink, two species of Anoles, the Ground Lizard, the Eye-spot Gecko (very rare on this island), the House Gecko, the *richardii* race of the Racer, and the Blind Snake. The salt ponds are hosts to a dozen species of shorebirds during the fall, winter and spring months. Salt Island also has sizeable flocks of Ground and Zenaida Doves, both of which nest on the island, as well as the American Kestrel.

GEOLOGICAL FEATURES. Over half of the island is composed of wacke and breccia from the Tutu Formation. When exposed along steep slopes, this type of rock is susceptible to erosion. Granitic rocks—predominantly diorite and granodiorite—are found along the northern slopes and southern edge of the island. Similar to Cooper Island, many porphyritic dikes cross the landscape, roughly in a north-south orientation.

NEARSHORE FEATURES. A diverse benthic community surrounds the island. The calm waters facing the settlement at Salt Island Bay are dominantly of sandy bottom with a few patches of seagrass and coral heads. Further east along the north coast, seagrass beds are more extensive. The entire eastern side of the island is dominated by an extensive lagoon/barrier reef complex. The lagoon is largely comprised of sand, seagrass and algae. Offshore is a barrier reef formed of coral rubble. Beyond the barrier reef lies a mixture of live coral. Most of the southwest side of the island (the South Bay area) is covered with scattered *Montastrea* coral and soft coral.

	Salt Island
Location:	N18° 22' 18" W64° 31' 37"
Ownership:	Private (uninhabited)
Size:	78 hectares (193 acres)
Elevation:	116 metres (381 feet)



The lagoon on the south end of The Sound, partially fringed with red mangroves (photo: JP Bacle).



Crystallised salt on Salt Island (photo: L Jarecki).



Virgin Islands Eye-spot Gecko (*Sphaerodactylus macrolepis*) is very rare on Salt Island, found in the leaf litter of woodlands. Fingers provided for comparison of relative size (photo: K. Lindsay).



House Gecko (*Hemidactylus mabouia*), found around the small settlement on Salt Island. It is a species often associated with human habitation and activities, (photo: K. Lindsay).



A Frangipani Caterpillar glimpsed on Salt Island (photo: JP Bacle).



Severe hillside erosion due to overgrazing by goats along steep east-facing slopes on Salt Island (photo: K. Lindsay).

SALT ISLAND (continued)



An aerial view of the west end of Salt Island. The settlement is on the north shore along Salt Island Bay. Directly south are the island's two salt ponds connected by a narrow channel (photo: S. Gore).

WETLANDS. There are two salt ponds and a small wetland lagoon on Salt Island. The largest pond is located behind the settlement at Salt Island Bay. At almost four hectares (a little over nine acres), it is also the largest salt pond in all of Tortola's Sister Islands. Nearby to the west (and facing the Wreck of the Rhone Marine Park) is the second salt pond at just under one hectare (a little more than two acres) in size. The ponds are connected by a narrow man-made channel that allowed Salt Islanders to control water levels when harvesting salt. The restriction of salt water was necessary to create conditions for the formation of salt crystals in the main salt pond.

A small wetland lagoon fringed with Red Mangroves occupies the southern extremity of The Sound.

MANMADE FEATURES. The small settlement at Salt Island Bay, where about 100 islanders once tended livestock, fished and harvested salt, lost its last inhabitant in 2004. Today, unlike its neighbouring Sister Islands, Salt Island offers no restaurants, beach bars, resorts, dive tours, or other tourist-focused amenities. There is a small cemetery, which is not only a burial site for Salt Islanders but also provided the final resting place for passengers on the Rhone whose bodies had washed ashore at Salt.

Indeed, aside from salt harvesting, Salt Islanders are best remembered for their care and integrity in the aftermath of the Rhone disaster. Queen Victoria was reportedly so grateful that she ceded ownership of the island to its inhabitants and their descendants in perpetuity, requiring only one bag of salt per year in payment.

PROTECTED AREA STATUS. The Wreck of the Rhone Marine Park stretches from Lee Bay on the west side of Salt Island westward to include Dead Chest. The ship's anchor broke away and now lies outside Great Harbour on Peter Island, which forms the second portion of the marine park. The Rhone is the largest park in the BVI park system, enclosing 310 hectares (766 acres) of marine habitat. The park was established in 1980.

Additionally, the Sound Salt Island Fisheries Protected Area was declared in 2003 under Regulations to the Fisheries Act (1997).

A marine park—the Salt and Cooper Island Marine Park—is proposed as part of the *BVI Protected Areas System Plan (2007-2017)*. See the *Tortola Environmental Profile*, Chapter 8, for a description of this proposed marine park.

ISSUES AND RECOMMENDATIONS. The presence of feral goats on Salt Island is not sustainable, given the significant damage already caused to the island's environment. However, the cultural ties of Virgin Islanders to this island because of its salt harvesting past make it difficult to control the goat population as this too is linked by many to heritage and tradition.

Nevertheless the goat population needs to be controlled. As noted elsewhere in this publication, such an effort might best be approached as a multi-island, public/private sector--supported initiative.

If the goats can be controlled or removed, reforestation should be carried out in order to restore some of the island's damaged habitats, including the former freshwater marsh that once existed on the eastern coast.



Tree Cactus seedling about 1.5 metres in height. Few of this cactus species were found during an IRF survey visit to Cooper Island in August 2014, and all were seedlings (photo: JP Bacle).



A tall forested area above Manchioneel Bay that is still intact and worthy of protection (photo: JP Bacle).



A view of the Coral Bay salt pond on Cooper Island, with Ginger Island in the background. Within the palm grove is a small farm (photo: K. Lindsay).



The Tarantula Hawk Wasp, a skilled hunter of spiders and other invertebrates, on the forest floor of Cooper Island (photo: K. Lindsay).



A rare hybrid sea seagrass species, *Coccoleba krugil x uvifera*, on Cooper Island (photo: K. Lindsay).

COOPER ISLAND



Cooper Island Beach Club at Manchioneel Bay is in the foreground.

GENERAL DESCRIPTION. Cooper Island, characterised by its ham-bone shape, is located 1.7 kilometres (one mile) west of Ginger Island and less than one kilometre (one-half mile) east of Salt Island (Figure 3). From an aerial perspective, Cooper appears like two separate islands connected by a narrow isthmus barely 100 metres (330 feet) wide at Hallovers Bay. Both land masses—North Cooper and South Cooper—are similar in size and topography. The highest elevation, 155 metres (509 feet), is on the east side of South Cooper. The second highest peak on the island is in central North Cooper, between Cistern Point and Harry Bottom, with a peak of 128 metres (420 feet).

Only North Cooper has a permanent human presence, including the Cooper Island Beach Club and staff quarters at Manchioneel Bay, a handful of residences along Manchioneel Bay, and a small farm at Coral Bay.

VEGETATIONAL AND FLORAL FEATURES. The present vegetation on North Cooper consists of heavily goat-influenced grasslands, bare coastal cliffs, and croton scrub. Despite the impact of goats, there remains a patch of relatively tall forest in a small, shallow valley along upper, west-facing slopes southeast of the Beach Club at Manchioneel Bay. This forest area does show signs of goat damage and human impacts, but overall it is intact and worthy of protection. Elsewhere, semi-deciduous forest, evergreen woodlands, low scrub, and cacti communities are commonly found.

Important species include the rare columnar cactus *Stenocereus fimbriatus*, a rare *Muhlenbergia* grass species, *Coccoloba krugii*, and *Coccoloba krugii* x *uvifera*, a rare hybrid

seagrass species. A few Tree Cacti, all seedlings, are recorded at one site near Carvel Bay; the species may soon go extinct on the island. The Cooper Island Beach Club is mostly surrounded by exotic species. No information is available for South Cooper.

FAUNAL FEATURES. Cooper Island is home to the Puerto Rican Flycatcher, the Green-throated Carib hummingbird, the Yellow-crowned Night Heron, and the White-tailed Tropicbird. The Audubon's Shearwater is commonly heard vocalizing along the island's southern cliffs at night. At least 40 species of birds are reported for Cooper. Reptiles include the Ground Lizard, the Eye-spot Gecko, two species of Anoles, and the Puerto Rican Racer (*richardii* subspecies). The island is home to a number of butterflies, including the Hammock Skipper, common in woodlands. There are also numerous spiders, grasshoppers and the Tarantula Hawk Wasp, identified by its bright red wings.

GEOLOGICAL FEATURES. Like its Sister Islands to the south of Tortola, Cooper is composed of older rocks and newer granite formation. The northern part of the island is predominantly granitic bedrock, with volcanic rocks from the Tutu Formation further to the south. The southern half of Cooper is comprised of augite—andesite breccia and tuff from the Louisenhoj Formation. The main feature of the island is a porphyritic dyke that marks the ridgeline extending 2.4 kilometres (1.5 miles) from Quart-a-Nancy Point in the extreme north of the island to Red Bluff located on the southern coastline. Extensive alluvium deposits occupy the Coral Bay and Hallovers Bay areas.

Cooper Island	
Location:	N18° 22' 40" W64° 30' 35"
Ownership:	Private (inhabited, partially developed)
Size:	138 hectares (340 acres)
Elevation:	155 metres (509 feet)



Quart-a-Nancy Point, on the northern most tip of Cooper Island, looking toward Tortola and Beef Island (photo: K. Lindsay).



The Yellow-crowned Night Heron (*Nyctanassa violacea*) seeking sanctuary on Cooper Island (photo: K. Lindsay).



A large bulky nest on Cooper Island of the most common termite species in the Sister Islands, the arboreal termite *Nasutitermes costalis* (photo: K. Lindsay).



One of the common tree lizard species on the island is the *Anolis stratulus* (photo: JP Bacle).



The rare *Stenocereus* cactus survives on Cooper Island (photo: JP Bacle).



View of the two halves of Cooper Island, with the narrow isthmus connecting the two in between and Ginger Island in the distance. Photo taken from Salt Island (photo: JP Bacle).



The Cooper Island Beach Club, dubbed by Virgin Islands Property & Yacht as the BVI's "greenest" luxury resort (photo: www.bvipropertyyacht.com).

COOPER ISLAND (continued)



NEARSHORE FEATURES. Coastal and nearshore features are quite variable given Cooper Island's many bays alternating with steep coastal cliffs. Surrounding most of the island is an extensive coral reef system highlighted by a number of barrier reef systems and in certain areas a series of offshore reef ridges occurring at varying depths. Along the east side of the island most embayments have extensive seagrass beds.

WETLANDS. Cooper Island has four salt ponds with the largest—the Coral Bay Pond—less than one hectare (less than two acres) in size; it is located at Coral Bay along the northeastern coast of the island. The Coral Bay Pond is shallow and likely dry during the driest season. It is fringed with mostly Buttonwood Mangrove.

The other three ponds are located in South Cooper and average less than half a hectare (one acre) in size.

MANMADE FEATURES. The resort at Manchioneel Bay is relatively small and laid back compared to other Sister Island properties. It also prides itself on being an eco-friendly facility with an emphasis on self-sufficiency and low environmental impact. Photovoltaic panels (208 in total) line the resort's roofs and provide 85 percent of its electricity, including solar water heaters. Furniture is made of recycled teak and reclaimed fishing boats. At the resort, waste water is recycled into 1,000 gallons of water daily for landscape irrigation and boat wash-downs. Drinking water is produced on site, eliminating the use of plastic drinking bottles.

The resort does not have a marina, only a dock, but boats moor in Manchioneel Bay where 30 mooring balls have been installed.

The Cooper Island Beach Club provides a live stream feed from adjacent reefs and seagrass beds to a large screen in its

bar. Two underwater cameras, in place since 2012, provide these in-real-time pictures not only for guests to enjoy but also as part of an international educational and research network in which the Beach Club participates.

PROTECTED AREA STATUS. There are currently no legally protected areas in the environs of Cooper Island. However, the Salt and Cooper Island Marine Park has been proposed as part of the *BVI Protected Areas System Plan (2007-2017)*. The park would protect marine waters from the western side of Salt Island, around the southern tip of Salt to the western coast of Cooper Island. See the *Tortola Environmental Profile*, Chapter 8, for a description of this proposed marine park.

ISSUES AND RECOMMENDATIONS. Like neighbouring Salt Island, and other of Tortola's Sister Islands, the presence of goats is causing considerable environmental damage to Cooper Island's vegetation. As recommended elsewhere in this document, the issue of goat control and removal might best be approached as a multi-island, public/private sector partnership, with input from those government agencies and private sector land owners who have confronted and made progress in addressing the issue.

After the goat population has been controlled, reforestation of eroded hillsides should be carried out.

The proposed Salt and Cooper Island Marine Park should be fully established by the BVI Government without undue delay.

Cooper Island, as well as other Sister Islands with residential or resort communities, might want to consider participation in periodic seabird census surveys. A volunteer "citizen science" programme, employing visitors and residents, would be reasonably easy to set up and would improve data collection for the island's wetlands.



Carval Rock taken from a boat offshore (photo: JP Bacle).



A Brown Booby in flight, one of many seabird visitors to Carval Rock (photo: T. Baily).



Carval Rock as seen from Dusty Point on Cooper Island (photo: JP Bacle).

CARVAL ROCK



Tiny Carval Rock is situated between Ginger Island (foreground) and south Cooper Island (background).

GENERAL DESCRIPTION. Carval Rock lies 1.6 kilometres (1 mile) to the southwest of Ginger Island and one kilometre (0.6 mile) east of Cooper Island (see Figure 3). The tiny and rocky islet is barely one hectare (slightly larger than two acres) in size and is marked by sheer cliffs on all sides with the surface of the islet being very rugged.

Carval Rock is about 50 metres (164 feet) wide and 200 metres (656 feet) long with an approximate elevation of 35 metres (114 feet). Vegetation is sparse, and wildlife mostly limited to sea bird activity.

VEGETATIONAL AND FLORAL FEATURES. The small size of Carval Rock and its overexposure to strong winds and sea spray account for the limited vegetation on this islet. A few patches of plants inhabit the nooks and crannies along the interior. The cliffs are mostly bare.

FAUNAL FEATURES. The rocky islet may be home to a single endemic, the Carval Least Gecko (taxonomy yet to be determined). Sea birds occasionally frequent the islet as a foraging and resting area. Pairs or small groups of the White-tailed Tropicbird have been seen on the cliffs. Little else is known about the ecology and wildlife of the islet.

GEOLOGICAL FEATURES. Carval Rock likely reflects similar geology to that of the southeastern end of Cooper Island. Augite-Andesite Breccia and minor tuff from the Louisenhoj Formation are the dominant rocks types exposed throughout this rugged landscape.

NEARSHORE FEATURES. Along the north side of Carval Rock, large expanses of soft and hard coral cover the nearshore seafloor. Included are an array of colourful sponges, coral (including Fire Coral), sea fans, and Elkhorn Coral. A sandy bottom substrate wraps the northwest side and extends considerably offshore. The rocky formation is frequented by divers, but landing is nearly impossible due to the rock's sheer cliffs and the presence of mostly strong swells and currents.

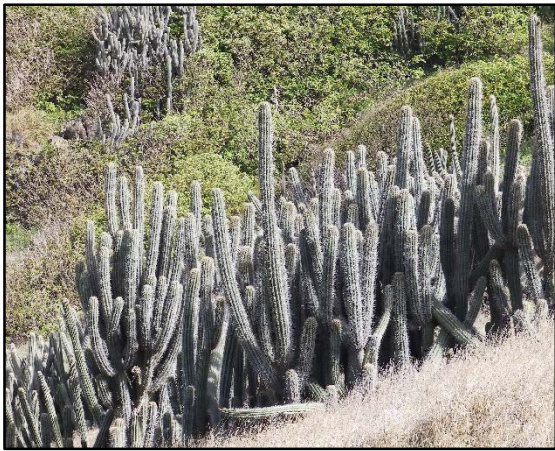
WETLANDS. None.

MANMADE FEATURES. None.

PROTECTED AREA STATUS. None.

ISSUES AND RECOMMENDATIONS. Especially if the Carval Least Gecko is determined to be endemic, some kind of protected status should be considered for Carval Rock.

Carval Rock	
<i>Location:</i>	N18° 22' 22" W64° 29' 18"
<i>Ownership:</i>	Crown (uninhabited)
<i>Size:</i>	<1 hectare (2 acres)
<i>Elevation:</i>	35 metres (114 feet)



Large colonies of the rare and native columnar cactus *Stenocereus fimbriatus* are found in eastern areas of Ginger Island (photo: JP Bacle).



Entrance to Wedge Bay, marked by a narrow mouth of coral berm sheltering the inner area from heavy swells; the main access to Ginger Island is into Wedge Bay through a narrow channel seen above (photo: JP Bacle).



A rare and new discovery, *Chloroleucon tortum* or Brazilian Rain Tree, on Ginger Island (photo: K. Lindsay).



The Tree Cactus (*Consolea rubescens*) in flower on the eastern side of Ginger Island (photo: K. Lindsay).



The colourful flower of *Cordia rickseckeri*, or "manjack," on Ginger Island, with flame-orange, trumpet-like flowers (photo: K. Lindsay).



Ginger Garden Point in foreground toward south side of Wedge Bay with columnar cacti also in the foreground (photo: JP Bacle).



The tiny Eye-spot Gecko on Ginger Island (photo: JP Bacle).

GINGER ISLAND



GENERAL DESCRIPTION. Topographically, the uninhabited Ginger Island features a steep and rugged landscape. The highest point is in the south along the Wedgeo Bluffs where elevations reach 146 metres (478 feet). Here, dramatic cliffs exceeding 100 metres (328 feet) line the entire coastline. The north coastline facing Sir Francis Drake Channel is equally steep with cliffs averaging 75 metres (246 feet) high. Elsewhere, the island contains many high points above 100 metres (330 feet) in elevation. There are several watersheds and most drain east toward the low-lying areas around Wedgeo Bay, which is the main access to the island.

VEGETATIONAL AND FLORAL FEATURES. Ginger possesses a variety of habitat types and floral communities. These include extensive grassland habitats, low semi-deciduous woodlands, and semi-deciduous forests in sheltered areas. On exposed slopes, cactus scrub communities are common. The island has perhaps the largest population of *Stenocereus fimbriatus* (a rare columnar cactus species) in the entire Virgin Islands. It is also home to large populations of Woolly Nipple, Turk's Cap and several other species of cacti such as the Tree Cactus. There are also large populations of Jost van Dyke's Indian Mallow, *M. woodburyana*, and the very rare Brazilian Rain Tree (see pages 10-11 above).

FAUNAL FEATURES. Ginger provides a sanctuary for the rare VI Bronze Skink, Richard's subspecies of the Puerto Rican Racer, two species of Anoles, the Ground Lizard and the Eye-spot Gecko. Common birds include nesting Noddies, the American Oystercatcher, the Laughing Gull, the American Kestrel, the Grey Kingbird, the Smooth-billed Ani, the Bananaquit, and the Green-throated Carib. The endangered Audubon's Shearwater was recorded as nesting on the cliffs at South Bay in the late 1970s.

GEOLOGICAL FEATURES. Ginger contains more geological diversity than most islands of similar size. Across many areas are exposures of gray crystalline limestone running to the west end

but also on the east side of the island. Igneous rock outcrop is found on the northern end. The exposed rocks are mainly visible from the sea and are comprised of granitic rocks, predominantly, diorite, granodiorite, and tonalite. Sediment deposits along low-lying areas around the main salt pond at South Bay and nearshore at Wedgeo Bay are recent alluvium.

NEARSHORE FEATURES. The underwater topography strongly reflects the terrestrial topography. For most of the island, the shore drops off quickly to 10 metres (33 feet) or more. The only shallow areas are the northeast side of South Bay and Wedgeo Bay. Strong currents and waves ensure good water circulation that is favorable to coral health and flourishing reef habitat. Main access to the island is by small boat into Wedgeo Bay through a narrow channel across a bay mouth coral berm. The island enjoys several popular dive sites.

WETLANDS. Along the southwest side of Ginger facing South Bay is the island's only salt pond. It is slightly more than half a hectare (1.5 acres) in size and is completely surrounded with vegetation, primarily mangroves. The wetland is in good condition and appears in early succession stages. The pond is separated from the sea by a long rubble berm mainly composed of dead coral and rubble of bedrock origin. On the east side of the island along Wedgeo Bay is a minor wetland lagoon about a quarter hectare (0.6 acre) in size.

MANMADE FEATURES. None.

PROTECTED AREA STATUS. The Sound Ginger Island Fisheries Protected Area was declared in 2003 under Regulations to the Fisheries Act (1997). Two additional protected areas for Ginger have been proposed under the *BVI Protected Areas System Plan (2007-2017)*: the South Bay to Man Hole Protected Seascape and the Sound, Wedgeo Bay Marine Park.

ISSUES AND RECOMMENDATIONS. Ginger Island is currently for sale, with the option of Government purchase representing a potential opportunity to protect the island and its rare and endangered species such as the Brazilian Rain Tree, the Virgin Islands' largest grove of the columnar cactus *Stenocereus fimbriatus*, Jost Van Dyke's Indian Mallow, the Stinging Cherry, the Tree Cactus, and several species of native grasses. This is particularly critical because the presence of goats on neighbouring Sister Islands has reduced the numbers of these species, while Ginger remains goat-free.

Ginger Island	
Location:	N18° 23' 15" W64° 28' 40"
Ownership:	Private (uninhabited)
Size:	105 hectares (259 acres)
Elevation:	146 metres (478 feet)



Calm waters inside Wedge Bay on Ginger Island (photo: JP Bacle).

CHARACTERISATIONS of the SISTER ISLANDS

THE EASTERN ISLANDS GROUP

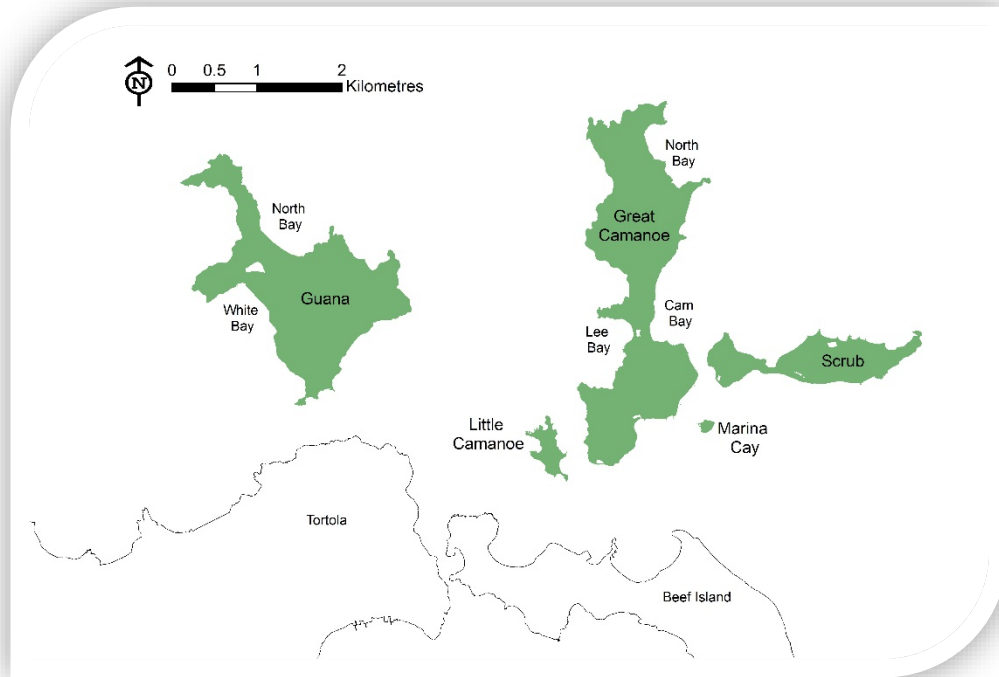


Figure 4.

The Sister Islands of the Eastern Group: Guana Island, Great and Little Camanoe, Marina Cay, and Scrub Island.

The five islands comprising the Eastern Group of Tortola's Sister Islands are located a mere half a kilometre to two kilometres (0.3 to 1.25 miles) north of Beef Island and the eastern end of Tortola. They include Guana Island, Great Camanoe, Little Camanoe, Marina Cay and Scrub Island.

In many ways, the Eastern Group is a contrasting set of islands. In size, Great Camanoe is the largest at 337 hectares (833 acres), while nearby Marina Cay is the smallest at two hectares (five acres). Guana Island at 246 metres (806 feet) boasts the highest elevation amongst all of Tortola's Sister Islands. It is also

the most diverse with the greatest number of floral and faunal species. By contrast, Marina Cay and Little Camanoe—being the smallest and with the lowest elevations—have far less biodiversity.

As a cluster, the Eastern Group of islands offers a wide range of natural resource attractions, both in their terrestrial and marine landscapes.



Guana Island looking north with White Bay (left) and the Guana Island salt pond (right) (photo: L. Jarecki).

A flock of Black-necked Stilts at the Guana Island salt pond (photo: L. Jarecki).



Caribbean Flamingo introduced to Guana (photo: L. Jarecki).



Croton fishlockii K at Guana Island (photo: L. Jarecki).



Sabal Palm at Guana Island (photo: L. Jarecki).



Turk's Cap Cactus at Guana Island (photo: L. Jarecki).



Flooded salt pond on Guana Island in 2005 (photo: L. Jarecki).

GUANA ISLAND



GENERAL DESCRIPTION. The southern tip of Guana Island is slightly less than a kilometer-and-a-half (less than a mile) from the northeastern coast of Tortola at Balsam Ghut. Reportedly named for a rock formation resembling a giant lizard's head, Guana is the third largest of Tortola's offshore islands.

The current owners purchased the island in the 1970s and have since developed it as a modest but elite tourist destination, a refuge for Caribbean wildlife, and an "island for science." Guana's rich biological diversity has been extensively studied, made possible in part because the current owners have avoided excessive development and have supported environmental research on the island.

Some scientists maintain that Guana has more flora and fauna than any island of its size yet studied in the Caribbean. As reported by Dr. James (Skip) Lazell in his 2005 study focusing on Guana (*Island—Fact and Theory in Nature*, University of California Press), "... time and again it is found that the best-studied groups on Guana have many times more species than the island's size should allow."

VEGETATIONAL AND FLORAL FEATURES. The island is steep and with deep valleys, allowing for evergreen and semi-deciduous forests and woodlands along the ghuts, deciduous and semi-deciduous woodlands on more exposed slopes, mangroves, coastal cliffs with cacti, and dry coastal shrubland. Native plant species include a BVI endemic, Jarecki's Pitcairnia, a bromeliad; another bromeliad, the Puerto-Rico Bank endemic, *H. antillana*; and the myrtle, Underwood's Stopper (*E.*

underwoodii), endemic to Puerto Rico and a handful of islands in the Virgin Islands archipelago.

FAUNAL FEATURES. The fauna include an introduced population of the Caribbean Flamingo, which nests on the island, the Bridled Quail Dove, possibly the Virgin Islands Screech Owl, the White-cheeked Pintail, and the nesting Red-billed Tropicbird. The island is home to more than one hundred recorded bird species.

There are four species of snakes—including the VI Tree Boa—three Anoles, the Anegada Iguana (introduced), the Green Iguana, the Red-footed Tortoise (introduced), the Ground Lizard, the Lesser VI Skink, the VI Worm Lizard, geckos, and an invertebrate fauna somewhat similar to that of Great Camanoe, including scorpions, spiders, giant roaches and many beetles.

The Guana Science programme has supported the restoration and protection of several faunal species, including the Red-legged Tortoise, the Bridled Quail Dove, and the Caribbean Flamingo.

GEOLOGICAL FEATURES. Near 80 percent of Guana Island is of the Necker Formation. Bedrock is predominantly volcanic tuffs and breccias. Elsewhere, the island is formed of igneous rocks, mainly porphyritic basalt, found at the northwest tip of the island. Alluvium sediments cover the remaining portions of Guana, mainly along North Bay and at White Bay where the only salt pond is located.

Guana Island	
<i>Location:</i>	N18° 28' 24" W64° 34' 04"
<i>Ownership:</i>	Private (inhabited, partially developed)
<i>Size:</i>	297 hectares (733 acres)
<i>Elevation:</i>	246 metres (806 feet)



A juvenile Yellow-crowned Night Heron at Guana (photo: L. Jarecki).

Juvenile Brown Pelican at its nest on Guana (photo: L. Jarecki).



The Anegada Iguana, introduced to Guana (photo: L. Jarecki).



The bromeliad *Pitcairnia jareckii* (grass-like with yellow flowers), named for the owner of Guana Island where it was first identified (photo: K. Lindsay).



The eastern coastline of Guana Island, taken from Great Camanoe (photo: JP Bacle).

GUANA ISLAND (continued)



NEARSHORE FEATURES. Guana's diverse shoreline is well represented by a variety of nearshore benthic habitats. The lengthy northeast-facing coast features coral rock and terrigenous rock along its edge with soft coral further offshore. The south-east nearshore substrate is mainly sandy with soft coral, while from Monkey Point to White Bay nearshore coral rock, with sandy bottom, is found. The rugged cliffs in Muskmelon Bay are fronted by extensive coral rock.

WETLANDS. Inland from White Bay lies the island's only salt pond. It is 19 hectares (47 acres) in size. The pond is completely enclosed and is separated from the sea at White Bay by a forested sand berm, 180 metres (590 feet) wide. Currently, the pond is managed for the protection of flamingos and other waterfowl species.

MANMADE FEATURES. Substantial historical remains are present on Guana with more than 30 sites catalogued, ranging from artifact scatters to one of the best preserved and most substantial sugar works in the BVI.

Modern touristic development on Guana, as seen in the aerial figure above, is concentrated in the western sector on approximately 28 hectares (70 acres). The remainder of Guana has not been developed. The island's tourist accommodations include 15 hilltop cottages and a number of scattered villas. A dining area is provided for guests on the island, but there are no public facilities.

PROTECTED AREA STATUS. Guana Island's terrestrial environment is not formally protected, although the current owners have established an informal species restoration and preservation programme.

The North Bay Guana Island Fisheries Protected Area was established in 2003 under Regulations to the Fisheries Act (1997). A marine protected area (North Bay Marine Park) has been proposed for waters north of Guana's Fisheries Protected Area as part of the *BVI Protected Areas System Plan (2007-2017)*.

GUANA SCIENCE. Scientific research at Guana Island (more recently known as Guana Science) began as early as 1932 when a retired U.S. army major visited Guana and published the results of his terrestrial vertebrate survey. Other researchers followed focusing in subsequent decades on collecting land snails, a systematic listing of birds, documentation of turtle nesting, investigation of fruit flies, and studies of marine snails.

Under sponsorship of the current owner's family, the early 1980s marked initiation of what has become a more intensive and less *ad hoc* approach to scientific study on the island, including an annual gathering of diverse specialists, who study the island's ecology, and an expansion of research to encompass the marine environment.

ISSUES AND RECOMMENDATIONS. Guana is the most studied of all of Tortola's Sister Islands, and it is hoped that this programme of environmental research will endure and will continue to expand upon the more than 30 years of effort to date. For example, an updated survey of the island's flora should be initiated, and further work on the island's bats is required. Additionally, past studies and research need to be assembled in a comprehensive and uniform manner and made more widely accessible to researchers in the BVI and elsewhere.

An introduced population of sheep is still present on Guana and needs to be controlled. Efforts in the past to control the population were only partially successful, and the island's owner is currently planning a renewed removal programme.



Cam Bay Lagoon and Barrier Reef on Great Camanoe (photo: JP Bacle).



The Lesser Virgin Islands Skink on resident's deck at Great Camanoe (photo: K. Robinson).



Eye-spot Gecko on Great Camanoe (photo: JP Bacle).



Lignum Vitae tree on the southwest coast of Great Camanoe (photo: K Lindsay).



The uncommon regional endemic legume shrub White Stick Pea. Found in the undergrowth of seasonal woodland on Great Camanoe, it produces small white puffs of wispy blooms resembling a loose toupee (photo: K. Lindsay).



Cricket feeding on nectar at night on Great Camanoe. Cacti blooms are rarely observed given their habit of opening during the evening (photo: T. Baily).



Large colony of Night-blooming Cactii on Great Camanoe (photo: JP Bacle).

GREAT CAMANOE



The southern third of Great Camanoe viewed from its western shoreline, with Little Camanoe in the foreground. Lee Bay is seen on the left of the photo, with the northern two-thirds of the island mostly not visible. To the right of Great Camanoe are tiny Marina Cay and the much larger Scrub Island.

GENERAL DESCRIPTION. Located just north of Beef Island (1 kilometre/0.6 mile) and northeast of Tortola (2 kilometres/1.2 miles), Great Camanoe is the second largest of Tortola's Sister Islands and seventh largest island in the territory. A modest number of low-density residences and holiday homes are located in the southern third of the island, while the northern two-thirds area (privately owned) is undeveloped. The island is rugged in topography, dominated by coastal cliffs. It is steep with elevations easily reaching 150 metres (500 feet) within 600 metres (2,000 feet) from the shoreline.

Its longest axis is oriented north-south for a little more than four kilometres (less than three miles), while the average width along its east-west axis is about one kilometre (0.6 mile), with the narrowest section (about 200 metres/657 feet) from Cam Bay to Lee Bay. This area, highlighted by a salt pond, beach and barrier reef complex at Cam Bay, is essentially an isthmus that connects the two main land masses of the island. At one point in geological history, Great Camanoe consisted of two islands.

The northern, uninhabited, part of the island is remote and relatively unexplored. The area is often used by BVIslanders, including BVI families who own this part of the island, for weekend camps, excursions and family reunions.

Little is known about the origins of the island's name, although Camanoe resident William (Robby) Robinson has a theory based on his observation that East End/Long Look residents on Tortola had long instructed him to call the island "Caymanos,"

not Camanoe. Starting then with "Caymanos," Robinson parsed out a possible meaning since "cay" means "small island" and "monos" means "hands" — which, to Robinson, made sense since Camanoe is indeed a small island neatly divided into two north-south "hands" by Lee Bay on the west and Cam Bay on the east.

VEGETATIONAL AND FLORAL FEATURES. Low coastal evergreen shrublands, upland evergreen and deciduous forests and woodlands, and mangroves are to be found on Great Camanoe. Some of the most interesting native plant species include perhaps the largest population of Lignum Vitae (*Guaiacum officinale*) in all of the Virgin Islands, the rare columnar cactus *S. fimbriatus*, and the BVI endemic bromeliad Jarecki's Pitcairnia (*P. jareckii*), previously reported only from Guana Island. Also present are *Croton fishlockii*, a VI endemic; *Eugenia Sessiliflora*, a PR Bank endemic; and the very rare *M. nivosa*, a species becoming increasingly rare in the Virgin Islands due to damage by feral animals.

A rare and endangered native tree, Yellow Satinwood (*Zanthoxylum flavum*), was identified by IRF scientists in 2014. It is a species that has largely disappeared from much of the Caribbean due to overharvesting for its highly sought yellow, scented wood. The specimen observed in the Privateer Estate area of Camanoe was quite tall and fairly robust, suggesting it could be at least 20 years old.

FAUNAL FEATURES. The Pearly-eyed Thrasher, the Bridled Quail Dove, the migrant Peregrine Falcon, the American Kestrel, the migrant Prairie Warbler and perhaps even the Audubon Shearwater are feathered citizens of Great Camanoe. The reptiles and amphibians include the Anegada Racer, the VI Tree Boa, the VI Ground Lizard, the Lesser VI Skink, the Eye-spot Gecko, at least two species of *Anolis* lizards, the House Gecko, the VI Worm Lizard, and the Antillean Tree Frog. Numerous species of invertebrates—including scorpions, spiders, giant roaches and many beetles—also form part of the native fauna of Great Camanoe.

	Great Camanoe
Location:	N18° 28' 25" W64° 31' 58"
Ownership:	Private (inhabited, sparsely developed in southern third and undeveloped in northern two-thirds)
	National Park at Cam Bay
Size:	337 hectares (833 acres)
Elevation:	168 metres (551 feet)

An Antillean Fruit-eating Bat caught on Great Camanoe in 2014, confirming a new distribution record (photo: K. Lindsay).



A mated pair of the American Kestrel (male on the right) on Great Camanoe.

Locally called Killi Hawk because of its call, it is the smallest of the Virgin Islands' birds of prey (photo: T. Baily).



The subspecies of the Puerto Rican Racer *Borikenophis portoricensis* subsp. *Anegadae* on Great Camanoe (photo: T. Baily).



American Oystercatcher on Great Camanoe (photo: JP Bacle).



A dwarf palm on the north coast of Great Camanoe (photo: JP Bacle).



Lee Bay and Camanoe's salt pond to the left and Cam Bay to the right (photo: JP Bacle).



The endangered Stinging Cherry, a small tree of dry coastal habitats, as seen on Great Camanoe (photo: JP Bacle).



Gulf Fritillary Butterfly on Great Camanoe (photo: T. Baily).



The west coastline of Great Camanoe, dominated by rocky cliffs (photo: JP Bacle).

GREAT CAMANOE (continued)



Great Camanoe is on the left in this photo, with Marina Cay (in the foreground) and Scrub Island to the right.

GEOLOGICAL FEATURES. This elongated island oriented along a north-south axis has three distinctive geological features. The portion south of Lee and Cam Bay consists of igneous granitic bedrock, mostly diorite, tonalite, and granodiorite. The geology north of Lee and Cam Bay is mainly volcanic in origin, composed of quartz-andesite and tuffs and breccias of the Necker Island Formation. A noted exception is the rocky overhang at the northern tip consisting of porphyritic basalt that intruded into the Necker Island Formation.

Between Lee and Cam bays lies a narrow low-lying sediment plain that forms an isthmus between the two land masses. Herein also lies the island's only salt pond.

NEARSHORE FEATURES. The size and complexity of Great Camanoe account for a great variety of nearshore features. Seagrass beds and sandy substrate occupy the southern portion of the island up to the channel separating it from Scrub Island. To the north along the east coast, mixed coral and soft coral cover the nearshore substrate with minor patches of algae. The North Bay area is dominantly coral rock. Off the north coast and along the entire west coast, terrigenous rock and coral rock dominate, with minor areas of mixed coral.

WETLANDS. The only salt pond, at 1.2 hectares (3 acres) in size, is located on the Lee Bay side of the isthmus. A long narrow coastal mangrove wetland about 1.6 hectares (3.9 acres) in size fringes the Cam Bay side and stretches northward to Kitto Ghut. The once existing salt pond at Low Bay has been totally reclaimed for a marina.

MANMADE FEATURES. Great Camanoe is primarily a residential island, divided into two communities, Indigo Plantation and Privateer Estate, on the southern third of the island. Access is by private boat, with residential docks provided for both communities and a marina at Low Bay. Visitors often anchor at Lee Bay or Cam Bay.

There are substantial historical remains on the southern third of the island (no information is available for the northern area). In 2013, Dr. John Chenoweth (currently a professor at the University of Michigan-Dearborn) led a small research team to this area and excavated several parts of a complex of buildings

presenting a multi-phase, multi-structure settlement dating from at least the mid-1700s to the late 1800s. Chenoweth reports that the archaeology on the site is unusually rich, with excellent preservation of both structures and artifacts.

There is also a large, possibly pre-historical construction near the southern tip of the island, including a horseshoe-shaped pile of stones and conch shells. Evidence of pre-Columbian settlement has also been found at Cam Bay, where pottery shards have been carbon-dated to 800 AD.

PROTECTED AREA STATUS. Cam Bay National Park, comprising eight hectares (20 acres) on the eastern shore of Great Camanoe, was established in 1999. The park protects a near full range of habitats from terrestrial cactus scrub forest to a coastal salt pond, mangroves, a beach, and an extensive shallow reef system.

Two marine protected areas have been proposed for Great Camanoe under the *BVI Protected Areas System Plan (2007-2017)*: the first comprising the waters of Lee Bay (Lee Bay Managed Resource Area) and the second (the West South Bay Protected Seascape) encompassing a 187 hectare (462 acre) marine area from north of the Cam Bay National Park southward along the channel between Great Camanoe and Scrub Island and including the entire southern shore of Scrub Island.

ISSUES AND RECOMMENDATIONS. Invasive species are an issue on Great Camanoe. Residents have noted the prevalence of rats and their impact on the island's ecology, such as snakes suffering from rat bites. Goats are also present, although residents have attempted, largely unsuccessfully, to control the population. To effect a long-term programme to control and perhaps eradicate these invasive populations, residents in the south of the island and non-resident land owners in the north will need to work together to design and implement cost-effective control measures.

Residents should consider participating in periodic seabird census surveys in order to improve data collection for the island's wetlands. Any development in the north should take into consideration the location of threatened plant species, now being mapped by the NPTVI.



The southern tip of Little Camanoe showing East End Bay, with Beef Island (Little Mountain) in the immediate background and Tortola behind Beef Island (photo: JP Bacle).



The centre of Little Camanoe, with Beef Island in the background to the left and Tortola behind (photo: JP Bacle).



The north end of Little Camanoe, with Guana Island in the background (photo: JP Bacle).



The Jumping Cactus on Little Camanoe, possibly *Opuntia triacantha* (photo: JP Bacle).



Aerial view of Little Camanoe (photo: S. Gore).

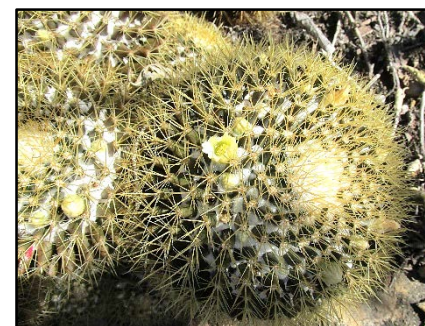


One of a few Century Plants on Little Camanoe (photo: JP Bacle).

A Brown Booby colony at the southern tip of Little Camanoe, at Pull and be Damn Point (photo: JP Bacle).



Sandy beach on Little Camanoe that has shown signs of nesting sea turtles (photo: K. Lindsay).



A colony of Woolly Nipple cacti on Little Camanoe, some of the largest specimens ever encountered by IRF researchers (photo: JP Bacle).

LITTLE CAMANOE



GENERAL DESCRIPTION. Like Great Camanoe, Little Camanoe is located just north of Beef Island and northeast of Tortola, a little less than one kilometre (one-half mile) separating the southern tip of Little Camanoe from Little Mountain on Beef Island. It lies west of its larger sister island, approximately 300 metres separating the two (see Figure 4). The island is low-lying with a gentle topography. The average elevation is approximately 15 metres (50 feet).

Although Little Camanoe is uninhabited and not developed, much of the island's vegetation has been devastated due to the presence of a small herd of goats. Increasingly severe erosion is clearly visible, and the habitats of many native fauna have been degraded.

VEGETATIONAL AND FLORAL FEATURES. Because of the damage caused by feral goats, the island's vegetation now consists of low scrub dominated by *Croton*, semi-evergreen woodland, cactus scrub and bare ground. However, despite habitat degradation and the loss of many native plant species, some rare gems continue to hold on to existence, including the rare Woolly Nipple cactus (*M. nivosa*) and the rare Jumping Cactus, a West Indies endemic *Opuntia*, *O. triacantha*. The latter has only been tentatively identified by IRF researchers. Also present are fairly large numbers and colonies of the Stinging Cherry, *M. woodburyana*, although few regenerations have been observed and many trees have been browsed by goats to below two metres. Fortunately, many mature specimens have escaped the impact of goats.

FAUNAL FEATURES. Much of Little Camanoe's native fauna includes animals also found on nearby Great Camanoe and Tortola. Bird species include the Red-tailed Hawk, visiting herons, doves and the Scaly-naped Pigeon. Many species of

seabirds frequent the small island, especially along the rocky ledges such as at the southern tip.

Lizards include two species of Anoles, the Ground Lizard and dense populations of the Eye-spot Gecko. The invertebrates are most numerous in the small patches of forest and woodlands, especially where heavy leaf litter is present. Sea turtle tracks were observed along East End Bay Beach, suggesting nesting activities on this island.

GEOLOGICAL FEATURES. The island is of similar geology to nearby Great Camanoe. Igneous granitic bedrock comprising diorite, tonalite, and granodiorite are the dominant rock types. Most of the island is bedrock except for a small area in the south where a depositional landform of beach sediments has formed a tombolo-like feature linking the main core to the rocky area known as Pull and be Damn Point.

NEARSHORE FEATURES. Surrounding the entire nearshore of Little Camanoe is a mixed variety of hard coral species. Soft corals are more frequent in deeper waters. Along the channel separating Little Camanoe and Great Camanoe is a zone of terrigenous rocky substrate.

WETLANDS. None.

MANMADE FEATURES. The island is not inhabited, and there are no modern manmade structures. Although historical ruins have not been identified, historical records indicate settlement on Little Camanoe, including, surprisingly, a population of 21 persons in 1823.

PROTECTED AREA STATUS. None.

ISSUES AND RECOMMENDATIONS. The destructive impact of goats on the island's ecology is the single most critical environmental issue on Little Camanoe. The goats need to be controlled or removed, after which a modest reforestation effort should be carried out, perhaps even restocking the island with rare or endangered species from nearby islands. However, since the island is privately owned and the owners have not clearly expressed a concern about the invasive species on their island, this is not likely to occur in the near-term.

Little Camanoe	
Location:	N18° 27' 31" W64° 32' 35"
Ownership:	Private (uninhabited, undeveloped)
Size:	16 hectares (40 acres)
Elevation:	32 metres (106 feet)



Marina Cay taken from Great Camanoe (photo: JP Bacle).

Great Camanoe in the background sheltering Marina Cay.



Seaside Maho at Marina Cay (photo: JP Bacle).



Crested Anole on Marina Cay (photo: JP Bacle).



Gray Kingbird photographed at Marina Cay (photo: JP Bacle).



Flowering exotic plants, common throughout the island of Marina Cay (photo: JP Bacle).

MARINA CAY



GENERAL DESCRIPTION. Marina Cay is located approximately one kilometre (less than a mile) north of Sprat Point, Beef Island. It lies to the east of Great Camanoe and to the south of Scrub Island (see Figure 4). It is a small circular island that rises as a rocky islet from the surrounding sea. It is partially sheltered by a reef system and has a circumference that can be comfortably walked in about ten minutes.

Its highest point, approximately 14 metres (45 feet), is where the author Robb White's home was located in the 1930s, the setting for his book *Our Virgin Island* (1953), later made into a movie filmed on Marina Cay. Today, the entire island is occupied by a small resort.

VEGETATIONAL AND FLORAL FEATURES. The vegetation of this small resort island consists largely of gardens, lawns, semi-deciduous woodland and coastal woodlands.

FAUNAL FEATURES. The island has five species of lizards, including two Anoles, the Ground Lizard, the Eye-spot Gecko and the House Gecko. The Puerto Rican Racer and the Racerlet snakes are present. Invertebrate fauna include many of the same species of nearby Great Camanoe.

GEOLOGICAL FEATURES. Marina Cay is a rather small, flat-lying and circular-shaped island, barely 200 metres (650 feet) in diameter. It is entirely composed of granitic rocks, predominantly diorite, tonalite, and granodiorite. Most of the shoreline

is rocky or consists of a narrow coral cobble beach. The only sandy beach is located in front of Pusser's restaurant on the southwest side of the island.

NEARSHORE FEATURES. Except for the northwestern side of the island, Marina Cay is surrounded by an extensive reef system averaging about 200 metres (650 feet) in width from shoreline to the outer edge. The nearshore portion of the reef flat is covered with mixed hard coral, while soft coral species are more representative offshore. The area provides for good snorkeling.

WETLANDS. Although there are no wetlands or salt ponds on Marina Cay, a few mangrove species can be found along the southeast shoreline.

MANMADE FEATURES. The island has been developed as a tourist destination and includes a small hotel with villas and a restaurant. It is accessible by boat or ferry from Trellis Bay on Beef Island.

PROTECTED AREA STATUS. None.

ISSUES AND RECOMMENDATIONS. Marina Cay has been extensively developed; however, where possible, coastal woodlands should be restored to help protect the coastline and to provide shelter and roosts for seabirds.

	Marina Cay
<i>Location:</i>	N18° 27' 40" W64° 31' 31"
<i>Ownership:</i>	Private (inhabited, developed)
<i>Size:</i>	2 hectares (5 acres)
<i>Elevation:</i>	14 metres (45 feet)



The developed western portion of Scrub Island showing the hotel, villas, and marina (photo: www.scrubisland.com).



A view of the sandy pocket beach on the north side of the isthmus that joins the two "islands" of Scrub (photo: ATM, Scrub Island EIA, 2005).

The locally common Butterfly Orchid, also known as Peacock Orchid (photo: ATM, Scrub Island EIA, 2005).



Typical cacti landscape along exposed rocklands, Scrub Island, with the rare bromeliad *H. antillana*, centre (photo: ATM, Scrub Island EIA, 2005).



A typical cacti community present in exposed areas on Scrub, comprised mainly of Turk's Cap and Pipe-organ Cacti (photo: ATM, Scrub Island EIA, 2005).



A lone-standing palm tree, the native Sabal, near the salt pond at Deadman's Bay (photo: ATM, Scrub Island EIA, 2005).

The rare Yellow Dancing Lady Orchid on Scrub Island (photo: ATM, Scrub Island EIA, 2005).



Mixed dry scrub vegetation along a rock ledge on the north-west side of "Little Scrub," with Great Camanoe beyond (photo: ATM, Scrub Island EIA, 2005).

SCRUB ISLAND



GENERAL DESCRIPTION. Scrub Island is located to the west of Great Camanoe and northeast of Tortola, with an approximate distance of 1.7 kilometres (one mile) separating it from Sprat Point on Beef Island. The island is divided into eastern (“Big Scrub”) and western (“Little Scrub”) portions, with a low-lying isthmus of coral rubble separating the two. Both portions of the island are narrow and steep.

Two environmental impact assessments (EIAs) have been completed for Scrub Island: the first by Grigg & Associates in 1994 for an aborted development project, and the second in 2005 by Applied Technology and Management, Inc. (ATM) for the present resort and marina development.

VEGETATIONAL AND FLORAL FEATURES. Overall, the flora of Scrub Island is similar to that of Great Camanoe. However, vegetation is more fully intact in most areas eastward of the resort’s footprint, with more extensive scrub and low woodland communities. On the south-facing slopes and valley bottoms, which are less exposed to desiccating winds, a low-standing woodland occurs. Shallow soils, high exposure to the elements, and the effects of past land use (including the presence of livestock) have helped to transform the central ridge into a low shrub community of *Croton* sp., spiny plants and several types of cacti. On the north side—on exposed upper slopes where soils are thin and communities bask in intense solar radiation and the trade winds—low scrub persists with cacti and numerous shrub species, as well as the rare Puerto Rico Bank endemic bromeliad *Hohenbergia antillana*, and *Psychilis* and *Tolumnia* orchids. In sheltered locations, dry woodlands occur. The rare West Indies endemic palm, *Sabal causiarum*, is present at Deadman’s Bay, and the Thatch Palm (*C. barbadensis*) is present elsewhere in relatively small numbers.

FAUNAL FEATURES. The bird life of Scrub Island includes the Mangrove Cuckoo, roosting Brown Pelicans, the White-cheeked Pintail, Zenaída and Ground Doves, the Bridled Quail Dove, the Green-throated Carib and Antillean Crested Hummingbirds, the Grey Kingbird, and the Bananaquit. Of the snakes,

only the Puerto Rican Racer is known. There is one species of Anole and the Ground Lizard. Invertebrates include a number of crabs such as the Giant Land Crab and the Ghost Crab.

GEOLOGICAL FEATURES. Scrub Island can be viewed as two rugged granitic islands connected by an isthmus. The two halves are predominantly diorite, tonalite and granodiorite bedrock. The isthmus in between is flat-lying in topography and composed of sediments ranging from sand to coral cobble and rock rubble. High-energy wave action from the south has created a steep rubble beach along the south side of the isthmus and elsewhere along the southern shoreline.

NEARSHORE FEATURES. With the exception of the steep northeast and eastern shoreline and a sandy natural harbour at the west end of the island, the majority of Scrub Island is bordered by shallow coral reefs extending several hundred feet offshore. West End Bay includes a narrow sandy beach and a largely sandy offshore area that drops quickly into the Camanoe-Scrub Island channel. The northeastern shoreline is steep and rocky, and over 90 percent of the island’s shorelines are coral rubble and rock/gravel beaches. Less than ten percent of the island’s shorelines are sandy beaches, all on the north or north-west coasts. Several north-facing beaches are considered valuable nesting habitat for sea turtles.

WETLANDS. There are four salt ponds although the one in the west is mostly reclaimed. The largest (2.1 hectares/5.3 acres), situated on the southeast side of the isthmus, is a mangrove swamp with all four species of mangroves present. A smaller pond is located at Gravel Bay, and another tiny pond is on the south central shore.

MANMADE FEATURES. The western part of the island, “Little Scrub,” is developed, featuring a luxury hotel, villas, marina and spa that opened in 2010. The remainder of the island is undeveloped except for a few access roads.

PROTECTED AREA STATUS. None. The 2005 EIA for Scrub Island designated the two wetlands on the eastern portion of the island as “preserves.” The designation carries no official status.

ISSUES AND RECOMMENDATIONS. Western Scrub has been extensively developed. However, key areas in the relatively undeveloped eastern area (such as the salt ponds) could still be designated by the island’s owners as nature reserves, with little or no structural development permitted.

SCRUB ISLAND	
Location:	N18° 28' 06" W64° 30' 34"
Ownership:	Private: (Inhabited, partially developed)
Size:	97 hectares (240 acres)
Elevation:	134 metres (438 feet)

ANNEX A

“Belonger” Plant Species of Tortola’s Sister Islands, by Island.

TABLE KEY:

H = Herb N = Native WI = West Indies
 S = Shrub Com. = Common VI = Virgin Islands
 T = Tree Loc. = Localised PR = Puerto Rico
 V = Vine UnC. = Uncommon

Family	Species	Habit	Origin	Status	Comments	Carval Rock	Cooper Island	Dead Chest	Ginger Island	Great Camanoe	Great Thatch	Great Tobago	Guana Island	Little Camanoe	Little Thatch	Little Tobago	Marina Cay	Norman Island	Pelican Island	Peter Island	Salt Island	Scrub Island
Pteridophytes - Ferns and Fern Allies																						
Pteridaceae	<i>Pityrogramma chrysophylla</i> (Sw.) Link var. <i>gabrielae</i> Domin	H	N	UnC.	WI Endemic.						✓	✓				✓						
Monocots - One Cotyledon-seeded Plants																						
Arecaceae	<i>Sabal causiarum</i> (O.F. Cook) Becc.	T	N	Rare	WI Endemic. Also cultivated.								✓		✓							✓
Asparagaceae	<i>Agave missionum</i> Trel.	H	N	UnC.	PR-VI Bank Endemic; Endangered					✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	
Bromeliaceae	<i>Hohenbergia antillana</i> Mez	H	N	Rare	PR-VI Bank Endemic.								✓									✓
	<i>Pitcairnia angustifolia</i> Sol. ex Aiton var. <i>angustifolia</i>	H	N	Com.	WI Endemic. May represent a species complex in the BVI. Further study needed.				✓	✓	✓	✓		✓	✓	✓		✓			✓	
	<i>Pitcairnia jareckii</i> Proctor & Cedeno-Mald	H	N	Rare	PR-VI Bank Endemic. May readily hybridise with <i>P. angustifolia</i> . Plants on Great Camanoe need further study.					✓			✓	?								
	<i>Tillandsia fasciculata</i> x <i>setacea</i>	H	N	Rare	Endemic? The two parent spp. seem to hybridise when growing together, producing this new form.								✓									
Cyperaceae	<i>Cyperus nanus</i> Willd.	H	N	Rare	WI Endemic.								✓	✓								

Family	Species	Habit	Origin	Status	Comments	Carval Rock	Cooper Island	Dead Chest	Ginger Island	Great Camanoe	Great Thatch	Great Tobago	Guana Island	Little Camanoe	Little Thatch	Little Tobago	Marina Cay	Norman Island	Pelican Island	Peter Island	Salt Island	Scrub Island
	<i>Cyperus unifolius</i> Boeckeler	H	N	Rare	PR-VI Bank Endemic.								✓									
Orchidaceae	<i>Tetramicra canaliculata</i> (Aubl.) Urb.	H	N	Loc.	WI Endemic.					✓			✓									
	<i>Tolumnia prionochoila</i> (Kraenzl.) Braem	H	N	Rare	WI Endemic.					✓			✓									✓
Poaceae	<i>Aristida cf. cognata</i> Trin. & Rupr.	H	N	Rare	WI Endemic.									✓								
	<i>Aristida cf. refracta</i> Griseb.	H	N	Rare	WI Endemic.																?	
	<i>Digitaria eggersii</i> (Hack.) Henrard	H	N	Rare	PR-VI Bank Endemic.								✓									
	<i>Uniola virgata</i> (Poir.) Griseb.	H	N	Rare	WI Endemic.				✓													
Smilacaceae	<i>Smilax coriacea</i> Spreng.	V	N	Loc.	WI Endemic.						✓											
Dicots - Two Cotyledon-seeded Plants																						
Acanthaceae	<i>Oplonia microphylla</i> (Lam.) Stearn	S	N	Loc.	WI Endemic.				✓		✓	✓	✓		✓	✓		✓			✓	
	<i>Oplonia spinosa</i> (Jacq.) Raf. subsp. <i>spinosa</i>	S	N	Loc.	WI Endemic. Declining as habitat areas are developed.					✓	✓		✓								✓	
Amaranthaceae	<i>Alternanthera crucis</i> (Moq.) Boldingh	H	N	Rare	WI Endemic				✓		✓		✓									
Apocynaceae	<i>Metastelma decipiens</i> Schltr.	V	N	Com.	WI Endemic.								✓									
	<i>Plumeria alba</i> L.	T	N	Com.	WI Endemic.		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Asteraceae	<i>Lepidaploa glabra</i> (Willd.) H. Rob.	S	N	Loc.	WI Endemic.								✓									
	<i>Piptocoma antillana</i> Urb.	S	N	Loc.	PR-VI Bank Endemic.		✓		✓			✓						✓			✓	
Bignoniaceae	<i>Crescentia linearifolia</i> Miers	T	N	Rare	WI Endemic. Gourds float up on Little Thatch.										✓							

Family	Species	Habit	Origin	Status	Comments	Carval Rock	Cooper Island	Dead Chest	Ginger Island	Great Camanae	Great Thatch	Great Tobago	Guana Island	Little Camanae	Little Thatch	Little Tobago	Marina Cay	Norman Island	Pelican Island	Peter Island	Salt Island	Scrub Island
	<i>Tabebuia heterophylla</i> (DC.) Britton	T	N	Com.	WI Endemic.		✓			✓	✓	✓	✓	?			✓	✓		✓	✓	
	<i>Tabebuia lepidota</i> (Kunth) Britton	T	N	UnC.	WI Endemic.							?	✓	?						?		
Boraginaceae	<i>Cordia rickseckeri</i> Millsp.	T	N	Com.	PR-VI Bank Endemic.		✓	✓	✓	✓	✓		✓		✓		✓	✓	✓	✓	✓	
	<i>Euploca ternata</i> (Vahl) J.I.M. Melo & Semir	S	N	Rare	WI Endemic.								✓							✓	✓	
Cactaceae	<i>Consolea rubescens</i> (Salm-Dyck ex DC.) Lem.	T	N	Rare	WI Endemic. The plants on Tortola more closely resemble <i>C. moniliformis</i> . Needs reassessment. Cultivated on Guana.				✓		✓	✓	✓		✓	✓		✓		✓		
	<i>Hylocereus trigonus</i> (Haw.) Saff.	V	N	Com.	WI Endemic. This is a very different plant from Lesser Antillean populations and therefore requires further study.					✓	✓		✓									
	<i>Mammillaria nivosa</i> Link ex Pfeiff.	S	N	Rare	WI Endemic.	?		✓	✓		✓	✓		✓		✓		✓		✓	✓	✓
	<i>Melocactus intortus</i> (Mill.) Urb. subsp. <i>intortus</i>	S	N	Rare	WI Endemic. The plants of Tortola do not conform to the parameters for this species. Needs reassessment.		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
	<i>Opuntia antillana</i> Britton & Rose	S	N	Rare	WI Endemic.									✓								
	<i>Opuntia dillenii</i> x <i>O. repens</i>	S	N	Rare	PR-VI Bank Endemic.			✓				✓	✓			?						
	<i>Opuntia repens</i> Bello	S	N	Com.	PR-VI Bank Endemic.		✓	✓	✓		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
	<i>Opuntia triacantha</i> (Willd.) Sweet	S	N	Rare	WI Endemic.								✓	✓							?	
	<i>Pilosocereus royenii</i> (L.) Byles & Rowley	T	N	Com.	WI Endemic. The species in the BVI requires study since they do not conform to plants in the Lesser Antilles.		✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓		✓
	<i>Stenocereus fimbriatus</i> (Lam.) Lourteig	T	N	Rare	WI Endemic.		✓	✓	✓	✓		✓			✓		✓		✓	✓		✓
Capparaceae	<i>Morisonia americana</i> L.	T	N	Rare	WI Endemic.						✓		✓		✓							

Family	Species	Habit	Origin	Status	Comments	Carval Rock	Cooper Island	Dead Chest	Ginger Island	Great Camanoe	Great Thatch	Great Tobago	Guana Island	Little Camanoe	Little Thatch	Little Tobago	Marina Cay	Norman Island	Pelican Island	Peter Island	Salt Island	Scrub Island
Celastraceae	<i>Elaeodendron xylocarpum</i> (Vent.) DC.	T	N	Com.	WI Endemic		✓			✓	✓		✓	✓	✓			✓		✓		✓
	<i>Maytenus laevigata</i> (Vahl) Griseb. ex Eggers	T	N	Rare	WI Endemic								✓									
Convolvulaceae	<i>Ipomoea eggersii</i> (House) D.F. Austin	V	N	Com.	PR-VI Bank Endemic.					✓		✓	✓									
	<i>Ipomoea steudellii</i> Millsp.	V	N	Com.	PR-VI Bank Endemic.					✓				✓				✓				
	<i>Jacquemontia cumanensis</i> (Kunth) Kuntze	V	N	Loc.	WI Endemic.				✓	✓										✓	✓	
	<i>Jacquemontia solanifolia</i> (L.) Hallier	V	N	Rare?	WI Endemic.								✓									
Erythroxylaceae	<i>Erythroxylum brevipes</i> DC.	T	N	Com	WI Endemic.						?		✓		?					✓		
Euphorbiaceae	<i>Argythamnia candicans</i> Sw.	T	N	Com.	WI Endemic.								✓									
	<i>Croton astroites</i> Dryand.	S	N	Com.	WI Endemic.		✓		✓	✓	✓		✓	✓			✓	✓		✓	✓	
	<i>Croton betulinus</i> Vahl	S	N	Loc.	WI Endemic. Declining.								✓									
	<i>Croton fishlockii</i> Britton	S	N	Rare	VI Endemic.					✓			✓									
	<i>Euphorbia articulata</i> Aubl.	S	N	Loc.	WI Endemic.			✓	✓	✓			✓			✓		✓		✓		
	<i>Euphorbia tithymaloides</i> L. subsp. <i>padifolia</i> (L.) V.W. Steinm.	S	N	Rare	WI Endemic. An introduced form is cultivated. The wild form is very rare.					✓							✓					
	<i>Flueggea acidoton</i> (L.) G.L. Webster	T	N	Rare	WI Endemic.		✓		✓				✓					✓		✓	✓	
	<i>Gymnanthes lucida</i> Sw.	T	N	Com.						✓	✓	✓	✓		✓					✓		
Fabaceae	<i>Chamaecrista glandulosa</i> (L.) Greene var. <i>swartzii</i> (Wikstr.) H.S. Irwin & Barneby	S	N	UnC.	WI Endemic.								✓									
	<i>Erythrina</i> cf. <i>corallodendron</i> L. var. <i>corallodendron</i>	T	N	Rare	WI Endemic.									✓								

Family	Species	Habit	Origin	Status	Comments	Carval Rock	Cooper Island	Dead Chest	Ginger Island	Great Camanoe	Great Thatch	Great Tobago	Guana Island	Little Camanoe	Little Thatch	Little Tobago	Marina Cay	Norman Island	Pelican Island	Peter Island	Salt Island	Scrub Island
	<i>Galactia dubia</i> DC. var. <i>dubia</i>	V	N	Com.	WI Endemic.								✓									
	<i>Galactia eggersii</i> Urb.	V	N	UnC.	VI Endemic.				✓	✓			✓							✓		
	<i>Guilandina ciliata</i> Bergius ex Wikstr.	S	N	Loc.	WI Endemic.				✓	✓								✓		✓	✓	
	<i>Pictetia aculeata</i> (Vahl) Urb.	T	N	Com.	PR-VI Endemic					✓		✓	✓	✓		✓		✓		✓	✓	
	<i>Poitea florida</i> (Vahl) Lavin	T	N	Com.	PR-VI Endemic		✓			✓			✓									
	<i>Senegalia muricata</i> (L.) Britton & Rose	T	N	Com.	WI Endemic					✓	✓		✓					✓		✓		
Lythraceae	<i>Ginoria rohrii</i> (Vahl) Koehne	T	N	Loc.	PR Bank Endemic.						✓		✓		✓							
Malpighiaceae	<i>Malpighia woodburyana</i> Vivaldi	T	N	Loc.	PR-VI Bank Endemic.			✓	✓	✓	✓		✓	✓				✓		✓		✓
	<i>Stigmaphyllon emarginatum</i> (Cav.) A. Juss.	V	N	Com.	WI Endemic.		✓		✓	✓	✓	✓		✓		✓		✓		✓	✓	
Malvaceae	<i>Bastardiopsis eggersii</i> (Baker f.) Fuertes & Fryxell	T	N	Rare	PR-VI Bank Endemic.			✓					✓								✓	
	<i>Helicteres jamaicensis</i> Jacq.	S	N	Com.	WI Endemic.		✓			✓		✓	✓	✓								
Myrtaceae	<i>Eugenia cordata</i> (Sw.) DC. var. <i>cordata</i>	T	N	Com.	WI Endemic.					✓			✓								✓	
	<i>Eugenia sessiliflora</i> Vahl	T	N	Loc.	PR-VI Bank Endemic.					✓												
	<i>Eugenia</i> cf. <i>underwoodii</i> Britton	T	N	Rare	WI Endemic. This species has strongly fissured bark and may be <i>E. confusa</i> , although the north shore of Camanoe does not have habitat for this species. More field study needed.					✓		?	✓									
Nyctaginaceae	<i>Neea buxifolia</i> (Hook. f.) Heimerl	S	N	Loc.	PR-VI Bank Endemic.										✓							
	<i>Pisonia subcordata</i> Sw.	T	N	Com.	WI Endemic.		✓			✓	✓		✓	✓		✓	✓		?	✓	✓	✓

Family	Species	Habit	Origin	Status	Comments	Carval Rock	Cooper Island	Dead Chest	Ginger Island	Great Camanoe	Great Thatch	Great Tobago	Guana Island	Little Camanoe	Little Thatch	Little Tobago	Marina Cay	Norman Island	Pelican Island	Peter Island	Salt Island	Scrub Island
Oleaceae	<i>Forestiera eggersiana</i> Krug & Urb.	T	N	Com.	WI Endemic.					✓		✓	✓					✓		✓		
Polygonaceae	<i>Coccoloba krugii</i> Lindau	T	N	Loc.	WI Endemic.		✓			✓												
	<i>Coccoloba krugii</i> x <i>uvifera</i>	T	N	Rare	WI Endemic. Needs further study.		✓			✓												
	<i>Coccoloba microstachya</i> Willd.	T	N	UnC.	WI Endemic. Possibly declining in some areas.				✓													
Primulaceae	<i>Jacquinia berteroi</i> Spreng. var. <i>berteroi</i>	T	N	UnC.	WI Endemic.					✓			✓								✓	
Rhamnaceae	<i>Reynosia guama</i> Urb.	T	N	Rare	VI Endemic.					✓			✓								✓	
Rubiaceae	<i>Psychotria glabrata</i> Sw.	S	N	UnC.	WI Endemic.								✓									
	<i>Rondeletia pilosa</i> Sw.	S	N	Com.	PR-VI Bank Endemic.							✓	✓									
	<i>Scolosanthus versicolor</i> Vahl	S	N	Loc.	WI Endemic.					✓			✓								✓	
Sapindaceae	<i>Paullinia plumieri</i> Triana & Planch.	V	N	Rare	WI Endemic.													?				
	<i>Serjania lucida</i> Schumach.	V	N	Com.	PR-VI Bank Endemic.		✓			✓			✓	✓	✓			✓		✓		
Solanaceae	<i>Brunfelsia americana</i> L.	S	N	Com.	WI Endemic.					?	✓										✓	
	<i>Cestrum diurnum</i> L.	S	N	Rare	WI Endemic.					?												
	<i>Solanum polygamum</i> Vahl	S	N	Com.	WI Endemic.		✓		✓	✓	✓		✓					✓		✓	✓	
Urticaceae	<i>Pilea margarettae</i> Britton	H	N	Rare	WI Endemic.		✓															
	<i>Pilea microphylla</i> (L.) Liebm. var. <i>succulenta</i> Griseb.	H	N	Rare	WI Endemic.								✓									
	<i>Pilea sanctae-crucis</i> Liebm.	H	N	Loc.	PR-VI Bank Endemic.										✓							

ANNEX B

Native Plants of Conservation Concern on Tortola's Sister Islands, by Island.

TABLE KEY:

H = Herb Com. = Common
 S = Shrub Loc. = Localised
 T = Tree UnC. = Uncommon
 V = Vine WI = West Indies
 N = Native LA = Latin America

Family	Species	Habit	Origin	Status	Comments	Carval Rock	Cooper Island	Dead Chest	Ginger Island	Great Camanoe	Great Thatch	Great Tobago	Guana Island	Little Camanoe	Little Thatch	Little Tobago	Marina Cay	Norman Island	Pelican Island	Peter Island	Salt Island	Scrub Island
Pteridophytes - Fens & Fern Allies																						
Pteridaceae	<i>Cheilanthes microphylla</i> (Sw.) Sw.	H	N	Rare								✓										
	<i>Pityrogramma chrysophylla</i> (Sw.) Link var. <i>gabrielae</i> Domin	H	N	UnC.	WI Endemic.						✓	✓				✓						
Monocots - One Cotyledon-seeded Plants																						
Arecaceae	<i>Sabal causiarum</i> (O.F. Cook) Becc.	T	N	Rare	WI Endemic. Also cultivated.								✓		✓	?						✓
Asparagaceae	<i>Agave missionum</i> Trel.	H	N	UnC.	WI Endemic; Endangered					✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	
	<i>Yucca</i> sp.	T	I	Natur.	There is an ancient <i>Yucca</i> on Salt Island with specimens perhaps over 50 years old. <i>Yucca</i> may live for many hundreds of years. The Salt Island species is unknown, but possibilities include <i>Y. brevifolia</i> or <i>Y. decipiens</i> . A study to determine identity is needed.																✓	
Bromeliaceae	<i>Aechmea lingulata</i> (L.) Baker	H	N	Loc.							✓				✓							

Family	Species	Habit	Origin	Status	Comments	Carval Rock	Cooper Island	Dead Chest	Ginger Island	Great Camanoe	Great Thatch	Great Tobago	Guana Island	Little Camanoe	Little Thatch	Little Tobago	Marina Cay	Norman Island	Pelican Island	Peter Island	Salt Island	Scrub Island
	<i>Hohenbergia antillana</i> Mez	H	N	Rare	WI Endemic. Needs further study.								✓									✓
	<i>Pitcairnia jareckii</i> Proctor & Cedeno-Mald.	H	N	Rare	WI Endemic. May readily hybridise with <i>P. angustifolia</i> . Plants on Great Camanoe need further study.					✓			✓	?								
	<i>Tillandsia fasciculata</i> x <i>setacea</i>	H	N	Rare	Endemic? The two-parent spp. seem to hybridise when growing together, producing this new form. Needs further study.								✓									
Cymodoceaceae	<i>Syringodium filliforme</i> Kütz.	H	N	Loc.	Declining.								✓							✓		
Hydrocharitaceae	<i>Thalassia testudinum</i> K.D. Koenig	H	N	Loc.									✓									
Orchidaceae	<i>Tetramicra canaliculata</i> (Aubl.) Urb.	H	N	Loc.	WI Endemic.					✓			✓									
	<i>Tolumnia prionochoila</i> (Kraenzl.) Braem	H	N	Rare	WI Endemic.					✓			✓									✓
Poaceae	<i>Antheophora hermaphrodita</i> (L.) Kuntze	H	N	Loc.									✓							✓		
	<i>Aristida</i> cf. <i>cognata</i> Trin. & Rupr.	H	N	Rare	WI Endemic.									✓								
	<i>Aristida</i> cf. <i>refracta</i> Griseb.	H	N	Rare	WI Endemic.																?	
	<i>Digitaria eggersii</i> (Hack.) Henrard	H	N	Rare	WI Endemic.								✓									
	<i>Eriochloa</i> sp.	H	N	Rare	Needs further investigation. Found in the understory of forest in the Privateer section of Great Camanoe.					✓												

Family	Species	Habit	Origin	Status	Comments	Carval Rock	Cooper Island	Dead Chest	Ginger Island	Great Camanoe	Great Thatch	Great Tobago	Guana Island	Little Camanoe	Little Thatch	Little Tobago	Marina Cay	Norman Island	Pelican Island	Peter Island	Salt Island	Scrub Island
	<i>Panicum pilosum</i> Sw.	H	N	Rare						?												
	<i>Paspalum</i> sp.	H	N	Rare	Large clump of grass on Great Tobago, but so far no fertile material to determine species. Needs further investigation.							✓										
	<i>Spartina patens</i> (Aiton) Muhl.	H	N	Loc.	Declining.					✓			✓					✓		✓		✓
	<i>Sporobolus virginicus</i> (L.) Kunth	H	N	Loc.	Declining.				✓	✓	✓		✓		✓	✓				✓		
Ruppiaceae	<i>Ruppia maritima</i> L.	H	N	UnC.	Declining.								✓									
Dicots - Two Cotyledon-seeded Plants																						
Araliaceae	<i>Heptapleurum arboricola</i> Hayata	T	I	Cult.											✓			✓				
Basellaceae	<i>Anredera vesicaria</i> (Lam.) c.f. Gaertn.	V	N	Com.																✓		
Bignoniaceae	<i>Crescentia linearifolia</i> Miers	T	N	Rare	WI Endemic. Gourds float up on Little Thatch.										✓							
Boraginaceae	<i>Tournefortia gnaphalodes</i> (L.) R. Br. ex Roem. & Schult.	S	N	Rare	Formerly <i>Argusia gnaphalodes</i> .				✓				✓								✓	
Cactaceae	<i>Consolea rubescens</i> (Salm-Dyck ex DC.) Lem.	T	N	Rare	WI Endemic. The plants on Tortola more closely resemble <i>C. monilliformis</i> . Needs reassessment. Cultivated on Guana Island.				✓		✓		✓		✓	✓		✓		✓		

Family	Species	Habit	Origin	Status	Comments	Carval Rock	Cooper Island	Dead Chest	Ginger Island	Great Camanoe	Great Thatch	Great Tobago	Guana Island	Little Camanoe	Little Thatch	Little Tobago	Marina Cay	Norman Island	Pelican Island	Peter Island	Salt Island	Scrub Island
	<i>Harrisia</i> sp.	T	N	Rare	Plant reported for Dead Chest by Kew/NPT team but not confirmed. May be a very spiny form of <i>P. royenii</i> . Further investigation needed.			✓														
	<i>Mammillaria nivosa</i> Link ex Pfeiff.	S	N	Rare	WI Endemic.	?		✓	✓	✓	✓	✓		✓		✓		✓			✓	✓
	<i>Melocactus intortus</i> (Mill.) Urb. subsp. <i>intortus</i>	S	N	Rare	WI Endemic. The plants of Tortola do not conform to the parameters for this species. Needs reassessment.		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓	*	✓
	<i>Opuntia antillana</i> Britton & Rose	S	N	Rare	WI Endemic. Needs further study.									✓	✓							
	<i>Opuntia dillenii</i> x <i>O. repens</i>	S	N	Rare	WI Endemic. Needs further study.			✓				✓	✓			?						
	<i>Opuntia elatior</i> Mill.	S	N	Rare	Needs further study.											✓						
	<i>Opuntia triacantha</i> (Willd.) Sweet	S	N	Rare	WI Endemic. Needs further study.								✓	✓								?
	<i>Stenocereus fimbriatus</i> (Lam.) Lourteig	T	N	Rare	WI Endemic.		✓	✓	✓	✓		✓			✓			✓	?	✓	✓	
Celastraceae	<i>Maytenus laevigata</i> (Vahl) Griseb. ex Eggers	T	N	Rare	WI Endemic								✓									
Combretaceae	<i>Bucida buceras</i> L.	T	N	Loc.	Declining.										✓							
	<i>Conocarpus erectus</i> L. var. <i>erectus</i>	T	N	Loc.	Declining.				✓	✓	✓	✓	✓	✓			✓	✓		✓	✓	
	<i>Laguncularia racemosa</i> (L.) Gaertn. f.	T	N	Loc.	Declining.					✓	✓		✓	✓	✓		✓	✓		✓	✓	
Euphorbiaceae	<i>Croton betulinus</i> Vahl	S	N	Loc.	WI Endemic. Declining.								✓									

Family	Species	Habit	Origin	Status	Comments	Carval Rock	Cooper Island	Dead Chest	Ginger Island	Great Camanoe	Great Thatch	Great Tobago	Guana Island	Little Camanoe	Little Thatch	Little Tobago	Marina Cay	Norman Island	Pelican Island	Peter Island	Salt Island	Scrub Island
	<i>Croton fishlockii</i> Britton	S	N	Rare	WI Endemic.								✓									
Fabaceae	<i>Chloroleucon tortum</i> (Martius) Pittier	T	N	Rare	Listed as found in Brazil, LA and VI, but more taxonomic studies are needed. Critically Endangered according to IUCN.				✓													
	<i>Erythrina</i> cf. <i>corallogen-dron</i> L. var. <i>corallogen-dron</i>	T	N	Rare	WI Endemic. Needs further study.										✓							
	<i>Erythrina variegata</i> L.	T	I	Cult.									✓									
	<i>Galactia eggersii</i> Urb.	V	N	UnC.	WI Endemic. Needs further study.				✓	✓			✓							✓		
Goodeniaceae	<i>Scaevola plumieri</i> (L.) Vahl	S	N	Rare				?	✓	✓			✓							✓		
Malpighiaceae	<i>Malpighia woodburyana</i> Vivaldi	T	N	Loc.	WI Endemic.			✓		✓	✓		✓					✓				✓
Malvaceae	<i>Bastardiopsis eggersii</i> (Baker f.) Fuertes & Fryxell	T	N	Rare	WI Endemic.			✓	✓				✓					✓		✓		
Myrtaceae	<i>Eugenia</i> cf. <i>underwoodii</i> Britton	T	N	Rare	WI Endemic. This sp. has strongly fissured bark and may be <i>E. confusa</i> , although the north shore of Great Camanoe does not have the habitat for this species. More field study is needed.					✓		?	✓									
Polygonaceae	<i>Coccoloba krugii</i> Lindau	T	N	Loc.	WI Endemic.					✓												
Rhizophoraceae	<i>Rhizophora mangle</i> L.	T	N	Com.	Declining.				✓	✓	✓		✓								✓	

Family	Species	Habit	Origin	Status	Comments	Carval Rock	Cooper Island	Dead Chest	Ginger Island	Great Camanoë	Great Thatch	Great Tobago	Guana Island	Little Camanoë	Little Thatch	Little Tobago	Marina Cay	Norman Island	Pelican Island	Peter Island	Salt Island	Scrub Island	
Rutaceae	<i>Zanthoxylum flavum</i> Vahl	T	N	Rare	Requires further study.					✓													
Sapindaceae	<i>Paullinia plumieri</i> Triana & Planch.	V	N	Rare	WI Endemic.													?					
Surianaceae	<i>Suriana maritima</i> L.	S	N	Loc.	Declining				✓				✓							✓		✓	
Zygophyllaceae	<i>Guaiacum officinale</i> L.	T	N	Rare	Also cultivated. Needs further study.					✓			✓										

ANNEX C

Invasive Plant Species of Tortola's Sister Islands, by Island.

TABLE KEY:

H = Herb I = Introduced
 S = Shrub Cult. = Cultivated
 T = Tree Natur. = Naturalised
 V = Vine

Family	Species	Habit	Origin	Status	Comments	Carval Rock	Cooper Island	Dead Chest	Ginger Island	Great Camanoe	Great Thatch	Great Tobago	Guana Island	Little Camanoe	Little Thatch	Little Tobago	Marina Cay	Norman Island	Pelican Island	Peter Island	Salt Island	Scrub Island
Pteridophytes - Fens & Fern Allies																						
Lomariopsidaceae	<i>Nephrolepis brownii</i> (Desv.) Hovenkamp & Miyam.	H	I	Natur.	Highly invasive. Also cultivated.								✓				✓					
	<i>Nephrolepis exaltata</i> Cultivar.	H	I	Natur.	Highly invasive. Introduced cultivar.				✓				✓									
Monocots - One Cotyledon-seeded Plants																						
Araceae	<i>Epipremnum pinnatum</i> (Linnaeus) Engler	V	I	Cult.	Invasive. Also cultivated.				✓				✓		✓		✓					
Asparagaceae	<i>Sansevieria hyacinthoides</i> (L.) Druce	H	I	Natur.	Highly invasive. Also cultivated.		✓								✓			✓		✓		
	<i>Sansevieria trifasciata</i> Prain	H	I	Cult.	Potentially very invasive.								✓									
Commelinaceae	<i>Callisia fragrans</i> (Lindl.) Woodson	H	I	Natur.	Very invasive.					✓			✓		✓							
Crassulaceae	<i>Kalanchoe fedtschenkoi</i> Raym.-Hamet & Perrier	H	I	Cult.	Potentially very invasive.					✓												
Poaceae	<i>Megathyrsus maximus</i> (Jacq.) B.K. Simon & S.W.L. Jacobs	H	I	Natur.	Invasive.				✓	✓			✓		✓		✓			✓		
	<i>Pennisetum alopecuroides</i> (Linnaeus) Sprengel	H	I	Cult.	Potentially invasive.																	✓

Family	Species	Habit	Origin	Status	Comments	Carval Rock	Cooper Island	Dead Chest	Ginger Island	Great Camanoe	Great Thatch	Great Tobago	Guana Island	Little Camanoe	Little Thatch	Little Tobago	Marina Cay	Norman Island	Pelican Island	Peter Island	Salt Island	Scrub Island
	<i>Zoysia tenuifolia</i> Willd. ex Thiele	H	I	Natur.	Potentially invasive. Also cultivated.					✓					✓		✓			✓		✓
Dicots - Two Cotyledon-seeded Plants																						
Acanthaceae	<i>Asystasia gangetica</i> (L.) T. Anderson	V	I	Natur.	Potentially very invasive. Escaping into the wild.					✓			✓		✓		✓					
	<i>Barleria repens</i> Nees.	H	I	Cult.	Potentially very invasive. Also cultivated.					✓					✓							
	<i>Crossandra infundibuliformis</i> (L.) Nees	S	I	Cult.	Escapee around home gardens.								✓									
	<i>Ruellia costata</i> (Nees) Hiern.	H	I	Cult.	Sometimes escapee around home gardens.		✓			✓					✓		✓					✓
Apocynaceae	<i>Calotropis procera</i> (Aiton) W.T. Aiton	S	I	Natur.	Invasive.																	✓
	<i>Cryptostegia grandiflora</i> R. Br.	V	I	Cult.	Highly Invasive. Possibly naturalised.								✓									
	<i>Cryptostegia madagascariensis</i> Bojer ex Decne.	V	I	Natur.	Highly Invasive. Also cultivated.		✓			✓	✓						✓			✓	✓	
Casuarinaceae	<i>Casuarina equisetifolia</i> L.	T	I	Cult.	Invasive.								✓									
Cleomaceae	<i>Arivela viscosa</i> (L.) Raf.	H	I	Natur.	Invasive. Formerly <i>Cleome viscosa</i> .		✓						✓					✓		✓	✓	
Fabaceae	<i>Haematoxylum campechianum</i> L.	T	I	Natur.	Invasive.					✓			✓									
	<i>Leucaena leucocephala</i> (Lam.) De Wit subsp. <i>leucocephala</i>	T	I	Natur.	Invasive.		✓			✓	✓		✓		✓		✓	✓		✓		✓
	<i>Vachellia farnesiana</i> (L.) Wight & Arn.	T	I	Natur.	Invasive.					✓												
	<i>Vachellia macracantha</i> (Humb. & Bonpl. ex Willd.) Seigler & Ebinger	T	I	Natur.	Invasive.		✓			✓	✓		✓	✓	✓					✓		

Family	Species	Habit	Origin	Status	Comments	Carval Rock	Cooper Island	Dead Chest	Ginger Island	Great Camanoe	Great Thatch	Great Tobago	Guana Island	Little Camanoe	Little Thatch	Little Tobago	Marina Cay	Norman Island	Pelican Island	Peter Island	Salt Island	Scrub Island
Goodeniaceae	<i>Scaevola taccada</i> (Gaertn.) Roxb.	S	I	Natur.	Invasive.		✓	?		✓			✓		✓		✓			✓		
Meliaceae	<i>Azadirachta indica</i> A. Juss.	T	I	Natur.	Invasive. Also cultivated.		✓						✓							✓		
Plantaginaceae	<i>Russelia equisetiformis</i> Schltld. & Cham.	H	I	Cult.	Potentially Very invasive.					✓			✓		✓							
Polygonaceae	<i>Antigonon leptopus</i> Hook. & Arn.	V	I	Natur.	Highly invasive.								✓									
Rubiaceae	<i>Morinda citrifolia</i> L.	T	I	Natur.	Invasive.					✓										✓		
Rutaceae	<i>Murraya paniculata</i> (L.) Jacq.	T	I	Natur.	Potentially a serious invasive.					✓										✓		
Sapindaceae	<i>Majidea zanguebarica</i> K. Kirk	T	I	Cult.	Potentially invasive.										✓							
	<i>Melicoccus bijugatus</i> Jacq.	T	I	Natur.	Invasive.					✓	✓		✓				✓					

ANNEX D

Bird Species of Tortola's Sister Islands, by Island.

COMMON NAME	SCIENTIFIC NAME	Carval Rock	Cooper Island	Dead Chest	Ginger Island	Great Camanoe	Great Thatch	Great Tobago	Guana Island	Little Camanoe	Little Thatch	Little Tobago	Marina Cay	Norman Island	Pelican Island	Peter Island	Salt Island	Scrub Island
Pied-billed Grebe	<i>Podilymbus podiceps</i>								✓									
White-tailed Tropicbird	<i>Phaethon lepturus</i>		✓						✓		?	✓						
Red-billed Tropicbird	<i>Phaethon aethereus</i>	✓			✓	✓		✓	✓			✓				✓		✓
Brown Booby	<i>Sula leucogaster</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Brown Pelican	<i>Pelecanus occidentalis</i>		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Magnificent Frigatebird	<i>Fregata magnificens</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Audubon's Shearwater	<i>Puffinus lherminieri</i>		✓		✓	✓		✓						✓		✓		
Great Blue Heron	<i>Ardea Herodias</i>					✓			✓	✓								
Great Egret	<i>Ardea alba</i>				✓	✓			✓	✓			✓					
Snowy Egret	<i>Egretta thula</i>								✓									
Little Blue Heron	<i>Egretta caerulea</i>					✓	✓		✓		✓			✓		✓		
Cattle Egret	<i>Bubulcus ibis</i>		✓						✓				✓			✓		
Green Heron	<i>Butorides virescens</i>		✓			✓			✓							✓	✓	
Yellow-crowned Night Heron	<i>Nyctanassa violacea</i>		✓			✓			✓		✓					✓		✓
Greater Flamingo	<i>Phoenicopterus ruber</i>								✓									
White-cheeked Pintail	<i>Anas bahamensis</i>							✓	✓					✓		✓		✓
Blue-winged Teal	<i>Anas discors</i>								✓									
Osprey	<i>Pandion haliaetus</i>		✓			✓			✓				✓			✓		
Sharp-shinned Hawk	<i>Accipiter striatus</i>								✓									
Red-tailed Hawk	<i>Buteo jamaicensis</i>		✓		✓	✓	✓	✓	✓			✓		✓		✓		
American Kestrel	<i>Falco sparverius</i>		✓		✓	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓	✓
Merlin	<i>Falco columbarius</i>					✓												
Peregrine Falcon	<i>Falco peregrines</i>					✓			✓							✓		
Clapper Rail	<i>Rallus longirostris</i>								✓									
Common Moorhen	<i>Gallinula chloropus</i>					✓			✓		✓			✓		✓		
Common Gallinule	<i>Gallinulagaleata</i>				✓													

COMMON NAME	SCIENTIFIC NAME	Carval Rock	Cooper Island	Dead Chest	Ginger Island	Great Camanoe	Great Thatch	Great Tobago	Guana Island	Little Camanoe	Little Thatch	Little Tobago	Marina Cay	Norman Island	Pelican Island	Peter Island	Salt Island	Scrub Island
Black-bellied Plover	<i>Pluvialis squaterola</i>								✓									
Wilson's Plover	<i>Charadrius wilsonia</i>				✓				✓				✓			✓		✓
Semi-palmated Plover	<i>Charadrius semipalmatus</i>								✓								✓	
Killdeer	<i>Charadrius vociferus</i>		✓						✓							✓		
Whimbrel	<i>Numenius phaeopus</i>								✓									
American Oystercatcher	<i>Haematopus palliatus</i>		✓		✓	✓	✓	✓	✓		✓	✓	✓			✓	✓	✓
Black-necked Stilt	<i>Himantopus mexicanus</i>				✓	✓			✓							✓	✓	
Greater Yellowlegs	<i>Tringa melanoleuca</i>								✓								✓	
Lesser Yellowlegs	<i>Tringa flavipes</i>								✓							✓	✓	
Solitary Sandpiper	<i>Tringa solitaria</i>		✓		✓	✓			✓					✓				
Spotted Sandpiper	<i>Actitis macularia</i>		✓		✓				✓				✓			✓	✓	
Ruddy Turnstone	<i>Arenaria interpres</i>		✓						✓		✓		✓	✓		✓	✓	✓
Common Snipe	<i>Gallinago gallinago</i>								✓									
Short-billed Dowitcher	<i>Limnodromus griseus</i>																✓	
Stilt Sandpiper	<i>Calidris himantopus</i>								✓									
White-rumped Sandpiper	<i>Calidris fuscicollis</i>								✓									
Sanderling	<i>Calidris alba</i>																✓	
Dunlin	<i>Calidris alpina</i>																✓	
Western Sandpiper	<i>Calidris mauri</i>								✓									
Semi-palmated Sandpiper	<i>Calidris pusilla</i>								✓								✓	
Least Sandpiper	<i>Calidris mitunilla</i>								✓								✓	
Upland Sandpiper	<i>Calidris munita</i>								✓								✓	
Little Stint	<i>Bartramia longicauda</i>								✓								?	
Willet	<i>Catoptrophorus semipalmatus</i>								✓									
Laughing Gull	<i>Larus atricilla</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Ring-billed Gull	<i>Larus delawarensis</i>					✓												
Great Black-backed Gull	<i>Larus marinus</i>					✓							✓					
Caspian Tern	<i>Sterna caspia</i>								✓									
Royal Tern	<i>Sterna maxima</i>		✓						✓									✓

COMMON NAME	SCIENTIFIC NAME	Carval Rock	Cooper Island	Dead Chest	Ginger Island	Great Camanoe	Great Thatch	Great Tobago	Guana Island	Little Camanoe	Little Thatch	Little Tobago	Marina Cay	Norman Island	Pelican Island	Peter Island	Salt Island	Scrub Island
Sandwich Tern	<i>Sterna sandvicensis</i>		✓	✓		✓			✓		✓	✓	✓	✓		✓		✓
Roseate Tern	<i>Sterna dougallii</i>	✓	✓	✓		✓			✓	✓		✓	✓	✓		✓		✓
Common Tern	<i>Sterna hirundo</i>								✓									
Least Tern	<i>Sterna antillarum</i>		✓						✓		✓	✓	✓					
Sooty Tern	<i>Sterna fuscata</i>								✓									
Bridled Tern	<i>Sterna anaethetus</i>	✓	✓	✓	✓	✓			✓			✓	✓	✓	✓	✓		
Brown Noddy	<i>Anous stolidus</i>	✓	✓		✓				✓			✓	✓	✓				✓
Scaly-naped Pigeon	<i>Columba squamosa</i>		✓		✓	✓	✓	✓	✓	✓	✓		✓	✓		✓		✓
White-crowned Pigeon	<i>Columbia leucocephala</i>								✓									
Bridled Quail-Dove	<i>Geotrygon mystacea</i>								✓	?								✓
White-winged Dove	<i>Zenaida asiatica</i>		✓			?					✓					✓		
Zenaida Dove	<i>Zenaida aurita</i>		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
Common Ground-Dove	<i>Columbina passerine</i>		✓		✓	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓	✓
Puerto Rican Screech Owl	<i>Otus nupides</i>								✓									
Antillean Nighthawk	<i>Chordeiles gundlachii</i>		✓															
Chuck-Will's Widow	<i>Caprimulgus carolinensis</i>								✓									
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>								✓									
Mangrove Cuckoo	<i>Coccyzus minor</i>		✓		✓	✓	✓	✓	✓		✓		✓	✓		✓	✓	✓
Smooth-billed Ani	<i>Crotophaga ani</i>		✓		✓	✓			✓	✓	✓		✓	✓		✓	✓	✓
Antillean Mango	<i>Anthracothorax dominicus</i>								✓									
Green-throated Carib	<i>Eulampis holosericeus</i>		✓		✓	✓	✓		✓		✓		✓	✓		✓	✓	✓
Antillean Crested Hummingbird	<i>Orthorhynchus cristatus</i>		✓		✓	✓			✓		✓		✓	✓		✓	✓	
Belted Kingfisher	<i>Ceryle alcyon</i>					✓			✓	✓	✓							
Caribbean Elaenia	<i>Elaenia martinica</i>					✓	✓		✓							✓	✓	
Puerto Rican Flycatcher	<i>Myiarchus antillarum</i>		?															
Gray Kingbird	<i>Tyrannus dominicensis</i>		✓		✓	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓	✓
Tree Swallow	<i>Tachycineta bicolor</i>								✓									
Caribbean Martin	<i>Progne dominicensis</i>		✓	✓		✓		✓	✓		✓		✓	✓	✓	✓		✓
Barn Swallow	<i>Hirundo rustica</i>		✓			✓			✓	✓	✓		✓			✓		

COMMON NAME	SCIENTIFIC NAME	Carval Rock	Cooper Island	Dead Chest	Ginger Island	Great Camanoe	Great Thatch	Great Tobago	Guana Island	Little Camanoe	Little Thatch	Little Tobago	Marina Cay	Norman Island	Pelican Island	Peter Island	Salt Island	Scrub Island
Northern Mockingbird	<i>Mimus polyglottos</i>		✓				✓	✓	✓		✓		✓			✓	✓	
Pearly-eyed Thrasher	<i>Margarops fuscatus</i>		✓			✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
Swainson's Thrush	<i>Catharus ustulatus</i>								✓									
Black-whiskered Vireo	<i>Vireo altiloquus</i>				✓				✓									
Red-eyed Vireo	<i>Vireo olivaceus</i>								✓									
Yellow-throated Vireo	<i>Vireo flavifrons</i>								✓									
White-eyed Vireo	<i>Vireo griseus</i>								✓									
Northern Waterthrush	<i>Parkesia noveboracensis</i>								✓									
Yellow Warbler	<i>Setophaga petechia</i>		✓		✓	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓	
Northern Parula	<i>Setophaga americana</i>					✓			✓									
Golden-winged Warbler	<i>Vermivora chrysoptera</i>								✓									
Black-throated Blue Warbler	<i>Setophaga caerulescens</i>								✓									
Magnolia Warbler	<i>Setophaga magnolia</i>								✓									
Prairie Warbler	<i>Setophaga discolor</i>					✓			✓									
Palm Warbler	<i>Setophaga palmarum</i>								✓									
Cape May Warbler	<i>Setophaga tigrina</i>								✓									
Blackburnian Warbler	<i>Setophaga fusca</i>								✓									
Kentucky Warbler	<i>Geothlypis formosa</i>								✓									
Blackpoll Warbler	<i>Setophaga striata</i>								✓									
Black-and-White Warbler	<i>Mniotilta varia</i>								✓									
American Redstart	<i>Setophaga ruticilla</i>								✓									
Chestnut-sided Warbler	<i>Setophaga pensylvanica</i>								✓									
Ovenbird	<i>Seiurus aurocapilla</i>								✓									
Nashville Warbler	<i>Oreothlypis ruficapilla</i>								✓									
Bananaquit	<i>Coereba flaveola</i>		✓		✓	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓	✓
Bobolink	<i>Dolichonyx oryzivorus</i>								✓									
Black-faced Grassquit	<i>Tiaris bicolor</i>		✓		✓	✓		✓	✓		✓		✓	✓		✓	✓	✓
Lesser Antillean Bullfinch	<i>Loxigilla noctis</i>		✓					✓	✓		✓					✓		
Indigo Bunting	<i>Passerina cyanea</i>					✓			✓									

COMMON NAME	SCIENTIFIC NAME	Carval Rock	Cooper Island	Dead Chest	Ginger Island	Great Camanoe	Great Thatch	Great Tobago	Guana Island	Little Camanoe	Little Thatch	Little Tobago	Marina Cay	Norman Island	Pelican Island	Peter Island	Salt Island	Scrub Island
Blue Grosbeak	<i>Guiraca caerulea</i>								✓									
House Sparrow	<i>Passer domesticus</i>		✓										✓			✓		
EXOTIC SPECIES																		
Muscovy Duck	<i>Cairina moschata</i>		✓															
Rock Dove	<i>Columba livia</i>								✓									

Note: The variation in bird records from island to island reflects the number of site visits, number of observers, time of day, and season. Thus, more frequent observations during all seasons will yield a greater number of species. It is equally important to note the island's size, height, and habitat types as contributing factors to the number-of-species data recorded.

Source of Table Data:

Island	Jean-Pierre Bacle	Kevel Lindsay	Clive Petrovic	Susan Zaluski	J.D. Lazell [†]	Scrub Island EIA [♦]
Carval Rock			Various Observations			
Cooper Island	15 August 2014	15 August 2014	Various Observations	Various Observations		
Dead Chest			Various Observations			
Ginger Island	18 August 2014	18 August 2014	Various Observations	Various Observations		
Great Camanoe	24-27 October 2014	24-27 October 2014	Various Observations			
Great Thatch	23 May 2014	23 May 2014				
Great Tobago	24 May 2014	24 May 2014	24 May 2014	Various Observations		
Guana Island					✓	
Little Camanoe	26 October 2014	26 October 2014				
Little Thatch	21 May 2014	21 May 2014	Various Observations			
Little Tobago	24 May 2014	24 May 2014	24 May 2014	Various Observations		
Marina Cay	27 October 2014	27 October 2014	Various Observations			
Norman Island	23 October 2014	23 October 2014	Various Observations	Various Observations		
Pelican Island			Various Observations			
Peter Island	17 August 2014	17 August 2014	Various Observations	Various Observations		
Salt Island	20 August 2014	20 August 2014	Various Observations			
Scrub Island						✓

Dates above, associated with the name of the observer, indicate date of field trip observation.

[†] James D. Lazell, 2005. *Island-Fact and Theory in Nature*. University of California Press.

[♦] Applied Technology and Management (ATM), 2005. *Environmental Impact Assessment for Scrub Island*, Appendix C.

ANNEX E

Amphibians, Reptiles, and Native Mammals of Tortola’s Sister Islands, by Island.

SPECIES	COMMON NAME	Carrot Rock ♦	Carval Rock	Cooper Island	Dead Chest	Ginger Island	Great Camanoe	Great Thatch	Great Tobago	Guana Island	Little Camanoe	Little Thatch	Little Tobago	Marina Cay	Norman Island	Pelican Island	Peter Island	Salt Island	Scrub Island	CONSERVATION STATUS
AMPHIBIANS																				
<i>Eleutherodactylus antillensis</i> Reinhardt & Lutken	Antillean Coqui/Tree Frog/Bo Peep						?	?				?								Widespread and common.
<i>Eleutherodactylus cochranæ</i> Grant	Whistling Coqui/Bo Peep	<i>Recorded for the BVI, but not yet confirmed for the Sister Islands.</i>																	Widespread but localised.	
<i>Eleutherodactylus schwartzii</i> Thomas	Virgin Islands Coqui/Tree Frog/Bo Peep											✓								Uncommon to rare and localised in some areas; distribution seems patchy. Listed as Endangered.
<i>Leptodactylus albilabris</i> Günther	White-lipped Frog/Puerto Rican Ditch Frog																			Very Rare. Possible on several Sister Islands because of available habitats.
<i>Osteopilus septentrionalis</i> Dumeril & Bibron	Cuban Tree Frog																✓			Introduced to Tortola; widespread and common.
LIZARDS																				
<i>Ameiva exsul</i> Cope	Virgin Islands Ground Lizard			✓	✓	✓	✓	?	✓	✓	✓	?	?	✓	✓		✓	✓	✓	Common and widespread.
<i>Amphisbaena fenestrata</i> Cope	Virgin Islands Worm Lizard						✓	✓		✓										Uncommon to rare; endemic to the Virgin Islands.
<i>Anolis cristatellus</i> subsp. <i>wileyae</i> Cope	Virgin Islands Crested Anole			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Common and widespread.
<i>Anolis ernestwilliamsi</i> Lazell	Ernest Williams' Crested Anole	✓																		Very rare. Endemic to Carrot Rock.
<i>Anolis pulchellus</i> Dumeril & Bibron	Puerto Rican Bush Anole	<i>Recorded for the BVI, but not yet confirmed for the Sister Islands.</i>																	Common and widespread.	
<i>Anolis stratulus</i> Cope	Puerto Rican Spotted Anole			✓			✓			✓		✓		✓	✓		✓	✓		Common and widespread.

SPECIES	COMMON NAME	Carrot Rock ♦	Carval Rock	Cooper Island	Dead Chest	Ginger Island	Great Camanoë	Great Thatch	Great Tobago	Guana Island	Little Camanoë	Little Thatch	Little Tobago	Marina Cay	Norman Island	Pelican Island	Peter Island	Salt Island	Scrub Island	CONSERVATION STATUS
<i>Cyclura pinguis</i> Barbour	Anegada Rock Iguana									✓		✓								Critically Endangered. Introduced to Guana and Little Thatch Islands.
<i>Hemidactylus mabouia</i> Moreau De Jonnès	House Gecko			✓			✓			✓				✓			✓	✓		Introduced; common around residences and in the wild.
<i>Iguana iguana</i> Linnaeus	Green Iguana/Common Iguana									✓							✓			Possibly introduced to Tortola and the Virgin Islands. More genetic work is needed to determine the status of this species.
<i>Sphaerodactylus macrolepis</i> subsp. <i>macrolepis</i> Günther	Puerto Rican Eye-spot Sphaero/ Puerto Rican Eye-spot Gecko	?	?	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Common and widespread.
<i>Sphaerodactylus</i> sp.	Virgin Islands Least Gecko	✓																		Endemic to the BVI; localised and believed to be rare, but perhaps should be considered as Endangered.
<i>Spondylurus semitaeniatus</i> Wiegmann Spondylurus	Lesser Virgin Islands Skink					✓	✓			✓		✓							✓	Considered uncommon to rare. Continues to decline due to the Mongoose, habitat destruction and development; Hedges, <i>et al.</i> (2012)† consider this species, based on IUCN criteria, to be Endangered.
<i>Spondylurus sloanii</i> Daudin	Virgin Islands Bronze Skink			?									✓		✓		✓	✓		Endemic to Sister Islands to the south of Tortola (Salt, Peter and Norman) and to the west (Little Tobago), and several islands off of St. Thomas, USVI. Very rare.
<i>Spondylurus macleani</i> Mayer & Lazell	Carrot Rock Skink/McClean's Skink	✓																		Very Rare.
SERPENTS																				
<i>Borikenophis portoricensis</i> subsp. <i>anegadae</i> Barbour	Anegada Racer						✓			✓				✓					✓	Relatively common and widespread.

SPECIES	COMMON NAME	Carrot Rock ♦	Carval Rock	Cooper Island	Dead Chest	Ginger Island	Great Camanoë	Great Thatch	Great Tobago	Guana Island	Little Camanoë	Little Thatch	Little Tobago	Marina Cay	Norman Island	Pelican Island	Peter Island	Salt Island	Scrub Island	CONSERVATION STATUS
<i>Borikenophis portoricensis</i> subsp. <i>richardii</i> Barbour	Richard's Racer			✓		✓											✓	✓		Rare.
<i>Chilabothrus grantii</i> Zenneck	Virgin Islands Tree Boa						✓			✓										Uncommon but widespread on Tortola; endemic to the VI; considered Endangered by IUCN.
<i>Magliophis exiguus</i> subsp. <i>exiguus</i> Cope	Virgin Islands Racertlet			✓			✓			✓							✓			Uncommon to rare; possibly declining.
<i>Typhlops richardii</i> Dumeril & Bibron subsp. <i>richardii</i>	Virgin Islands Blind Worm/Virgin Islands Blind Snake/Richards Blind Snake													?				✓		Rarely seen or observed; the conservation status of this species remains unknown. Populations throughout much of the range may need genetic study to determine taxonomic relationships.
TORTOISES AND TERRAPINS																				
<i>Chelonoidis carbonaria</i> Spix	Red-legged/Red-footed Tortoise									✓		✓					✓			Rare and extinct in much of Tortola. Should be considered Critically Endangered locally.
MARINE TURTLES																				
<i>Chelonia mydas</i> Linnaeus	Green Turtle																		✓	Internationally listed as Endangered by IUCN; locally?
<i>Dermochelys coriacea</i> Vandelli	Leatherback Turtle	<i>Recorded for the BVI, but not yet confirmed for the Sister Islands.</i>																		Internationally listed as Vulnerable by IUCN; locally?
<i>Eretmochelys imbricata</i> Linnaeus	Hawksbill Turtle			✓													✓		✓	Internationally listed as Critically Endangered by IUCN; locally?
BATS																				
<i>Brachyphylla cavernarum</i>	Antillean Fruit-eating Bat/Antillean Cave Bat/Antillean Pig-faced Bat						✓			✓					✓					Rare. Limited in distribution by the availability of natural caves.
<i>Molossus molossus</i>	Velvety Free-tailed Bat						✓			✓										Common in the BVI.

SPECIES	COMMON NAME	Carrot Rock ♦	Carval Rock	Cooper Island	Dead Chest	Ginger Island	Great Camanoe	Great Thatch	Great Tobago	Guana Island	Little Camanoe	Little Thatch	Little Tobago	Marina Cay	Norman Island	Pelican Island	Peter Island	Salt Island	Scrub Island	CONSERVATION STATUS
<i>Noctilio leporinus</i>	Bulldog Bat/Greater Bulldog Bat/Fishing Bat						✓			✓					✓					Widespread but rare across the BVI.
<i>Tadarida brasiliensis</i>	Mexican Free-tailed Bat									✓										Very rare in the BVI.
<i>Artibeus jamaicensis</i>	Jamaican Fruit Bat									✓										Widespread and common in the BVI.

♦ Carrot Rock is located south of Peter Island.

† S. Blair Hedges and Caitlin E. Conn, 2012. A New Skink Fauna from Caribbean Islands (*Squamata, Mabuyidae, Mabuyinae*) *Zootaxa* 3288. Magnolia Press.