

Sherwin

NATURE RESERVE GUIDE

INCLUDING **Warwick Pond**



THE BERMUDA NATIONAL TRUST



ACKNOWLEDGEMENTS

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To protect Bermuda's unique natural & cultural heritage forever

Preface

Ever since Bermuda was first settled 400 years ago, its residents have been making an impact on these islands, for better and for worse. They have crafted and built beautiful things...houses, boats, furniture and silver spoons. They have also changed the landscape, using biodiversity-rich marshes as rubbish dumps, importing invasive plant and animal species that threaten the native species, over-developing this narrow strip of land in the ocean. The threat of losing valuable open spaces and historic treasures sparked the creation of the Bermuda Monuments Trust in 1937 by a group of Bermudians who wanted to ensure that future generations would have the opportunity to understand their past. In 1970 the Bermuda National Trust was founded and took over from the Monuments Trust. Since then it has grown to become one of the island's most respected institutions. It is an independent not-for-profit organization which promotes the preservation of the island's architectural, historic and environmental treasures, and encourages public access to and enjoyment of them. Its members and friends are from all walks of life, having in common a love of Bermuda and the desire that its special aspects should be safeguarded for everyone to enjoy now, and forever.

This guide provides information on the importance, history, geography and biology of this very special Bermuda National Trust property. It highlights individual habitats, the most common flora and fauna and offers images which will help you to identify species found within the reserve. We hope that this guide will enhance your visit to our nature reserve and encourage you to visit other Trust properties soon.

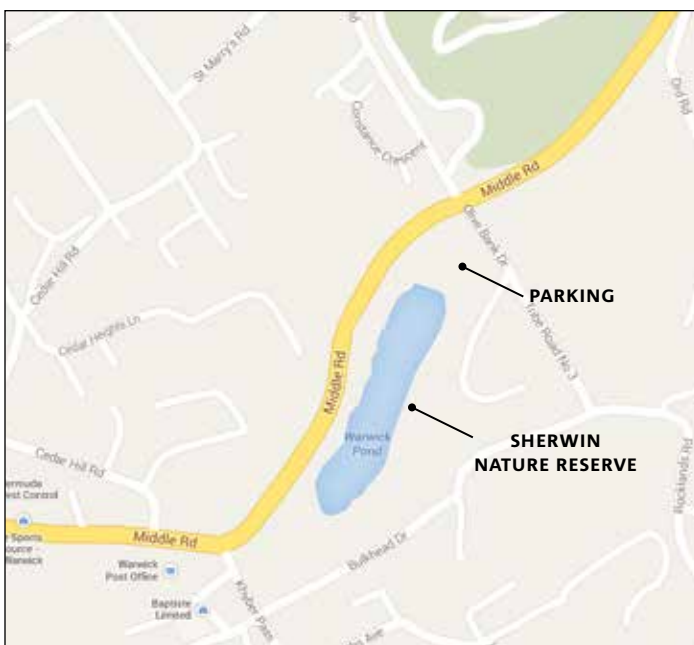
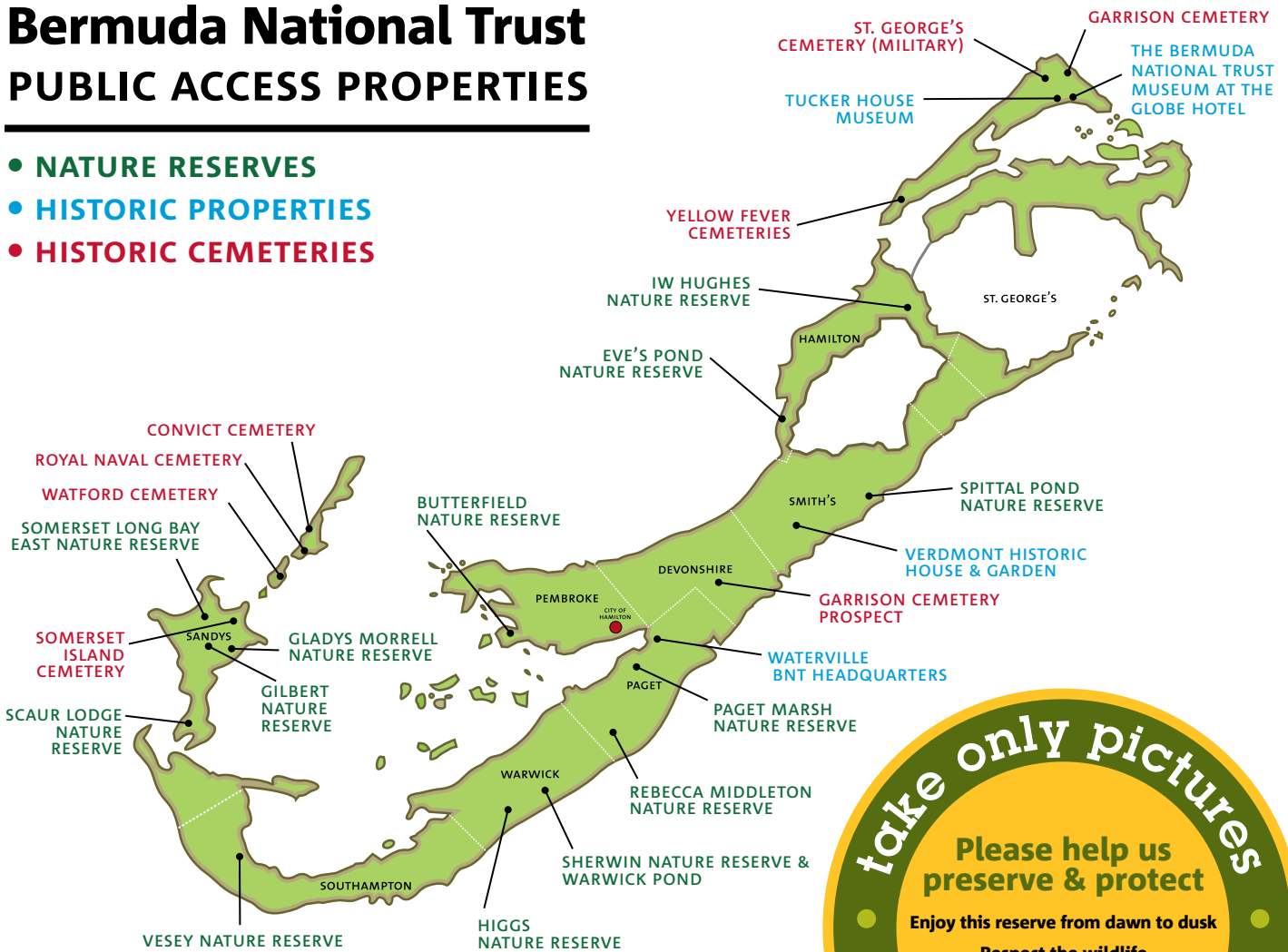
For more information on the Bermuda National Trust, the properties in its care, programmes, events, membership and volunteer opportunities please visit www.bnt.bm or contact us at 441 236 6483.

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Bermuda National Trust PUBLIC ACCESS PROPERTIES

- NATURE RESERVES
- HISTORIC PROPERTIES
- HISTORIC CEMETERIES



Directions

Sherwin Nature Reserve is located on Middle Road in Warwick Parish. If traveling by public transportation, take the number 8 bus leaving from the City of Hamilton, for a 20 minute trip, or from the Royal Naval Dockyard it is a 40 minute trip. Enter via Olive Bank drive.

Sherwin NATURE RESERVE

INCLUDING Warwick Pond



REPRESENTING FARMLAND, WOODLAND AND THE LARGEST FRESHWATER pond in Bermuda, this nature reserve is one of a chain of wetlands from Southampton to Smiths Parish.

Sherwin Nature Reserve represents one of the few tracts of natural inland water that has survived and not been used for landfill. In this densely developed residential area of Bermuda, the land provides valuable open space and woodland area as amenity space. The pond is an important sanctuary for bird life, not only for the resident wetland and forest birds but especially for the migratory shorebirds which use the mud flats as they pass through Bermuda in the early fall and a much wider diversity of migratory waterfowl including herons, ducks, coot and grebes which visit Bermuda from North America for the winter.

Prior to 1968, the area was subdivided into about 30 shares, allowing persons to live and vote in one parish yet also own land and so have the right to vote in another parish as well. After 1968, all of the lots were gradually purchased by Mr. Leon Graham Bento Powell and later offered to the Trust for purchase. The first part comprising 9.318 acres, including much of the pond and surrounding woodland was purchased by the Bermuda National Trust in 1987, thanks to a donation by Dennis Sherwin.

In 2007 the southern tract of woodland was purchased, this time as part of a campaign to protect green spaces across the island and to preserve the undeveloped open space.

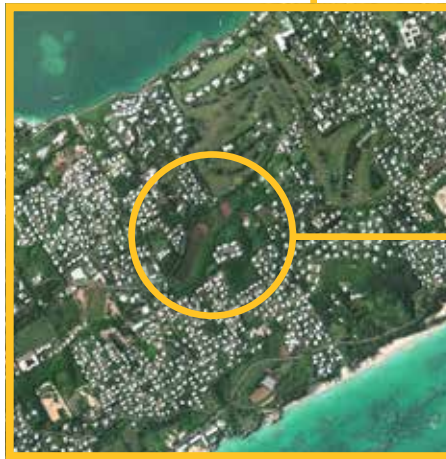
The conservation efforts of the Bermuda National Trust have transformed what was once thought to be a useless, mosquito-infested area into a now recognized Ramsar site because of its size, its importance to both resident and migratory waterfowl, and the fact that it is the only site in which the endemic **Bermuda Killifish** (*Fundulus bermudae*) has a freshwater-adapted population.



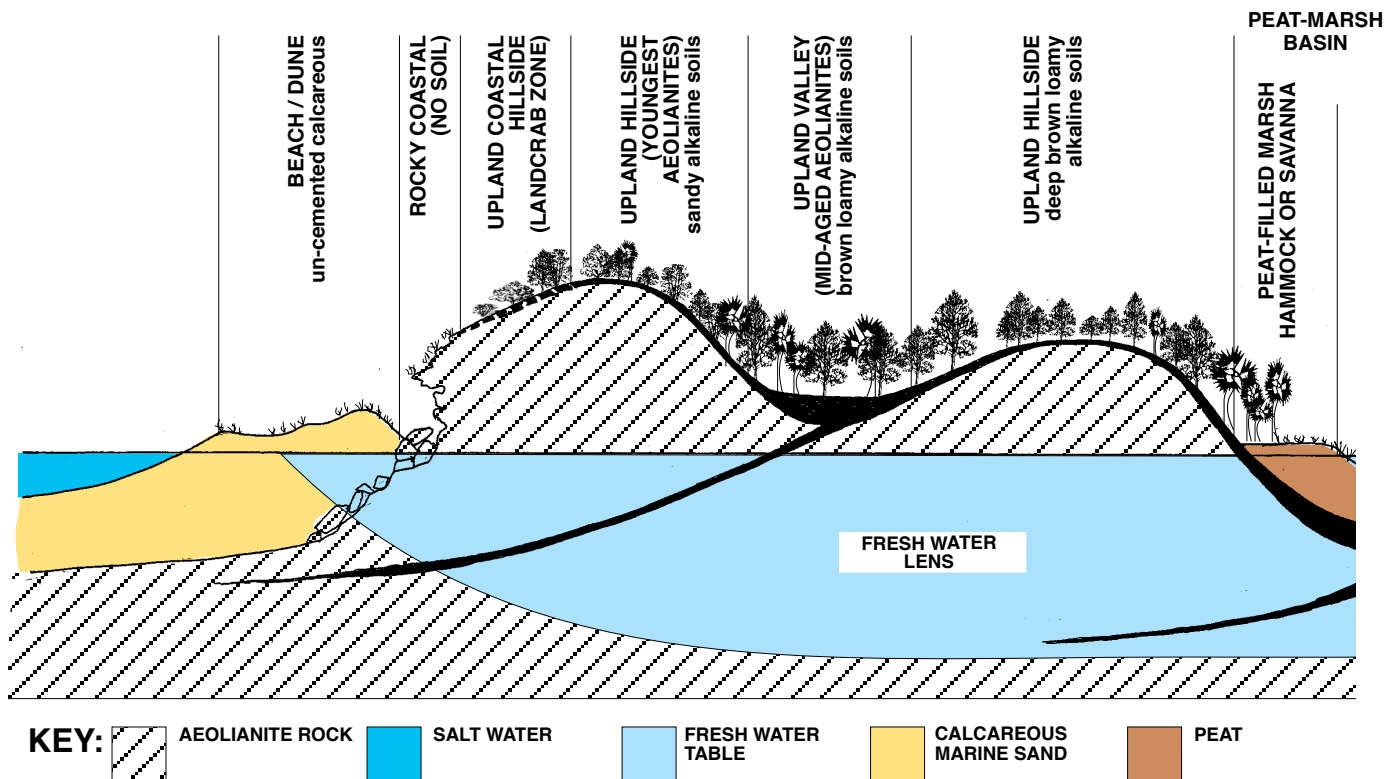
Sherwin Nature Reserve

Reserve Trail

The reserve can be explored by following the trail from either the entrance west of the car park, across from the agricultural land, or from the marked Railway trail. The trail provides a view of different habitats and various plant species. Allow between 1 and 2 hours to experience the area. Please remember that nature reserves are special areas – dogs should be kept on a leash and walkers are asked to keep to the trail to avoid disturbing wildlife.

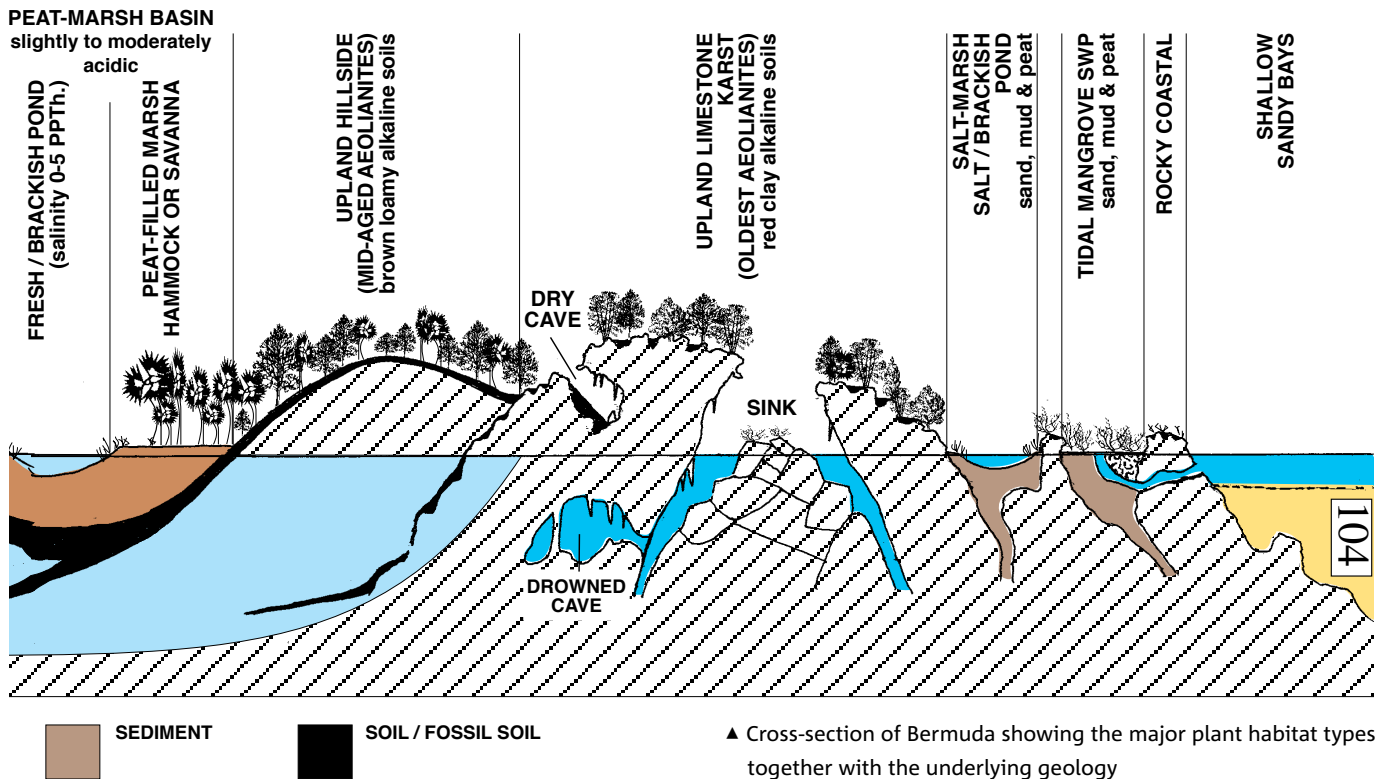


PHOTOS: © BERMUDA ZOOLOGICAL SOCIETY



Warwick Pond Formation

The pond lies in an inter-dune valley partly drowned by sea level rise, so that the fresh water table is now exposed above ground. Subsequent colonisation of the area with various marsh flora occurred, followed by the accumulation of dead plant remains over time. This resulted in a layer of peat which prevents mixing of fresh water with the salt water in the porous rock below. The presence of peat also increases the acidity of the water. Water level fluctuations occur predominantly as a result of rainfall and run-off from surrounding hillsides and from evaporation but also as a result of long term tidal fluctuations raising and lowering the water table. In the summer months, as evaporation increases, the water level decreases, exposing mud flats around the edges of the pond.



COURTESY OF BERMUDA ZOOLOGICAL SOCIETY AND DR. MARTIN THOMAS

Definition of Terms

NATIVE: A species which colonised Bermuda naturally without human help. Most arrived long before human settlement and are found in other countries too.

ENDEMIC: A native species which has been isolated in Bermuda long enough to have evolved into a unique species.

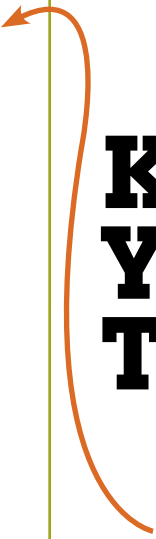
INTRODUCED: A species which is not found naturally in Bermuda, but has been brought here either accidentally or intentionally by humans.

INVASIVE: An introduced self-propagating species which has a tendency to spread rapidly, overwhelming the native and endemic species and/or causing economic damage

RESIDENT: A bird that nests in Bermuda and does not make seasonal journeys off-island

MIGRANT: A bird that makes regular seasonal journeys to Bermuda from elsewhere for the purpose of feeding or breeding

VAGRANT: A bird very rarely seen in Bermuda, probably blown off course



Know Your Terms

Abiotic Factors: are the nonliving factors in an ecosystem that affect the population growth of a species. Such factors include:

- Water (e.g. salinity, oxygen content, level, pollution)
- Soil (e.g. pH, humus content, moisture, depth)
- Sunlight (e.g. light intensity)
- Wind exposure
- Temperature

Biotic Factors: are the living components in an ecosystem. These include members from all five kingdoms – plants, animals, bacteria, fungi and protists. The members of an ecosystem live in dynamic interaction with each other and with their environment. Hence, one species may affect the population growth of another species through:

- Competition with other species
- Predation
- Grazing by herbivores
- Food supply
- Population density
- Symbiotic relationships (e.g. where several organisms depend on each other)
 - Symbiotic relationships include:
 - Mutualism:** in which each organism benefits
 - Parasitism:** in which one organism benefits and the other is generally harmed
 - Commensalism:** in which one organism benefits whilst causing little or no harm to the other

Appreciating Our Open Spaces

In order to appreciate and take care of our open space, we need to understand what space is available, how it is being used, why it is important to maintain open space and what threats impact the environment.

Land usage in Bermuda as of 2008

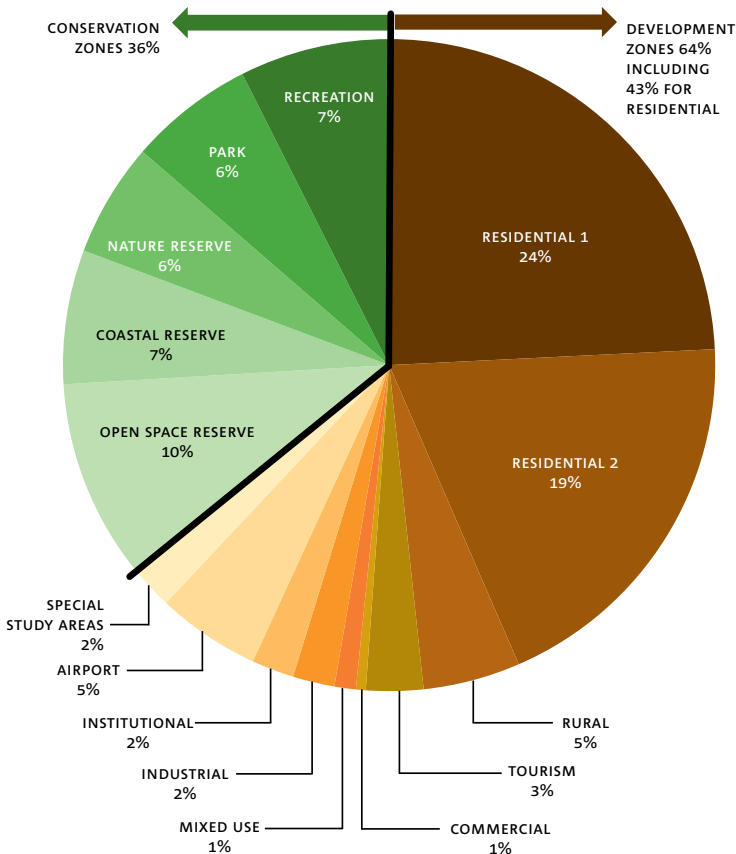
The chart below shows a breakdown of how Bermuda's land is used.

Conservation Zones totalled = 36%

- 10% Open space reserve
- 6% Parks
- 7% Reserves - coastal
- 6% Reserves - nature
- 7% Recreation

Development Zones totalled = 64%

- | | |
|------------------|--------------------|
| 5% Airport | 5% Rural |
| 1% Commercial | 2% Special studies |
| 2% Industrial | 1% Mixed use |
| 2% Institutional | 3% Tourism |
| 43% Residential | |



Open Space is Important Because

- Natural beauty attracts visitors and encourages tourism
- It provides recreational areas such as sports and playgrounds
- As amenity space, it enhances our psychological well-being
- It maintains our unique biodiversity

Threats to Terrestrial Habitats

The key threats to terrestrial habitats in Bermuda are:

- Domination of existing open space by invasive species
- Loss of open space through development

The reasons for development include:

- Economic growth
- Housing
- Other individual requests – pools, large houses, upscale condos, driveways

Other threats to the environment include:

- Pollution
- Littering
- Vandalism
- Natural causes such as erosion and storm damage

It is every citizen's responsibility to protect the natural environment wherever we are in the world so that future generations will have clean air to breathe, unpolluted and abundant food, and water and energy sources

Sources: The Bermuda Zoological Society and the Bermuda Aquarium, Museum and Zoo, *Bermuda Biodiversity Country Study*, Bermuda, 2001, Bermuda Department of Planning – Forward Planning Branch, 2008

Habitats of The Sherwin Nature Reserve

The Pond

The pond originated from rainwater accumulation in a valley, where the fresh water table was exposed above ground. Subsequent colonisation of the area with various marsh flora occurred followed by the build up of dead plant remains over time. This resulted in a layer of peat which increased the acidity of the water. Water level fluctuations occur predominantly as a result of rainfall and run-off from surrounding hillsides and from evaporation but also as a result of long term tidal fluctuations raising and lowering the water table. In the summer months, as evaporation increases, the water level decreases exposing more of the mud flats around the edges of the pond.

The pond itself is still thought to be home to the only endemic fish of Bermuda's ponds, the **Bermuda Killifish** (*Fundulus bermudae*). It is only found in a limited number of ponds across the island. Killifish are able to live in either fresh or salt water, known as 'euryhaline.' They feed on small invertebrates, plant material, and sediment from the pond. The male and female are quite different visually, with the larger female being a darker olive colour, and the smaller male a bright colour. Due to the threats of loss of habitat, predation, competition pressures and pollution, their population decline is of concern.

Introduced in 1928 for mosquito larval control, and now abundantly naturalised, the **Eastern Mosquito Fish** (*Gambusia holbrooki*) are a key link in the food chain and are eaten by herons, kingfishers, and other waterfowl. Damselflies and dragonflies are usually present and conspicuous on pond edges. The **Red-eared Slider** (*Trachemys scripta elegans*) has either escaped or been introduced and is quite common in the pond as well.



Killifish
Fundulus bermudae

ENDEMIC



Eastern Mosquito Fish
Gambusia holbrooki

INTRODUCED



Red-eared Slider
Trachemys scripta elegans

INTRODUCED
INVASIVE

The Marsh Wetland

The area surrounding the pond is a marshy wetland, and so is dominated by grasses and sedges. Distinct zones of flora can be observed in the north east corner surrounding the pond. The **Giant Fern** (*Acrostichum danaeifolium*), is found on the southern edge between the Cattails and the forest. This large fern is easy to spot since the huge fronds tower to at least 2.5 m (8 ft) high. The **Cattail** (*Typha angustifolia*) is easily distinguished by its height and flower stalk. **Sheathed Paspalum Grass** (*Paspalum vaginatum*) forms an extensive community next to the water; this area is subject to periodic flooding. **Para Grass** (*Panicum barbinodes*) the taller grass behind the **Paspalum** is found on drier ground and the agricultural field is subject to human influence of periodic flooding. The fauna associated with this grassy area may include a number of invertebrates: roaches, ants, butterflies, and dragonflies. The most common vertebrate may be the **Giant Cane** or **Marine Toad** (*Bufo marinus*), but rodents and lizards may also be seen. Birds include mourning doves, ground doves, starlings and sparrows all year round.



Giant Fern **NATIVE**
Acrostichum danaeifolium



Cattail or Lesser Bulrush **NATIVE**
Typha angustifolia



Sheathed Paspalum Grass **NATIVE**
Paspalum vaginatum



Marine/Cane Toad **INTRODUCED**
Bufo marinus

Mud Flats

The mud flat at the north end of Warwick Pond forms only in summer and early fall when high evaporation rates lower the water level of the pond. It is rich in nutrients, tiny crustaceans, insect larvae and worms that allow migratory shore birds to refuel rapidly and safely. The only resident species of water bird on Warwick Pond are the **Mallard** (*Anas platyrhynchos*) and the **Common Gallinule** (*Gallinula galeata*), a chicken-like rail with red on its beak. Migratory birds using the pond and its shores for refueling include:

Shorebirds sandpipers & plovers



Black-necked stilt **MIGRANT**
Himantopus mexicanus



Solitary Sandpiper **MIGRANT**
Tringa solitaria



Stilt Sandpiper **MIGRANT**
Calidris himantopus



Semipalmated Sandpiper **MIGRANT**
Calidris pusilla



Least Sandpiper **MIGRANT**
Calidris minutilla



Spotted Sandpiper **MIGRANT**
Actitis macularia



10-11" TALL

Lesser Yellowlegs **MIGRANT**
Tringa flavipes



Short-billed Dowitcher **MIGRANT**
Limnodromus griseus



MIGRANT

Semipalmated Plover
Charadrius semipalmatus



14" TALL

Greater Yellowlegs **MIGRANT**
Tringa melanoleuca



Pectoral Sandpiper **MIGRANT**
Calidris melanotos

Waterfowl ducks, grebes, rails & herons



Pied-billed Grebe **RESIDENT**
Podilymbus podiceps



American Coot **MIGRANT**
Fulica americana



Blue-winged Teal **MIGRANT**
Anas discors



Snowy Egret **MIGRANT**
Egretta thula



American Bittern **MIGRANT**
Botaurus lentiginosus



Mallard **RESIDENT**
Anas platyrhynchos



Lesser Scaup **MIGRANT**
Aythya affinis



Ring-necked Duck **MIGRANT**
Aythya collaris



Belted Kingfisher **MIGRANT**
Megaceryle alcyon



Great Egret **MIGRANT**
Ardea albus



Sora **MIGRANT**
Porzana carolina



Green-winged Teal **MIGRANT**
Anas carolinensis



Green Heron **RESIDENT**
Butorides virescens



Little Blue Heron **MIGRANT**
Egretta caerulea



Common Gallinule **MIGRANT**
Gallinule galeata

The Forest

Prior to human settlement, Bermuda was forested exclusively with native and endemic flora. Following colonisation, the native flora has been gradually overwhelmed by introduced and invasive species, which now comprise 95% of the vegetative cover of Bermuda. The original forest no longer exists. Nonetheless, pockets of the original forest flora and fauna can be seen in a few restricted areas.

Forests are examples of stratified ecosystems comprised of:

- A canopy – uppermost layer of leaves and branches where the bulk of photosynthesis takes place
- The understorey – shrubs, the density of which is dependent on the light through the canopy
- The herb layer – fungi, mosses, ferns and seedlings as well as a variety of invertebrates
- The soil layer – rich in roots and fungal threads, burrowing insects and worms

History of Upland Forest

Very little is known about the composition of the first forests in Bermuda. They were likely to have developed under different climatic conditions than experienced today. The trees of upland forests left little fossil remains, except perhaps the pollen deposited in swamps and ponds and preserved in sediments. Unfortunately, little of this ‘pollen record’ has been investigated to date. Looking back to records of the first explorers and settlers shows very little detail. What is known is that with the arrival of man the forests went into a rapid decline. There were several reasons for this.

Pigs released by early new world explorers on many of the larger islands rooted through the forests for food, disrupting natural regeneration and decimating the ground layer of delicate herbs, ferns and mosses. Rats from vessels also invaded most of the islands and started eating the seeds of forest species. Man contributed to the decline by clearing and burning for agriculture and harvesting several useful tree species for timber and later cutting huge areas of forest for housing, ship building and business.

Ornamental gardens were planted and a further destructive series of changes happened; purposely introduced species competed with native ones, plants accidentally brought in introduced insect pests and diseases to which native trees were susceptible.

The end result of all this is that out of all the natural habitats in Bermuda, the upland forest is the most changed. Little remains of the original forest and there are only scattered remnants that are richer in the original species than others. Not surprisingly, these remnants are in difficult terrain or on islands where pigs and rats did not become established.

Some of the original trees reaching Bermuda evolved into distinct new species after they started to grow and reproduce here; these are the endemic species that occur naturally nowhere else but Bermuda. Two examples are the Bermuda Cedar and the Bermuda Palmetto. There is little doubt that these two trees dominated the original forest. Both were useful to man and their presence was therefore well documented. Another tree, the Bermuda Olivewood also evolved in the Bermudian forests. This tree was probably never dominant in any forest but scattered among the cedars, palmettos and native trees; its bark was used for tanning by early settlers. As the forest became established, a unique new habitat was created under the trees and other species evolved in this damp, stable environment. Examples of these are the **Bermuda Sedge** (*Carex bermudiana*), the moss **Bermuda Trichostoma** (*Trichostomum bermudanum*), the **Bermuda Maidenhair Fern** (*Adiantum bellum*) and the shrub **Bermuda Snowberry** (*Chiococca alba*).

Native species are those that arrived in Bermuda by natural means but remain essentially identical to their forbearers elsewhere. Thus they arrived by the same means as the endemics – by the ocean, wind, or transported on bodies of or in the intestines of migrating or windborne flying creatures. The difference from native species is that they did not evolve into a new species. Several native species important in the original forest never form large trees and are usually classified as shrubs. These are **Forestiera** (*Forestiera segregata*), **White Stopper** (*Eugenia axillaris*) and **Jamaica Dogwood** (*Dodonaea viscosa*). These shrubs grow up to 7m or 20ft in height and probably formed what is called the understory, growing beneath the canopy of the larger trees. There is also poison ivy in the reserve – this too is a native species (sadly!)



Bermuda Sedge NATIVE
Carex bermudiana



Maidenhair Fern ENDEMIC
Adiantum bellum



Bermuda Snowberry ENDEMIC
Chiococca alba



Forestiera NATIVE
Forestiera segregata



White Stopper NATIVE
Eugenia axillaris



Jamaica Dogwood NATIVE
Dodonaea viscosa

Animal & Plant Life of the Forests

The animals and plants of the Bermuda forests, commonly termed the ‘forest biota’, are made up of a wide variety of ecological groups. Some are typical forest species that live nowhere else. Others are from a broader ecological group of organisms which are found in a variety of habitats but can tolerate forest conditions. This latter group can be expected to frequent forest edges rather than the deep recesses of woodland. Quite a few of the animals are not by any means permanent forest dwellers but move in and out seasonally, in migration or when certain food sources become available. Some birds use forest habitat as protected nesting sites, but feed elsewhere. The forest is a highly structured system that has habitats within it that are extremely stable.

Predominant Flora

Introduced, Invasive & Endemic Trees

The predominant trees in the forest at the Sherwin Nature Reserve are the **Allspice** (*Pimenta dioica*) and **Chinese Fan Palm** (*Livistona chinensis*), although many **Brazil Pepper** trees (*Schinus terebinthifolius*) line the eastern edge of the pond. All of these are invasive, dominating the landscapes on which they grow. While forest birds eat the berries of the Brazil Pepper and hence propagate them across the island, the fruit of the Allspice can be collected in the fall and ground to form a flavouring used in cooking. At one time the straight woody stems of the sapling Allspice were used to make fishpots in Bermuda, because the wood did not float when saturated with salt water. The two endemic trees of Bermuda, the **Bermuda Cedar** (*Juniperus bermudiana*) and the **Bermuda Olivewood** (*Cassine laneana*), and the endemic palm, the **Bermuda Palmetto** (*Sabal bermudana*), are also seen in the forest at Sherwin Nature Reserve.



Allspice
Pimenta dioica **INTRODUCED**



Chinese Fan Palm
Livistona chinensis **INVASIVE**



Brazil Pepper
Schinus terebinthifolius **INVASIVE**



Olivewood
Cassine laneana **ENDEMIC**



Bermuda Cedar
Juniperus bermudiana **ENDEMIC**



Palmetto
Sabal bermudana **ENDEMIC**

Other Flora



Japanese Pittosporum
Pittosporum undulatum **INVASIVE**



Indian Laurel
Ficus microcarpa **INVASIVE**



Fiddlewood
Citharexylum spinosum **INTRODUCED**

Fruit Trees



Loquat
Eriobotrya japonica **INTRODUCED**



Surinam Cherry
Eugenia uniflora **INTRODUCED INVASIVE**



Paw-paw
Carica papaya **INTRODUCED**

Sedges/Grasses on the Pond Edge



Great American Bullrush
Schoenoplectus validus **NATIVE**



Cattail
Acrostichum danaeifolium **NATIVE**



Sheathed Paspalum Grass
Paspalum vaginatum **NATIVE**

Low Growers in the Forest



Bermuda Sedge
Carex bermudiana **NATIVE**



Morning Glory
Ipomoea indica **INTRODUCED INVASIVE**



Rouge Plant or Blood Berry
Rivina humilis **INTRODUCED**



Poison Ivy
Rhus radicans **NATIVE**



Shrubby Fleabane
Pluchea odorata **NATIVE**



Doc Bush
Baccharis glomeruliflora **NATIVE**

Fern & Fern-like



Holly Fern
Cyrtomium falcatum

INTRODUCED



Long-leaved Brake
Pteris longifolia

INTRODUCED



Asparagus Fern
Asparagus setaceus

INTRODUCED

Forest Fauna

In the canopy and sub-canopy, climbing insects and spiders are found. The giant native **Golden Orbweaver** (*Nephila clavipes*), also named **Golden Silk Spider** or **Hurricane Spider** becomes common in summer weaving its strong yellow webs high between tree branches. This is the largest spider found in Bermuda and can reach 6 inches across, including the legs. The **Crab Spider** or **Spiny-Backed Orbweaver** (*Gasteracantha cancriformis*) makes webs low across pathways which can tangle in the hair of unwary path users. A number of smaller birds feed in the forest canopy or forest floor. The forest floor itself is home to a variety of invertebrates including: Centipedes, Millipedes, Pill-bugs (Rolly Polly), snails, termites, roaches, flies, ants, and beetles.



Crab Spider
Gasteracantha cancriformis

INTRODUCED



Crab Spiderweb



Golden Silk Spider
Nephila clavipes

NATIVE

Resident Woodland Birds



Grey Catbird **RESIDENT**
Dumetella carolinensis



Northern Cardinal **RESIDENT**
Cardinalis cardinalis



Bermuda White-Eyed Vireo
Vireo griseus bermudianus
ENDEMIC

Migratory Birds Frequenting the Woodland



Black and White Warbler
Mniotilta varia **MIGRANT**



North American Wood Warbler
Phylloscopus sibilatrix **MIGRANT**



Ovenbird **MIGRANT**
Seiurus aurocapilla



Northern Parula **MIGRANT**
Setophaga americana



American Redstart **MIGRANT**
Setophaga ruticilla



Barn Swallow **MIGRANT**
Hirundo rustica

Management Goals for Sherwin Nature Reserve

Pond Management

Ecosystems change over time and ponds are no exception. As eutrophication continues, peat accumulates filling in the pond. The grasses bordering the edge encroach further and further over time and if left to the natural process of succession, would eventually cover the pond. Thus pond management is critical to maintaining the current diversity of habitats. One long-term possibility is to pump sediment from the south end of the pond, putting it on the agricultural field on the north side. This would raise the land in the field, retain the mud flat for the migratory shorebirds at the northern end, and deepen the southern end of the pond. Preserving this last feature is important because Warwick Pond is subject to drying up over the course of a hot dry summer resulting in the death of the endemic fish within.

The Warwick Pond Killifish are genetically distinct enough that they should be kept isolated until genetic studies are completed. As part of the management plan Warwick Pond Killifish were translocated to a pond at WindReach and overseas to the Vienna Zoo, where they are being bred successfully. Four hundred were introduced into Seymour Pond in 2011 and that population mushroomed to 10,000 in 2012. It is possible that Killifish no longer exist in Warwick Pond.

Pond Pollution

Warwick Pond is very contaminated with metals and petroleum hydrocarbons in its sediments which have detrimental effects on the environment and our biodiversity. Recent studies have shown that the PAHs (polyaromatic hydrocarbons) cause endocrine disruptions while metals suppress immune function in animals and humans.

An expert in the US has said that used motor oil is a prevalent source of PAHs in our ponds, which is not surprising considering the cultural habit of pouring used motor oil on the ground. We have only been recycling motor oil since 1991. We also know that atmospheric deposition and road run-off contribute to all of the metals and hydrocarbons that have been identified in the ponds.

Woodland Management and Native Flora Restoration

The long-term goal of the Bermuda National Trust for this reserve is to employ woodland management in order to restore the woodland to a more diverse and native-dominated forest by selective culling and replanting. Clearings within the dominant allspice woodland are intended to favour adult cedars by creating sunny openings. Subsequently, the planting of other endemics and natives such as the Bermuda Palmetto, Bermuda Olivewood, Southern Hackberry and Wax Myrtle and Bermuda Snowberry will also be encouraged. The end result: a more diverse and healthier forest, favouring diversity of fauna as well.

Source: Dr. Jamie Bacon, 2012

Glossary

Abiotic Factors: the nonliving factors in an ecosystem that affect the population growth of a species. Such factors include: pH, moisture, depth of soil, water level, humus content, light intensity, and wind exposure

Accumulation: to gather or pile up, especially little by little.

Biodiversity: the number of different species present at a location

Biotic Factors: the living factors in an ecosystem that affect the population growth of a species. Such factors include: competition with other species, predation, grazing by herbivores, food supply, population density, and disease

Carnivore: an animal that eats other animals

Climate change: the long-term change in the earth's climate, especially a change due to an increase in the average atmospheric temperature; usually referred to as a consequence of human impacts

Colonise: the spreading of a species into new areas

Development: the act or process of growing or progressing

Dominate: to rule or take over, to control

Ecology: the external surroundings in which a plant or animal lives which tend to influence its development and behaviour

Ecosystem: a system involving the interactions between a community and its non-living environment

Endemic: a native species which has been isolated long enough to have evolved into a unique species

Eutrophication: an abundant accumulation of nutrients that support dense growth of algae and other organisms, the decay of which depletes the shallow waters of oxygen in summer

Evaporation: the act of changing from a liquid state into vapor.

Evolve: to develop gradually

Herbivore: an animal that feeds only or mainly on grass and other plants

Introduced: a species which is not found naturally in Bermuda, but has been brought here either accidentally or intentionally by humans

Invasive: an introduced self-propagating species which has a tendency to spread rapidly, overwhelming the native and endemic species and/or causing economic damage

Invertebrates: an animal that does not have a backbone, e.g. an insect or worm

Migration: going from one country, region, or place to another

Monocultures: in forestry, monoculture refers to the existence of one species of tree

Native: a species which colonised Bermuda naturally without human help. Most arrived long before human settlement and are found in other countries too

Peat: a compacted deposit of partially decomposed organic debris, usually saturated with water

Preserve: to keep alive or in existence; make lasting

Sanctuary: a sheltered place, or sometimes facility, where animals can live protected, able to maintain comfortable conditions; a safe haven

Succession: the series of changes that create a full-fledged plant and animal community, e.g. from the colonisation of bare rock to the establishment of a forest

Threat: an indication of warning or probable trouble

Translocated: to move somebody or something from one place or position to another

Vertebrates: an animal with a segmented spinal column and a well-developed brain, e.g. a mammal, bird, reptile, amphibian, or fish

Wetland: land that has a wet and spongy soil

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- For more information on educational tours and activities see the full Teacher Resource Guide at www.bnt.bm