

Somerset

LONG BAY EAST

NATURE RESERVE



TEACHER RESOURCE GUIDE



ACKNOWLEDGEMENTS

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To protect and promote Bermuda's unique natural and cultural heritage for everyone, forever

Learning with the Bermuda National Trust Education Programme

The Bermuda National Trust's teacher resources focus on nature reserves and historic homes owned and maintained by the Trust, offering comprehensive resources and creative learning experiences for visitors, teachers and students. We provide first-hand experiences that cannot be re-created in the classroom. Guided tours can be scheduled with a member of our education staff for preschool, primary, middle and senior level classes.

It is our hope that students will visit all the Trust properties, beginning at preschool or primary 1 - 2, and experience repeated visits throughout later primary, middle and senior years. Repeat visits help students build on their prior learning and develop a deeper understanding of the concepts and terms associated with each site. Senior students are encouraged to visit each site to learn about the care and preservation of nature reserves and historical homes. Opportunities are available for senior students to participate in our AIM Programme, allowing them to volunteer their time caring for Trust properties, which can be applied to required community service hours.

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Arranging a Class Trip/Teacher Resources

>Note to Teachers

Our goal is to make a visit to Somerset Long Bay East Nature Reserve valuable and meaningful to children and to stimulate a lifelong interest in the environment, their surroundings and some of the features that make Bermuda so unique. This resource was created to provide background information on the reserve along with suggested activities that you can conduct with your students before your class visit to the reserve and afterwards, to enhance your students' learning experience and help you achieve your curriculum goals.

There are a few options to support you before and after the field trip:

Teacher workshop

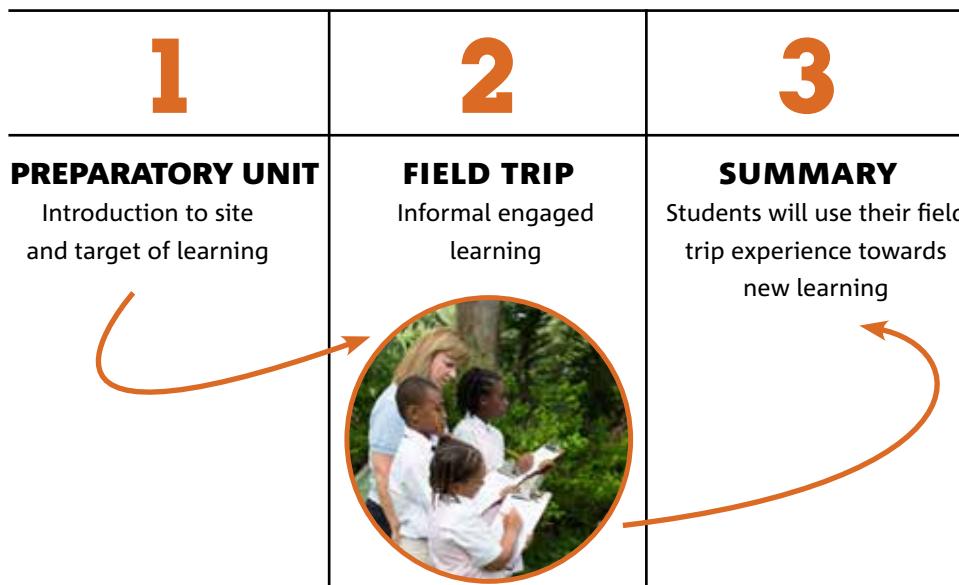
We can provide a "group teacher workshop" in our AXIS Education Classroom prior to a field trip with your students. A minimum of 10 teachers is required, maximum group size is 15. The time allotted for the workshop is 1.5 - 2 hours.

The overall focus of the workshop is to:

- Obtain a copy of the Somerset Long Bay East Nature Reserve resource booklet
- Review the history of the reserve, resources and suggested activities
- Obtain materials to create a map of Bermuda and labels to show the location of the Bermuda National Trust properties and other local landmarks, which can be used in your classroom introductory lesson before taking the class tour
- Network with other teachers to brainstorm ideas for additional activities that can be offered to promote student learning before and after the class tour

Three-Part Learning Experience

We offer a three-part learning experience. After booking a field trip, a Bermuda National Trust educator can provide an introductory lesson for your students in your classroom, providing information about the site. This is an excellent preparation for the field trip which builds on students' prior knowledge and is helpful for engaged learning during the field trip. After the site visit a follow-up lesson can also be scheduled. Students will be guided in a review of their field trip and summarise their new knowledge.



Follow-up Visit

Teachers are welcome to schedule a follow-up visit for their class at our AXIS Education Classroom at our Waterville site after the tour, preferably within two to three weeks. The goal is to review what students learned about the nature reserve and for them to share/ highlight the work they have completed. The time allotted for this student follow-up visit at Waterville is approximately 1.5 hours.

Tips for Using This Resource

Reading through the background information will assist teachers in answering the more probing questions from inquisitive students, and help create additional activities that extend the learning associated with Somerset Long Bay East Nature Reserve.

The Somerset Long Bay East Nature Reserve resource booklet and map of Bermuda are also available to download from our website.

The activities provided focus on the Cambridge International Curriculum Key Stages 1 and 2, Primary Stages 1-6 and Secondary 1, Middle Stages 7 and 9. Curriculum links to activities are provided for integrating the Bermuda Ministry of Education's Science and Social Studies. While looking through the activities provided, teachers may also think of ways to integrate other subjects. The teacher's method of preparation and delivery will vary with students' needs and interests.

We continue to seek ways to improve our educational programmes and welcome suggestions for enhancing this resource and the experience for the children. Please contact us with any suggestions or comments.

Enjoy yourselves,
The Education Team
Bermuda National Trust

education@bnt.bm
236-6483

* Scheduling a field trip to Somerset Long Bay East Nature Reserve

To schedule a trip to Somerset Long Bay East Nature Reserve download and complete a school field trip booking form on our website, www.bnt.bm (found under the school tours heading) or copy the form in the back of this book. Return the form via email to: education@bnt.bm.

The ratio of guided tours is one adult for every ten children. Additional adults are welcome.

Ensuring a Safe and Enjoyable Visit

Before teachers come with their students they should be aware that the path through the reserve is rugged and individuals with physical limitations will need assistance. To ensure that students and adults have an enjoyable experience in the reserve, it is essential for teachers to:

- Assume responsibility for the safety, behaviour, support and welfare of students. Students will need to be supervised at all times
- Ensure that students are prepared with appropriate clothing and walking shoes
- Prepare and carry a register to include the names of all students with emergency and medical information
- Ensure that each student has a completed Trust parent/guardian consent form to attend the tour, which includes our photo release policy. This form is included in the appendix. Teachers need to notify the Trust staff member leading the tour of any students who do not have prior consent to be photographed
- Provide information for the Bermuda National Trust staff member about relevant student learning needs, behavioural support, allergies or health
- Bring a first aid kit and a cell phone to be used in the event of an emergency
- Teachers and other adults are to refrain from using cell phones and texting during the tour
- We ask that teachers support students in their learning before, during the tour and after their visit

Before the Tour, Setting the Stage for Student Learning

After booking the tour, teachers are encouraged to review the information that follows:

- The history of Somerset Long Bay East Nature Reserve and map showing the location of the reserve
- The definitions of key terms relating to plant and animal life
- The birds that inhabit the reserve and those classified as waders, water birds, shorebirds and land birds

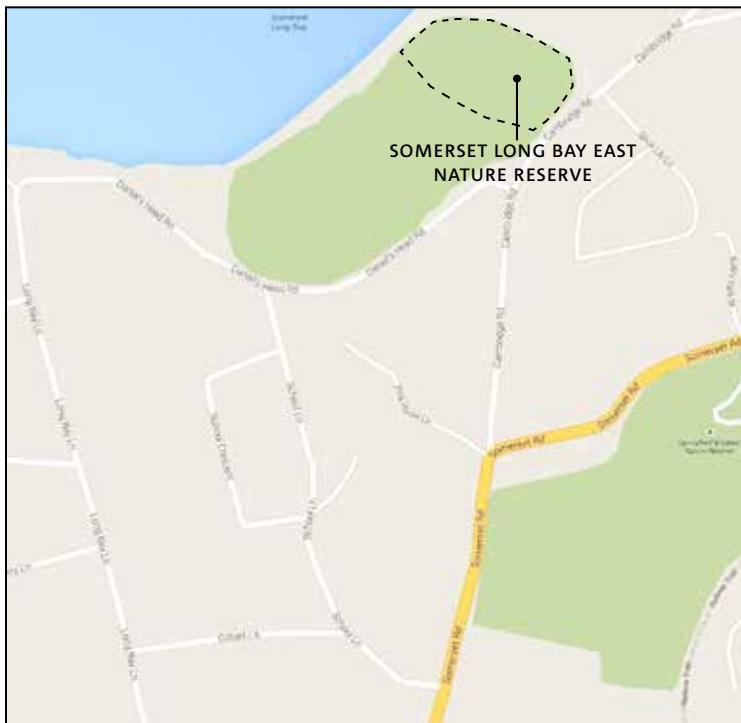
In preparation for the tour, initial classroom activities are provided to assist students to recall their prior knowledge of nature reserves and open spaces and acquire specific information about Somerset Long Bay East Nature Reserve. The scope of students' learning will depend on the grade level, their prior exposure to reserves, background knowledge and understanding of terms. Although the activities provided begin at the lower primary level, teachers of older students can modify the activities for the grade and developmental level of their students' abilities. We hope that teachers will generate new ideas for creating additional activities and share them with our education staff.

Provide students with the following information:

- The significance of Somerset Long Bay East Nature Reserve
- There are several habitats in this nature reserve including the pond, the young woodland and the beach/dune habitat. These represent a diversity of plant and animal life
- Somerset Long Bay is an important sanctuary for resident wetland birds, migratory shore birds and the endemic Bermuda White-eyed Vireo, or Chick-of-the-village
- Nature reserves are important for our health and well-being
- The meaning of the terms native, endemic, introduced and invasive (see definition of terms)
- Ways that we can take care of nature reserves such as keep the areas free of trash, leave the walking paths, trees, plants and flowers and the overall area as you found them
- Whether you are visiting as a student, teacher or with family or friends, it is important to be respectful of this beautiful public space

Bermuda National Trust STEWARDSHIP PROPERTIES

- NATURE RESERVES
- HISTORIC PROPERTIES
- HISTORIC CEMETERIES



Directions

This map shows the location of Somerset Long Bay East Nature Reserve. There are two entrances to the reserve which is located on Daniel's Head Road as it connects with Cambridge Road in Somerset. One entrance is located within Somerset Long Bay Park; coming from the parking lot and walking towards the beach, an entrance is located on the right side of the park. Another entrance is directly off of Cambridge Road. Signs for the reserve are posted at each

Somerset Long Bay EAST NATURE RESERVE



THE SOMERSET LONG BAY AREA WAS ORIGINALLY A TEN-ACRE MARSH and mangrove forest protected by a sand bar beach. An 1899 map shows that an extensive swampy area extended to the eastern side of Daniel's Head Road deep into Somerset. It would have periodically flooded with seawater in winter storms and hurricanes.

In the 1930s and '40s the Government initiated a policy of filling in the marshes for mosquito control by using them as public dumpsites. This continued until the 1950s, by which time most of the marshland had become a wasteland of bottles covered by heaps of debris.

The 1960s saw the growth of tourism and the need for more public beaches. Government acquired the central three acres from the Astwood family in 1968 for a public beach park, and a few years later the Bermuda Audubon Society purchased the western three acres from F.W. Yearwood and restored it to a functioning wetland and pond.

In the 1980s Joffre Pitman, a Somerset resident and conservationist, purchased the eastern three acres and set out to replicate the Audubon's reserve, excavating a pond and contouring the old fill areas.

In 2004 this property, like so much of Bermuda's dwindling open space, was earmarked for development. (Sadly, it is a fact that over 1,200 acres of open space have been built on over the last 30 years.) Fortunately, thanks to determined public action, this site has now been saved and preserved forever.

The Audubon Society and the Bermuda National Trust – the only two charitable bodies with legal powers to hold land in trust as nature reserves – pooled resources and launched the "Buy Back Bermuda" campaign and through contributions from almost 500 people raised the \$1.7 million needed to purchase, enhance and maintain the land.

Today, with approximately 30% of Bermuda's land mass (1,293 acres) protected as National Parks or nature reserves, the opening of this reserve to public access is a significant gift to the people of Bermuda, and helps to preserve the island's natural heritage and biodiversity while enhancing the charm of Somerset Long Bay.

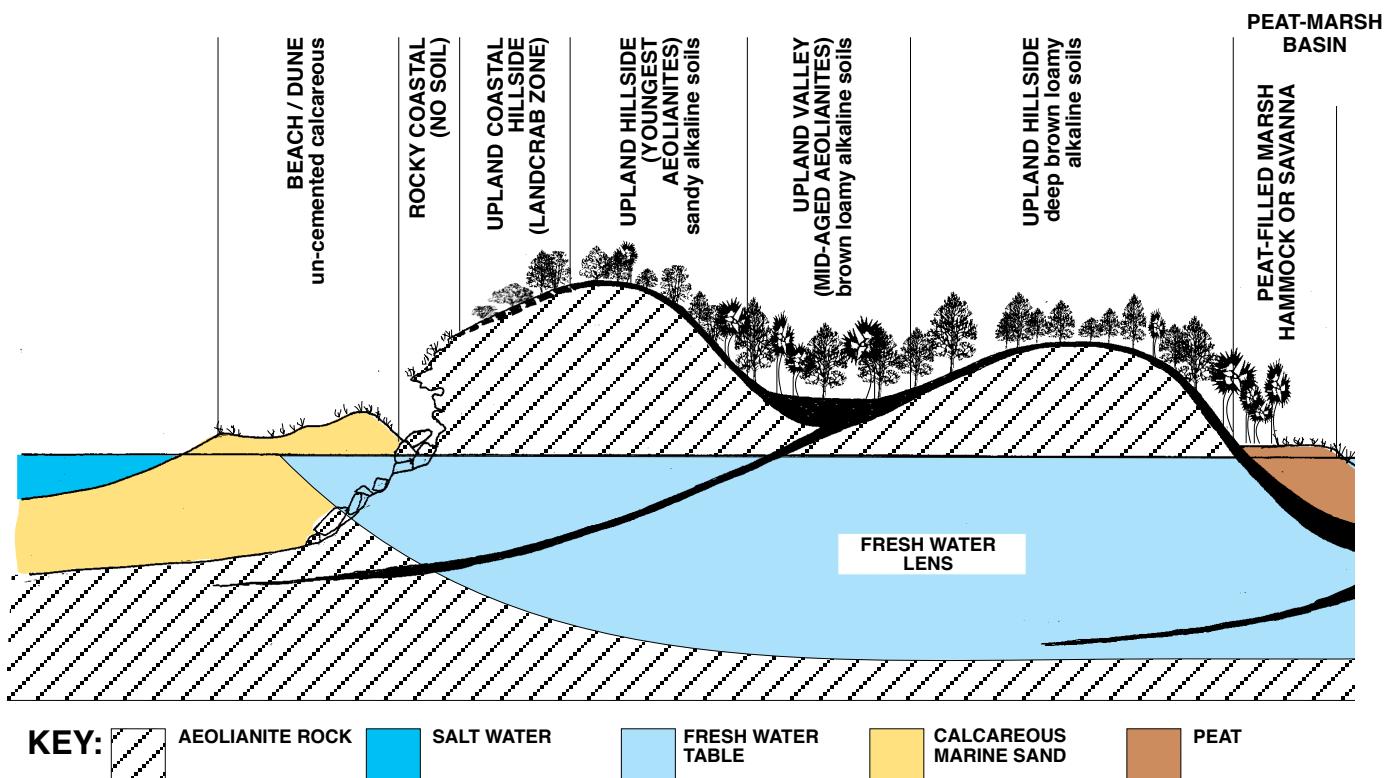


Somerset Long Bay



The aerial view on the far right shows three parcels of land which make up nearly 10 acres of protected open space. Somerset Long Bay West is owned by the Bermuda Audubon Society, the central National Park is owned by Government and Somerset Long Bay East is jointly owned by the Bermuda Audubon Society and the Bermuda National Trust.

TOP PHOTO: © BERMUDA ZOOLOGICAL SOCIETY
BOTTOM PHOTOS: COURTESY OF THE MINISTRY OF WORKS & ENGINEERING, SURVEY SECTION



The Importance of this Reserve

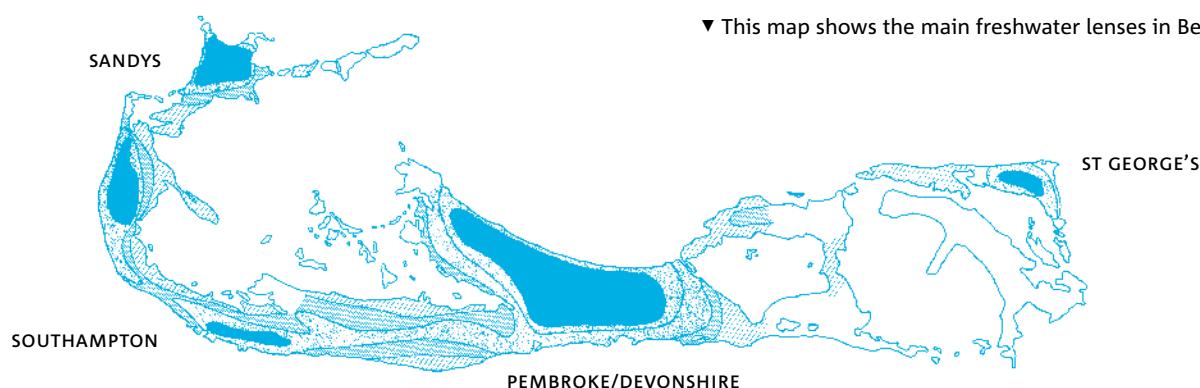
Somerset Long Bay East Nature Reserve is a very valuable part of Bermuda's natural heritage.

1. The reserve provides valuable open amenity space for the health and well-being of the local community. Studies have shown that people who regularly interact with nature show lower stress levels, are less violent and heal faster from illness.

2. A unique feature of the pond in the reserve is that it lies within the area of the Somerset freshwater lens, and so, despite proximity to the sea, it supports an essentially freshwater pond community, including resident and migratory water birds.

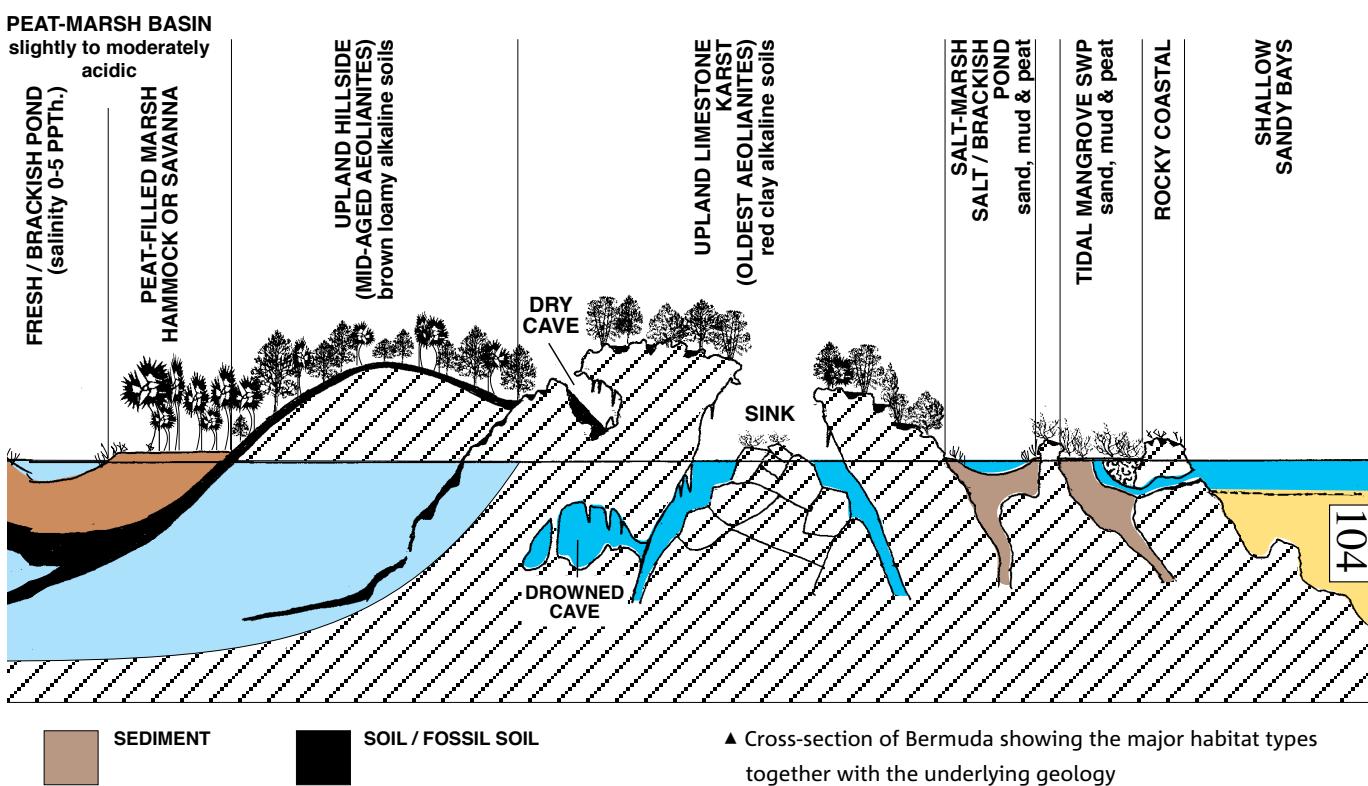
3. Another feature is that there are now small nesting islands in the pond which have been colonised by five species of breeding waterfowl – a record for Bermuda marshes and ponds.

4. As the pond is near the extreme northwestern tip of Bermuda it is an important first landing site for migratory birds searching for freshwater. Many unusual sightings have been made including a Whistling Swan and a Siberian Flycatcher.



▼ This map shows the main freshwater lenses in Bermuda

MAP FROM THE VACHER REPORT, COURTESY OF BERMUDA WATERWORKS LTD



▲ Cross-section of Bermuda showing the major habitat types together with the underlying geology

COURTESY OF BERMUDA ZOOLOGICAL SOCIETY AND 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

Abiotic Factors: are the non-living 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

Disease

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

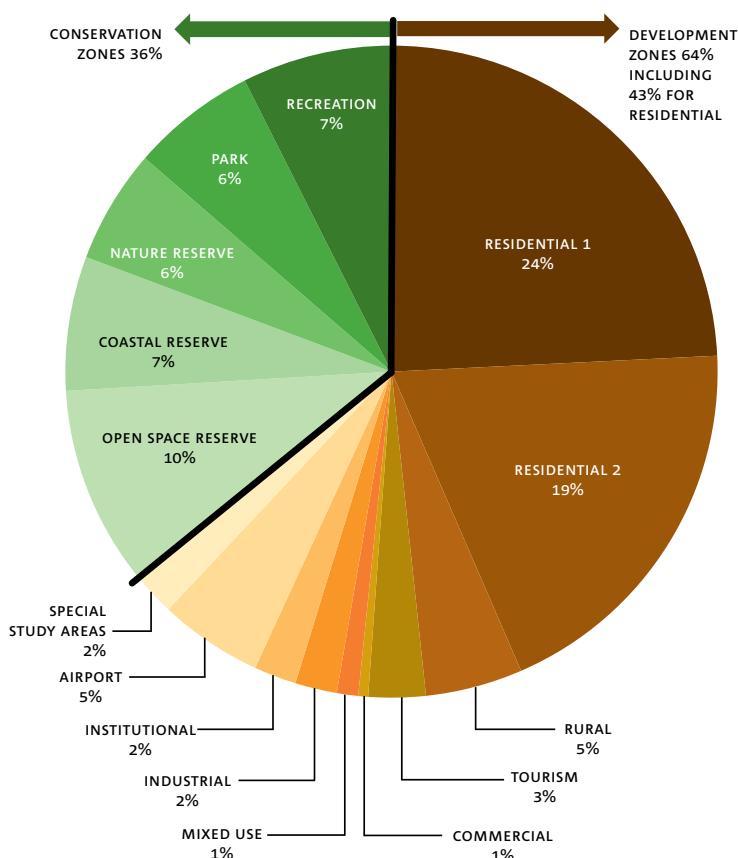
The chart below shows a breakdown of how Bermuda's land is used.

Conservation Zones totalled = 36%

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

Development Zones totalled = 64%

5%	Airport
1%	Commercial
2%	Industrial
2%	Institutional
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

Pond Life

Bermuda has no natural surface fresh water streams or lakes and a limited number of small ponds. The majority of these are brackish or fully marine. Natural fresh water ponds are very uncommon. The marshy area of Somerset Long Bay is unusual in that despite close proximity to the sea it lies within the Somerset freshwater lens. This makes Pitman's Pond an important freshwater habitat for a variety of aquatic plants, insects, snails and migratory birds, some of which are very rare.

All of Bermuda's ponds are threatened by invasive species as well as with run-off pollution from roads and neighbouring farmland, groundwater enrichment through sewage seepage and trash debris from continued illegal dumping. Reducing pollutants in the pond is an ongoing and long-term process.

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Know Your Terms

Pond Facts

The pond was excavated by backhoe in 1986 by the then owner Joffre Pitman. It was previously a mangrove and marsh area that had been filled with garbage in an attempt to control mosquitoes.

- Average depth – 1 m (3 ft)
- Deepest point – 139 cm (4ft 7in)
- The pond bottom is flat and consists of fine black anoxic (lacking oxygen) mud, overlying fine, calcareous sand that contains remains of Plateweeds and Scaleweeds (sand-producing marine algae)
- The water has an average salinity of about 2.5 percent, 7 percent seawater and 93 percent freshwater, so it is slightly brackish
- At times there has been a Cyanobacteria (blue-green algae) bloom in the pond. This reduces visibility to an inch or so
- There is a small variability in water levels throughout any one day, which is believed to be due to the relationship between the Somerset freshwater lens and the ocean tides

Pictures of many of the plants and animals mentioned on the following pages can be found in this publication as well as on the information boards at the reserve.

Animal Life

Adapted in unique ways for survival, animals of a wetland may live in, on or above the water. Some of the common species seen year-round in this pond include **Eastern Mosquito Fish** (*Gambusia holbrooki*) introduced for mosquito control, dragonflies and birds. Tadpoles from the large **Marine/Cane Toad** (*Bufo marinus*) can also be seen in the pond during the spring and summer months and **Red-eared Sliders** (*Trachemys scripta elegans*) can be spotted throughout the year. This introduced and very invasive reptile is a popular pet but, because of illegal abandonment, has managed to find its way into virtually every fresh water pond in Bermuda.



Predaceous Diving Beetle
Thermonectus ornaticollis

NATIVE



Blue Dasher Dragonfly
Pachydiplax longipennis

NATIVE



Marine/Cane Toad
Bufo marinus

INTRODUCED



Eastern Mosquito Fish
Gambusia holbrooki

INTRODUCED

The Red-eared Slider



Red-eared Slider
Trachemys scripta elegans

INTRODUCED
INVASIVE

The Red-eared Slider (*Trachemys scripta elegans*), also known as the Red-eared terrapin, a fresh water terrapin is abundant in the pond and in a full range of sizes attesting to local breeding. Red-eared Sliders have devastating impacts on pond ecosystems because they eat almost anything including water plants, molluscs, insects and small fish. In Bermuda they eat the **Killifish** (*Fundulus bermudae*) and the **Mosquito Fish** (*Gambusia holbrooki*) which keep the mosquito numbers down. This has serious implications for human health because of mosquito-borne disease and general wellbeing. Like all reptiles, Red-eared Sliders are cold blooded, so they must pull themselves out of the ponds and bask in the sun to warm up their bodies so they can properly digest their food. Unfortunately one of the Sliders preferred basking places is on top of the water level nests of wetland birds such as the **American Coot** (*Fulica americana*) and **Common Moorhen** (*Gallinula chloropus*). Sliders are known to crush bird eggs in this way; they also have been known to eat the chicks. It is clear that with no predators to keep the population in check, the Red-eared Sliders are significantly upsetting the ecology of Bermuda's ponds.

Most of the Red-eared Sliders in Bermuda's parks and nature reserves were released there by pet owners who no longer wanted them. A total of 523 Red-eared Sliders were removed from the pond at Somerset Long Bay East and West Nature Reserve from 2006-2010. If you no longer want your terrapin, make the responsible choice and have it put down by your veterinarian or take it to the Department of Conservation Services at 'Shorelands' located adjacent to the Bermuda Aquarium Museum and Zoo parking area.

The Pond Edge

Plants on the pond edge provide critical habitats for the animals and often help filter run-off pollutants in the pond.



Umbrella Sedge
Cyperus alternifolius INTRODUCED



Sheathed Paspalum Grass
Paspalum vaginatum NATIVE



Morning Glory
Ipomoea indica INTRODUCED INVASIVE



Capeweed
Lippia nodiflora NATIVE

Pond Edge Plant Life

- The Sheathed Paspalum (*Paspalum vaginatum*) occurs in patches, the Umbrella Sedge (*Cyperus alternifolius*) is common in clumps around the edges and the Seaside Daisy (*Wedelia trilobata*), and Capeweed (*Arctotheca calendula*) form fringing mats around the pond.
- Cattail (*Typha angustifolia*), Great Bulrush (*Scirpus validus*), Hedge Hyssop (*Gratiola officinalis*), Water Hyssop (*Bacopa monnieri*) and a Cypress have colonised the pond since it was restored by excavation. The Cattail had to be culled out because it is so aggressive in freshwater marshes that it would quickly fill all the open water.
- The Morning Glory (*Ipomoea indica*), another invasive, is challenging to control.

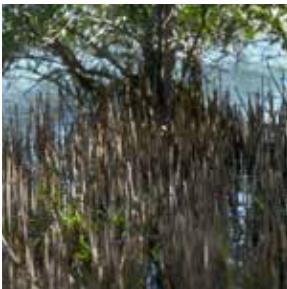
BLACK Black Mangrove, *Avicennia germinans* NATIVE



Seed



Leaf & flower



Pneumatophores

MANGROVES

Mangroves are important worldwide as sheltered habitats for invertebrates, as nurseries for young fish and in the prevention of coastal erosion. The two types seen here are Red Mangrove and Black Mangrove.

RED Red Mangrove, *Rhizophora mangle* NATIVE



Propagule



Leaf & flower



Prop roots

Plant Life

The vast majority of flora on the island is comprised of species introduced by humans and which have become naturalised or invasive. This nature reserve has been restored to emphasise the original native and endemic flora which characterised Bermuda before human settlement. Native species are those which colonise an area without human aid, arriving by natural dispersal from birds, wind and sea currents long before human settlement. Native species which have been reproductively isolated long enough to have evolved into a unique species with unique characteristics are distinguished as endemic. Both natives and endemics have played important roles in Bermuda's natural environment as well as its social and economic history.

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Know Your Terms

Bermuda's Trees



Bermuda Cedar **ENDEMIC**
Juniperus bermudiana



Palmetto **ENDEMIC**
Sabal bermudana



Olivewood **ENDEMIC**
Cassine laneana

Coastal Plants

The native plants have adapted unique features to survive harsh coastal conditions – poor soil and exposure to sun, winds and salt spray. **Spanish Bayonet** and **Briar Bush** also serve as effective barrier hedges. The **Tamarisk** was introduced as a windbreak and is common along the North Shore.



Buttonwood *Conocarpus erectus* NATIVE



Tassel Plant *Suriana maritima* NATIVE



Coast Sophora *Sophora tomentosa* NATIVE

Woody Shrubs

These are still common in some areas and where present are an indication of land that has remained relatively undisturbed by man over the centuries.



Jamaica Dogwood *Dodonaea viscosa* NATIVE



White Stopper *Eugenia axillaris* NATIVE



Forestiera *Forestiera segregata* NATIVE

Shrubs · Grasses & Sedges

These low-growing plants include the spring-flowering endemics, **Bermudiana**, **Darrell's Fleabane** and **Bermuda Sedge**, and the native **Sheathed Paspalum Grass**.



Bermudiana *Sisyrinchium bermudiana* ENDIMIC



Darrell's Fleabane *Erigeron darrellianus* ENDIMIC



Sheathed Paspalum Grass *Paspalum vaginatum* NATIVE

Bird Life

The freshwater pond with its muddy margins and vegetated edges provides a habitat for many species of birds associated with water. The surrounding trees and bushes provide habitat for a variety of perching birds. Freshwater is a scarce and declining habitat in Bermuda and so the pond acts as a magnet for birds. Because of its northwestern location and inviting features, the open spaces bordering Somerset Long Bay provide the first landing for migrant birds. This reserve is crucial to their survival.

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 rarely seen in Bermuda, probably blown off course

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

Know Your Terms

Winter

In the winter, the resident **Mallards** are joined by other wildfowl including **Blue-winged Teal** and **Ring-necked Ducks**. All of the **Heron** and **Egret** species are regular visitors. **Least Bittern** and **American Bittern** are not uncommon and, along with **Sora** and **Wilson's Snipe**, are easily disturbed and so tend to hide. The **Northern Waterthrush** and **Common Yellowthroat** are found on the pond's edge while **Indigo Buntings** are frequent visitors to the longer grasses.



Mallard **RESIDENT**
Anas platyrhynchos



Blue-winged Teal **MIGRANT**
Anas discors



Least Bittern **MIGRANT**
Ixobrychus exilis



Sora **MIGRANT**
Porzana carolina



Indigo Bunting **MIGRANT**
Passerina cyanea



Great Blue Heron **MIGRANT**
Ardea herodias

Spring

Few spring migrants are recorded, but you may be lucky enough to see a **Purple Gallinule**. **Pied-billed Grebes** sometimes breed in the early spring, while **Mallards**, **American Coot** and **Common Moorhen** also breed in the spring and early summer.



Purple Gallinule **MIGRANT**
Porphyrrula martinica



Pied-billed Grebe **RESIDENT**
Podilymbus podiceps



Common Moorhen **RESIDENT**
Gallinula chloropus

Fall

The greatest number of species can be recorded during the fall months when migrants such as **Shorebirds**, **Cuckoos**, **Flycatchers**, **Vireos** and **Warblers** are passing through. This is the best time of the year to observe shorebirds around the edge of the pond. As many as 20 shorebird species may be recorded in any year, including **Yellowlegs** and a variety of **Sandpipers**. This is one of the best places to see a **Louisiana Waterthrush**, a very scarce warbler which visits in August.



Yellow-billed Cuckoo **MIGRANT**
Coccyzus americanus



Wilson's Snipe **MIGRANT**
Gallinago delicata



Solitary Sandpiper **MIGRANT**
Tringa solitaria



Common Yellowthroat **MIGRANT**
Geothlypis trichas



Greater Yellowlegs **MIGRANT**
Tringa melanoleuca



Louisiana Waterthrush **MIGRANT**
Seiurus motacilla

Breeders & Rarities

This nature reserve also supports resident breeding birds such as the **Grey Catbird**, **Northern Cardinal** and **European Goldfinch** as well as Bermuda's only endemic land bird, the **White-eyed Vireo** or **Chick-of-the-village**. Recent rarities to the pond have included Little Egret, Tufted Duck, Hudsonian Godwit and Ruff.



Grey Catbird **RESIDENT**
Dumetella carolinensis



Bermuda White-eyed Vireo
Vireo griseus bermudianus



Hudsonian Godwit
Limosa haemastica **VAGRANT**

Shorebirds



14" TALL

Greater Yellowlegs **MIGRANT**
Tringa melanoleuca



10-11" TALL

Lesser Yellowlegs **MIGRANT**
Tringa flavipes



Solitary Sandpiper **MIGRANT**
Tringa solitaria



Spotted Sandpiper **MIGRANT**
Actitis macularia



Semipalmated Sandpiper **MIGRANT**
Calidris pusilla



Least Sandpiper **MIGRANT**
Calidris minutilla



Pectoral Sandpiper **MIGRANT**
Calidris melanotos



Short-billed Dowitcher **MIGRANT**
Limnodromus griseus



Wilson's Snipe **MIGRANT**
Gallinago delicata

Waders



Pied-billed Grebe **MIGRANT**
Podilymbus podiceps



American Bittern **MIGRANT**
Botaurus lentiginosus



Least Bittern **MIGRANT**
Ixobrychus exilis



Great Blue Heron **MIGRANT**
Ardea herodias



Great Egret **MIGRANT**
Ardea albus



Snowy Egret **MIGRANT**
Egretta thula



Little Blue Heron **MIGRANT**
Egretta caerulea



Tricolored Heron **MIGRANT**
Egretta tricolor



Cattle Egret **MIGRANT**
Bubulcus ibis



Green Heron **RESIDENT**
Butorides virescens



Yellow-crowned Night-Heron **RESIDENT**
Nyctanassa violacea



Sora **MIGRANT**
Porzana carolina

Water Birds



Mallard **RESIDENT**
Anas platyrhynchos



Blue-winged Teal **MIGRANT**
Anas discors



Green-winged Teal **MIGRANT**
Anas carolinensis



Hooded Merganser **MIGRANT**
Lophodytes cucullatus



Ring-necked Duck **MIGRANT**
Aythya collaris



Sora **MIGRANT**
Porzana carolina



Purple Gallinule **MIGRANT**
Porphyrio martinica



Common Moorhen **MIGRANT**
Gallinula chloropus



American Coot **MIGRANT**
Fulica americana



Lesser Scaup **MIGRANT**
Aythya affinis



Pied-billed Grebe **RESIDENT**
Podilymbus podiceps



Red-breasted Merganser **MIGRANT**
Mergus serrator

Teacher Resources/Activities

Before your visit/

Introducing Students to Somerset Long Bay East Nature Reserve

The activities included aspire to engage young minds and foster observation skills and inquisitiveness about our environment. We encourage respect and appreciation for nature and open spaces, and promote knowledge and understanding of the unique features of the reserve.

Curriculum links to all activities are provided in the appendix

*ACTIVITY 1/PRIMARY 1-3

Science Vocabulary

Primary students should be introduced to or review the following vocabulary as it applies to the reserve before their visit:

Flora: flowers, plants, bushes, trees that live in and around our island

Fauna: birds/animals that live in and around our island

Pond: a small still body of water formed naturally or created artificially

Marsh: low-lying waterlogged land that is poorly drained and liable to flood when it rains

Habitat: the natural conditions and environment in which a plant or animal lives.

Nature reserve: a managed and protected area of land, usually containing rare or endangered plants or animals

Mangroves: an evergreen tree found growing along pond edges with their roots exposed at low tide

*ACTIVITY 2/PRIMARY 1-3

Geography/Where is Somerset Long Bay?

Having a visual sense of the reserve's location and where students will be travelling for the upcoming tour helps to build excitement before the visit. This activity provides a springboard for visiting other Trust reserves - Paget Marsh, Spittal Pond and Sherwin Nature Reserve (Warwick Pond).

This activity also focuses on:

- The location of parishes
- Bodies of water in and around our island
- Learning directional terms, north, south, east, west
- The location of other Trust properties, light houses, caves, tribe roads, forts, the airport, etc.
- A key, which displays symbols that correlate to areas on the map

MATERIALS

- Access to a Smartboard, a computer and printer are needed
- Images of Bermuda maps and Trust properties are available on our website under our Teacher Resources heading

- Print both maps — one with Trust property locations and one without
- Print images of Trust nature reserves

To expand the activity, teachers can print images of other Trust properties available on our website and find other images of island landmarks online through Google/Images.

Additional Materials: poster board, self-adhesive Velcro, glue sticks and access to a poster size laminator. Local copy stores can enlarge/laminate the map and laminate landmark images.

PREPARATION • BEFORE THE ACTIVITY

- Print the maps of Bermuda. Enlarge the map without nature reserve locations to suit a size large enough for a whole group introductory lesson and laminate for durability. Back the laminated map on a display board
- Print pictures of the nature reserves, back them with poster board and laminate; the recommended size of images to be 2" x 2"
- Create and print names of parishes, tribe roads, etc. Google images of local landmarks and print as well
- Attach Velcro to the laminated images and the display map in the appropriate locations of Trust properties and refer to the map in this guide showing the nature reserve locations as a reference
- Have the display map and images ready for the Somerset Long Bay East Nature Reserve introductory lesson
- Log on to the Trust website/education section and display the digital images of Somerset Long Bay East Nature Reserve and other Trust nature reserves on a Smartboard; or print 8½" x 11" size to share with students

DURING THE ACTIVITY

- Ask students if they have visited a local reserve in the past; if so, which one(s) The images shown on the Smartboard or those printed will help them to recall prior visits and/or may instill an interest in visiting nature reserves
- Ask students what they know about nature reserves, what is important about them, and additional information they would like to learn
- Refer to the created display map and landmark signs. Allow students to choose a landmark and place the labeled photo sign its proper location. The map with identified locations can be used as a reference

Note: Once the students have had this introduction to the location of Somerset Long Bay East Nature Reserve and other landmarks they can work individually or with a peer to create their own map.

INDIVIDUAL AND PAIRED STUDENT LEARNING

- Print a map for each student — recommended size - 8½" by 14"
- Print photos of nature reserve signs and additional landmarks
- Ensure that students have glue sticks, scissors and pencils
- Students cut out the reserve and landmark signs and glue them in their correct locations, working individually or in pairs

Option: students can draw landmark signs or create them on a computer and print them out

*ACTIVITY 3/PRIMARY 4-6

Introduction of Somerset Long Bay East Nature Reserve

MATERIALS

- Access to a Smartboard, a computer and printer are needed

Teachers of Upper Primary and Middle levels should assess their students' prior knowledge of nature reserves and the science vocabulary (see Lower Primary Introduction) and glossary terms in preparation for their introduction to Somerset Long Bay East Nature Reserve. Creating a classroom map will also benefit students who have not developed an understanding of the reserve's location as well as other important landmarks.

Log on to our website/education section and display the digital images of Somerset Long Bay Each Nature Reserve and other Trust nature reserves on a Smartboard, or print 8½" x 11" size to share with students.

Review the history and importance of Somerset Long Bay East Nature Reserve with students and create:

- A table to show the timeline of how the nature reserve evolved including title, dates and description of each period
- The overall importance of Somerset Long Bay East Nature Reserve (possible headings: environmental value, freshwater lens, nesting islands, landing site)

Differentiation: Teachers can create a time line with students through the use of a Smartboard, a blank table that enables them to complete the information on a computer or handwrite, or students can create the table on their own

THE DAY OF THE TOUR TO SOMERSET LONG BAY

Tour materials needed - at a glance

Teachers need to:

- Ensure that all students have written parent/guardian consent to attend the tour.
- Prepare a register to include the names of students in attendance and their emergency contact information
- We ask that the teacher notify the Trust education staff member of any students who do not have consent to be photographed during the tour

What to wear

We advise everyone to wear appropriate clothing, comfortable walking shoes and hats and to apply sunscreen prior to the visit.

Bring the following items:

- First aid kit, a pre-charged cell phone
- Camera and binoculars optional for adults and mature students (who will be responsible for such items)
- Light-weight blanket(s) for students to sit on during a snack break

Materials needed for each student:

- Clipboard, 2 pencils
- Snack and water bottle
- Backpack

Capturing moments during the tour of Somerset Long Bay

Teachers are encouraged to bring a camera and photograph the experience and to use the images in activities afterwards. Older mature students can also bring cameras (and take responsibility for them) to photograph the experience as well. Somerset Long Bay East Nature Reserve is a showcase of birds and pond life. Binoculars allow students to get a closer look. Suggested activities will include ideas for the use of photographs as a creative way to extend student learning about the reserve.

During your visit/class Field Trip Activities

The following activities are provided during the tour for primary and middle level students:

*ACTIVITY 1/PRIMARY 1-2

Find Your Tree

As students are introduced to specific trees in the reserve, they will discover their unique characteristics and then engage in a creative 'blindfold game' allowing everyone to take turns being guided by or leading a peer using their sensory skills to locate a particular tree.

*ACTIVITY 2/PRIMARY 1-2

Scavenger Hunt

While participating in a Scavenger Hunt along the paths in the reserve, students will search for and identify certain species, use their artistic abilities to illustrate a picture of the pond, flora and fauna and label their artwork with key words such as: bird, flower, tree, sun, cloud.

*ACTIVITY 3/PRIMARY 3-4

Who Listens Well?

Using their sense of hearing, students will identify and distinguish different sounds both in nature and man-made that they hear within the reserve. A discussion will follow about the sounds heard and where students suppose they originated from. We anticipate hearing many birdsongs and will see if students can replicate their lively way of communication.

*ACTIVITY 4/PRIMARY 3-4

Bird Observations

A stop at the reserve's bird hide will allow students the opportunity to observe the birds in-residence, each focusing on one of their choice, noting its physical characteristics and behaviour. Students will then share their findings with a peer, noting similarities and differences. A discussion will follow regarding how people are like birds, in physical and behavioural characteristics.

*ACTIVITY 5/PRIMARY 5-6

Flora & Fauna

The identification of the flora and fauna that are native, endemic, introduced and invasive to Bermuda are the focus of this activity for students. A brief discussion about these terms, followed by an activity allowing students to sort colourful pictures in their appropriate category, will support students' understanding of these terms.

✳️ACTIVITY 6/PRIMARY 5-6

Ecosystem Elements

How ecosystems depend on and support each other is the focus for students as they are given an area in the reserve to observe with peers, noting how different organisms relate to each other. Students will learn the difference between the terms biotic (living organisms) and abiotic (non-living organisms) and the importance of maintaining a balance in environments.

✳️ACTIVITY 7/MIDDLE 5-6

Pond Water pH Findings

Young scientists will be at work to hypothesise and discover the pH of the water within the pond at the reserve. Students will first test the liquids from an orange and from vinegar to form a basic understanding of their pH levels and then make a prediction for the level of the pond water. Will their findings indicate acidic or alkaline conditions? What factors can impact this environment?

✳️ACTIVITY 8/MIDDLE 5-6

Habitats & Animal Adaptation

Understanding ways that animals adapt to their environment is essential for helping students to value the importance of protecting animal habitats. Students will engage in an activity that will allow them to choose a few habitats and the animals that live in each. A discussion will follow on the ways that animals adapt to their surroundings and how we can support them.

After your visit/Additional Information & Activities

The following sections provide insightful information that applies to Somerset Long Bay East Nature Reserve and suggested activities to carry out with students after the tour. The activities provided below include recommended age levels; however, most are open-ended and can be adapted to a range of grade levels. Older students can also create the games to play and share with younger students and/or siblings.

Appreciating Our Open Spaces

*ACTIVITY 1/PRIMARY • MIDDLE 1 & 3

Somerset Long Bay East Nature Reserve Books

Teachers and students can take pictures during the tour of the reserve to use for creating a class or individual student book or design a Power Point presentation (depending on level of ability).

*ACTIVITY 2/PRIMARY 1-2

Class Books

Teachers can create a class book using pictures taken during the class tour highlighting the events and including captions from beginning to end, using language that is age-appropriate and predictable. Students can take the book home for an evening to show/read to their parents. To extend this activity, students can create their own books and labels for the pictures.

Tip: create two books to circulate throughout the class each evening, or have one copy as a classroom library book and a backup in the event that one is misplaced.

*ACTIVITY 3/PRIMARY 3-4

Individual Books

Students can create their own books, writing captions to describe the images and including:

- Drawings of plants, trees and animals found in the reserve with labels of their proper names
- A map showing the trails, bird hide area and pond
- A time line of the tour activities and events, and/or a story describing facts known about Somerset Long Bay East Nature Reserve

*ACTIVITY 4/PRIMARY 5-6 Power Point Presentation

Students can use images taken on the tour to create a Power Point presentation including the activities and events that occurred and showing images of native and endemic, introduced and invasive plants, trees and animals, and the time line of the developments of the Somerset Long Bay East Nature Reserve, Park and Audubon properties.

Ask students what activities they would include if they were going to lead a tour of the reserve. Have students create a 'Somerset Long Bay East Nature Reserve Guide Book', highlighting the flora and fauna that can be seen in the reserve.

*ACTIVITY 5/PRIMARY 1-2 Categorising Plants, Trees & Animals on Posters

Using a 12" x 18" poster board, draw dividing lines to create sections with the following categories:

- Plant, tree, animal
- Native, endemic, invasive
- Types of birds – waders, water, shorebirds, land birds
- Animals found in the water, on the water and above the water
- Pictures of animals and plants/trees
- Older students can create display boards to highlight the different categories mentioned above

*ACTIVITY 6/PRIMARY 2-3 Nature Walk • Hunting for Specific Trees

Go on a hunt for the following trees and discuss their characteristics and talk about the importance of protecting trees in nature. Have students draw the different trees, label them with their correct names, point out the characteristics of each which make them similar or different.

Male & Female Cedar Trees

Bermuda Cedar trees flower in March and April. Male trees produce pollen-filled yellow cone-like flowers. The females have small flowers that become the characteristic berries. The blue-grey berries ripen and turn dark purple between September and December, and provide an excellent source of food for birds. Cedar trees also provide valuable nesting sites for birds such as the native Bluebird.



Male Cedar – showing pollen



Female Cedar – showing berries

Bermuda Palmetto & Chinese Fan Palm

Chinese Fan Palms can be distinguished from Bermuda Palmettos by the thorns found on the leaf stem of most Fan Palms. Palmettos never have thorns. Also the Fan Palm has a uniformly green leaf, hard oval grey-blue berries and the leaf meets the stem in a 'C' shape when viewed from above. Remember C is for Chinese Fan Palm. Distinguishing a young Fan Palm from a Palmetto is difficult, unless the parent tree is nearby.

Bermuda Palmettos grow to 35 feet (10.5 m) high. The leaf stalk projects about halfway into the leaf in a V-shape which distinguishes it from the invasive Chinese Fan Palm. Bermuda Palmettos also have an attractive bright yellow strip up the middle of the leaf. The dark green leaves are quite firm and hold up well in Bermuda's windy weather.

PHOTOS: BERMUDA CONSERVATION SERVICES



Chinese Fan Palm



Palmetto

*ACTIVITY 7/PRIMARY 3-4 Imagine a World • Discussion & Drawing

Have students close their eyes (for 30 seconds) and ask them to imagine what Bermuda would be like if there were no parks, no open spaces, no big gardens, just buildings and roads. Use local examples e.g. not having Somerset Long Bay Park, Victoria Park, Horseshoe Bay. Imagine what it would be like if there were no birds, grass, trees etc. Begin a discussion by asking students what our island home would sound like, smell like, look like, what colours would be missing, where would they play and relax on a hot day?

Ask students which kind of Bermuda would they prefer – one with open spaces or one without? Have students draw a picture of them in their favourite open space, park or nature reserve doing their favourite outdoor activity. Older students can create a poster showing Bermuda with open spaces and without and write an essay describing the consequences of each.

★ ACTIVITY 8/PRIMARY 2-3 & 5-6

Discussion: The Pros & Cons of Protecting Our Open Space

Discuss the pros and cons of protecting open space and taking care of our environment.

Have students draw a picture showing the pros and cons of protecting open space.

Young children can write a sentence about their picture, older children can expand on their writing, providing a paragraph(s) to describe their drawing.

Your discussion could include these questions:

Is it important to protect open spaces? Why?

Answers might include:

- To protect the plants and animals that are unique to Bermuda, which provide clean air and oxygen for us and the rest of the world
- To have places to watch birds on their migration journeys
- To have a place to relax, enjoy nature and get away from hustle and bustle

Why not?

Answers might include:

- Because we need the space to have houses - many people want to have their own home or to add on apartments to help pay for their homes
- Because we want more sports fields, schools, businesses, an airport, a hospital etc.

How can we help take care of our environment?

Answers might include:

- Don't litter and do recycle your trash
- Plant endemic and native trees
- Protect trees which are already growing
- Put up bluebird boxes
- Don't throw trash in ponds
- Don't release terrapins or other animals into nature reserves
- Support organisations that help protect Bermuda's environment – Bermuda Zoological Society, Keep Bermuda Beautiful, Bermuda National Trust, Bermuda Audubon Society
- Spread the word – tell your family, friends and neighbours how important our open spaces are and encourage them to respect nature

*ACTIVITY 9/PRIMARY 3-4 & 6

Community Projects

In order to start environmental projects in your school or neighbourhood, you must **First:** identify what some of the problems are. Draw a map of your school, community or neighbourhood and, using one colour, circle or draw the things that are environmentally friendly. In another colour, circle or draw the things that could be improved in the environment.

Second: make a list of what needs improving and brainstorm ways to improve these things. Put the list in order of what you would like to work on first, next, etc.

Third: for the top three ideas, determine:

- What you need to do to make it happen (action steps)
- Whether you need special help to complete it (adult supervision, particular expertise)
- Whether you will need special tools (hoes, paint, and detergent) to complete it and how long each action step will take

Collect all your supplies, arrange a date and begin. **Don't forget to have fun!**

*ACTIVITY 10/PRIMARY 5-6 • MIDDLE 1 & 3

Debate: Protecting Nature Reserves or Building Homes

Organise a debate. Split the class into two groups, one group will argue for the protection of Somerset Long Bay East Nature Reserve and the other group will argue for clearing the reserve of wildlife and building some new homes. Help each group to list their points, or give each member of the group a slip of paper with a role and a point which they must make during the debate. For example “You are a single parent with two small children, your family cannot support you anymore so you want someone to build houses on the nature reserve nearby, so that you can have your own home.” The teacher then chairs the debate.

*ACTIVITY 11/PRIMARY 5-6 • MIDDLE 1 & 3

Advocacy & Public Education

Have children create commercials for nature reserves. In a group discussion talk about why people would like to visit a nature reserve, then discuss and list examples of ‘persuasive language’. Look at adverts in newspapers and on the internet for ideas. In small groups, the children could either create or act out a TV or radio commercial, or design and draw an advert on the computer or by hand.

Children can also create a poster to show why it is important to protect nature reserves or to show how we can take care of our environment. Use pictures from magazines, the internet or those they have drawn.

*Games/PRIMARY 1-6

The games provided in this section can be used to engage children in small or large groups, strengthening their awareness of the environment.

• Noah's Ark

Make pairs of cards with animal names or pictures of animals. Gather students in a circle and pass out the cards randomly. Have them find their pair by making the sounds of the animal on their card.

• Counting

Have students count anything and everything – for example, the number of Palmettos they see, the number of different types of ferns, the number of ducks on the pond, the number of different birds they hear, how many lizards are in their yard.

• Acting the Part

Whisper the name of an animal to a child and get them to act it out. Give them a full 20-30 seconds before you allow the others to start guessing what animal they are pretending to be. **Suggestions:** ant, redbird, Duck, Kiskadees, Chick-of-the-Village, spider, Moorhen, worm, toad, Gambusia, etc. Alternatively, have groups of five children act out the members of an ecosystem – like a beach, a pond or a forest. Different players take different parts – the water, the birds, the grasses, etc. Allow the players to perform for a while before inviting the others to guess the habitat.

• Bat Ears

Discuss why bats have very good hearing – and hunt at night. Explain that they are going to put on their bat ears (could cup their hands around ears for this), close their eyes for 30 seconds and count how many different sounds they each hear. After 30 seconds, open eyes and discuss what they heard.

• Who am I?

Do this activity outside. Start with general clues and getting more specific, give one piece of information at a time about a plant or animal and have the children see if they can guess who you are. It is better if you chose a plant or animal in the vicinity so that, if they do not know the name, at least they can point to it. You can also do this next to one of the bird signs along the path.

For example, if you are a Bermuda Cedar tree you might say:

- I am green and brown
- I can grow taller than a human and taller than a house
- I have thin, round leaves
- I am unique to Bermuda
- The first settlers found me here when they arrived
- For many years I was used to make ships, furniture and even houses

A variation of this is to have children form teams. The teams then determine the plant or animal they are. The team thinks up and writes down six to eight clues for that plant or animal. The clues should be ordered from general to more specific.

• Plant, Pond, Bird life • Memory Game

Print duplicate images of plant, pond and bird life found on our website – 3" x 3" size. Back with poster board and laminate.

Students place the cards face down and turn over two at a time to see if they match. Have students name each image and the characteristics of the item shown, e.g. can be found along the trail, in the pond, is a tree or an animal, is endemic, native, was introduced, is invasive. Create enough cards to allow multiple groups of students to work collaboratively in pairs. Older students can create their own game cards to show a younger student how to play, describe the items shown in the images, and later share their experience with peers and teachers. As students turn over and match the cards, they can place them into different categories.

• Close Your Eyes & Observe

Have the students close their eyes and be still for a while. Ask them to use their senses. What can they feel with their skin? What can they hear? How many different sounds? What can they smell? Give them time to experience the environment with their other senses; then give them time to share.

• Identifying Plants

Form two teams and separate them by 20 to 30 feet. Put six to ten plant specimens on the ground between them. Have children "count off" on each team – 1, 2, 3 ... Call out the name of one of the plants and a number, e.g. "Palmetto – number 4". The child from each team who has that number must run to the middle and correctly pick up the plant that was called out. Picking up the correct specimen earns the team two points. Picking up the wrong specimen causes the team to lose two points.

• Animal Scramble

On cards or sticky labels, write the names of individual animals and plants. Make sure you have one label per child. Pin one name on the back of each child without letting them see. The children must wander from student to student asking questions to determine who they are. They can only ask questions that have yes or no answers to them! (e.g. Am I an animal? Do I have wings? Do I live in the water?)

• Eagle Eyes

Discuss why eagles have very good eyesight – as they need to spot their tiny animal prey from high up in the sky. Explain they are going to put on their eagle eyes, and in silence hunt for as many different animals, plants and forms of landscape they can see. Discuss what they saw.

• Similarities, Differences and Favorite Activities and Events

After visiting two or more nature reserves, discuss the similarities and differences of the reserves, highlighting favourite tour activities and events. Encourage students to return to the reserve(s) with their family and friends and to talk beforehand about what they would want their guests to see during the visit.

Flora of Somerset Long Bay East Nature Reserve

*ACTIVITY 1/PRIMARY 1-2 Cedar and Palmetto Trees

Have students enjoy a walk outside to hunt for Cedar and Palmetto trees and collect natural materials they shed such as Cedar shavings and Palmetto leaves. Allow them to glue the materials onto the pictures of the trees to represent bark and tree leaves. They can also use crumpled brown and green tissue paper cut into small squares.

*ACTIVITY 2/PRIMARY 1-2 Junior Horticulturists

Cedar and Palmetto berries can be collected in the fall and planted in pots. Before planting Cedar seeds, it is recommended that the berries are cold-shocked by keeping them in a refrigerator for six weeks. To encourage germination, the small Cedar berries are rubbed lightly between sandpaper to remove the tough outer coat and release the seeds.

Plant pots can be made out of many reused materials such as yogurt pots or toilet rolls (upright and wedged in a tray with others). You can also use scrap paper, rolled into a cylinder and folded in at one end, to plant the seedlings in. Plant the seedlings in bigger pots when they begin to sprout and then later in the ground.

This activity supports the growth of our endemic Cedar and Palmetto trees.

*ACTIVITY 3/PRIMARY 1-3 Native & Endemic Tree Collage • Stories & Poetry

Take a walk outside and around your school. Talk about the plants and trees that you see and make leaf rubbings of three trees.

Have students make tree leaf and bark rubbings to take back into the classroom to create an “endemic tree collage”. Ask students to bring in pre-used envelopes for the paper, highlighting that items can be reused/recycled to save resources – saving both money and trees. Younger students can write a few words that apply to this experience. Older students can write a short story or poetry inspired by this activity, which then can be included as part of this group effort.

*ACTIVITY 4/PRIMARY 3-6 Survey Your School Grounds

Have the children survey their school grounds to see how many native and endemic trees are on the property versus other trees and bushes. This information can be represented in a bar graph or pie chart. Using a map of the school, students can indicate the plant locations. They can then draw on their map the native and endemic plants they would like to see planted.

Flora of Somerset Long Bay East Nature Reserve

Bermuda's Trees



Bermuda Cedar *Juniperus bermudiana* **ENDEMIC**



Palmetto *Sabal bermudana* **ENDEMIC**



Olivewood *Cassine laneana* **ENDEMIC**

Coastal Plants



Buttonwood *Conocarpus erectus* **NATIVE**



Tassel Plant *Suriana maritima* **NATIVE**



Coast Sophora *Sophora tomentosa* **NATIVE**

Woody Shrubs



Jamaica Dogwood *Dodonaea viscosa* **NATIVE**



White Stopper *Eugenia axillaris* **NATIVE**



Forestiera *Forestiera segregata* **NATIVE**

Shrubs · Grasses & Sedges



Sheathed Paspalum Grass
Paspalum vaginatum NATIVE



Bermudiana ENDEMIC
Sisyrinchium bermudiana



Darrell's Fleabane ENDEMIC
Erigeron darrellianus



Umbrella Sedge INTRODUCED
Cyperus alternifolius

The Pond Edge



Washington Palm INTRODUCED
Washingtonia filifera



Brazil Pepper INVASIVE
Schinus terebinthifolius



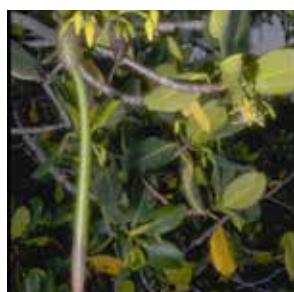
Morning Glory INTRODUCED INVASIVE
Ipomoea indica



Capeweed NATIVE
Lippia nodiflora



Black Mangrove NATIVE
Avicennia nitida



Red Mangrove NATIVE
Rhizophora mangle

Birds of Somerset Log Bay East Nature Reserve

*ACTIVITY 1/PRIMARY 3-4 & 6 · MIDDLE 1 & 3

Getting to Know Birds

Draw and label the main features of a bird. Obtain and use the David Wingate poster *Breeding Songbirds and Smaller Land Birds of Bermuda*. Walk around the school grounds and match the birds you see to the poster. Sit quietly and observe birds. Answer the questions on the activity sheet “My Bird Observations”. Colour the drawings of the birds (see following pages). Put the diagram of the bird found on page 43 onto a Smartboard. Show to the class as a group to review the physical characteristics.

*ACTIVITY 2/PRIMARY 3-4 & 6 · MIDDLE 1 & 3

Feet and Beak Adaptations

The feet and beaks of birds are adapted for special functions. Use the activity sheets (pages 50 & 51) and match the function to the correct structure. Somerset Long Bay East Nature Reserve is a wonderful place to observe birds in their natural habitat.

*ACTIVITY 3/PRIMARY 3-4 & 6 · MIDDLE 1 & 3

My Favorite Bird

Have students each choose one bird and investigate where it lives, what it likes to eat, what type of nest it builds, how many eggs it lays and anything else that is interesting about it. They can create a poster about the bird and share this information with their peers. Older primary students are encouraged to photograph birds and create their posters with the use of a computer.

*ACTIVITY 4/PRIMARY 3-4 & 6 · MIDDLE 1 & 3

Where Do They Go?

Investigate the migration routes of different birds. Find out where they go in the winter and where they go in the summer. Trace their routes on a map of the world. How long does the trip take? Where do they find food and rest on the way?

*ACTIVITY 5/PRIMARY 3-4 & 6 · MIDDLE 1 & 3

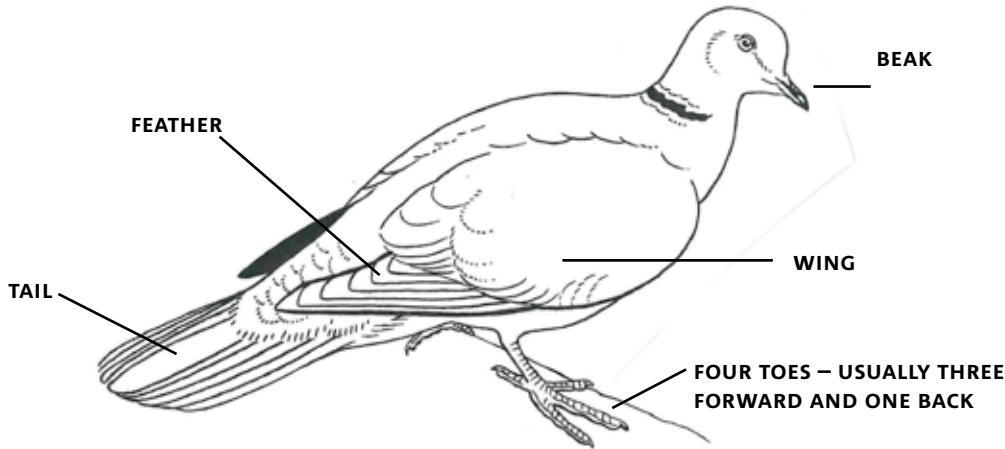
Bird Activity Worksheets

The following worksheets are provided for student enrichment. Teachers can revise the worksheets for ability levels.

Discovering Birds

What is a Bird?

Birds are found in almost every climate and location on earth. They come in many shapes, colours and sizes, each adapted to their environment. Even so, all birds have many physical features in common: a beak, two wings, two legs, feathers, a tail, etc. Birds also lay eggs and have hollow bones to make them light for flight.



There are many different kinds of birds. We can tell them apart by:

- The shapes of their bodies, beaks and feet
- The colour of their feathers
- The places where they live

If we look at a bird's beak, wings and feet, we can often tell what they eat and where they live. You can see that by taking the time to carefully observe birds you can tell a lot about them without even knowing what kind they are.

Feet	Beaks
SWIMMING	FILTERING
SWIMMING/WALKING	PROBING
WALKING	CATCHING INSECTS
PERCHING	CRACKING SEEDS
SEIZING PREY	TEARING MEAT
CLIMBING	DRILLING HOLES

Male & Female Birds

Many times male and female birds of the same kind are not the same colour. Why? The males are usually more brightly coloured than the females and spend a lot of the springtime singing. Male birds use their songs and bright colours to attract a female's attention. Females use their dull colours to hide themselves, their nest and babies from predators.

Where do Birds Live?

Birds have adapted to live in many different places. Some birds can float on water and live near oceans, lakes or rivers. Some birds hunt other animals. They generally like open places like fields, deserts or prairies. Many small birds live in areas that have trees, bushes or high grass in which they can nest, hide and find food. Birds are usually found only in those places to which they have adapted.

There are three major groups of birds that you see at Somerset Long Bay East Nature Reserve. These are separated into groups based on where they live:

In the pond – There are several resident birds you may see feeding on fish and weeds in the pond, including Grebes, Mallards, Coots, and Moorhens. Migrant birds you may see in the fall are Cuckoos, Flycatchers, Vireos, Warblers and Sparrows. In winter you may also see migrant Blue-winged Teals, and resident Ring-necked Ducks.

On the pond edges – In winter you may see Herons and Egrets stalking fish, worms and crustacean (shrimps, crabs, etc.). Mourning Doves and Ground Doves, Starlings and Sparrows can be seen throughout the year as well as Kiskadees which frequent the pond edge. Warblers visit during their migration and sometimes stay for the winter.

In the young woodland – Here you may also see the endemic White-eyed Vireo (or Chick-of-the-Village), Grey Catbirds and Cardinals (or Redbirds), all of which are resident and breeding here.

For pictures of
more birds please
refer to pages 21-25

POND & MARSH



Mallard
Anas platyrhynchos



Pied-billed Grebe
Podilymbus podiceps

POND EDGE



Great Egret
Ardea albus



Great Blue Heron
Ardea herodias

WOODLAND



Bermuda White-eyed Vireo
Vireo griseus bermudianus



Grey Catbird
Dumetella carolinensis

My Bird Observations

Name: _____

Date: _____

Location: _____



Habitat

Where did you observe the bird? Was it near buildings? Your house? Was it in a natural environment? The beach? Woods? A marsh?

Body size and shape

Is the bird bigger or smaller than a sparrow? A crow? Is it fat or slim? Does it have a long neck or a short neck?

Colour

What colour(s) is the bird? Are males and females different colours?

Beak

Is the beak long, medium or short? Is it small and pointed or short and thick? Is it bent or straight? What colour is it?

Legs and Feet

Does the bird have long, medium or short legs? What colour are they? What do the feet look like? Do they have small toes? Large claws? Webbed feet?

Behaviour

Is the bird flying, hopping or walking? Does it feed on the ground or in trees and plants? Does it swim? Is it alone or in a flock?

Song

Does the bird have a distinctive song or cry or alarm call?

Name of Bird



Name: _____

Date: _____

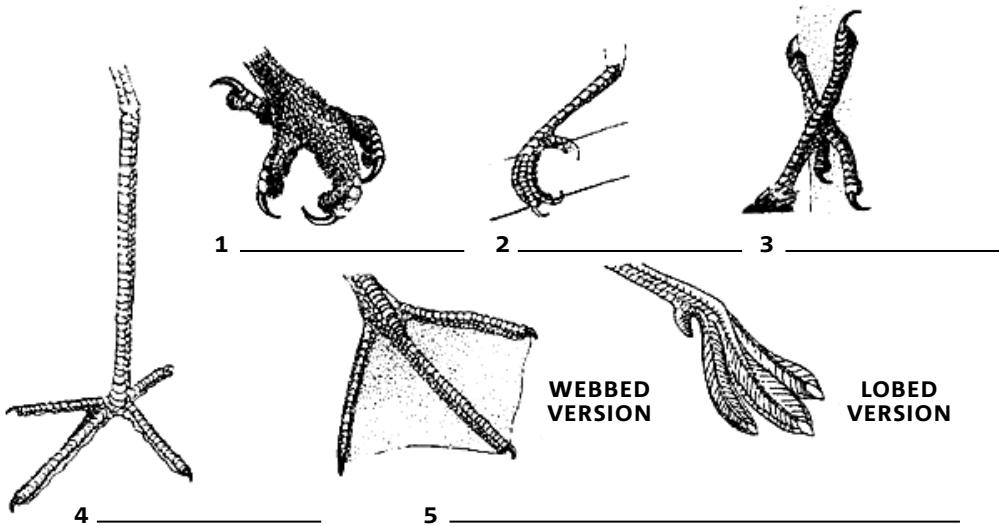
Feet Adaptations

Look carefully at the six different types of bird feet illustrated below. These are the foot adaptations certain birds have developed to manoeuvre in their habitats while gathering food.

Choose the word from below that best describes the type of function that would be most useful for each foot, and then label the drawing, with the word, on the blank line beneath it.

wading preying (seizing & capturing prey)

swimming perching climbing



Using the signs at Somerset Long Bay East Nature Reserve, name examples of:

Birds with feet like #4

1. _____

2. _____

Birds with feet like #5

1. _____

2. _____

Beak Adaptations

Each beak adaptation, shown below, is especially useful for gathering certain types of food.

Read each description, find the beak drawing that matches the description, and then label the drawing with the name of the beak type on the blank line beneath it.

Fish-eating beak: long, slim, strong, and pointed to reach into the water and to grasp slippery creatures

Insect-catching beak: small beak that can open wide to grab insects in flight

Seed-eating beak: arched into the shape of a cone; stout and sharp to crack seeds

Insect & Fruit-eating beak: narrow and pointed to grab insects or reach for fruits, and slightly arched to crack seeds; larger than an insect-catching beak but shorter than a fish-eating beak; sleeker and longer than a seed-eating beak

Water & Mud-shifting beak: wide and shallow; comb-like strainers on edges filter out bits of food in the water

Chisel beak: sturdy and sharply pointed to chisel into wood; accompanied by an extremely long, barb-tipped tongue to pull insects and insect eggs out of tunnels in bark or wood

Preying beak: stout, sharp, and sharply hooked to tear into the flesh of animals

Probing beak: thin and long to reach insects and other small animals buried in mud or sand

Name: _____

Date: _____



1 _____



2 _____



3 _____



4 _____



5 _____



6 _____



7 _____



8 _____

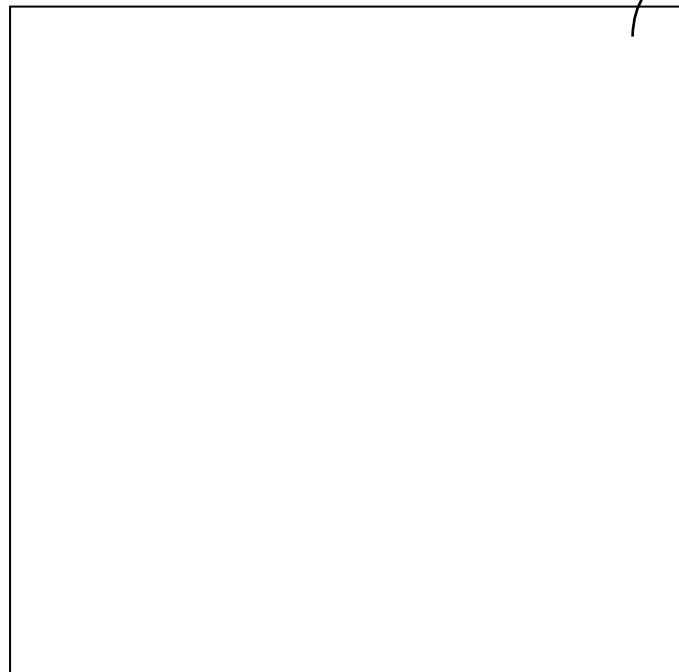
Beak Adaptations & Food Choices

Name: _____
Date: _____



Using the signs at the reserve, investigate the beaks and food choices of birds from the different habitats.

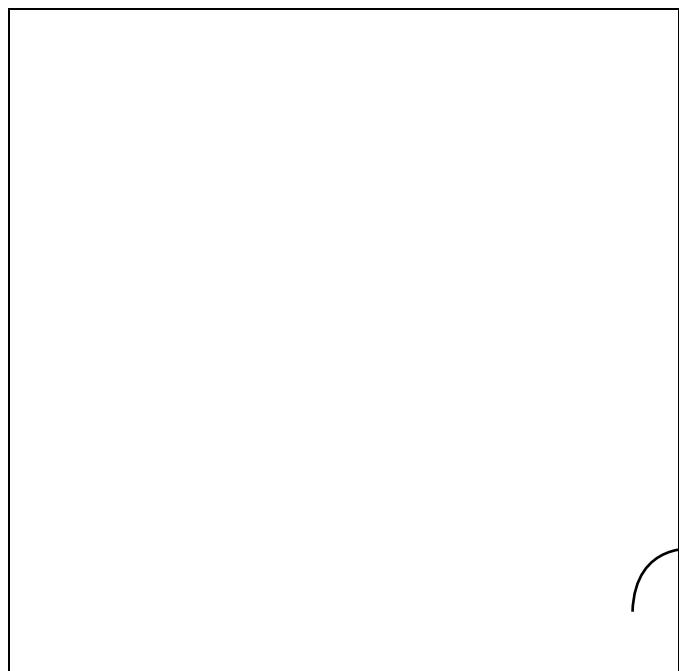
Shorebirds & Waders/ drawing of head & beak



Bird name: _____

What it likes to eat: _____

Land Birds/ drawing of head & beak



Bird name: _____

What it likes to eat: _____

Bird name: _____

What it likes to eat: _____

Bird Watching at Reserves

Name: _____

Date: _____



Look for birds that you can see around the reserve. Observe their shape, size, colour, behaviour and location. Draw two of the birds that you see. Try to include where you see them in your picture. Are they on the water, in the trees or on the plants?

Bird & Location 1:

Bird & Location 2:

Colouring the Birds of Bermuda

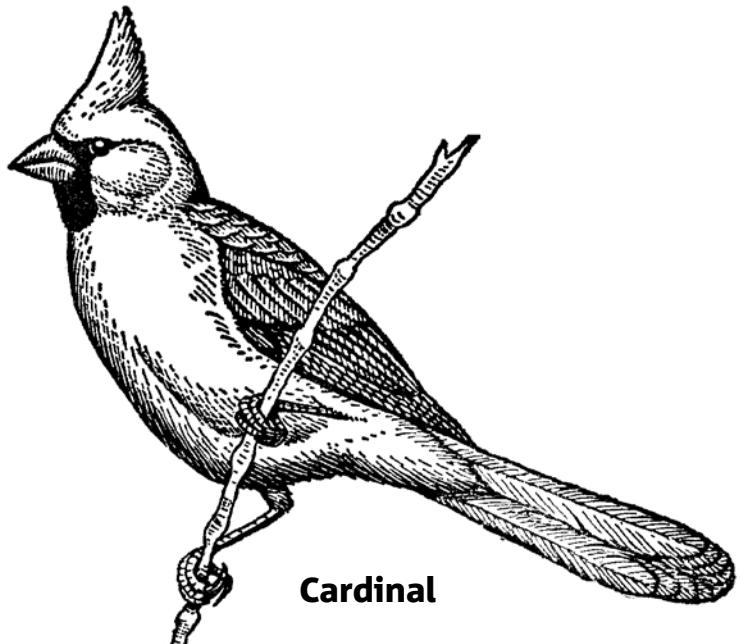
Name: _____
Date: _____



Colour In the pictures of the birds



Bluebird



Cardinal



**Yellow-crowned
Night Heron**



Chick-of-the-village

Bird Word Search

Name: _____

Date: _____



Can you find the names of these birds that visit nature reserves?

The names run forward, backward, horizontal, vertical and diagonal.



MARSH EDGES

Ground dove
Starling
Sparrow
Swallow

MUDFLATS

Stilt
Sandpiper
Plover

WOODLANDS

Catbird
Cardinal
Chick-of-the-village
Kiskadee
Warbler

ON THE POND

Grebe
Coot
Teal
Duck
Heron

Bird Word Search/ANSWERS

S

P		G	S	T	A	R	L	I	N	G				
C	A	R	D	I	N	A	L		R					
	E	R						O	W					
B		K	R				U		O					
E		I	O			N	H		L					
T	L	I	T	S		W	D	E		L				
D	U	C	K		D	R	I	B	T	A	C			
	A		O	O				W	O					
	D	V	N					S	O					
R	E	V	O	L	P			T						
	E							E						
S	A	N	D	P	I	P	E	R	E	L	B	R	A	W
										L				
E	G	A	L	L	I	V	E	D	K	C	I	H	C	

Chick-Of-The-Village

Name: _____

Date: _____



How many words can you make from the bird name, CHICK-OF-THE-VILLAGE?

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____

Ecosystems & Food Chains

*ACTIVITY 1/PRIMARY 3

Quiet Observation

Have students find a quiet place by themselves and spend 10-20 minutes sitting quietly and observing their surroundings. Complete the activity sheet 'Quiet Observation' (page 64). Younger students can be asked to draw a picture and label their drawings with key words and sentences.

*ACTIVITY 2/PRIMARY 4

Habitats

Walk through the various areas of Somerset Long Bay East Nature Reserve and observe the different habitats. Using the aerial view of Somerset Long Bay (page 12) to determine the location of these habitats, sketch their approximate locations onto the map and label.

On the **A Wetland Home** picture (page 66), have students identify the following:

- The Birds – Heron and Duck
- The Fish – Bermuda Killifish
- The Insects – Fly and Dragon Fly
- The Amphibian – Toad
- Marsh plants – Cattail and Paspalum
- Forest plants – Palmetto and Cedar
- The reptile – put an **X** through the Red-eared Terrapin which has a negative impact on our ponds

*ACTIVITY 3/PRIMARY 6 · MIDDLE 1 & 3

Line Transects

Sample the various ecosystems at Somerset Long Bay East Nature Reserve by conducting line transects. A 3m-long string is sufficient to obtain a sample. Hula hoops (or meter-square quadrants) may be used if available.

On the data sheet (page 59), students record the following:

- The name of each species present along the length of the transect
- The number of individuals for each species
- The role of each organism as a producer (P), consumer (C) or decomposer (D)
- Other species that are in the vicinity of the line but did not fall on the sample line
- Biotic and abiotic factors that may affect the distribution of the organisms

Use the discussion questions (page 64) to promote understanding

*Games/PRIMARY 4 & 6 • MIDDLE 1 & 3

The following games are designed to help students understand food chains and food pyramids.

• Food Chain Game

Children will simulate the different elements of the food chain in this game by representing different levels and catching their food. You will need a playground or an area of open space.

Divide children into three groups: about 15 insects (herbivores), 5 lizards (carnivores), and 1-2 Kiskadees (top carnivores). Give each student a colour-coded paper indicating their group and a bag (their stomach) to collect their food as they catch it. Spread plants, leaves, coloured paper or popcorn around the area. Start the game by allowing the insects to run around and collect their food. After a minute, release the lizards to catch the insects. When a lizard catches an insect, the insect must give up its food to the lizard and the insect is now out of the game. After a few minutes, allow the Kiskadees to catch the lizards.

Discuss: The contents of the stomachs of the survivors and how this represents the energy the animal has obtained from what it has eaten, whether this is enough energy to live and reproduce, especially for the survivors. What would happen if a portion of the plants were contaminated, e.g. pesticides, and how this pollution moves up the food chain (bioaccumulation). Discuss what would happen if the game were played with equal numbers of insects, lizards and Kiskadees.

• Pyramid of Numbers

Students will build a human pyramid in this game to represent the food pyramid. They will each need a piece of paper to secretly write the name of a plant or animal that they know of that lives in Bermuda. Discuss the flow of energy and how it begins from the sun and then goes through plants and animals. Have all the students with names of plants come forward to form the bottom layer of the pyramid. Children will kneel on all fours, side-by-side in a row. They are the producers in this pyramid. Build the pyramid by adding rows of consumers. This structure will most likely be unstable as there will probably be more carnivores than the pyramid can support. Explain how each carnivore needs to eat several herbivores and each herbivore needs to eat many plants.

Replay the game, only this time assign the children a card with the name of a plant or animal on it. Ensure that each successive level has significantly less than the one before. While the children are in the pyramid, discuss the consequences of removing or eradicating.

• Food Webs

This game demonstrates the inter-relationships between members of a community. You will need a ball of yarn or string.

Have students stand in a circle; ask them to name some of the plants in the area. As a plant is named, give the ball of string to that child and have them wrap the string around their hand. As another plant is named, pass the string to this child who also wraps the string around their hand. After naming a few plants, ask for examples of herbivores that might eat these plants and then examples of carnivores that eat the herbivores. Continue to pass the string ensuring that all connections have been made. This should form a network across the circle, creating a food web.

Once formed, introduce a disturbance to the web. For example, a Cedar tree is cut down or a Casuarina blows over in a hurricane. Tug lightly on the string and see how many others in the circle are affected. All those who feel the tug should now tug lightly as well. You will see how quickly every individual in the web is affected by the destruction of one tree.

• What's for Lunch?

Using the components of their lunch boxes (or last meal), students will examine relationships in their food sources.

List each item in the lunch box and decide what each is made from. For example, in a ham and cheese sandwich, the bread is made from flour which comes from wheat, the ham comes from a pig which eats vegetables and grains, and the cheese comes from a cow which eats grass. On a piece of paper, have students draw themselves at the top and then draw the components of their lunch below. Use lines to link the items appropriately. Using colour codes, circle the producers, herbivores, consumers, etc. Which category shows up the most? Why?

Imagine one of the producers is not available. Put an X beside one plant. Then put an X beside all other items that are linked to that plant. Would the meal have been the same? Would they lose things that they need or just things that they want?

• Predator-Prey

This game emphasises skills needed by predators to catch and by prey to escape.

Have children form a large circle, about 15 feet across. Blindfold two children in the centre – one will be the predator (Kiskadee, Heron) and one the prey (Gambusia, Crab). They will move about the circle, acting their part. The predator will try to catch the prey by listening for him, tracking him down and tagging him. The children in the circle must be silent while the game is in progress. If either the predator or prey strays too close to the edge of the circle, the children will tap him twice. For variety, use different numbers of predators and prey. Put bells on some animals and see how they modify their strategy. Tighten the circle and see what happens.

Sources:

- Environmental Concern Inc and The Watercourse, *WOW! The Wonders of Wetlands*, USA, 2003
- Cornell, Joseph, *Sharing Nature with Children*, Dawn Publications, USA, 1998
- Martin, Michele, *Birds Are Brilliant!* Activity Guide for Teachers, Bird Life, Seychelles, 2001

Ecosystems

Ecology is the study of ecosystems – the relationship between organisms and their environment or habitat in which they live. The habitats at Somerset Long Bay East Nature Reserve include: a freshwater pond, freshwater pond, young woodland and beach/dune.

A study of ecosystems includes both the abiotic (non-living) and biotic (living) components.

Abiotic Factors: are the non-living 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 a 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

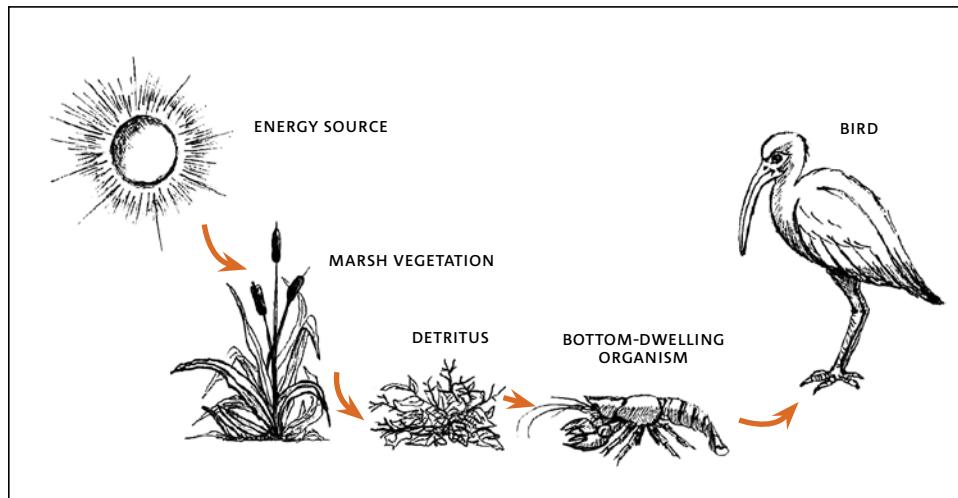
Commensalism: in which one organism benefits whilst causing little or no harm to the other

Disease

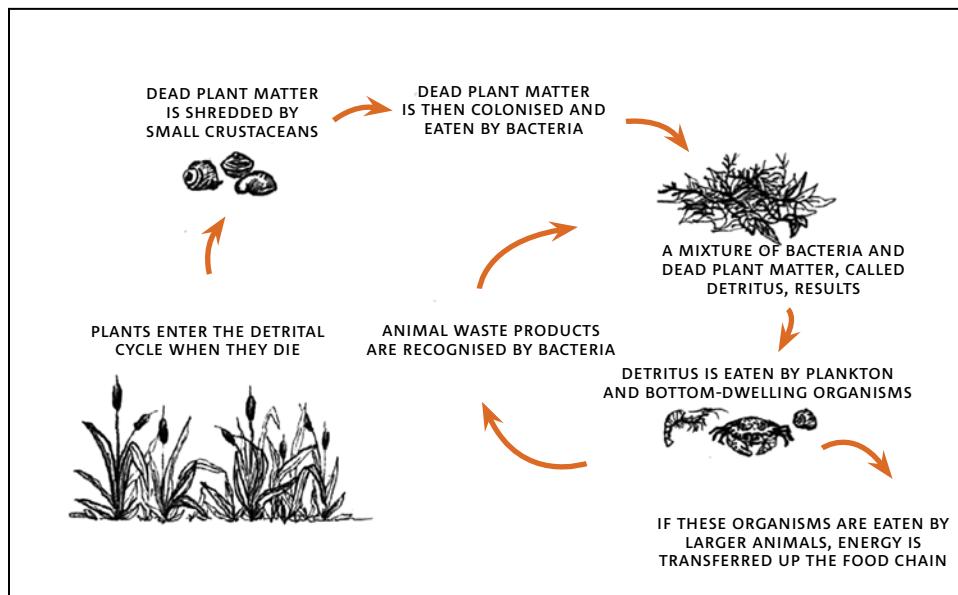
Food Chains

All organisms need energy to live, grow, move and reproduce. Animals obtain this energy from the food they eat. They are consumers – they are unable to make their own food and must eat other organisms to obtain energy. Plants can make their own food, using energy from the sun. They are producers and form the basis of any food chain. When producers and consumers die, bacteria and other microorganisms feed on them, breaking down the components into nutrients that can in turn be re-used by plants. These microorganisms are the decomposers.

Pond Edge Food Chain



The Role of Plants in the Detrital Cycle



Pond Transect Sample Data Sheet



Names of person(s) recording: _____

Habitat: _____

Date: _____

Time: _____

Names of species present along the length of transect	Number of individuals for each species	P (producer) C (consumer) D (decomposer)

**Other species
in the general
area but not on
the transect line:** _____

Biotic and abiotic factors that may affect the distribution of the organisms

Abiotic Factors
(temperature, wind,
pH, light, etc.)

Biotic Factors
(competition,
predators, disease,
parasites, etc.)

Quiet Observation Worksheet



Name: _____

Location: _____

Date: _____

Time: _____

Observations:

Sit quietly by yourself for a few minutes and observe the area around you. Record the various sights and sounds in the environment. Use your senses. What animals and plants do you see? What are the animals doing?

Thoughts:

As you watch your surroundings, write down some of your thoughts.

Living or Non-living

Name: _____

Date: _____



Draw and label things that you see in nature reserves that are living or non-living. Make sure you put them in the correct column!

Living

Non-living

Pond Life Scavenger Hunt/**PRIMARY 2-6**

Name: _____

Date: _____



Find two examples of each type of pond organism.
Draw and describe each one.

Pond Animal 1. _____

Pond Animal 2. _____

Pond Plant 1. _____

Pond Plant 2. _____

Nature Reserve Scavenger Hunt/PRIMARY 5-6

Name: _____

Date: _____



Walk through the reserve. Identify and record an example of each of the following items without disturbing the environment.

ITEMS TO FIND	NOTES LOCATION, NAME, ETC.
<input type="checkbox"/> The largest thing	_____
<input type="checkbox"/> The smallest thing	_____
<input type="checkbox"/> The coldest place	_____
<input type="checkbox"/> The warmest place	_____
<input type="checkbox"/> A seed or spore or new shoot	_____
<input type="checkbox"/> Something that can be recycled	_____
<input type="checkbox"/> Something alive that is camouflaged	_____
<input type="checkbox"/> Something with six legs	_____
<input type="checkbox"/> Something with wings	_____
<input type="checkbox"/> Something that swims	_____
<input type="checkbox"/> Something alive that makes a noise	_____
<input type="checkbox"/> Something that pollutes	_____
<input type="checkbox"/> A home for an animal	_____
<input type="checkbox"/> Something that hurts the environment	_____
<input type="checkbox"/> Something that helps the environment	_____
<input type="checkbox"/> The beginning of something	_____
<input type="checkbox"/> A stem, leaf, root	_____
<input type="checkbox"/> An interaction between a living and a non-living thing	_____
<input type="checkbox"/> An introduced organism	_____
<input type="checkbox"/> An invasive organism	_____

Discussion Questions/ **PRIMARY 6 • MIDDLE 1 & 3**

Categorising Species

- What is the predominant species at each sampling point?
- Which area had the most producers? Why?
- Which area had the most consumers? Why?
- Which area had the most decomposers? Why?
- Which area had the most native and endemic species? Why?
- Which area had the most introduced species? Why?
- What invasive species are in each zone?

Biodiversity

- Which area had the highest diversity of animals and plants?
- What were the biotic and abiotic factors in that area?
- Why do you think diversity was highest in that area?
- What are some limiting factors at work in this area?
- What are some adaptations that organisms might have, to be able to live in this area?
- Which area had the lowest diversity?
- What were the biotic and abiotic factors in that area?
- Why do you think diversity was lowest in that area?
- What are some limiting factors at work in this area?
- What are some adaptations that organisms might have, to be able to live in this area?
- What are the benefits of high biodiversity in an area?
- What could cause the biodiversity of a forest, pond or marsh to decrease?

Distribution of Organisms

- Were the same species present at each point in the woodland?
- Were the limiting factors the same from 0 to 10 meters in the woodland?
- If the limiting factors changed, explain why.
- What do you think might cause the distribution of species in the woodland to change?
- Name the location(s) of the Brazil Pepper trees.
- What do you think could explain the distribution of the Brazil Pepper trees?
- What might happen to the pond if the following occurred?
 - Road run-off was directed into the pond
 - Sewage from houses was directed into the pond

Energy Flow in an Ecosystem

- Why do plants and animals need energy? Where do they get it from?
- Make up a food chain that could occur at Somerset Long Bay East Nature Reserve.
This could be specific to one of the habitats or could interlink habitats.
- Use your food chains to make a food web. You may have to add more organisms to create the links.
- What possible effects could pollution have on a food chain?
- What would happen if one of the links in the food chain became extinct?

Succession

- How do you think the woodland/pond may have looked 20 years ago?
- How do you think the woodland/pond might look 20 years in the future?
- What signs of succession did you see during the day? Explain.

Human Interaction

- How do humans interact with woodlands?
- What benefits do humans gain from woodlands?
- How are woodlands beneficial to the environment?
- How do humans interact with ponds?
- What benefits do humans gain from ponds?
- How are ponds beneficial to the environment?
- Compare the species found in the pond habitat at Somerset Long Bay East Nature Reserve today with those that would have been found there 600 years ago.
- If there have been any changes, explain why these changes have occurred.
- What might happen to Somerset Long Bay East Nature Reserve and the surrounding area if it was not managed by conservation organisations?

Global Context

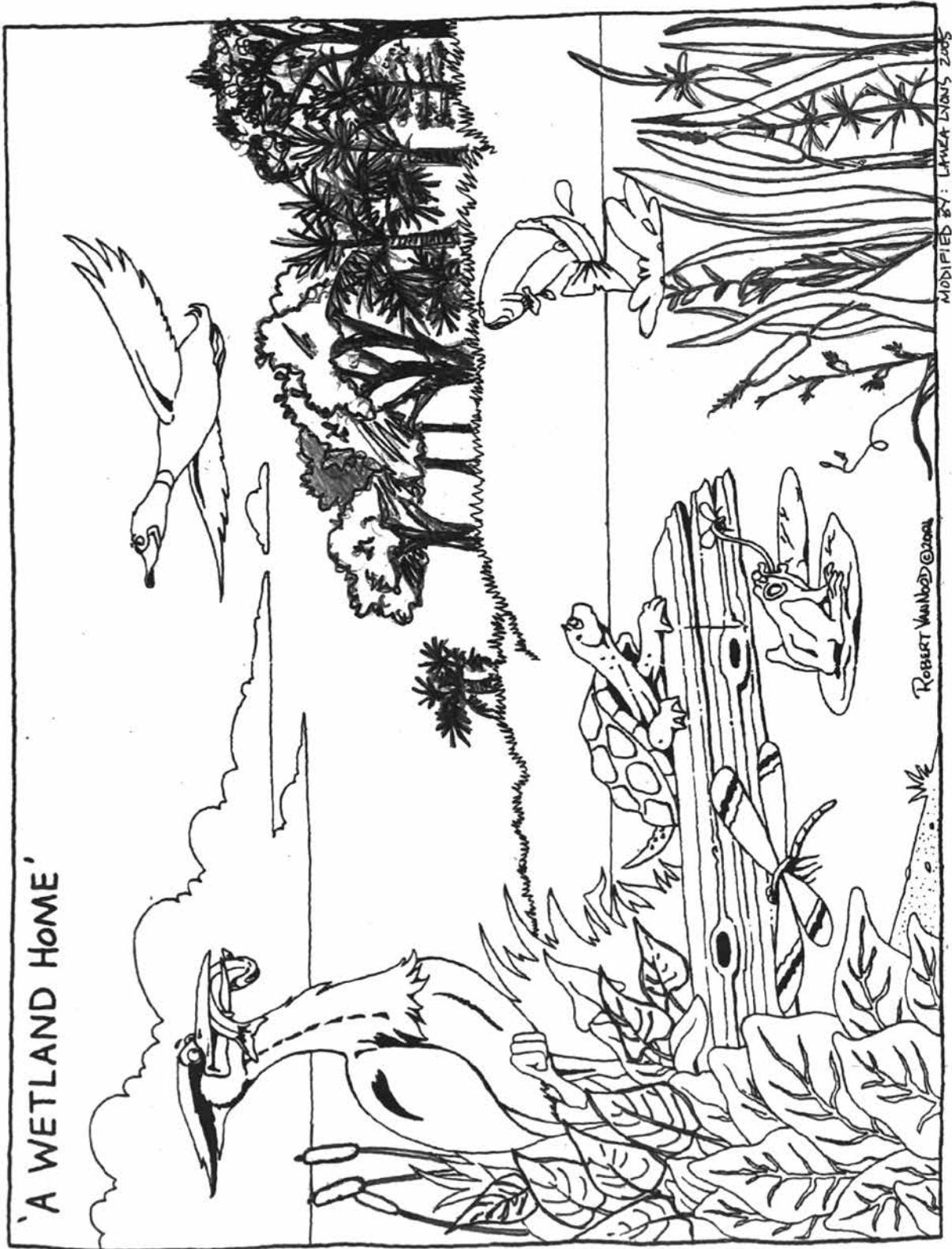
- Compare the species found in the Bermuda forest to those commonly found in a forest in the USA or the UK.
- The following are six different kinds of forest that exist in the world. Find an example of each kind.
 - a) Boreal Forests
 - b) Temperate Deciduous Forest
 - c) Freshwater Swamp
 - d) Saltwater Swamp
 - e) Tropical Rainforest
 - f) Temperate Rainforest
- Compare the species found in Pitman's Pond, a freshwater pond, with those found in a saltwater pond.
- Compare the species found in the Bermuda pond to those commonly found in a pond in the Caribbean or North America.
- What other kinds of wetlands are there in the world other than freshwater ponds?



Name: _____

Date: _____

'A WETLAND HOME'



Glossary

Abundant: present in great quantity; more than adequate; oversufficient

Acquired: to come into possession or ownership

Anoxic: lacking oxygen

Biodiversity: the number of different species present at a location

Brackish: a mix of fresh and salt water

Calcareous: containing or composed of calcium

Campaign: a systematic course of aggressive activities for a specific purpose

Colonise: The spreading of species into new areas

Community: a naturally occurring group of organisms

Conservationist: a person who advocates or strongly promotes preservation and careful management of natural resources and the environment

Development: the act or process of growing or progressing

Dominant: the most important organism in a community. Usually taken as the one contributing the greatest biomass

Domination: the act of ruling or taking over, controlling

Dwindle: to become smaller and smaller; to waste away; shrink

Earmarked: set aside for a specific purpose, use or recipient

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

Endangered: threatened with extinction

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

Erosion: the process by which the surface is worn away by the action of water, wind, waves etc.

Excavate: to make a hole or cavity by removing material

Freshwater lens: layer of fresh groundwater that floats on top of denser saltwater. It arises when rainwater seeps down through a soil surface and then gathers over a layer of seawater at or down to about five feet below sealevel

Habitat: a small area of environment where animals live

Introduced species: a species transferred to a new location by man, either accidentally or on purpose

Invasive: spreads aggressively by itself

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

Native species: a species which arrived in a new area by natural means and subsequently reproduced and survived

Policy: a course of action or procedure adopted and pursued by an organisation, usually Government

Pooled resources: to put into a common stock for a common interest

Predator: any organism that exists by preying upon other organisms

Replicate: to repeat, duplicate, or reproduce

Reproduction: the process by which new 'offspring' individual organisms are produced by their 'parents'

Restore: to bring back into existence or use, to a former or original condition; to bring back to a state of health or vigour

Salinity: the total dissolved salt content of sea water

Susceptible: capable of being affected by some influence or agency

Threat: an indication of warning or probable trouble

Windbreak: a structure, wall or growth of trees serving as a shelter from the wind

Somerset Long Bay East Nature Reserve

Teacher Resources

Activities & Curriculum Links

Before your visit/ *Introducing Students to Somerset Long Bay East Nature Reserve*

Activity	Grade Level	Subject	Curriculum Link
Activity 1 Science Vocabulary	Primary 1, 2, 3	Social Studies	P1 – Understand the concept of a map, identify a map of the island of Bermuda.
Activity 2 Geography Where is Somerset Long Bay East?			P2 – Be able to connect places with their correct parish.
Activity 3 Introduction to Somerset Long Bay East Nature Reserve	Primary 4, 5, 6	Social Studies	P3 – Create and interpret simple maps. Identify, draw or model and describe Bermuda's landforms, bodies of water, bridges, parishes and places as noted in the P1 and P2 curriculum.
		Information Technology	P4 – Create and interpret maps of Bermuda, using cardinal signs, symbols and simple legends, identify and describe major land forms and water bodies in Bermuda.
			P5 – Use cardinal and intermediate directions latitude and longitude to locate specific points in the community.
			P6 – Use physical and thematic maps to make comparisons between natural resources and natural vegetation.
			P4, 5, 6 – Manage computer generated documents. Format text using a word processor. Use graphic software tools.

During your visit/Class Field Trip Activities

Activity	Grade Level	Subject	Curriculum Link
Activity 1 Find Your Tree	Primary 1-2	Science	P1 – Know animals or plants are living things, Know that there are living things and things that have never been alive, Explore ways that different animals and plant inhabit local environments.
Activity 2 Scavenger Hunt			P2 – Can identify similarities and differences between local environments and know about some of the ways in which these affect the animals and plants found there.
Activity 3 Who Listens Well?	Primary 3-4	Science	P3 – Can describe differences between living and non living things using knowledge of life processes. Know life processes common to humans and animals include nutrition (water and food), movement, growth and reproduction.
Activity 4 Bird Observations			P4 – Investigate how different animals are found in different habitats and are suited to the environment in which they are found.
Activity 5 Flora and Fauna	Primary 5-6	Social Studies	P5 – Explain the impact of population increases on the environment. Explain how people in Bermuda have adapted to and changed the environment over time.
Activity 6 Ecosystems Elements			P6 – Explain how the human and natural alterations of the physical environment have produced positive and negative effects on the environment. Demonstrate how people can work together to solve/prevent environmental problems and prevent future ones.
Activity 7 Pond Water pH Findings	Middle 1 & 3	Science	M1 – Describe how organisms are adapted to their habitat. Discuss positive and negative influence of humans on the environment.
Activity 8 Habitats & Animal Adaptation			M3 - Explain the ways in which living things are adapted to their habitats. Describe and investigate some effects of human influences on the environment.

After your visit/Activities

Appreciating Our Open Spaces

Activity	Grade Level	Subject	Curriculum Link
Activity 1 Somerset Long Bay East Nature Reserve Books	Primary 1-2	English Science	P1-2 – Reading non-fiction. P1 – Explore ways that different animals and plants inhabit local environments. Can name the major parts of a plant looking at real plants.
Activity 2 Class Books		Social Studies	P2 – Can identify similarities and differences between local environments and know about some of the ways in which these affect the animals and plants found there. P1-2 – Understand the difference between and give examples of natural and man-made environments.
Activity 3 Individual Books	Primary 3-4	English Science Social Studies Visual Arts	P3-4 – Reading and writing non-fiction. P3 – Can describe differences between living and non living things using knowledge life processes. P4 – Investigate how different animals are found in different habitats and are suited to the environment in which they are found. P3 – Recognize and locate landmarks in Bermuda. P4 – Identify and describe major land forms and water bodies in Bermuda. P3 – Demonstrate proper technique for holding a camera. P4 – Look carefully at an object and photograph it from three points of view.
Activity 4 Power Point Presentation	Primary 5-6	English Science	P5-6 – Reading and writing non-fiction. P5 – The life cycle of a flowering plant. P6 – Explore how humans have positive and negative effects on the environment e.g. loss of species, protection of habitats.
Activity 5 Categorizing Plants, Trees and Animals	Primary 1-2	Science	P1 – Know that animals and plants are living things. Explore ways that different animals and plants inhabit local environments. P2 – Can identify similarities and differences between local environments and know about some of the ways in which these affect the animals and plants found there.
Activity 6 Nature Walk, Hunting for Specific Trees	Primary 2-3	Science	P2 – Can identify similarities and differences between local environments and know about some of the ways in which these affect the animals and plants found there. P3 – Can sort things into groups using simple features and describe rationale for groupings.

Appreciating Our Open Spaces • continued

Activity	Grade Level	Subject	Curriculum Link
Activity 4 Imagine a World... Discussion and Drawing	Primary 3-4	English	P3-4 – Speaking and listening.
		Social Studies	P3 – Demonstrate understanding of humans responsibility for the environment (problem-solve).
		Science	P4 – Can recognise that human activity affects the environment.
Activity 8 Discussion: The Pros and Cons of Protecting Our Open Space	Primary 3, 5, 6	English	P3, 5, 6 – Reading and writing non-fiction.
		Social Studies	P3 – Describe how the physical environment influences human activity. Demonstrate their understanding of their responsibility to the environment.
		Science	P5 – Explain the impact of population increases on the environment. Explain how people in Bermuda have adapted to and changed the environment over time. P6 – Explain how the human and natural alterations of the physical environment have produced positive and negative consequences. Demonstrate how people can work together to solve present environmental problems and prevent future ones. P4 – Can recognize ways that human activity affects the environment.
Activity 9 Community Projects	Primary 3, 4, 6	English	P3-6 – Phonics, spelling and vocabulary, Grammar and punctuation, Reading and Writing - Non-fiction, Speaking and Listening.
		Social Studies	P3 – Describe how the physical environment influences human activity. Demonstrate understanding of humans' responsibility for the environment.
		Science	P6 – Explain how the human and natural alterations of the physical environment have produced positive and negative consequences. Demonstrate how people can work together to solve present environmental problems and prevent future ones. P4 – Can recognise ways that human activity affects the environment.
Activity 10 Debate: Protecting Nature Reserves or Building Homes	Primary 5, 6 Middle 1 & 3	English	P5-6 , Middle 1 & 3 – Speaking and listening.
		Social Studies	P5 – Explain the impact of population increase on the environment. P6 – Explain how the human and natural alterations have produced positive and negative consequences. M3 – Develop an understanding of sustainable development.
		Science	P6 – Explore how humans have positive and negative effects on the environment. M1 – Discuss positive and negative influence of humans on the environment. M3 – Describe and investigate some effects of human influences on the environment.

Flora of Somerset Long Bay East Nature Reserve

Activity	Grade Level	Subject	Curriculum Link
Activity 1 Cedar & Palmetto Trees	Primary 1-2	Science	<p>P1 – Explore ways that different plants inhabit local environments.</p> <p>P2 – Identify similarities and differences between local environments and know about some of the ways in which these affect the animals and plants found there, understand ways to care for the environment.</p>
Activity 2 Junior Horticulturists	Primary 1-2	Science	<p>P1 – Know animals or plants are living things and that there are living things and things that have never been alive. Explore ways that different animals and plant inhabit local environments, name the major parts of a plant.</p> <p>P2 – Identify similarities and differences between local environments and know about some of the ways in which these affect the animals and plants found there, understand ways to care for the environment.</p>
Activity 3 Native & Endemic Tree Collage, Stories and Poetry	Primary 3	English	P3-6 – Reading and writing non-fiction (Poetry).
Activity 4 Survey Your School Grounds	Primary 3 - 6	Science	<p>P3 – Can sort things into groups using simple features and describe rationale for groupings.</p> <p>P4 – Can recognise ways that human activity affects the environment.</p> <p>P6 – Explore a number of ways of caring for the environment.</p>
		Social Studies	<p>P3 – Create and interpret simple maps.</p> <p>P5 – Explain the impact of population increases on the environment.</p>
		Math	<p>P6 – Explain how the human and natural alterations have produced positive and negative consequences.</p> <p>P3 – Use tally charts, pictograms, bar charts.</p> <p>P4 – Answer a question by identifying what data to collect, organizing, presenting and interpreting data in tables, diagrams, tally charts, pictograms and bar charts.</p> <p>P5 – Draw pictograms and bar line charts.</p>

Birds

Activity	Grade Level	Subject	Curriculum Link
Activity 1 Getting to Know Birds	Primary 3-4 & 6	Science	P3 – Can sort things into groups using simple features and describe rationale for groupings, know life processes common to humans and animals including nutrition (water and food), movement, growth and reproduction.
Activity 3 My Favorite Bird	Middle 1 & 3		P4 – Investigate how different animals are found in different habitats and are suited to the environment in which they are found, use simple identification keys.
Activity 4 Where Do They Go?			M1 – Describe how organisms are adapted, drawing on locally occurring examples.
Activity 5 Bird Activity Worksheets			M3 – Describe the ways in which living things are adapted to their habitats.

Ecosystems & Food Chains

Activity	Grade Level	Subject	Curriculum Link
Activity 1 Quiet Observation	Primary 3	English Science	P3 – Reading and writing non-fiction P3 – Can sort things into groups using simple features and describe rationale for groupings.
Activity 2 Habitats	Primary 4	Science	P4 – Investigate how different animals are found in different habitats and are suited to the environment in which they are found, use simple identification keys.
Activity 3 Line Transects	Primary 6 Middle 1 & 3	Science	P6 – Children have explored and can construct food chains in a particular habitat. M1 – Draw and model simple food chains. Discuss positive and negative influence of humans on the environment. M3 – Explain food chains, food webs and energy flow. Describe and investigate some effects of human influences on the environment.

References

Amos, E. J. R. *A Guide to the Birds of Bermuda*. E.J.R. Amos, Warwick, Bermuda 1991.

Bermuda Zoological Society *Bermuda Wetlands*, Project Nature, Field Study Guides for Bermuda Habitats. Bermuda Zoological Society, Bermuda 2001.

Bermuda Zoological Society *Project Nature, Eco-File, Information Sheets on Bermuda's Natural History*. Bermuda Zoological Society, Bermuda 1995.

Collett, Jill *Bermuda: Her Plants and Gardens 1609-1850*.
MacMillan, Bermuda National Trust, London 1987.

Dobson, Andrew *A Birdwatching Guide to Bermuda*. Chelmsford: Arlequin, 2002.

Ministry of the Environment *Growing With Trees, Millennium Tree Planting Guide*.
Ministry of the Environment 2000.

Peterson, Roger Tory *A Field Guide to the Birds of Eastern and Central North America*.
Houghton Mifflin Company, Boston 1980.

Phillips-Watlington, Christine *A Field Guide to Bermuda's Botanical Wonderland*.
MacMillan Education Ltd. 1996.

Thomas, Martin Lewis Hall *A Naturalist's Field Guide to Bermuda*.
Bermuda: Bermuda Zoological Society, 2010.