

Gateway

US Department of the Interior
National Park Service

Gateway National Recreation Area
Jamaica Bay Unit
New York



Habitats by Land and Sea



Jamaica Bay Wildlife Refuge Queens

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Introduction

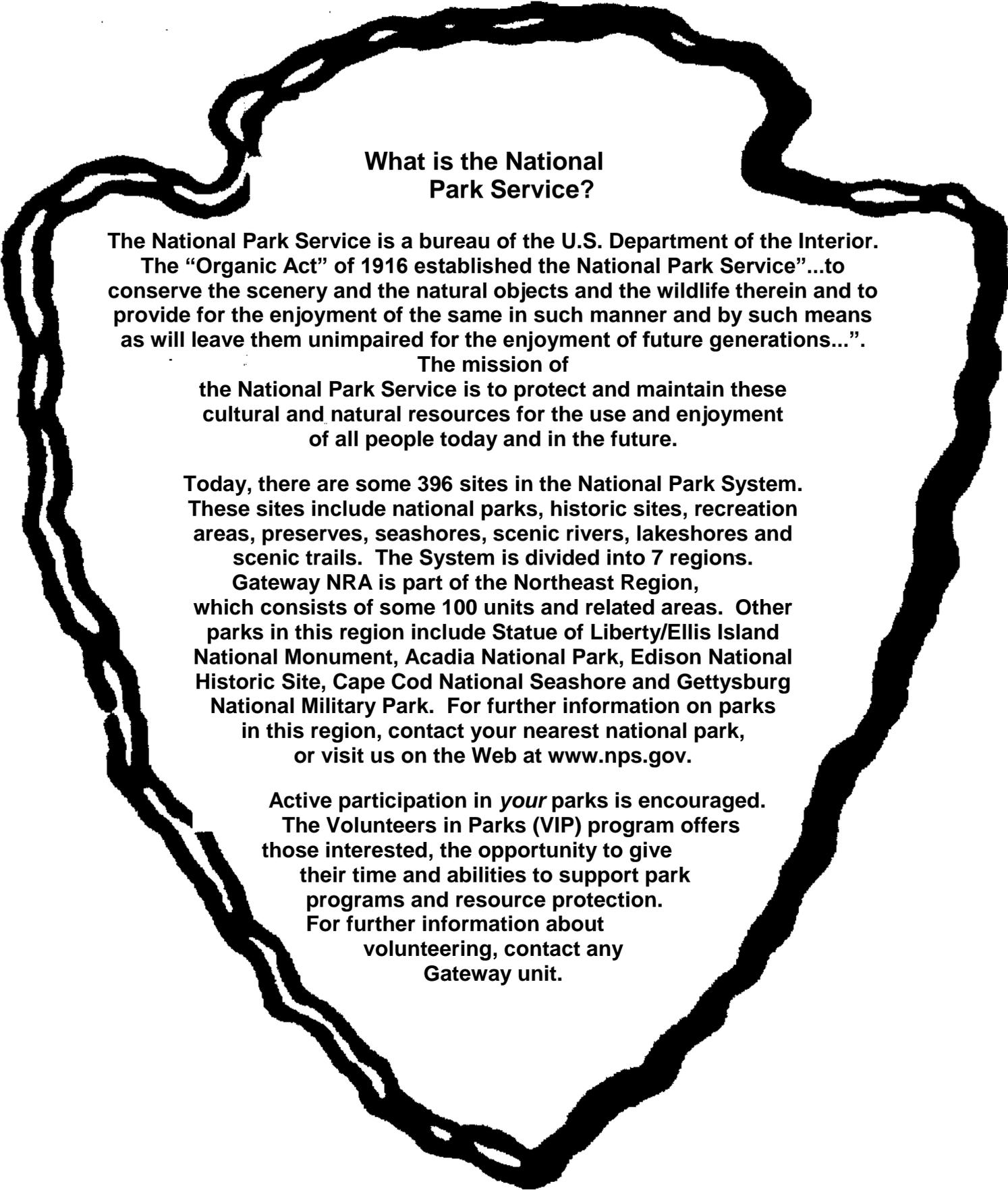
Dear Teacher:

Gateway National Recreation Area and the staff of the Jamaica Bay Unit are pleased to welcome you and your class. The information in this packet is designed to acquaint you with the Wildlife Refuge prior to your visit, so that you and your students can make the most of your experience.

The National Park Service administers Gateway National Recreation Area. Our mission is to preserve and protect the natural and cultural resources in the park. Education plays a vital role in the accomplishment of this objective. The foundation of this program is built on the New York City standards and emphasizes hands-on investigation of natural resources.

Our approach to environmental education is interdisciplinary and hands-on. The success of the program depends on the incorporation of both the pre-site and post site activities, included in this packet. It is extremely important that your students bring the field experience back to the classroom and the home/school environment.

The Wildlife Refuge habitat areas offer the opportunity for exciting investigations of the physical and natural worlds. Our primary goal is to stimulate children's natural sense of wonder and educate them about their environment.



What is the National Park Service?

The National Park Service is a bureau of the U.S. Department of the Interior. The “Organic Act” of 1916 established the National Park Service”...to conserve the scenery and the natural objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations...”.

The mission of the National Park Service is to protect and maintain these cultural and natural resources for the use and enjoyment of all people today and in the future.

Today, there are some 396 sites in the National Park System. These sites include national parks, historic sites, recreation areas, preserves, seashores, scenic rivers, lakeshores and scenic trails. The System is divided into 7 regions.

Gateway NRA is part of the Northeast Region, which consists of some 100 units and related areas. Other parks in this region include Statue of Liberty/Ellis Island National Monument, Acadia National Park, Edison National Historic Site, Cape Cod National Seashore and Gettysburg National Military Park. For further information on parks in this region, contact your nearest national park, or visit us on the Web at www.nps.gov.

Active participation in *your* parks is encouraged.

The Volunteers in Parks (VIP) program offers those interested, the opportunity to give their time and abilities to support park programs and resource protection.

For further information about volunteering, contact any Gateway unit.

HABITATS BY LAND AND SEA

Target Audience: 4th-6th

Length of Program: 2 hours

Theme: The diverse habitats of the Jamaica Bay Wildlife Refuge support a variety of plants and animals that have different adaptations for survival.

Goals:

1. Students will understand that within any given habitat, animals and plants display adaptations that enhance their survival.
2. Students will understand that the environmental conditions (i.e. soil type, sun exposure, moisture, wind, temperature, vegetation cover, salt spray, etc.) within a habitat influence the plants and animals that live there and shape their adaptations.

Objectives:

1. Students will be able to define the words *habitat* and *adaptation*.
2. Students will be able to name one animal or plant from each habitat.
3. Students will name one adaptation and describe how it helps the organism survive.
4. Students will be able to state one example of how environmental conditions affect animal and plant adaptations (ie. sun, salt, wind, moisture, or shade)

CURRICULUM CONNECTIONS

New York City Department of Education Elementary School Scope and Sequence for Science

Unit 1

Exploring the Temperate and Deciduous Forests and Other Ecosystems

- An ecosystem is made of living and non-living elements. 1.1a-d
- Who are members of the forest community? 5.2
- Population 6.1 e-f
- Competition between and within species 3.2b, 6.1e-f
- Competition between plant groups 6.1 e-f

New York State Elementary Level Science Core Curriculum:

Science Content: Level III

IIIA: Living things are affected by and affect the environment.

IIIB: Environmental conditions in an area determine the types of plants and animals within a community.

IIIE.3: Changes in one part of the ecosystem may affect other parts of the ecosystem.

Inquiry Skills: Classifying, generalizing, inferring, observing and recording data.

Language Arts Skills: Classifying, developing vocabulary, questioning, recording data, acquiring information and communicating information.

Science Attitudes: Appreciating nature and enjoying the process of studying about it.

TRIP INFORMATION

Travel Directions

From Manhattan, Brooklyn and Queens: take the Belt Parkway to Cross Bay Boulevard (Exit 17S). Drive south through the town of Howard Beach and over the North Channel Bridge (no toll). Continue one and a half miles south to a stop light. Make a right into the Wildlife Refuge entrance and parking lot.

From Rockaway: take Beach Channel Drive/Rockaway Freeway to the Veteran's Memorial/Cross Bay Bridge. Cross north over bridge (toll) to Cross Bay Boulevard and through the town of Broad Channel. The refuge entrance/parking lot is approximately ½ mile north of town on the west (left) side of Cross Bay Boulevard.

Bus Permit for the Belt Parkway

A bus permit is required by all buses traveling the Belt Parkway. The issuance of a permit is subject to restrictions, due to construction schedules. If you intend to use the Belt Parkway in order to reach the Wildlife Refuge, inquire about a permit with the bus company.

Program Information

When you and your class arrive at the Wildlife Refuge, a Park Ranger will meet you and begin your program. Groups are expected to arrive at 10am unless otherwise noted. Please call (718)338-4306 if you are going to be late or have to cancel your visit for any reason. Ranger guided programs last from 10am to 12pm. Afterwards, most classes spend approximately ½ hour for lunch and bus boarding.

Gateway National Recreation Area



THINGS TO REMEMBER

Preparation

1. The success of your visit depends on how well you and your class are prepared. Please review the teacher packet and provide necessary information about the site and class visit to your students. Discuss the park rules with your class and chaperones before the trip. Failure to follow the rules and improper behavior could lead to early termination of the class visit.
2. Please have at least one adult chaperone for every ten children. At no time are students to be left without adult supervision. Chaperones are encouraged to take part in ranger led activities.
3. Students are free to explore under the guidance of the ranger. The teacher and chaperones are responsible for discipline and control of the class. The class must stay together as a group and stay on the trails unless otherwise directed by the ranger.
4. To make the trip more personal for each student and to ease communication with individuals, we recommend that the students wear name tags.
5. The Habitats by Land and Sea Program requires that students come prepared for the on-site activity by having prior experience working in their cooperative teams and have an understanding of various environmental concepts. This can be assured if you work through the recommended pre-visit assignments with your students.

Dress

1. The refuge is usually windy and cool because it is near the shore, so please dress accordingly. We suggest the students wear layered clothing: a hat, scarf, gloves and long johns in cool weather, a hat and sun protection in warm weather. Rain gear such as a tarp or raincoat should be brought along, as the students will be expected to go outdoors, rain or shine.
2. Students should wear casual clothing as they may be required to sit on the ground or walk through muddy areas. All students should wear long pants and a long sleeved shirt (regardless of the temperature) and closed, comfortable walking shoes, boots or sneakers. Open sandals and high heels are **not** recommended.

Safety

1. Ticks are commonly found on and near vegetation during the spring, summer and autumn. They can be avoided by staying on the trails and dressing properly. For further information, please read the tick information bulletin included in this packet.

2. Poison Ivy is ubiquitous throughout the park. It is identified by its smooth-margined leaflets in groups of three, aerial rootlets and creamy white berries. It can grow as a vine, woody shrub or ground cover. Students can avoid contact with poison ivy by staying on the trails and not touching plants they are unfamiliar with. If contact does occur with this plant, wash well with soap and water.

Lunch

1. There is no food concession at the refuge and an indoor eating space is not available. At the discretion of the teacher, students can bring a bag lunch for after the program.

2. Picnic tables are located outside of the visitor center. Please collect all of the lunches and place them in a large box or bag for distribution after the program. In the event of inclement weather, lunches could be brought back to the school, or with the permission of the driver, eaten on the bus.

Things to Bring

1. First aid kit, insect repellent and drinking water (other beverages are not permitted on the trail).

2. Extra lunches, clothing, rain gear, watches or timers, and pencils for those students not prepared.

1. Binoculars, hand lenses, field guides and a small notebook are recommended. Please note: specimen (i.e., soil, water, plants, shells, etc.) collecting is not permitted even for educational purposes.

HISTORY

Jamaica Bay's form has been determined largely by the glaciers that intermittently covered our region between 1.5 million and ten thousand years ago, and the melt waters and outwash that formed much of southern Queens and Brooklyn. Wind, wave, tide and creeks have been and continue to be dynamic forces sculpting the ever-changing borders and the shape of Jamaica Bay.

The retreat of the glaciers coincides with the oldest dated remains of Native Americans in this area. The Lenape Indians dwelled around Jamaica Bay where they hunted, fished and collected wild grains and fruits. Starting approximately 1,000 B.C. they began cultivating maize, beans and squash.

Dutch settlers arrived in New Amsterdam in the 1600s. They traded with the Lenape and learned much about hunting, fishing and farming from them. The Dutch and other European settlers eventually gained dominance over the land.

The nineteenth century witnessed a period of rapid growth in New York City as population and industry expanded. In order to accommodate this development, much of the marshland in and around Jamaica Bay was drained and filled through the 1950's. The bottom of the bay was dredged for fill, or to create channels for water-borne transportation.

Robert Moses, Commissioner of Parks for New York City, realized the great loss of resources that accompanied the destruction of the bay and sought a plan to arrest the dangerous trend. In 1950, the city adopted his proposal to develop five parks around the bay and the Jamaica Bay Wildlife Refuge was established. Shortly thereafter, plans were put in motion to improve the area and create additional habitat for a diverse wildlife population.

In 1953, the New York City Transit Authority sought permission from Commissioner Moses to build an embankment for the IND train track across Jamaica Bay. Mr. Moses granted the permit with the stipulation that the Transit Authority construct a series of dikes or impoundments that would prevent the flow of tidal waters behind them. Rain water filled these natural low lying areas, the results of which became the 45 acre West Pond and the 120 acre East Pond.

Material was dredged from the bay to create additional upland landmasses. These areas, as well as the early dikes, were then planted with vegetation that would stabilize the new soils, as well as provide important food, cover and nesting areas for wildlife.

Much of the early work was accomplished by a small crew of workers headed by Herbert Johnson, the first manager of the Jamaica Bay Wildlife Refuge. He spearheaded the plans for habitat improvement, developed an environmental education program for urban school children and created a trail system for the enjoyment of the visiting public.

On October 27, 1972, the United States Congress authorized the National Park Service to accept donations of land from New York and New Jersey to establish Gateway National Recreation Area. One of these acquisitions included the Jamaica Bay Wildlife Refuge. Today the refuge's 9,155 acres of salt marsh, open bay, freshwater ponds and uplands provide safe haven for marine life, small mammals, reptiles, amphibians and over 325 species of birds.

NATURAL RESOURCES

THE UPLANDS

Definition: Higher ground not subject to marine tides or standing water, often characterized by the presence of woody plant species and other vegetation.

Ecological Importance: The fruits, buds, leaves and stems of upland plants provide food for a wide variety of insects, birds and mammals. Thick vegetation offers cover from predators as well as nesting sites and shelter for all forms of wildlife. The deciduous nature of many woody plants leads to the annual input of organic matter into the soil each autumn, in the form of detritus. This detritus is fed upon and broken down by fungi and soil organisms and, through time builds a topsoil of moist, nutrient rich humus. Through the years, uplands go through the process of natural succession as pioneer plants that require strong sunlight and do well in poor soils get replaced by more competitive, shade-tolerant species that thrive in moist, rich environments. Through evaporation and transpiration, woodland communities supply significant amounts of moisture to the atmosphere and moderate the local climate. As a by-product of photosynthesis, the oxygen given off by green plants is important to most animal life on earth.

Upland Plants: Here at the refuge, the upland plants include species that were planted to provide food and cover for wildlife as well as naturally occurring early successional species. Original tree plantings of autumn olive, Japanese black pine, European alder, willow oak, red maple, red cedar, American holly and cottonwood still persist. Some of these, particularly species native to the area like American holly and red cedar, are successfully reproducing and saplings can be found throughout the upland community. Gray birch, black cherry and pussy willow, native early successional woodland species, have appeared here on their own, without the help of humans. In addition to trees, a variety of woody shrubs and vines can be found in the uplands including poison ivy, bayberry, European buckthorn, winged sumac, multi-flora rose, Virginia creeper, Japanese honeysuckle and oriental bittersweet. Wildflowers, ferns and grasses are also common.

Upland Animals: During spring, the uplands brim with activity as migrant warblers, vireos and tanagers touch down to glean insects from the tree limbs before continuing their northbound journeys, and resident songbirds begin their breeding and nesting season. Squirrels make their leafy nests high in the trees and chipmunks can occasionally be seen scurrying across the trail as they forage for food. Box turtles, snakes, even tree frogs, though well hidden, are common upland residents, as are earthworms and other soil invertebrates, and a host of insects from beetles to fireflies. Songbirds such as mockingbirds, mourning doves and robins feed of the fleshy fruits of many upland plants. Finches, sparrows and nuthatches prefer the dry fruits and seeds of birch, alder, pine and many herbaceous plants. During the autumn migration, woodland hawks hunt small birds and mammals in the uplands. In winter, the

evergreen pines and cedars offer important cover for many wildlife species and superb roosting areas for owls.

THE SALT MARSH

Definition: The land and water behind the barrier beach at the edge of the bay, subject to the rise and fall of the tides.

Ecological Importance: Salt marshes are one of the most productive natural habitats in the world. Several factors contribute to this great productivity, but the lion's share comes from the perennial grasses that dominate the salt marsh landscape. Each autumn, when the salt marsh grasses die back to the root stocks, a tremendous amount of biomass in the form of organic matter (detritus) is released into the tidal wetlands. This detritus is fed upon and broken down by many organisms, which in turn become food for others, and so on, all the way up to the top of the food pyramid. In addition, with each ebb and flow of the tide, organic matter produced in the salt marsh enters the open bay and eventually the ocean. From zooplankton and small marine invertebrates to shellfish, finfish and eventually top predators, the salt marsh grasses form the basis of a complex marine food web.

The extensive root systems and stems of salt marsh grasses trap sediments, debris and other runoff pollutants before they have a chance to enter the open bay. In urban areas, where airports, landfills and sewage treatment facilities are often located at the water's edge, this cleansing role of salt marshes is critical to the health of the bay. Salt marshes are also important buffers to the mainland that they fringe. By absorbing wave energy, they help control coastal erosion and are the first defense against coastal storms.

Salt Marsh Plants: The dominant plant species in this habitat are the perennial salt marsh grasses, salt marsh cordgrass and salt marsh hay. Salt marsh cordgrass grows closest to the open bay, at the lowest elevations of the marsh, and is subsequently inundated with saltwater during most high tides. Salt marsh hay grows on slightly higher ground, further back from the open water and is inundated only during extreme high tides associated with storms and full moons. Other salt marsh plants include black rush, spike grass, sea lavender and glasswort. Phragmites is common to salt marshes where natural elevation gradients have been disturbed due to dredging or other factors.

Salt marsh plants have few competitors among terrestrial plant communities. Most plants cannot tolerate the extremes of salinity and drought experienced by salt marsh plants, which are caused by the alternate flooding and receding of tidal waters. At high tide the salt marsh plants are flooded with saltwater, at low tide they are exposed to the drying effects of the sun, as well as fresh water in the form rain.

Just upland from the salt marsh, plants of tolerant of sandy soils, full sun and salt spray can be found. These include groundsel, bayberry, salt-spray rose, beach grass and seaside goldenrod.

Salt marsh Animals: The fertile, protected waters of salt marshes provide spawning sites and nursery grounds for many marine animals including bluefish, striped bass, flounder and other commercially important finfish. Atlantic silverside and killifish feed on the abundant algae and small invertebrates found in the salt marsh. Salt marsh mosquitoes and green head flies begin their lives in the marsh, as do grass shrimp, fiddler crabs, periwinkle snails and ribbed mussels. During late spring, horseshoe crabs move into the shallows and shorelines of the salt marsh to mate and lay eggs. Tree swallows hunt mosquitoes and other flying insects on the wing. Egrets and herons stalk fish in the shallow waters, while glossy ibis, sandpipers and plovers probe the mudflats for invertebrates. Osprey nest upon man-made platforms at several locations on Jamaica Bay salt marshes, occasionally they can be seen hunting fish. Gulls are abundant year-round. During spring and summer, red-winged blackbirds, song sparrows and common yellowthroat warblers can be heard calling from the upper reaches of the salt marsh. During the winter months, salt marshes proved food and shelter for thousands of ducks and geese.

THE PONDS

Definition: The ponds at the Jamaica Bay Wildlife Refuge differ from many you may know in several significant ways. For one, both the East and West Ponds are slightly salty or “brackish.” For another, they are man-made, created under the auspices of Robert Moses in the 1950’s. The West Pond measures 45 acres with an average depth of 4 feet. The East Pond is less salty than the West Pond. It measures approximately 120 acres and, in some areas, is almost 20 feet deep.

History and Ecological Significance: Both the East and West Ponds were created in the early 1950’s by banking up sandy materials from the bottom of Jamaica Bay. This proved to be one of the most important changes that occurred on Rulers Bar Hassock, the island where the Jamaica Bay Wildlife Refuge is located. Before the ponds were created approximately 60 species of birds could be found on the island, presently over 325 species have been observed. Many amphibians, reptiles and mammals also depend upon the ready availability of fresh water that the ponds afford. In 1982 a third, a much smaller pond was dredged on the east side of Cross Bay Boulevard. This one, known as Big John’s Pond, contains the freshest water of all three ponds.

Pond Plants: Within the ponds themselves simple plants known as algae grow in thick mats, but only Big John’s pond contains any vascular aquatic plants such as elodia, or emergent plants such as arrow arum. A common plant bordering all of the refuge ponds, often in dense stands, is the tall reed grass, phragmites. This hardy, salt-tolerant and frequently invasive grass can grow to almost 20 feet tall. Further land ward from the pond edges, grasses such as little bluestem and American beach grass dominate. Bayberry and wild black cherry are common in patches bordering the grassy areas.

Pond Animals: Several species of finfish call the ponds home. Most notably killifish and white perch adapt well to life in brackish water, white perch may reach lengths of 16 inches. Birds of all varieties use the ponds for bathing and drinking. Waterfowl such as black ducks and Canada geese feed on plants in or near the pond edges. Wading birds such as great blue herons and snowy egrets are also regularly observed as they feed upon small fish. Primarily nocturnal, mammals also make use of the ponds for feeding and grooming. Raccoons are common visitors overnight, and in the evenings and early mornings, muskrats play the pond edges looking for new shoots of grass and buds. Common reptiles in the ponds include the eastern painted turtle and snapping turtle.

PRE-VISIT ACTIVITIES:

- SCHOOL SURVEY - Teacher divides the class into 6 cooperative teams of 4-5 students each, students practice working in cooperative teams and collecting data in an outdoor area.
- WHAT IS A REFUGE – A discussion and mapping activity defining what a wildlife refuge is, and Jamaica Bay’s location in the New York metropolitan area.
- PICTURING ADAPTATIONS - (from High Rock Conservation Center: Exploring Environments) - Students play a matching game that reviews the adaptations of common plants and animals and how these adaptation enable the organisms to survive.
- DESERT LEAVES - A classroom demonstration that simulates the adaptive value of waxy leaves on plants growing in dry habitats.

Vocabulary List:

Students should be familiar with the following terms before the onsite visit:

Habitat	Marine
Adaptation	Coast
Refuge	Coastal Upland

ON-SITE ACTIVITIES:

HABITAT SLEUTHS: 6 teams of 5 students each visit two different habitats and record air temperature, soil characteristics, wind speed, vegetation growth and shade cover in two different habitats (woodland and coastal upland). Students record plants and animals observed in the two habitats and describe their adaptations.

MATERIALS:

6 backpacks, 5 thermometers, 5 wind meters, 5 folding rulers, 5 clipboards, 12 Habitat Investigation data sheets, 6 laminated identification charts of common plants and animals, 6 hand-lenses, 6 teaspoons, 6 pencils

LOGISTICS:

- Class assembles inside the visitor center display room for a welcome and introduction by ranger.
- 6 teams of 5 students each go to the West Pond Trail to gather “Habitat Investigations” data in a coastal upland. This would be followed by a brief ranger-guided interpretation of the habitat.

- 6 teams of 5 students each go to the south garden to gather “Habitat Investigation” data in a woodland. This would be followed by brief ranger-guided interpretation of the habitat.
- Class returns to the visitor center for a wrap up of the activities, observations and a brief discussion of follow-up classroom activities.

POST VISIT ACTIVITIES:

- **PLANT ADAPTATIONS MATCH-UP** – A review of the plants observed during the on-site visit and some of their adaptations for survival.
- **NATURE NAME** – Students choose a native plant or animal that begins with the first letter of their name and then research its habitat, adaptations and place in the food chain.
- **WHO AM I? GAME** - A volunteer is asked to assume the identity of an unknown plant or animal from one of the two habitats explored onsite. The rest of the class is shown a picture of the organism. The volunteer asks questions of the class to discover his/her identity. (i.e., What habitat am I found in? Am I a plant or an animal? What do I eat? How do I move around? How big am I? What sounds do I make? What are some of my adaptations for survival?)
- **DATA SUMMARY** - Class averages and/or graphs team data for wind speed, temperature, soil percolation and shade cover for the two habitats studied. This quantitative data, along with the other qualitative observations gathered during the field walk and activity, will be summarized to characterize environmental conditions in the two habitats studied. A discussion or activity (e.g. Who Am I? game) of common plants and animals found in the two habitats and their adaptations to the environmental conditions should follow.

PRE-VISIT ACTIVITY

SCHOOL SURVEY

It is important that students have some prior experience in the outdoors and working in their cooperative teams before their Gateway visit. This exercise will help accomplish this and enhance their awareness of both the natural and built environment in which they live.

Divide the students into cooperative teams of 4-5 students each. Select a reader/recorder, timekeeper/task master, equipment manager and questioner/presenter for each group. Define the roles of each:

- . **Reader/Recorder:** This person is responsible for holding the data sheet, reading the instructions and writing down the team's answers.
- . **Timekeeper/Task Master:** This person is responsible for keeping team members on task within the given time frame and for timing activities.
- . **Equipment Manager:** This person is responsible for keeping track of all of the equipment, setting it up and putting it away.
- . **Questioner/Presenter:** If questions arise during the activity this person is responsible for asking an adult for needed help or clarification. As the presenter, this person will read the group answers back in the class.

IN ADDITION TO THEIR INDIVIDUAL RESPONSIBILITIES, ALL TEAM MEMBERS SHOULD WORK TOGETHER TO MAKE THE OBSERVATIONS AND GATHER THE RESULTS.

Each team will need the following materials:

- 1 Thermometer
- 1 Clipboard/Data Sheet
- 1 Hand lens
- 1 Plastic teaspoon
- 1 Pencil

SCHOOL SURVEY SHEET

TEMPERATURE

Class room ____ Hall ____ Staircase ____ Outdoor area ____

OUTDOOR CLOUD COVER

(circle) sunny partly cloudy cloudy

OUTDOOR WIND CONDITIONS

(circle) slightly breezy very windy calm

LAWN

Has it been recently cut? _____

How do you know?

TREES

How many different types of trees do you see around your school? How are they different from each other?

As a team, select one tree and examine it closely. List or describe any animals or signs of animals that are living in or around the tree (including birds and insects)?

Do you see any other plants growing in the schoolyard besides trees?

(circle all that you see)

wild or planted flowers grasses shrubs (woody bushes) other

SOIL

Collect about a teaspoon of soil and examine it with the hand lens. The soil is:

(circle all that apply) dark light moist dry sandy rich gravelly

HUMAN IMPACT

List examples of human impact that you see around your school.

Positive Impacts

Negative Impacts

PRE-VISIT ACTIVITY

What is a Refuge?

Theme: By exploring what defines a refuge we can better understand the role of Jamaica Bay Wildlife Refuge in wildlife conservation locally, and globally.

Materials: Large map of New York City, map including the east coast, global map, dictionary, Jamaica Bay Wildlife Refuge brochure, large sheets of blank or graph paper, pencils.

Procedure: Tell students that they are going to be visiting the Jamaica Bay Wildlife Refuge. Ask them what they think that title means.

- Define refuge
- Define wildlife
- Point out the placement of the refuge on the map of New York City (contrast the heavily developed areas of Brooklyn and Queens with the area labeled “park”.)
 - a.) Discuss which areas would most likely be most likely to be important to wildlife, both resident species and migratory species.
 - b.) Discuss why those might be so (habitat, food, shelter, availability of water)
- Point out the placement of the Wildlife Refuge on a map including the east coast.
 - a.) Have the students research the “Atlantic flyway”. This is the migratory route that many birds and insects and even bats follow along the coastline during their migrations North and South.
- What do refuges provide?
 - a.) Discuss the Jamaica Bay Wildlife Refuge brochure (for example: protecting land providing public programs, enhancing habitats, counting wildlife or surveying plant life).
 - b.) Locate other wildlife refuges on the map of the east coast or use the internet.
- Your neighborhood
 - a.) Are there areas at the school or in the immediate neighborhood that might be attractive to wildlife? Identify them and examine why they are there.
 - b.) Why are these areas NOT identified as refuges? By extension, discuss priorities that people have for uses of space, such as schools, housing and shopping.
 - c.) Explore the possibility of making your school yard or other designated areas a wildlife refuge. What would be necessary?
(For example: Would government recognition be important, or just local support? Would a brochure or trail guides be important? What about a visitor center? What would you choose to protect? What about staff? What kinds of activities would you be involved with if you worked at a wildlife refuge?)

- For the classroom

Divide the class into three groups to create a map of the site chosen by your class. Each group will be in charge of placing one important issue on the map.

Group 1: How will visitors get to the site and move through the site. Label parking areas, trails, facilities.

Group 2: How will visitors understand what features are important at the site. Design signage and brochures to explain the sites' important points.

Group 3: Label areas that will need particular protection or enhancement? For example where plants need protection, or buildings require maintenance?

Extension: On your visit to the Jamaica Bay Wildlife Refuge, compare and contrast those issues that were important on your map to those that were considered in the creation of the Jamaica Bay Wildlife Refuge. Create a list of questions that the students can ask the ranger on the date of your visit.

PRE-VISIT ACTIVITY

Picturing Adaptations

THEME:

Animals and plants display features that enable them to survive. These features are called ***adaptations***.

TIME:

15-20 minutes

MATERIAL:

Pictures of living things with obvious adaptations, approximately one for each pair of students. You can use the black and white illustrations provided here or your own source of colorful photographs from magazines.

Two text cards for each picture. One lists an obvious adaptation of the plant or animal, the other, how that adaptation helps the organism survive. If you use the written material prepared for the above illustrations, cut the cards out with scissors and distinguish the two types of cards from each other. For example you can highlight the *adaptation* cards in red and the *how it helps the organism to survive* cards in green, or they could be mounted on red or green construction paper.

PROCEDURE:

Spread out the pictures in a circle so that the participants can walk around and see them all. Give at least one text card to each participant and instruct each to place his/her card next to the most appropriate picture. Their card, together with someone else's, should describe how one adaptation of the organism helps it to survive. Each picture should end up with one card highlighted in green and one in red.

Stop while the interest is high, even if not all of the cards are accurately matched. Quickly review the adaptations by asking a person standing near each picture to read the two cards together as a sentence or phrase. Group wisdom will help stray cards fall into place. Now the group should be ready to discover many adaptations outdoors, and to conjecture how the adaptations help the organisms to survive.

PRE-VISIT ACTIVITY

DESERT LEAVES

THEME: Plants growing in dry environments have adaptations that help them retain water. A waxy covering on a leaf helps it retain water.

MATERIALS:

2 small sponges, wax paper or a wax paper bag, water

PROCEDURE:

Cut two sponges into the equally-shaped small leaves. Saturate both “leaves” with water, place one leaf in a wax paper bag or cover it with wax paper, leave the other exposed to the open air. Place both leaves on a sunny window sill or outdoor area. Which leaf do you think will dry out sooner? Why? Compare the results to your expectations.

EXTENSION

Many plants that grow in dry environments with full sun and sand, such as deserts and coastal areas have a waxy covering on their leaves called a “cuticle.” How is a waxy cuticle an adaptation? How does it help a plant growing in a dry environment survive?

Do you know of any plants with waxy cuticles? Can you think of other adaptations of plants growing in dry environments? (i.e., Cacti have thick succulent stems that retain water, other plants are covered with silvery hairs that reflect sunlight, some plants might have long tap roots to secure water)

If time allows, research in the library or on the internet, the characteristics of rain forest plants and desert plants. How do the characteristics enable the plants to survive in their respective habitats? (In other words, how are these plant characteristics adaptations?)

Onsite-Activity

Materials Manager : Please complete this form. Throughout the program, it is your responsibility to keep track of all of the equipment!!

DATE:

TEACHER:

SCHOOL:

DISTRICT:

TEAM MEMBERS (Materials Manager, please print your name first):

MATERIALS CHECKLIST:

At the finish of the program, please check off all of the materials you are returning.

_____ Backpack

_____ Clipboard

_____ Teaspoon

_____ Plant/Animal ID Chart

_____ Hand Lens

_____ Wind Meter

_____ Thermometer

_____ Folding Ruler

_____ Magnet

_____ Pencil

Team Members:

(on-site activity)

COASTAL HABITAT INVESTIGATION

1. SETTING UP THE STUDY PLOT

The ranger will designate your study plot with a colored flag.

2. SUN OR SHADE

All team members stand still at the edge of the study plot. Tilt your head back and look straight up at the sky above. Answer these questions:

Are there any tree branches or leaves in your view?

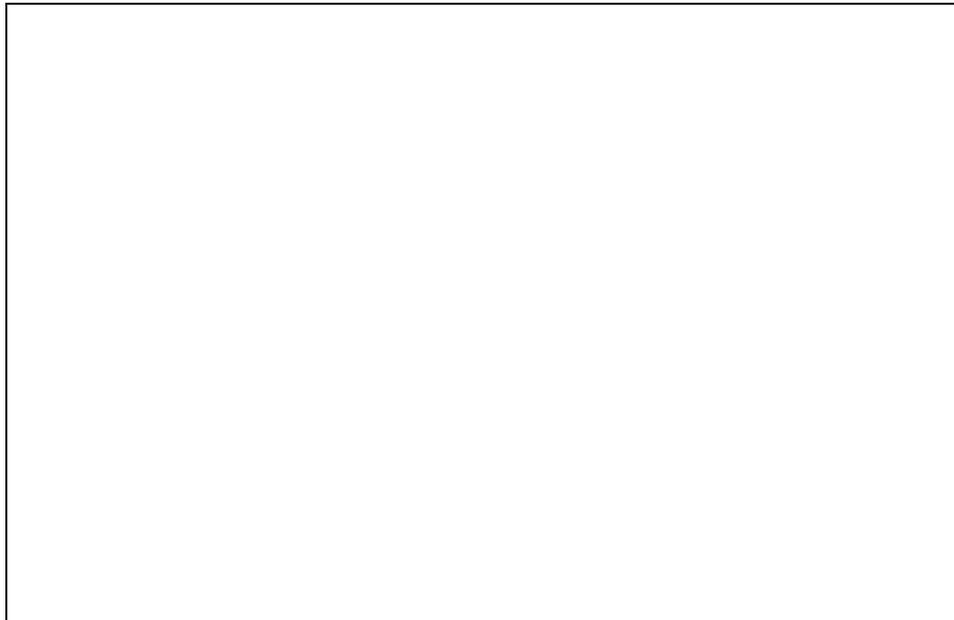
Yes _____ No _____

Is there an open sky? Yes _____ No _____

Are there clouds in your view? Yes _____ No _____

In the box below, sketch the view of the sky above your head.

Timer: Time the sketching for one minute.



3. THE SOIL

Inside the study plot collect a teaspoon of soil and put it in the bug box. Examine the soil: feel its texture, smell it, and look at it with a hand lens.

The soil in the study plot is: (check all that apply)

dry _____ **moist** _____ **dark** _____ **light** _____
sandy _____ **fine** _____ **coarse** _____

What does the soil smell like? _____

What do you think the soil is made of? _____

Does the magnet pick up anything? If so describe _____

Dump out the contents of the bug box when you are done.

4. TEMPERATURE and WIND SPEED

Take the thermometer from the backpack and hold it up. Do not touch the glass. Time the activity for **1 minute** and then record the temperature in Celsius.

Air temperature _____ C°

Stand facing into the wind and hold the wind meter over your head _____ with the printed scale (the red side) facing you. Time the activity for **30 seconds** and record the highest wind speed.

_____ mph

5. PLANTS in the STUDY PLOT

How tall is the tallest plant in the study plot? (Use the ruler) Remember: 1inch = 3cm

_____ less than 30cm _____ 1m to 3m

_____ 30cm to 100cm (1m) _____ over 3m

What types of plants are growing in the study plot? (Check all that apply)

_____ grasses and wildflowers _____ cactus _____ ferns

_____ shrubs _____ trees _____ vines

Name two of the plants that are growing in the study plot. (Use the plastic chart)

6. PLANTS OF THE COASTAL HABITAT

Here are some features that help plants survive (adaptations). Check all that you have observed during your visit to this coastal habitat.

_____ fluffy seeds _____ berries or fruits _____ sticky seeds
_____ direct sunlight _____ thick or waxy leaves _____ hairy leaves
_____ thorny stems _____ direct shade _____ colorful flowers
_____ nice smelling flowers _____ leaves that fall in the autumn
(deciduous leaves)

7. ANIMALS OF THE COASTAL HABITAT

Team members: Name or sketch any animals or signs of animals that you have observed in this habitat below. Note any features or behaviors of the animals that you think might help them survive (adaptations).

Team Members:

WOODLAND HABITAT INVESTIGATION

1. SETTING UP THE STUDY PLOT

The ranger will designate your study plot with a colored flag.

2. SUN OR SHADE

All team members stand still at the edge of the study plot. Tilt your head back and look straight up at the sky above. Answer these questions:

Are there any tree branches or leaves in your view?

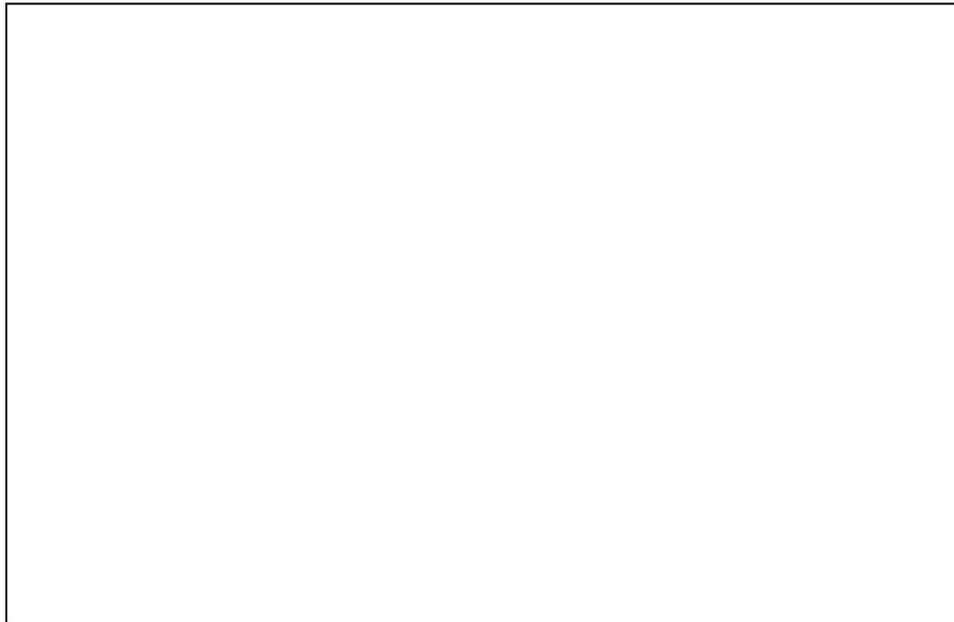
Yes _____ No _____

Is there an open sky? Yes _____ No _____

Are there clouds in your view? Yes _____ No _____

In the box below, sketch the view of the sky above your head.

Timer: Time the sketching for one minute.



3. THE SOIL

Inside the study plot collect a teaspoon of soil and put it in the bug box. Examine the soil: feel its texture, smell it, and look at it with a hand lens.

The soil in the study plot is: (check all that apply)

dry _____ **moist** _____ **dark** _____ **light** _____
sandy _____ **fine** _____ **coarse** _____

What does the soil smell like? _____

What do you think the soil is made of? _____

Does the magnet pick up anything? If so describe _____

Dump out the contents of the bug box when you are done.

4. TEMPERATURE and WIND SPEED

Take the thermometer from the backpack and hold it up. Do not touch the glass. Time the activity for **1 minute** and then record the temperature in Celsius.

Air temperature _____ C°

Stand facing into the wind and hold the wind meter over your head _____ with the printed scale (the red side) facing you. Time the activity for **30 seconds** and record the highest wind speed.

_____ mph

5. PLANTS in the STUDY PLOT

How tall is the tallest plant in the study plot? (Use the ruler) Remember: 1inch=3cm

_____ less than 30cm _____ 1m to 3m

_____ 30cm to 100cm (1m) _____ over 3m

What types of plants are growing in the study plot? (Check all that apply)

_____ grasses and wildflowers _____ cactus _____ ferns

_____ shrubs _____ trees _____ vines

Name two of the plants that are growing in the study plot. (Use the plastic chart)

6. PLANTS OF THE WOODLAND HABITAT

Here are some features that help plants survive (adaptations). Check all that you have observed during your visit to this woodland habitat.

_____ fluffy seeds _____ berries or fruits _____ sticky seeds

_____ direct sunlight _____ thick or waxy leaves _____ hairy leaves

_____ thorny stems _____ direct shade _____ colorful flowers

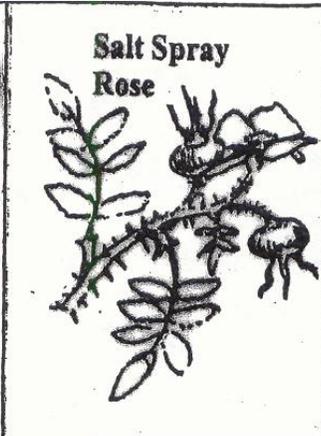
_____ nice smelling flowers _____ leaves that fall in the autumn
(deciduous leaves)

7. ANIMALS OF THE WOODLAND HABITAT

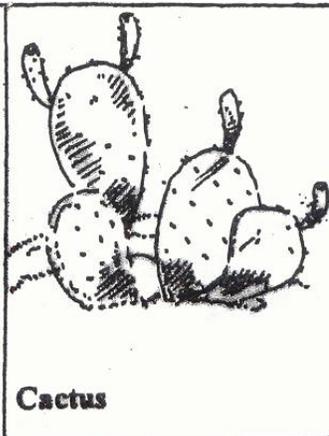
Team members: Name or sketch any animals or signs of animals that you have observed in this habitat below. Note any features or behaviors of the animals that you think might help them survive (adaptations).



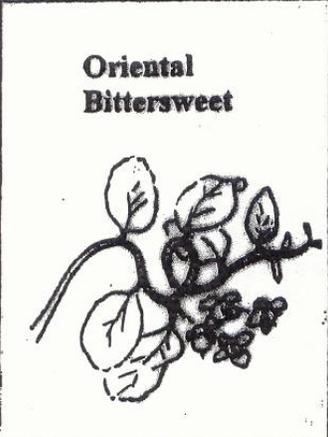
Phragmites



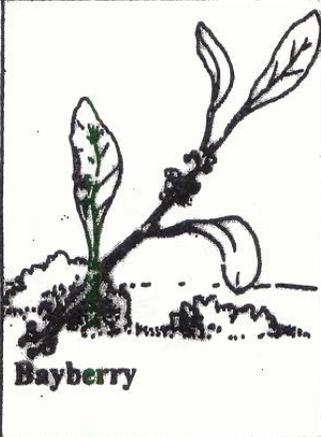
**Salt Spray
Rose**



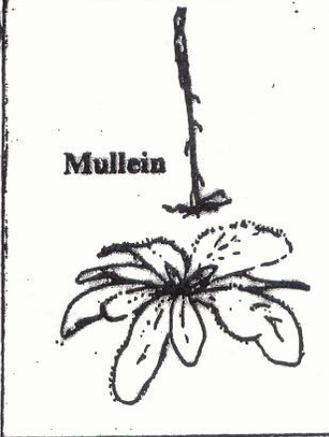
Cactus



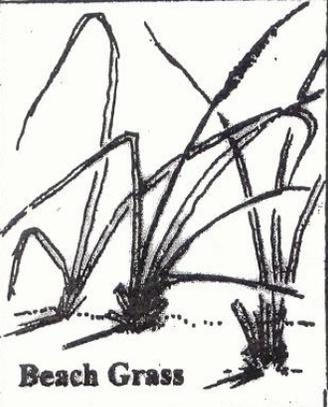
**Oriental
Bittersweet**



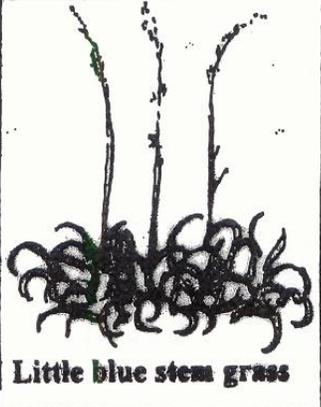
Bayberry



Mullein



Beach Grass



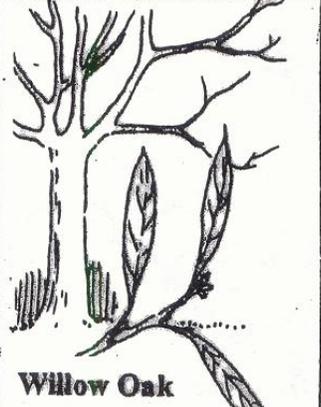
Little blue stem grass



Seaside Goldenrod



Fern



Willow Oak



Red Maple

POST VISIT ACTIVITY

PLANT ADAPTATIONS

Match the plant adaptations in column #1 to the correct letter in column #2.

- | | |
|---|--|
| _____ Thorny stems | A. helps a plant reach water deep below the surface of sandy soil. |
| _____ Waxy, leathery leaves or thick pads | B. helps seeds disperse in the wind. |
| _____ Juicy berries | C. allows a plant to grow well in a shady woodland. |
| _____ Colorful flowers that smell nice | D. are too sharp for plant eating insects to eat. |
| _____ A long, carrot-like tap root | E. help seeds disperse by sticking to animal fur. |
| _____ Fluffy, fly-away seeds | F. help a plant conserve water in a dry habitat. |
| _____ Light colored, wooly leaves | G. help plants reproduce by attracting pollinating insects. |
| _____ Sticky seeds | H. help reflect sunlight in sunny habitats |
| _____ Shade loving | I. Feed birds and other animals when they disperse the seeds inside. |

During your visit to the Jamaica Bay Wildlife Refuge you saw plants that had some of the above adaptations. What were the names of these plants and what adaptations did they display?

POST VISIT ACTIVITY

NATURE NAME

Name: _____

Class _____

List three choices for your NATURE NAME. This plant or animal must begin with the same letter as your first name. Also, this plant or animal must be native to the northeastern part of the United States.

1. _____ 2. _____ 3. _____

This top portion is due

.....
Complete the following once your nature name has been approved.

1. The plant or animal I have selected for my nature name is _____.
2. Describe the habitat of your plant or animal.

3. Describe your plant or animal's position in the food chain.
 - A. What does it eat?

B. What is it eaten by?

4. List three adaptations for survival.

A. _____

B. _____

C. _____

5. Draw a labeled diagram of your "nature" self.

POST VISIT ACTIVITY

WHO AM I?

This fun classroom activity can be used as a review of the plants, animals, adaptations and natural habitats explored during the class visit to the Jamaica Bay Wildlife Refuge.

MATERIALS: Photographs or illustrations of plants and animals.

TIME: 20 minutes

PROCEDURE:

Ask a volunteer to come to the front of the class. Inform the volunteer and the rest of the class that the volunteer has been temporarily transformed into a different type of organism than he or she is used to being. The volunteer will be a plant or animal that the class has learned about. Instruct the volunteer to close his or her eyes and show the rest of the class a picture of the organism. It is now the volunteer's job to find out his or her identity by asking questions to the class.

Some of the questions the volunteer might ask include:

- What habitat am I found in?
- Am I a plant or animal?
- If I'm a plant, then what color are my flowers, what kind of leaves or fruits do I have?
- If I'm an animal, then what major group of animals do I belong to? (herbivore or predator; vertebrate or invertebrate; cold blooded or warm blooded; amphibian, reptile, bird, insect, mammal, or fish, etc.)
- What do I eat?
- What sounds do I make?
- How big am I?
- How do I move around?
- What are some of my adaptations for survival?

POST VISIT ACTIVITY

DATA SUMMARY

Summarize the data that was collected by the teams and use it to compare environmental conditions in the two habitats that were examined. Taking averages or graphing (bar or line) results would accomplish this as well as support the education standards in mathematics.

TEMPERATURE (C°)

Coastal Habitat	<u>Team 1</u>	<u>Team 2</u>	<u>Team 3</u>	<u>Team 4</u>	<u>Team 5</u>	<u>Team 6</u>	<u>Team 7</u>	<u>Team 8</u>	<u>Average</u>
Woodland Habitat									

WIND SPEED (MPH)

Coastal Habitat	<u>Team 1</u>	<u>Team 2</u>	<u>Team 3</u>	<u>Team 4</u>	<u>Team 5</u>	<u>Team 6</u>	<u>Team 7</u>	<u>Team 8</u>	<u>Average</u>
Woodland Habitat									

RESOURCES:

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