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A Comparison Study of Water Habitats for Primary Age Children

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This science unit will map out ways for the primary grade teacher in New Haven to make relevant to their students two distinctly different local geographical areas and the diversity of their indigenous wild life and geology. This unit will be designed to help small children make sense of the world around them and gain a perspective of their place in it.

Freshwater river habitats will be compared to saltwater coastal environments through the study of the wetlands of East Rock Park and the wetlands and coast of Lighthouse Point Park. We will focus in on comparisons between freshwater habitats, using the Mill River as an example, and salt water habitats, using Long Island Sound as a reference. We will compare how each unique aquatic environment provides habitats for very specific life forms. This unit will help make clear to a young mind the reasons for the differences and similarities between these two unique environments and will lay the foundation for further investigation into their own accessible surroundings.

Parks are critical open areas in our city, the city dweller's primary contact point with the "natural" environment. As children and adults who live in the city are more removed from their natural surroundings by concrete and asphalt, a need for environmental education is more critical than ever. In our city of New Haven, I have selected two distinct parks to cover in this unit. Both parks are unique in their own flora, fauna, and geology. Both parks contain aquatic environments which support wild animals that depend upon the aquatic environments for survival. Aquatic environments may be freshwater, such as rivers, lakes, ponds, streams and freshwater marshes; or saltwater, such as oceans, estuaries, and saltwater marshes. Some aquatic animals such as fish or crabs, might live in the water. Others might live in the water some of the time and out of the water some of the time, such as frogs and salamanders. Some aquatic animals may find food, water, shelter, and space both in and out of the water, such as beaver or seals. Other animals like osprey, kingfisher, or seagulls are examples of wildlife that need to live near aquatic environments. All aquatic wildlife depends directly on aquatic habitats for survival. Water is one of the basic components of habitat for people and for wildlife. Water is essential for all life. Aquatic ecosystems and wildlife give humans early clear warning about the quality of the water environment upon which we all depend. For example, frogs, considered the "coal mine canaries" of the aquatic ecosystem, show signs early on of detrimental effects from human contaminants.

Waters from all of New HavenÍs streams, marsh creeks, and rivers drain into Long Island Sound which in turn drains into the Atlantic Ocean. The place where this fresh water drains into the salt water is called an estuary. Estuaries are semi-enclosed parts of the coastal ocean where sea water is diluted and mixed with fresh water

coming from land. Our local rivers, harbors, and even Long Island Sound itself is all part of an estuarine system.

The word marsh has been defined as a treeless area of soft, wet land. To be a good marsh for wildlife it must be wet and it must have a varied balance of marsh plants that can support a population of small and larger animals which feed on the plants and on each other. Available food is not enough, the marsh must have a great variety of habitats in order to support a broad range of wildlife. It must have, deep water areas, shallow water areas, heavy vegetation on some of the shoreline, some bare areas on the shoreline, flooded grassy meadows, and dry grassy meadows. Marshy areas vary greatly. Some are permanent, some are temporary, some are freshwater, brakish water, or salt water, some are acidic, some are alkali, and they vary in size, depth, and in the forms of life they support. East Rock Park and Lighthouse Point have their own unique wetlands to study.

East Rock Park and Lighthouse Point Park both have a story to tell; it's a record of what came before as well as what's happening now. When you walk through the ranger station entrance to East Rock Park on the corner of Orange Street and Cold Spring Street and look up at the red sandstone around the base and up to the summit of East Rock along the traprock vertical ridges, think about the fact that these rocks are the result of molten material originating from below the earth's crust moving up along cracks in the sandstone and solidifying into large sheets of black traprock otherwise known as dolerite. This happened approximately 170 million years ago. This traprock weathers to a brownish orange because of its iron content. Glacial activity created the final formations. Traprock resists erosion so hills were created. Streams of meltwater as the glacier receded were affected by the rise of the sea. This sent arms of rivers up beyond what is now North Haven. Sand and mud brought down by those rivers and peat formed in the salt marshes have since filled in those areas producing the flood plain through which the two rivers, the Mill and the Quinnipiac Rivers, wind their way towards New Haven Harbor and Long Island Sound. Beside the summit of East Rock are two other summits, Indian Head and Snake Rock, both formed by glacier activity. East Rock was quarried for its traprock for years. Many foundations of older New Haven homes were laid with East Rock traprock. The largest area quarried still visible is Corner Quarry, next to the Giant Steps leading to the summit.

College Woods, a level area near the Ranger Station, has gone through very few changes over the years. Many Indian artifacts found here have suggested this was the sight of a Quinnipiac village or camp sight long before the white settlers arrived in the New Haven area. Artifacts would include arrowheads, short bladed knives, and chisels. The Indians would use New Haven area rocks such as quartz, sandstone, and traprock to make these tools. They would also use rocks from other areas, west of the Hudson River, that flaked more easily such as jasper and black chert.

After years as a Quinnipiac hunting ground with the hills used as Indian lookouts, the white settlers arrived in this area. The Puritans attempted to establish a major commercial trading port. The area around the Mill River began to change rapidly. Grist Mills were built along the river and waterpowered by a low dam. In time Eli Whitney built his gun factory in 1798 on the Mill River below where the dam is today. It was here that Eli Whitney began the use of the interchangeable parts production process which became known as the American System of Manufacturing. Over the years much interest was given to making East Rock into a public park. Through generous donations of land from Yale College and individual families, East Rock Park went into operation in 1880 as a public park.

The Mill River is one of New Haven's most beautiful rivers. It is dammed up to form Lake Whitney, a public water supply. The Lake lies in depressions created during the ice age about 10,000-15,000 years ago. The

clear water coming out of the Whitney Lake supports fish and invertebrate. While the Quinnipiac tribe lived near the river, they harvested fish, crab, and shellfish from its waters. Fresh water springs ran from the base of East Rock. One hundred years ago the Mill River was a prime spot for swimming, boating, and fishing all the way down the river past Chapel Street . The park where the Mill River joins the Quinnipiac River was a popular sunbathing and swimming area. The Mill River was a tidal river healthy and abundant in wildlife.

Today the rich soil deposits of the river and its flooding and eroding action influence the plant growth in the low flood plain. There is a high water table preventing the deep penetration of root systems and secure anchorage of trees, thus many trees topple alongside the river. The black willow with its shallow, broad root system successfully thrives long the river banks. Other vegetation we find within the low flood plain of the Mill River are Pin Oak, Shrubs; such as Nannyberry and Silky Dogwood. The multiflora rose is a popular habitat and food source for nesting birds. Cattail marshes also provide cover for nesting and migrant birds. These marshes include water atruim, skunk cabbage, and swamps with woody shrubs. A very unusual fern grows in the shallow margins of the water. This unique plant is the water shamrock and looks like a floating four-leaf clover. The plants from Lake Whitney and Bantam Lake are the original stock from which all water shamrocks in the United States originate. Because the Mill River is a tidal river, there is an influx of salt water twice a day with the tidal changes. The seawater on the surface of the river tends to sink as lighter fresh water rises, and mixing takes place from the surface to the bottom of the river. This is known as tidal overmixing. The river water flows seaward on a shallow surface over an upstream movement of seawater. An unusual variety of vegetation grows within the confines of the fresh and salt water mix. We find a salt content in the river up to the footbridge crossing the Mill River. Here we begin to find cattails growing. These plants need less than 10% salt in the water source in order to survive. The plant material needs to be as hardy as the aquatic animal life that thrives in this fresh and salt water mix.

There is more life in a healthy wetland than there is in almost any other kind of habitat. A healthy wetland can support huge numbers of insects, fish, birds, and other animals. East Rock Park is on a major bird migration route bringing over 200 species of birds through, many of which are rarely seen elsewhere in the state. These birds converge on the wetlands on the way to their summer or winter homes to “refuel” on the rich food supply found in marshes. The spring migration of over twenty species of warblers through the park bring bird watchers from all over Connecticut. Throughout the winter, black ducks and pied-billed grebes winter on the river and woodpeckers, chickadees, brown creepers, and nuthatches, to name a few, live among the bare tree trunks.

Wetlands are vital nurseries for many species. Young fish, crab, and other creatures spend their earliest days in wetlands protected before moving out into the open waters. Wetlands also give protection to many endangered species. About 35 percent of all of the animals and plants listed as threatened or endangered in the U.S. either live in wetlands or depend on them in some way. Mammals, reptiles, and amphibians thrive in the flood plain marshes of the Mill River. Racoon, skunks, and oppossum live year round in the park. Muskrat, snakes, snapping turtles, and salamanders live in the river or along the river banks in the marshes. Red fox, bats,and flying squirrel are the more elusive residents of the park. The type of fish depend of the salinity of the water. Upriver where the water is fresh, sticklebacks, goldfish, carp, pumpkin seeds, banded killifish, and more recently, large mouthed bass thrive. Farther downstream towards the mouth of the river are found, among other species, mummichop which can stand the pollution and saltiness of the river.

Industrial waste, sewage, and thermal pollution has taken its toll on the Mill River. Just above State Street are old tide gates reaching across the river which have the enormous job of keeping polluted water from flowing upstream during the influx of high tide. There have been hundeds of acres of marsh land around the Mill River

and New Haven Harbor that have been destroyed, drained and filled in for houses , roads, and other developments. Plans are in place to clean up the Mill River and to further protect this beautiful resource. Funding and time seem to be the continuing factors in actualizing these plans. Right now the city of New Haven is in the process of installing a sewage separation system in parts of the city. This will mean cleaner water in the surrounding rivers and in Long Island Sound. Heavy rains often force sewage to overflow into the Sound and into local rivers. With this new system fresh storm water will be routed into the Sound while human waste will be enclosed and routed to a sewage treatment plant.

East Rock Park
(figure available in print form)

To understand the geology of Lighthouse Point in relation to the rest of New Haven we have to go back about 250 million years. At that time there was a melding of continents, a collision which formed a single land mass. This collision closed an ancient ocean called Iapetos, sandwiched in a group of minicontinents called Avalonia and formed a supercontinent referred to by geologists as Pangaea from the Greek meaning “all-lands”. Connecticut is one area where these large continents were welded together. As this supercontinent started to pull apart separating North America , Europe, and Africa, the remnants of this welding stuck to the edges of these new continents. Much of Connecticut is the remnant of the welding of these continents. A small portion of Connecticut is what was once the small continents of Avalonia which were sandwiched during the collision. This portion reaches along the eastern shoreline of Connecticut westward and stops at Lighthouse Point. The geology we find at Lighthouse Point is very different from what we find elsewhere in New Haven. The granite formations at Lighthouse Point are much older than the basalt outcrops we find across Morris Cove at Nathan Hale Park or across New Haven Harbor to the volcanic rock west of New Haven. Since the rock we find is so different in type, age, and formation, the beaches and ecology we would find would also differ.

Lighthouse Point Park is now an 84 acre park which lies on the east side of New Haven harbor reaching out into Long Island Sound. Lighthouse Point was formed out of high temperatures and pressure and landscaped by glacier activity. The bedrock is billion year old granite. The Eastern Border Fault otherwise known as the Great Fault runs between Lighthouse point and the rest of New Haven. The point is flatland and saltmarsh which proves to be a natural draw for migrating birds following the coastline on the Atlantic flyway. A large area of the park in the northeast corner is designated as a bird sanctuary to give protection to these birds. While East Rock Park is known for its migrating warbler population, Lighthouse Point is just as well known for its coastal migrating hawk population. Throughout the fall, thousands of hawks of different varieties, falcons, osprey, and occasionally eagles can be sighted. An average count of twenty thousand raptors can be seen during the migration season. Thousands of songbirds migrate through Lighthouse Point during the fall also. Again the wetlands provide a place for them to rest and take advantage of the abundant food source before moving on.

Lighthouse Point has a variety of coastal communities that we can explore and learn about. These would include salt wetlands, rocky shoreline, and sandy beaches, all of which contain an intertidal zone, the area between the high-and low-tide lines. Tides and wave action are two of the most important factors which shape our coast. These two factors can also change a habitat dramatically every day. The tide rises and falls twice a day and during these times animals and plants who live within the intertidal zones need to withstand changes in temperature, moisture levels, and sometimes even salinity changes. Marine animals and plants have adapted in ways so as to survive these daily changes in their habitats.

Along the rocky shore we find animals and plants we would not see living at the sandy beach or the salt

marsh. These marine organisms have found their own way of surviving the harsh action of waves against rocks and the rise and fall of the water. Animals and plant material either are anchored onto the rocks themselves such as barnacles, mussels, or seaweeds, or they hide in cracks such as crabs or seastars, or they bend with the waves as seaweeds do while floating on the waters surface while anchored to rocks. As the tide goes out, many animals, to avoid drying out, will pull their bodies into their shells and become inactive like the periwinkle. Others like crabs will lay under the protective moist layering of seaweed. As the tide goes out there are also left behind small pools of water in depressions and crevices in rocks. Many different animals and plants inhabit these pools during low tide including algae, anemones, hermit crabs, sea stars, and even tiny fish. They wait for the water level to rise again with the tide.

Life at the beach is very different. The beach proves to be a harsher habitat to live in for animals and plants. That is because what makes up a beach is always shifting and moving with the waves and the wind. Animals which live in this area cope with the conditions by usually burrowing into the sand, these would include clams, worms, sand dollars, and crabs. Much of what we find on top of the sand is material that has been washed ashore, seaweed which has become adrift and empty shells of animals which have been eaten.

Lighthouse Point contains areas of wetland or salt marsh which, like the wetland of the Mill River, provides nursery grounds for many animals and a home to crustaceans, fish, birds, reptiles and mammals. Salt marshes also provide a filtering system for pollutants and contaminants. They also trap nutrients and sediment which are slowly released into the water through decayed vegetation. Salt marshes are usually intersected by salt water creeks or tidal creeks which rise and fall with the tides. Lighthouse Point is intersected by Morris Creek. There was once a large expanse of wetlands in the Morris Creek area along the shoreline to East Haven. Through development this wetland has been broken up and reduced. Morris Creek has been rerouted many times due to the expansion of Tweed-New Haven Airport. These smaller marshes are not as effective as filtering and drainage systems. Sediment and nutrient rich silt brought through a marsh by creeks and rivers build up in the salt marsh and give marsh plants an ideal place to sprout and grow undisturbed. The most common plants in the salt marsh are grasses. The toughest, most productive grass is the spartina grasses. These grasses provide an abundant food source for the animals which make the marsh their home. The many plants we find in the salt marsh are dependent on the presence of salt water above the ground level at least some of the time. Salt marsh cordgrass which we find along tidal creeks and along the harbor edge is frequently flooded by saltwater. Where it is better drained, we find saltmeadow hay, spikegrass, sea lavendar, and glasswort. Farther inland within the marsh we find marsh elder and seaside goldenrod. The grass that marks the end of the salt marsh is called Phragmites. No saltwater reaches this point and dryland plants begin. Near the beach there is a grove of small gnarly trees which are persimmon trees. We usually find these thriving in a warmer climate. This grove is said to be the most northern grove of persimmon in the United States.

Lighthouse Point Park
(figure available in print form)

Salt marshes are vital to the ecology of the area supplying cover and homes to wild aquatic life and food for birds and mammals. It takes thousands of years for a salt marsh to form and very little time for a marsh to be destroyed. Since the early part of the century over fifty percent of the salt marshes in Connecticut have been destroyed through dredging, filling, waste disposal, industrial sites, housing developments, airports, and parking lots. At this time, most salt marshes are protected by law.

Sample Worksheet

Animal or Plant	Where did you find it?	Points
Red-winged Blackbird	_____	
Fiddler Crab	_____	
Orange Sulphur Butterfly	_____	
Diamondback Terrapin (turtle)	_____	
Bullfrog	_____	
Osprey	_____	
Snapping Turtle	_____	
Water Snake	_____	
Meadow Vole	_____	
Horseshoe Crab	_____	
Herring Gull	_____	
Spotted Sandpiper	_____	
Black Crowned Night Heron	_____	
Box Turtle	_____	
Clapper Rail	_____	
Killdeer	_____	
Belted Kingfisher	_____	
Seaside Earwig	_____	
Long-Billed Marsh Wren and nest	_____	

Animal or Plant Where did you find it?

Points

Regal Fritillary Butterfly	_____
Common Tern	_____
Salt marsh grass	_____
Beach Plum	_____
Sea Rocket	_____
Cattail	_____
Seaside Goldenrod	_____
Willow	_____
Reeds	_____
Dandelion	_____
Beach Pea	_____

Sample Activity #1

Create a Creature

Objectives:

Students will be able to:

1) describe adaptations of sea creatures to their environments;

2) describe how adaptations can help sea creatures survive in their habitat;

3) interpret the importance of adaptations in animals.

Method:

Students design a variety of sea creatures adapted for various aquatic habitats.

Background:

Aquatic animals are the product of countless adaptations over long periods of time. These adaptations, for the most part, are features that increase the animalsÍ likelihood of surviving in their habitat.

When a habitat changes, either slowly or catastrophically, the species of animals with adaptations that allow them many options are the ones most likely to survive. Some species have adapted to such a narrow range of habitat conditions that they are extremely vulnerable to change. They are overspecialized and are usually more susceptible than other animals to death and extinction.

In this activity, the students design a kind of sea creature. They choose the adaptations that their animal will have. Each choice they make would actually take countless years to develop. As these adaptations become part of the creatureĺs design, the animal becomes better suited to the habitat in which it lives. Because of the variety of conditions within each habitat, many different sea creatures can live together and flourish.

Materials:

recycled “junk”, paper, large chart paper, magazines pictures of sea creatures, tape, glue, markers, scissors.

Procedures:

1) Lead a discussion emphasizing the adaptation of various animals to their habitat. Guide the discussion into the salt water environment and the adaptations of sea creatures. Using a chart and magazine pictures, have children come up with examples of adaptation of sea creatures, coloration, body shape, mouth shape, locomotion methods, and reproduction (laying of eggs or having live babies). Leave the chart displayed for future reference. (For further activities on adaptation, see “The Ocean Book” by the Center for Marine Conservation.)

Ask the students to “create a creature” using the characteristics previously discussed. This can be done as an individual task or the children can work in small groups cooperatively. Each individual or group should:

Đcreate an artform that represents the creature

Đname the creature

Đdescribe and draw the habitat for their creature Ask each group or individual to share with the rest of the class and report about the attributes of the sea creature they have designed, including identifying and describing its adaptations. Ask the students to describe how this kind of sea creature is adapted for survival.

Extensions:

Repeat this activity using the concept of freshwater habitats and the unique animal life found there.

ĐIntroduce the activity by asking students to create a creature that could survive in a future time. This allows students to express possible scenarios for future ocean habitats.

Sample Activity #2

Setting up a Long Island Sound Aquarium
An aquarium must provide everything that the organisms in it require to stay alive: Food, oxygen, and clean water of correct temperature, correct salinty, and correct chemical balance. If you buy the right supplies the tank will mostly take care of itself.

The pump forces water through the gravel. The gravel filters and cleans the water physically by trapping sediment, including animal waste products. The surface of every piece of gravel gets colonized with bacteria, which break the organic matter down into nutrients. The nutrients are the most easily removed by changing the water regularly. You should do a 10 gallon water change once a month.

Materials:

1. Tank, all glass. Metal parts will corrode and introduce toxins into the water. A 20 or 29 gallon tank is sufficient. Since most of your animals will be bottom living, rather than swimming in the water column, a long tank is better than a high one.
2. Air pump and tubing, and air stones. The stronger the pump the better. Don’t skimp, since the air pump is providing both oxygen and cleaning power.
3. Gravel made of calcium carbonate. The calcium carbonate keeps the pH stable, saving you the trouble of testing and correcting it. You need to buy gravel designed specifically for a salt water aquarium. You need 15-20 pounds, giving you a layer of 2-3 inches thick. You could also use oyster shells crushed finely. You can obtain quantities of oyster shell from Tallmadge Brothers Inc. in New Haven. Students enjoy putting shells into a pillowcase and, wearing eye goggles, smashing the shells with a hammer. The pieces need to be very fine, however, both to provide sufficient filtration and sufficient surface area for bacteria, and also to keep the tank uncluttered.
4. Under gravel filter. The air rising in the tube pulls water up the tube. The through the gravel, and passes under the platform and up the tube.
5. Water. If you live or work near the Sound, the easiest thing to do is to get water in empty jugs or buckets. You can also buy sea salts such as “Instant Ocean” from a pet store. For a Long Island Sound aquarium use a little more water and a little less salt than the package instructions recommend.

6. Cover. This keeps water from evaporating, and keeps animals from jumping or climbing out. Also it keeps children's hands out and limits vandalism.
7. You will also need a small dip net and a few rocks for the animals to hide under, you will not need a heater or a light.

Set Up

ÐSet the aquarium in a cool place. You will not be able to move it once it is filled.
ÐPlace the pump above and to the side of the tank so that it cannot fall in.
ÐPlace the filter in the bottom as directed.
ÐRinse the gravel very well trying to get out as must dust as possible.
ÐAdd the gravel on top of the filter platform, fill the tank with water and start the pump.
ÐLet the aquarium run for a day or two until the water is clear.
ÐAdd one or two small crabs. They will run around for a week spreading bacteria into the gravel.
ÐAfter a week, introduce the other animals gradually. Choose hardy animals direct from Long Island Sound. Many fish, mollusks, crustacea, and other animals do very well but be careful not to overcrowd the animals. A good rule to remember is no more than one or two inches of animal per gallon of water.
ÐFish should be less than six inches long.
ÐYour students can begin collecting intertidal animals from the beach, tide pools, and mud flats as you begin to take your class on field trips to the shoreline.

Feeding

Mussels collected and broken open or chunks of canned tuna can be used for aquarium foods. Feed two or three times a week. Remove uneaten food after half an hour or it will rot and foul the tank.

Children love to be made part of the process of setting up an aquarium, feeding the animals, and maintaining the tank. When involved, they take a daily interest in observing activity and changes in the aquarium. Additional activities have been mentioned previously in this unit to continue study of the aquarium habitat throughout the year.

An excellent resource to the classroom teacher in New Haven is Schooner, Inc. This organization is a non-profit marine educational organization dedicated to the conservation and study of Long Island Sound and its tributaries. They trawl daily for animals from mid-April to mid-November and can help stock your aquarium with animals. Schooner, Inc. makes a point of working closely with the New Haven schools by providing hands-on programs to the classrooms and setting up outdoor shore trips. They also provide an excellent curriculum guide called Project Soundwise, A Curriculum and Teacher's Guide to Long Island Sound for Grades K-4. Also a curriculum written for grades 5-8 has just been finished and will be available to teachers by 1996.

Sample Activity #3

Peabody Museum Diorama Hunt
Peabody Museum of Natural History

Shoreline Diorama in the Hall of Southern New England

Objectives:

To identify some of the plants and animals that live in various wetland habitats.

Method:

Students will participate in finding and identifying animals and plants in a shoreline diorama.

Background:

The Peabody Museum of Natural History has outstanding exhibits which can be used as resources throughout the year. On the third floor there are numerous dioramas which reflect a wide variety of habitats such as; a mangrove swamp, a prairie, a desert, a tundra, a rainforest, and more. One diorama in particular can be used directly with this study of local wetlands. The shoreline diorama in the Hall of Southern New England shows three representations of local habitat communities, the seashore, the salt marsh, and the lowland farm including freshwater habitat. Some of the animals seen find their niche in more than one community such as the red-winged black bird, others have a very restricted niches and are limited to one single habitat, such as the fiddler crab. We also find a shell midden displayed here left by the Native Americans in this area dating between 4000 and 2000 B.C. Shell middens are mounds of waste left by the Native Americans usually consisting of discarded shells and bones. It is advisable for the teacher to visit the museum beforehand to become familiar with the diorama. A diorama which represents such a wide and varied range of habitats can be utilized in many ways with a class.

Procedure:

We begin in the classroom after our initial introduction of what wetlands are and descriptions of some of the different kinds of wetlands. Literature is read to the class about wetlands and the wildlife found there. Slides and/or pictures are then shown of several different wetlands and marshes which we find in our area. Talk about the types of animals most likely found there. See if the students can describe how each animal is

adapted to living in a wetland habitat. For example, the heron's long legs help it wade in shallow water while searching for food, or the duck's webbed feet help it swim. Ranger Rick's NatureScope called Wading into Wetlands provides a variety of useful information and activities for younger children as well as older children.

Primary children love to find and count things that are hidden. A hunt can be initiated using the shoreline diorama. The students could work either individually or in pairs. A list of animals and/or plants present in the diorama would be available to them. On this list would be the animal name. The students would then, after finding this animal in the diorama, write down where they found this animal; in the seashore, salt marsh, or lowlands. A number of points would be given for each animal or plant found. More points are given for animals and plants which are more difficult to find. A sample worksheet follows. At the end of the activity, the students add up the points they accumulated and prizes related to the study can be awarded. Everyone should receive a prize of acheivement.

Extensions and Options:

The list of animals to find would change with the age of the group. Younger children would have fewer animals to find than older children. This activity can also be divided into two separate trips to the museum; one "hunt" for animals and another "hunt" for wetland plants. The questions asked on the worksheet can be more specific in terms of types of animals found and classifying them into proper catagories such as mammals, birds, fish, amphibians, or reptiles. Clues and riddles about particular animals to find instead of the animal name can also be tried. The following is only a sample of animals and plants found in the diorama.

Bibliography

Braus, Judy (Ed.). Ranger Rick's Naturescope, "Wading into Wetlands", National Wildlife Federation. 1988. An excellent activity book to be used with children of all ages covering a variety of wetlands.

Braus, Judy (Ed.). Ranger Rick's Naturescope, "Diving into Oceans", National Wildlife Federation. 1988.

Broker, Steve. Hurd, Stephen. Thorburn, Martha. "Morris Creek Marshes, A Historic Overview". 1992.

Dana, Edward. Longwell, Chester. "Walks and Rides in Central Connecticut and Massachusetts", Tuttle, Morehouse and Taylor Company. 1932. A comprehensive look at this area much of which is still relevant today.

East Rock Neighborhood Association, "East Rock Park", The Advocate Press: New Haven. 1972. A good general guide to the park and its history.

Finkelstein, Robert. "Central Park Workbook Activities for an Urban Park", Robert Finkelstein. 1980.

Hutchinson, Evelyn G. "Notes on Ecological Principles Easily Seen in the Hall of Southern New England Natural History." Peabody Museum Special Publication. No. 8.1964.

McArdle, Conway, Norwitz. "Project Soundwise, a Curriculum and Teacher's Guide to Long Island Sound for Grades K-4." Schooner, Inc. 1992. Motivating and easy to implement into the classroom, highly recommended.

Orville, Lise. "The Mill River: An Outdoor Laboratory", Curriculum Unit, Yale-New Haven Teachers Institute: New Haven. 1993. A very

clear study of water and the Mill River for the high school student.

Rodgers, John. “The Geological History of Connecticut”, Discovery Magazine, Volume 15, Number 1, Peabody Museum of Natural History, Yale University. 1981.

Samples, Bob dir.. “Project Wild Aquatic, Aquatic Education Activity Guide”, Western Regional Environmental Education Council. 1987. One of three environmental education curriculums available through the D.E.P. They are Project Wild, Project Wild Aquatic, and Project Learning Tree. These are available after taking part in workshops designed for each program. They contain a storehouse of information for grades K-12.

Shumway, Floyd. Hegel, Richard (Ed.). “New Haven, An Illustrated History.” Windsor Publications: New Haven. 1987. A fascinating detailed account of New Haven’s History.

Smith, Robert Leo. “Elements of Ecology”, Harper Collins Publishers Inc.. 1992.

Sowls, Lyle K.. “Life in Freshwater Marshes”, Audubon Nature Bulletin, The National Audubon Society. 1969.

Spinner, Blanche (Ed.). “New Haven Outdoors, a Guide to the City’s Parks”, Citizens Park Council of Greater New Haven. 1990. A great guide to all of New Haven’s public parks.

Additional Resources

Braus, Judy (Ed.). Ranger Rick’s Naturescope, “Geology: The Active Earth”, National Wildlife Federation. 1987.

Charles, Cheryl (Dir.). “Project Wild”. Western Regional Environmental Education Council. 1986.

Coastal Area Management Program. “Long Island Sound: An Atlas of Natural Resources”, Connecticut Department of Environmental Protection. 1977.

Hill, David E., Shearin, Arthur E.. “Tidal Marshes of Connecticut and Rhode Island”, The Connecticut Agricultural Experimental Station, New Haven. 1970.

Kotchian, Winifred. “The Quinnipiac, the Story of a River,” North Haven Bicentennial Commission. 1976.

Olmstead, Nancy C. (Ed.). “Plants and Animals of the Estuary”, Connecticut Arboretum. 1978.

Olmstead, Nancy C. (Ed.). “Tidal Marsh Invertebrates of Connecticut”, Connecticut Arboretum. 1974.

Rights, Mollie. “Beastly Neighbors, All About Wild Things in the City, or Why Earwigs Make Good Mothers”, Little, Brown and Company. 1981.

Roberts, Mervin F. “Tidal Marshes of Connecticut, A Primer of Wetland Plants”, Connecticut Arboretum, Connecticut College, New London, Ct. 1970.

Sobel, David (Ed.). “The Ocean Book, Aquarium and Seaside Activities and Ideas for All Ages”, Center for Marine Conservation. John Wiley and Sons, Inc.. 1989.

Wahle, Lisa. “Plants and Animals of Long Island Sound”, Connecticut Sea Grant College Program. 1990.