NAME: Montauk Point

TYPE: Visitation of field work

LEVEL: Upper elementary through senior high

AREA: Long Island - South shore to Montauk Point

Arrangements: Contact Manager of group sales for Long Island Railroad, Mr. Tomlinson; 516/812-3900 ext. 498. The trip as planned by the L.I.R.R. is only a visitation which included a three-hour bus tour in the Montauk vicinity. If a field trip to a specific site is preferred, further arrangements are necessary. Contact the Seashore Transit Company. 516/728-6511.

Directions: A Long Island Railroad train may be taken at Penn Station, Brooklyn or from any point on the south shore to Babylon. Train change at Babylon to Montauk where a bus is provided for tour or transportation to area of special interest.

Facilities: Public park for eating packed lunches and rest rooms available at Montauk. Gossman's Dock provides eating places and public rest rooms.

Water Facilities: Oyster Pond, located on the northern part of Montauk Point with access to Block Island Sound provides three types of marine environments: fresh, brackish and salt water.

Best Usage: The train ride to Montauk should be part of the learning experience. Pupils should be made aware of the changes in the environment as they go east. Such things as type of architecture, clusterings of homes, the amount and types of industries, the flora and fauna, suggested visual occupations (industrial, farming, fishing, duck raising, etc.) should be recorded. Multi-uses of the shore areas (boating, swimming, pleasure viewing, shellfishing and industry) should be discussed. Photography, as well as pencil and charcoal sketching should be an integral part of this phase of trip for future activities on return to the classroom. Taping of the discussion is worthwhile.

Type of Environment: Basically a shore environment will be observed on this trip (Inlets, bays, ocean ponds, sandy beaches, and eroded cliffs).

Suggested Activities:

Prior to trip: Research history of Long Island through the study of famous people, Indians, the colonial period, economic development. Have a lesson on the glacial movement in North America and its effect on the geological formation of Long Island and its water bodies. Discuss uses of shore areas, the effects of such uses on a long-term and short-term basis (i.e.: building on marsh areas, industrial complexes, sewage treatment plants, boat marinas, nuclear energy plants). Discuss the
types of pollution of bay and coastal areas and possible causes and solutions. Discuss the extent of farming in eastern Long Island and the crops raised. Review the decline of farming in recent years due to labor costs, taxes etc.

At the site: Visitations: Montauk Point Lighthouse, Montauk Ocean Science Lab., Lobster houses on Gossman’s Dock, Deep Hollow Ranch. Children may photograph, pencil and charcoal sketch and write descriptive writings.

Field work: Oyster Pond - seining, plankton sampling, testing waters (pH, salinity, temperature, dissolved oxygen), core sampling or sampling of benthic life, collecting of live specimens for tank, collecting of rocks and other shore debris for later use in beach crafts. Collect, float and mount algae. Detailed comparison of environmental factors in the three types of marine environment (fresh, brackish and salt) with the types of marine organisms found in each. Record types of algae, fish and benthic life. Note types of substrate in each area. Shagwong Point on the Northeast side of Montauk facing Block Island Sound is a good place for the study of geology. Eroded cliffs expose the layering of the land formation.

Upon return: Set up a salt water aquarium. Make a large map of Long Island showing the route and the highlights of the trip. Start a bulletin board of newspaper articles pertaining to aspects of Long Island discussed or visited. Map out the territories occupied on the island by the various Indian tribes. Have poetry readings of Walt Whitman. Frame and display charcoal and pencil drawings. Blow up particularly interesting photos for display. Write up visitations and observations. Listen to and discuss the tapes. Make a display of the rocks collected and label.
Research the life of an American lobster. Research the oyster industry and the clamming industry. Research the historical importance of the whaling industry on Long Island. Compile data and make charts on the marine environments worked at. Define the limits of physical tolerances for each of the types of animals. Discuss how the environs of these marine animals might be changed by man's activities. Discuss also how nature might change the environment.

Preparation: Educational: Awareness question sheet for trip out to Montauk and another for Montauk Point itself (i.e., note the decrease in population as we go eastward and what factors might influence this). Seine net, plastic gallon containers for water and specimens, plankton nets, microscopes and slides, water testing equipment, shallow pans and cardboard for floating and mounting algae, collection bags for beach debris and rocks, identification books, charcoal, pencils, drawing pads, notebooks.

Physical: Boots, change of clothing, bathing suits, towel, etc.

General Comments: There must be a minimum of thirty children on this trip. Cost of train will depend on where on the Island the children board. (Cost from Penn. Station and Brooklyn is $2.50 per student. The bus for the tour is $60.00.) The time element must be taken into consideration in planning. It is doubtful that both a tour visitation and a working field trip could be included in one outing, but that is left to the discretion of the leader.

Author - Educator: Ann T. Kempner, Saw Mill Road School, North Bellmore, N.Y.
Home address: 1449 Sycamore Ave., North Merrick, N.Y. 11566

Suggested References: (GE) 13, 16, 20, 22, 32; (B) 38; (L) 45; (M) 52; (PL) 68.
Hither Hills State Park
Walking Dunes

Type: Field work including observing, hiking, testing, and collecting

Level: Secondary, but activities can be modified for elementary, intermediate, or college study

Area: Giant sand dunes east of Napeague Harbor, Suffolk County

Arrangements: Since the area is a State Park, no special arrangements have to be made prior to the field trip.

Directions: Take Rt. 27 (Montauk Highway) approximately 6.0 miles east of Amagansett. The Lobster Roll (LUNCH) located on the right side of the road (traveling east) is 0.8 miles from the turn-off at Napeague Road. Proceed east and look for the Hither Hills Racquet Club on the left side of the road. Just past the Racquet Club, turn left on Napeague Harbor Road and proceed to the end, a distance of 0.7 miles. Park the cars and proceed to trails on the northeast of the parking area that lead to the walking dunes.

Facilities: It would be advisable for the field trip group to meet at the Lobster Roll, a roadside restaurant, approximately five miles east of Amagansett where food, parking, restrooms, and shelter from foul weather can be found. At the Lobster Roll one can purchase an excellent and reasonable lunch. There are outside benches and tables which can serve as an outside meeting place for those involved with the field trip. However, the Lobster Roll is only open from Memorial Day to Labor Day!!
Water Facilities: A beach is located at the end of Napeague Harbor Road. The Bay is only 150 feet from the road. The Bay is shallow enough for seining and swimming if these activities are part of the planned field trip.

Beach Environment: The area provides the following for investigation:
1. Massive sand dunes that are the highest active dunes on Long Island
2. Salt water marsh
3. Freshwater marsh and bog
4. An extinct pitch pine-black oak forest
5. An extant pitch pine-black oak forest
6. A shallow estuary

Materials and Equipment: The following items (depending upon the habitats studied) should be brought along:
1. Small pocket handbook
2. Bathing suit
3. Sneakers
4. Long-sleeved shirt
5. Sun tan lotion
6. Bug spray
7. Clothing suitable for habitat to be studied
8. Towels
9. Plankton nets
10. Seines
11. Water test kits
12. Camera
13. First-aid kit
14. Soil sieves and shovels
15. Dissecting microscope and petri dishes
16. Collecting bottles
17. Soil cups
18. Plastic garbage bags for plant specimens
19. Buckets for shells
20. Clam rake or spade

Caution:
1. Pre-plan to sample salt marsh vegetation and/or shellfish populations at low tide.
2. Stay on natural paths because poison ivy is abundant.
3. Check clothing and bodies for ticks before leaving and again when arriving home. Ticks can cause ROCKY MOUNTAIN SPOTTED FEVER.
4. Apply bug spray and wear long clothing if mosquitoes are a problem.

Suggested Activities:
Pre-field trip:
1. Describe how sand dunes are formed.
2. Show pictures of insectivorous plants and explain how insectivorous plants trap insects.
3. Make sure all students understand the delicate nature of the area and also that they know how to recognize poison ivy.
4. Demonstrate shells of common shellfish: clams, oysters, and scallops. Discuss their life cycle and habitat preference.
5. Show slides of plants in various habitats so that students can identify these plants in the field.
6. Introduce the topic of primary succession.

At the Site:

A. Walking dunes
1. Identify beach grass and other species present.
2. Examine the extinct forest of black oak and pitch pine.
3. Note direction in which dunes are moving.
4. Collect and identify vegetation.

B. Salt marsh
1. Walk area and identify vegetation in the salt marsh.
2. Sample sand and mud at or below low tide level for marine invertebrates.
3. Make plankton tows at different depths.
4. Seining and listing of marine organisms.
5. Test water samples with portable test kits.
6. Collect soil samples in different vegetation zones of the salt marsh—note vegetation associated with each. Soil sample and collect vegetation samples.

C. Freshwater marsh and bog
1. Note the insectivorous sundew, orchids, cranberry, club moss, and other species that are indicative of freshwater marshes and/or bogs.
2. Take pictures of each species.

D. Black oak-pitch pine forest
1. Identify the dominant trees and shrubs of the forest.
2. Sample trees and shrubs by use of the Quadrat Method.
3. Collect vegetation samples in the forest.

Post-field trip:
1. Identify marine organisms and/or local flora.
2. Preserve animal specimens.
3. Mount plant specimens.
4. Discuss the ecology of each habitat visited.
5. Discuss the ecology of each organism identified.
6. Discuss preservation of rare and endangered species.
7. Extract chloride from soil samples in salt marshes and convert to salinity.
8. Relate species tolerance to salinity in accordance with tidal flooding.
10. Observe phytoplankton in guts of shellfish.
11. Discuss how vegetation stabilized dune.
12. Discuss food chains in an estuarine ecosystem.

General Comments: The walking dunes are the highest sand dunes on Long Island. Moving from three to five feet per year in a southerly and easterly direction, the dunes have buried a forest of pitch pine and black oak.
The walking dunes provide the students with four distinct habitats within one-half mile of each other. An instructor could concentrate on one or several of these unique habitats: sand dune community, salt marsh community, freshwater marsh-bog community and pitch pine-black oak community.

I recommend visiting this site during late spring, summer, or early fall. Field trip leaders desiring more information, including species lists or special activities, should contact the author-educator.

Author-Educator: Dr. Richard Stalter, Director of the Environmental Studies Program, St. John's University, Jamaica, New York 11439

Suggested References: (GE) 9, 10, 13, 18, 33; (B) 36; (f) 39; (l) 46, 51; (P) 59, 60; (PL) 63, 67, 72.
NAME: Studies of the North Fork

TYPE: Field work and visitations

LEVEL: Secondary

AREA: North Fork of Long Island

Arrangements:

1. For Orient State Park - at least two weeks ahead
   Phone: 516/SU 5 - 1600
   Write for Permit - Long Island State Park &
   Recreation Commission
   Jones Beach State Park
   P.O. Box 1000
   Wantagh, L.I., N.Y. 11793

2. Isle-End Snack Bar at Orient Point Ferry Landing
   (Food only, no restrooms, very small) Call ahead
   if you wish to have food ready for a group.
   Pete 516/323-2560

Directions: Long Island Expressway all the way to the last exit
for Orient. On to Route 25 which will go East all the
way to Orient.
A bypass route at Mattituck is located just north of
the main street of town. The route is called North
Road. It joins Route 25 at the Greenport light.
See Map.

Facilities:
At Orient Park - picnic tables, benches, restrooms (open from spring
thaw to first frost in late November), barbecues, a small weather
overhang near the restrooms, plenty of parking.
At Greenport - town parking behind Main Street stores.
At Oyster Farms plant - parking in front on dead end road.
At East Marion stop - parking is available at watersedge on the right
side of the road at the east end of town. Opposite Dam Pond and facing
Orient Harbor.
There is a KOA Campgrounds if an overnight is planned. Hot showers,
ten sites and water and electric hookups available. (516-477-0022)

Water Facilities:
At Orient; seining beach and salt marsh, swimming at park beach,
inflatables could be used.
At East Marion site; seining near sea wall, excellent tidal flow anytime
for a plankton haul at the bridge, tidal flats.

Best Usage:
At Orient Park - water chemistry beach and marsh
- geology - beach of stone - typical North Shore
- collecting biological specimens
- plant studies - beach plants
- ecosystems - beach, marsh
- maritime history
At East Marion site - tidal flats ecosystem
- tidal movements
- salt water marshes ecosystem
- collection of specimens

At Greenport - economic interrelationships - the fishing fleet and the oyster farms plant
- historic relationships - the buildings are some of the oldest on Long Island, telling the history of the old fishing village.

Type of Environment:
At Orient State Park - both north and south faces of the beach are typical rocky beach environments with five zones:
surf-intertidal-upper beach-dune (depleted) - maritime forest

FAUNA*          FLORA*
Snails - Littorina (periwinkle)  Cactus - Opuntia
Scallops - Pecten                      Pine - (Black) - Pinus (2 needles)
Razor Clam - Ensis                        Poison Ivy - Rhus
Boat Snail - Crepidula                    Sea Beach Goldenrod - Solidago
Fish-killifish - Fundulus
    (many others in season)            Beach Pea - Lathyrus
Osprey nests on poles                      Sea-Rocket - Cakile
SEAWEED                                    Scrub Oak - Quercus
Codium - green                             Salt-Spray Rose - Rosa rugosa
Chondrus - red                              Sea Rose - Rosa virginiana
Cladophora - green                         Dusty Miller - Artemisia
Ulva - green                                Dune grass - Ammophila
Fucus - brown                                    Bel Grass - Zostera
Laminaria - brown                           *This is a partial listing.

This area is ideal as a model for a beach environment to maritime forest in this climate and coastal form.

At East Marion - on Route 25, east end of town, the road is bordered by a sea wall on the right and a salt marsh (Dam Pond) on the left. On the south side, facing the harbor, is a tidal flat exposed at low tide. The place is extremely good for the inspection of scallops. They are like a carpet in this area. The fauna is similar to the list above for Orient with the addition of these species:

Clam - Mya, Mercenaria
Worms - several species

Several of the seaweeds mentioned above are also found in abundance. On the north side of the road is a large salt water pond and marsh. Typical marsh plants are here. There is a small bridge between the two areas. This is an excellent place for the collection of plankton by net. The area drops away
quickly to about eight feet in the middle of the bridge. The current is always moving. It would be excellent to arrive at either high or low tide early in the day and then return later to see the water moving in the opposite direction. This spot is the farthest point for the tide to reach as it influences Gardiners Bay, the Orient Harbor section. Seining can be very productive.

Suggested Activities on all three levels:

Prior to trip:
Lessons including these topics:
- salt marshes - formation, vegetation, value
- beaches - formation, types, zones, flora and fauna found on the beach
- geology - last glacier up to the present for Long Island
- plant succession in this area and climate
- history of the East end North Fork Area
- care and preservation of live specimens: prep aquaria.

At site:
- Water chemistry - test each site for dissolved oxygen and the salinity using a portable kit, commercial or homemade.
- Seining - fish should be put in a tub with a battery operated aerator; some should be immediately identified; some preserved in jars for further study and dissection; the rest should be returned to the water as soon as possible.
- Collection of seaweeds - identify each; put some in an open pail for further study in the classroom; preserve some by floating in a shallow pan of water, placing a stiff blotter or white board under the specimen - raise the paper slowly out of the water, taking care to center the seaweed on the paper. Let water drain off, then place between corrugated paper, tie tightly and allow to set overnight. You will have a set of plants for the class to study.
Collection of animals - take only what can be used to learn about the species, whether for a class dissection or individual research project. Either aerate or place in a wide-mouthed container for air supply; also preserve some for study.

Microscopic Examination - bring some stereoscopes with mirrors, a few watch glasses or culture dishes, even half of a petri dish will do to hold the smaller specimens for viewing.

Collection of Water - using five-gallon plastic gas-can-type jugs that have never had anything but water in them, fill and cap for use in the classroom tanks. You can put your specimens in water of the same temperature from which they came.

Plankton Collection - use glass jars with wide mouths to put the hauls into. Using small dropper and a petri glass dish, have the students observe and identify some critters; the stereos are used for this work. Put several hauls in a larger jar for use in the tanks when you arrive back at school.

Upon return:
Each seaweed can be tested by chromatography. The page-dried specimens can serve as posters for identification. The plankton can continue to be studied. A millipore filter can be used to get a good concentration which can then be looked at by several students. Another idea would be to inoculate a small tank or a graduated cylinder with a concentrated sample. Place this in direct sunlight. Each day note the turbidity of the sample. Keep making a microscopic examination daily to determine the surviving plant and animals. A regular compound microscope and glass slide preparation will reveal the algae present. Use of a spectrophotometer can give a very good graph for study.

Each animal collected should be identified by using a key; the dichotomous type is best. Then, if you have brought back enough, an investigation of the internal anatomy would enable all to learn some of the characteristics of the various phyla. Another alternative would be to divide the class into groups responsible for different specimens. Each will prepare an oral report on the organisms studied and also will be responsible for leading the overall class in a dissection of the specimens. One stencil may be given to each group for the written lab instructions they have planned.

Maintenance in tanks can be another ongoing project assigned to members of the group.

Preparation:
The following are suggestions for good order and coverage:

1. Tides - find a date to suit your time of arrival at East Marion site (tidal flats). To compute this, using the free high tide tables available at your local bait and tackle shop, use the Sandy Hook listing, add one hour and you have the high tide time at Greenport and East Marion. About three and one half hours later the tide should be out enough to expose the flats for study.

2. Arrange transportation, two or three weeks prior to departure.

3. Write or phone for permit - the listing is included above.

4. Teach lessons needed as background.

5. Make ready all classroom facilities for the work ahead.

6. Give each student a list of things to bring (baggies, knife, etc). Include a map of the area, times of visitations and a
special worksheet to be handed in after the trip. This last item should include questions about what is found, where and why.

7. Pack tubs, microscopes, glassware, nets, buckets, etc. and assign students to be responsible for these items during the entire expedition. If a fish fry is planned, the students should also be put in charge of the planning and cooking needs.

**Warnings:**

At the East Marion site - do not wade into the water just under the bridge for its depth suddenly drops off. Also, there are signs that only residents of Southold township may take scallops in numbers without a permit. So if you are planning for a meal, a permit from the township is necessary. The Dam Pond area is a delicate one - care should be taken not to enter in too far from the road.

At Orient State Park, observe the park signs; students should not bother the birds nesting in the sanctuary, especially the osprey nests. There is a short hike along the one road in the park in order to reach the marshes. It has some curves; watch for oncoming cars.

At the Oyster Farms on Shipyard Lane which is 1.3 miles east of the blinker light on Route 25 at Greenport, there is actually not much to see in the plant, but just getting a verbal permission to walk over and observe the tremendous pile of shells is enough to make a short stop worthwhile. In the pile are many other sea creatures that came up with the oysters when dredged. You may even get to see the oyster boat at dockside with all equipment aboard. Be sure to stop at the office and ask.

**General Comments:**

Orient Park comes just before the Plum Island Headquarters on the mainland. This is a restricted area, but one can see the special boats used to transport personnel to the Animal Disease Laboratory. Just beyond this facility is the end of Route 25 and the ferry landing. The Plum Gut Light can be seen, and the original lighthouse on Plum Island can be seen if you bring binoculars. The Gut is known for its very strong tidal currents. Standing waves can be seen. The snack bar mentioned before is here. No restrooms, just a few tables. Parking is available next to the snack bar.

The ride could take two hours from around mid-Nassau County. It may alleviate the long travel if you plan a lecture on Long Island geology and as you pass the moraine and pine areas, an ongoing lecture and question period could be accomplished. Refrigerate plankton to save.

**Author-Educator:**

Ms. Bernadette Ann Voras
Seaford Senior High School
Seaford, N.Y. 11783

**Suggested References:**

(GE) 3, 13, 32; (F) 39; (I) 46, (P) 60; (PL) 70.
NAME: Mt. Sinai Harbor

TYPE: General Field Work

LEVEL: All levels

AREA: North Shore, Eastern Suffolk, LI Sound

Arrangements: NONE

Directions: Long Island Expressway to Nichols Rd. (exit 62). North on Nichols Rd. to Nesconset Highway (347), 7 mi. East (right) on Nesconset Highway to Crystal Brook Hollow Rd. in Port Jefferson Station, 5 mi. North (left) on Crystal Brook Hollow Rd. to Brook Hollow Rd., 2 mi. Right on Brook Hollow Rd. to end, 1 mi.

Facilities: NONE (no restrooms). There are plans to construct some basic facilities, but to date they have not been started. Limited parking.

Boating Facilities: NONE. There is a town launching ramp, must have permit from Town of Brookhaven.

Type of Environment: 1) Long Island Sound with beach
2) Mt. Sinai Harbor with beach
3) Salt Marsh with estuary

Best Usage: Any type of near shore field work, beach botany, terrestrial salt marsh, poor city planning, beach erosion, coastal geology, birding.

Suggested Activities: Observation of local flora, some limited animals, comparative observation of several habitats, geology of beaches (area has high sand cliffs along the sound and very gentle beach in harbor, large spit develops at yacht club), ground water seeps, salinity, phosphate, nitrate tests on water.

Flora and Fauna
1) Salt Marsh Area
   Ruppia maritima, ditch grass
   Ammophila breviligulata, dune grass
   Distichlis spicata, salt grass
   Panicum virgatum, panic grass
   Spartina alterniflora, salt cordgrass
   Spartina patens, salt hay
   Juncus gerardi, black grass
   Chenopodium album, Lamb's quarters
   Rhus radicans, poison ivy
   Iva frutescens, marsh elder
   See publications below for more complete listing of plants.
fiddler crabs
many birds, egrets, heron, plover, sandpiper, sanderling,
gull yellowlegs, kingfisher (see publications for more
complete listing of birds)

2) Harbor, wooded area
black, red and chestnut oaks
beech
maple
flowering dogwood
sassafras
more complete listing in publications

mud snails
periwinkles
hermit crabs in tidal creeks
razor clams on intertidal islands
goosefish
moon snails and starfish on jetty
lobster
offshore in harbor -- chitins and sea urchins

3) Long Island Sound
all types of seaweeds
mussels
clam worms
barnacles

Preparation: Only organization of equipment

Warnings: Watch tides, beach features best to observe at low tide
avoid sensitive area of heath peninsula
may get stuck in the mud
patens marsh not as sensitive as alternafloa.

A typical tidal creek
General Comments: Particularly good to see varied habitats within a small area. Construction of the last few years has greatly damaged part of the area and is good to show poor planning. Major drawback is the lack of facilities, but if the Marine Sanctuary is developed somewhat this drawback should be eliminated.

Author-Educator: John Black
Suffolk County Community College, Selden, New York

Suggested References: (GE) 11, 17, 26; (F) 42; (I) 46, 51; (PL) 64, 65, 70.
NAME:  Studying an estuary, the Nissequogue River

TYPE:  Field work

LEVEL:  Secondary

AREA:  Smithtown, N.Y. - North Shore, L.I.

Arrangements:
Contact: 1. Suffolk County Dept. of Parks - specific - Blydenburg Park, Smithtown (Request form by phone and mail)
2. Smithtown Dept. of Parks - specific - parking at: The Landing Rd. Park and Short Beach Park on River Rd. (Request must be made in person, phone first.)

Directions:
1. Blydenburg Park - Take Veterans Highway, Hauppauge east-turn North on Brookside Rd. (2nd light east of the County Bldg.) Proceed to intersection of Brookside Rd. and Mill Dam Road, turn left at the light. The park is at the end of Mill Dam Road.
2. The Landing Road Park - return to Brookside Rd. and turn left or North at the light. Cross Rt. 25A, at the light, on to Edgewood Road. Turn left off Edgewood Road, at the light on to Landing Rd. The park is on the right hand side after the first bend in the road.
3. Short Beach Park - Return to Edgewood Road, turning left at the light. Proceed North. Turn left at a light on to River Rd. This is a narrow winding road which borders the river and ends at the beach.

Facilities:
Parking and rest rooms, except the Landing - no rest rooms.

Water Facilities:
Blydenburg - no in-water activity. Seining possible at the other stations.

Suggested Activities:
1. To observe the transition of a fresh water stream and its neighboring hardwood banks to become a predominantly salt water environment.
2. To investigate the changes in the physio-chemical properties of the estuary from its origin to its termination.
3. To observe changes in plankton obtained from each of the three stations using the microscope.
Blydenburg Park - The headwaters of the Nissequogue River are the spring-fed waters of Mill Dam Lake. Students can gather leaf samples of each of the hardwood trees. These leaves will be pressed, mounted and labeled in the classroom. A plankton sample is taken. Physio-chemical tests will be made of the following: Temp - Air and water; density; salinity - titration; Dissolved oxygen - D.O.; Carbon dioxide - CO₂; pH-water and bank soil. Fresh water plants and algae can be obtained. The many wild fowl present on the lake can be surveyed.

Landing Road Park - Here the students can graphically observe the dynamic change in the environment. A fresh water stream with its hardwood banks has now interacted with the Sound's tidal saltwater. To the south, the river has meandered and its valley widened. A fresh water marsh borders the river between the hardwood boundary. To the north, the marsh transcends into a brackish (salt-fresh) water marsh.

The students can walk into both marshes and survey the flora. With the aid of the teacher, floral zonation mapping can be done. Student teams can obtain one sample of each flora. The tidal height can be measured and its time recorded. Physio-chemical tests can be taken. Utilizing a seine net, those animals present in the river can be caught and identified. Sifting the bottom will isolate worms and eels.

Short Beach Park - The marsh, adjacent to the parking lot, is an excellent place to look for fiddler crabs, mud snails, hermit crabs and worms. Along the shore of the river, beach flora can be identified. Beach plums are abundant through the early Fall months. At the mouth, physio-chemical data is taken. Seining, behind the protected spit in the river, is excellent. The swale zone is evident along the shoreline.

Landing Road Park
Return to the Park. Measure the height of the water and record the time. Take physio-chemical tests.

Post-trip Activities:
1. Student teams will mount and identify all flora. These mounts can be displayed illustrating vertical zonation.
2. Observe the plankton samples diagram, identify and compare the three different stations.
3. Graph the physio-chemical data as a function of distance (Head waters; Landing; Mouth)
4. Individually complete a field report which consists of questions related to the activities.

Preparation:
1. Student equipment: boots; baggies; lunch.
2. Use of physio-chemical test kits.
3. Familiarization of the area.
4. Class equipment: buckets; ice packs; nets; plankton tow; shovels; sifters; physio-chemical kits; meter stick.
5. Recommend taking slides and movies; and field glasses.
Warnings: The water is very swift at the mouth and in-water activity is not recommended. Poison ivy is present in the beach flora.

Author - Educator: Don Annino
West Islip High School, Higbie Lane, West Islip, New York.

Suggested References: (GE) 16, 26; (P) 59, 60; (PL) 63, 64, 71, 72.

On a not so distant shore
NAME: Sunken Meadow State Park

TYPE: Marine Field Study - Beach and Salt Marsh Areas

LEVEL: Elementary, Intermediate or Secondary

AREA: Suffolk County - North Shore of Long Island

Arrangements: Obtain permit from the Long Island Parks and Recreation Commission if the group exceeds 50 persons (telephone 516/609-1000). There is a charge of $6/bus.

Facilities: There are parking accommodations, restrooms, shelter and picnic tables.

Water Facilities: Swimming and seining are possible.

Best Usage: Excellent specimens from beach and salt marsh environments may be found and zonation observed.

Type of Environment: Marine fauna are plentiful and diverse. They include the shells of clams, oysters, mussels, "moon" and jingles. Barnacles, drills, whelks, periwinkles and "slipper limpets" are abundant. Tubes of "trumpet worms" and "ribbon worms" are easily found. A search in the salt marsh may produce whelk casings, mud snails and amphipods. The flora includes green and brown algae and sometimes red algae when washed up from storms. This salt marsh displays the beautiful zonation typical of salt marsh vegetation.

Suggested Activities: A study of the flora and fauna expected to be found should be made prior to the trip and the zone where each item will most likely be found should be explained. For younger children, a list of plants and animals can be drawn up and points given for each item according to probability of finding it. Upon return from the trip, a thorough examination, under the microscope (if necessary) and a comparison of similar plants and animals should be made. Appropriate animals can be cleaned and displayed. Plants can be dried and processed.

Preparation: Appropriate clothes such as shorts and sweaters or jackets (it is colder at the beach) should be worn. Sneakers are a must! Pails, jars, plastic bags, tags and pencils (not pens) should be brought for collecting. Shovels and seine nets are also necessary.

Warnings: Again sneakers should be worn to protect the feet. Small children must not be allowed to wander alone on the beach. Care should be taken in the salt marsh. Small children should not be allowed here.

Author-Educator: Marjorie von Stade, C.W. Post College, Marine Science Department

Suggested References: (GE) 3, 11, 17, 26, 32; (I) 45; (PL) 68.
NAME: Sunken Forest, Fire Island

TYPE: Visitation, field work
(by ferry only)

AREA: Fire Island, Suffolk County

Arrangements: Contact the National Seashore Ferry at 516/589-1884 or at 10 Browns River Rd., Bayport, NY 11705 for schedule, group rates, and parking fees.

Directions: Long Island Expressway to exit 59 South. Continue South onto Lakeland Ave. and proceed across Main St. to dead end. Turn left and continue to end. Turn right onto Foster Ave. Turn left onto Terry St. (watch for Sunken Forest Sign) to River Rd. Immediately on left after turn look for sign next to gate to fenced-in parking area. Ferry ride to Sunken Forest approximately 30 minutes long.

Facilities: The Park Rangers offer an interesting variety of programs at the open amphitheater during the evening hours and meet each ferry to give you a brief talk on what to see during your visit. Brochures and booklets are available pertaining to the Sunken Forest and Fire Island 516/289-4810. During the summer months you may swim in the ocean and bay. Lifeguards are on duty during the summer only. There are also showers, clean bathroom facilities, a small museum and a concession stand for light lunches. The boardwalk starts at the Marina and winds through the cool forest, sunken below the line of wind and salt spray from the Atlantic Ocean. Only one hundred steps away are the Atlantic Ocean and the Great South Bay.

Water Facilities: The bay environment offers a protected area where students can easily seine and observe the characteristics of organisms living on a sand flat. The ocean environment contrasts the gentle bay with its rough surf and erosive winds and currents. Students should venture into the ocean only under strict supervision.

Best Usage: The Sunken Forest is a prime example of successions from a salt marsh through a primeval forest into a dune protected ocean beach. This underdeveloped portion of Fire Island will give everyone the opportunity to see a remnant of the seashore that our forefathers saw.

Type of Environment: The Sunken Forest is a living wonder of nature, a primeval woodland region with centuries old trees, tangled vines, wild marsh, small ponds, and bay areas. The forest consists of wind-twisted pines, holly trees reaching thirty-five feet high, groves of oak, tupelo, sassafras, thickets, vines and berry bushes. The forest is sunken below
the line of wind and salt spray from the Atlantic Ocean. The fall foliage, migratory birds and monarch butterflies (flying by the thousands along the top of the sand dunes) are a wonder to see. The sand dunes protect the forest and the living creatures that inhabit it. This area of Fire Island contains a water table of fresh water held by the peat bog, which provides the forest and its animals with fresh water. The bay waterfront has grassy wetlands and salt marsh where waterfowl abound. The flights of duck and many other water fowl darken the skies with their forms in the fall and spring migration. The area provides the following habitats for investigation:

1. A well-developed holly (Ilex opaca) forest
2. Sand dunes with associated vegetation
3. Salt water marsh
4. Estuary (Great South Bay)

**Suggested Activities:** The following are a few of the questions that can be used prior, during, and after a trip to Sunken Forest:

**Pre-field trip:**
1. Prepare a vegetation and topographical map of the area.
2. Introduce students to phytoplankton and its importance in food chains.
3. Describe how sand dunes are formed and the importance of vegetation in stabilizing dunes.
4. Introduce students to concepts of primary succession.
5. Give students a brief lecture on the ecology of dominant vegetation at the Sunken Forest: slides, pictures, herbarium specimens could be used to acquaint the students with: holly, black cherry, shad bush, sassafras, black gum, red maple, and various oaks, the most common trees and suffrutescent species.
6. Approximately how old is Fire Island? How was it originally formed?
7. What is the name of the body of water which separates Fire Island from Sayville? From Greenland?
8. What are the general dimensions of Fire Island? Are they changing?

**At Site:**
9. Tour the Sunken Forest. Point out different kinds of vegetation in different areas and relate the presence of this vegetation to its relative tolerance of salt spray, and primary succession.
10. The effects of salt spray. Show how the woody and shrubby vegetation has been sculptured by salt spray.
11. Use plotless methods such as the point centered quarter method or random pairs method to sample woody vegetation in the Sunken Forest. This can be done from the wooden walk. Students should estimate trunk diameter of tree species so they will not have an excuse to run wild in the forest.
13. Soil sieves to determine dominant particle size of sand along the various points of the Sunken Forest. (Secure park ranger's permission before attempting this task.)
At Site:
15. Plankton tows at different depths from the dock in the bay.
17. Optional: Special films of coastal life can be observed at the museum.
18. Brief examination of salt marshes on walk.
19. Name five functions of the Park Ranger on Fire Island.

Post-field trip:
20. List vegetation in each area of Fire Island beginning at the first line of dunes where dune grass dominates proceeding through the second dune system that shelters the Sunken Forest with damp depressions in the forest dominated by black gum and red maple to the sheltered salt marshes of the bay.
21. Primary succession. How long might it take a forest like this to develop? Specific studies of holly, dune grass, and/or other species in the area.
22. The importance of salt marshes in the estuarine environment.
23. Overhead projector to magnify plankton samples in the classroom (place concentrated plankton samples in petri dishes which when placed on the overhead projector will magnify the specimen from 10 to 30 times).
24. Discuss the importance of water salinity and nutrients in maintaining shellfish populations in the Great South Bay.
25. What does the term 'introduced species' mean? Give an example of one found on Fire Island, and why this particular organism is used.
26. List three causes of erosion which affect Fire Island.
27. Why are sand dunes never the same year after year? Why are the stones and shells on the ocean side so smooth?
28. What can be told from a cut-out, layered section of a sand dune?
29. Name three differences in water between the ocean side and the bay side of Sunken Forest.
30. Why is Fire Island growing westward? northward?

Preparation: Warm clothes, a big lunch, clipboard, plastic collecting bag, and a change of clothes (only if students are going in the water) are all that is necessary. Appropriate equipment for your individual class activities. This might include:
1. A small 3" x 5" notebook.
2. Appropriate clothing (sneakers, long-sleeved shirt, suntan lotion, bug spray, comfortable walking or hiking shoes.)
3. Small pails and bottles for samples.
4. Plankton nets.
5. Water test kits.

Warnings: Sneakers should be worn at all times, both on land and in the water. Fire Island has an abundance of Poison Ivy. Also watch for splinters on the boardwalks.
General Comments: The Sunken Forest of the Fire Island National Seashore supports a unique ecosystem, an evergreen maritime forest dominated by holly Ilex opaca. The dominance of holly, importance of salt spray and the area's relative isolation make this a most unique site for a field trip. This site should be visited during the summer, late spring, or early fall. Dr. Stalter will be pleased to provide any interested individual with much more detailed information about the ecology, geology, floristics (including plant lists), plant communities, and more detailed information about special activities.

Author-Educators: Linda Jaeger, St. Clare's School, Rosedale, N.Y.

Dr. Richard Stalter, Director of the Environmental Studies Program, St. John's University, Jamaica, New York 11439.

Suggested References: (GE) 8, 9, 10, 13, 26, 28, 33; (B) 35, 36; (F) 39; (I) 45, 46; (P) 60; (PL) 62, 64, 68, 70, 71.
NAME: Ecology of a Barrier Beach

TYPE: Field Work

LEVEL: Elementary - Secondary

AREA: Fire Island Inlet - Captree State Park

Arrangements: Contact Jones Beach Parkway Authority, Permit Division, Wantagh, NY, at least three weeks in advance to obtain bus permit. No parking fee for educational groups.

Directions: Wantagh Parkway to Captree State Parkway (about 20 miles). Bear left around water tower at Jones Beach and continue on Captree Parkway, past Robert Moses Bridge to Fire Island. About 1/4 mile past bridge, make right turn into parking lot (picnicking). Park bus at far end of field. Walk down towards beach and continue about 1/4 mile along beach to site under bridge. (See map)

Facilities: There are facilities for food, rest rooms, and shelter at the Captree Boat Basin. In order to use these facilities, students would have to walk or the class could be transported by bus. There are no facilities at the working site.

Water Facilities: Since Fire Island Inlet has direct access to ocean, there are many good areas for seining at low tide. Particularly good areas are the bridge pilings and mud flats in the surrounding areas.

Best Usage: Particularly good seining area for various types of fish and arthropods. Because of direct access to ocean, many varieties of seaweeds may be found.

Many organisms attached to pier pilings and cement bridge pilings (sponges, fan worms).

Also, further up the beach is an interesting hard-packed sand flat containing many forms of Annelids and Echinoderms.

Suggested Activities On All Three Levels:

a. Prior to trip

The preparation for this trip could be in many areas. The following is a list of some preparations which I undertake.

1. Classification of seaweeds
2. How to mount seaweeds, introduction to chromatography
3. Class discussion on plankton
4. Ecological relationships of a barrier beach environment
5. Fish population census
b. At the site
   1. Collection of seaweeds and plankton
   2. Seining for fish
   3. Digging for various annelids on sand flats
   4. Use of secchi disc and forele scale
   5. Observation and study of the herring gull colony (Larus argentatus)

c. Upon return
   1. Students examine plankton samples and identify organisms
   2. Mount seaweeds, chromatographic analysis of seaweed pigments
   3. Fish population analysis
   4. Follow-up discussion of ecological relationships

Preparation:
Maps of area
List of organisms which may be found in area
Things to bring on trip - boots, collecting buckets, snorkels, masks, shovels, nets, etc.

Warnings:
Do not walk out too far.
Possibility of swift current beyond first bridge piling.

Author - Educator: Burton Goldfeld, Marine Science Instructor, Valley Stream North High School, 750 Herman Ave., Franklin Square, New York, 11010

Suggested References: (GE) 8, 13, 26, 32, 33; (B) 35, 36, 37; (I) 45, 46.

A moon snail lunch
NAME: EARLY INDUSTRY ON LONG ISLAND
"Whaling"

TYPE: Visitation

LEVEL: Secondary, Jr. High

AREA: Long Island

ARRANGEMENT: Contact Cold Spring Harbor Whaling
Museum. 516/367-3418, Ms. Caroline Warner.
Arrangements made for as convenient a time
as possible, but on a first-come first-serve basis.

DIRECTIONS: Long Island to exit 49 north (Route
110). Follow Route 110 through Huntington
and follow signs to Cold Spring Harbor.
Museum is on east side of town.

BEST USAGE: This trip can be an inter-disciplinary
trip because it can be used for Social
Studies, Science, and English. It is
suitable for Social Studies curriculum
seventh grade New York State and eighth
grade "Industrial Revolution." Science
curriculum for whale anatomy and physiology.
English classes can read the novel "Moby
Dick" and use the trip to supplement
and enrich.

SUGGESTED
ACTIVITIES:

Prior: To prepare the students for the trip they should have a
background in the physiology of whales, whaling as an
industry and history of Long Island.

On Site: Activities at the museum can be concerned with the
physiology of the whale and an inspection of tools
used in whaling such as a whale boat, harpoons, etc.

Upon
Return: Follow-up activities on such topics as man's effect on
his environment, endangered species, and conservation.
The following questions can be used upon return from
the Whaling Museum.

1. When was the town of Cold Spring Harbor a whaling town?
Describe the whaling fleet that was based at Cold Spring Harbor.

2. What physical aspects of Cold Spring Harbor made it difficult for
the whaling fleet to operate?
DIRECTIONS: While viewing the film "Down to the Sea in Ships" answer the questions below:

A. Describe the life in a whaling town.
B. Describe life on a whaling vessel.
C. Describe the actual whale hunt.
D. What are the dangers of a whale hunt?
E. What parts of the whale are useful to the whaling industry?

SCRIMSHAW EXHIBIT

3. What is meant by scrimshaw?

4. What useful purpose did the making of scrimshaw collections serve while on a whaling voyage?

WHALE BOAT EXHIBIT

5. Describe the equipment on a whale boat.

6. How many men made up a whale-boat crew?
   What were the different jobs they had?

7. What was the purpose of harpooning?

8. What is the purpose of the axe in the bow of the boat?

9. What were some of the early mechanical means of killing whales?

EXHIBIT OF TOOLS

10. List the various tools and other implements used in processing the whale.

11. Name some other tools that are necessary for a ship to have before leaving on a whaling voyage.

PREPARATION: I would strongly suggest that the students have a knowledge of the whaling industry on Long Island and why it became extinct. Also it would be a good idea for them to read "Moby Dick".

GENERAL COMMENTS: The fee for the tour is $10 per group and due to availability of space, groups are limited to 30. There is a movie, "Down to the Sea in Ships", that you can arrange to view while you are at the museum. In addition, you can arrange for museum personnel to visit your classroom for a $15 fee, and present a slide show and a movie entitled "California Gray Whale".

Author Educator: Roy Shepherd
Mineola JHS, 200 Emory Rd., Mineola, N.Y. 11501

Suggested References: (GE) 20, 22, 31; (M) 53