

Chapter 12

Outdoor Classroom Learning Station Techniques at St. Marks National Wildlife Refuge

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Introduction

This outdoor education experience exposed educators to a variety of outdoor classroom learning station techniques used at the St. Marks National Wildlife Refuge. The focus was on hands-on learning experiences and ways to translate these experiences to other outdoor areas accessible to educators. Learning stations included sampling both a freshwater pond and saltwater estuary with dip nets, buckets, seines, and ID clipboards, as well as exploring different habitats. To explain actual fire management techniques used on a national wildlife refuge such as St. Marks, educators collected weather data, such as temperature, humidity, wind speed and wind direction as a "fire crew" to determine if it were a good day to burn at St. Marks and why. The participants were outside most of the day and dealt with sun, bugs, and humidity - a challenge for students and educators and staff!

Materials

Field Equipment

The following materials were used for the day for 20 students, divided into 5 teams:

clipboards (either 20 or 5, depending on team strategy)

wind meters (5)

compasses (5)

sling psychrometers (5),

thermometers (5)

pH indicators (5)

buckets (5)

long-handled dip nets (5)

25 foot beach seines (2)

data sheets (5)

pencils (20 or 5, depending on team strategy)

Background Information

The outdoor classroom experience involves classroom preparation, familiarity with the site and programs, and organizing your schedule with site staff, parents, bus drivers and the school. In environmental education, activities provide every person with opportunities to acquire knowledge, values, attitudes, commitment, and skills needed to improve and/or protect the environment. Basic ecological concepts covered by the field experiences include: everything has a home; everything is becoming something else; everything depends on something else; diversity is essential for life; and humans can change the balance of nature. Different learning styles and group dynamics were used to touch a diverse audience. At St. Marks NWR, most of the over 5,000 students involved in outdoor classroom activities are in the K - 9 grade level and the following activities are geared for this wide range of abilities.

Objectives

Conceptual: Participants understood how outdoor classroom settings, such as national wildlife refuges, can be used for science study.

Procedural: Participants experienced various outdoor classroom learning stations, using different techniques to explore habitats and wildlife management.

Procedure

Upon arrival at the Refuge, participants were broken down into teams of four. An orientation slide show about the refuge and its programs was presented. Educators brainstormed about outdoor classroom techniques they've used before and the pros and cons of each technique. A short survey was done to help staff learn the background of the participants (Appendix 1). Two things became immediately obvious from our pre-assessment: most of the participants taught students 18 years and older; and most were unfamiliar with the National Wildlife Refuge System.

Field Exercises

For the first exercise, "Habitat Study", the teams collected data on soils, sun, temperature, wildlife, plants, and wind at three separate locations (see Appendix 2) and reported their findings to the other teams. The activity took about 45 minutes. The discussion of data collected was quite lively and creative. The group enjoyed the activity, although they wished for more in-depth interpretation of the plants and animals they were seeing.

The second exercise focused on the freshwater pond behind the Visitor Center (see following Appendix 3). Teachers were given background information and then collected/observed plants and animals in and around the pond. They developed simple food webs and energy chains; they measured pH and temperature and discussed how these might affect pond life. This activity involved math, art, language art skills as well as science.

The third exercise involved collecting fire weather data using a belt weather kit. Educators brainstormed about why prescribed burning is used on wildlife refuges and national forests and

the pros and cons of burning. They reviewed the accepted parameters for a burn in the exercise area (See Appendix 4.) and, after collecting the data, made the call "to burn or not to burn."

The fourth exercise included sampling a saltwater estuary next to the historic St. Marks Lighthouse, about 7 miles south of the Visitor Center. Educators continued to collect data (see Appendix 5) about the barrier beach and tidal area. They developed a simple food web, plus did a compare and contrast discussion on the two wetlands sites.

Assessment

Upon returning to the Visitor Center, an assessment was made of the different techniques used and the different skills and content highlighted by the four exercises. A final evaluation of the day was completed by the participants. Participants said the most helpful things learned were: how to use games to achieve learning objectives, the unique habitats of north Florida's coastal areas; and, the techniques used in measuring parameters for prescribed burning. Participants' criticisms were that the activities were not at the college level and that more time was needed to cover all the activities and habitats.

Acknowledgments

Educator's Guide to St. Marks National Wildlife Refuge, St. Marks Refuge Association, Inc., 1990.

Appendix 1 **Outdoor Classroom Learning Station Techniques: Pre-Assessment**

Objective: Experience different outdoor classroom learning stations and discuss how these could be used in areas the participants have available for use.

1. How often does your class use outdoor learning stations (per semester)?
2. What type of habitats do you usually use for these stations?
3. Why did you sign up for this session?
4. What are two expectations you have about this session?
5. What are your student age groups and how many students do you normally have in class?
6. What subject areas should we try to correlate to our activities?

7. Are you familiar with the National Wildlife Refuge System?

Appendix 2

Habitat Study

Objectives:

Students will collect data at three different habitats at the Visitor Center area and will compare how nonliving elements impact living elements in those habitats.

Background

An ecosystem is the place where living and nonliving elements interact. Examples of living elements would be plants and animals. Nonliving elements affecting these living plants and animals would be sunlight, moisture, temperature, and wind. In different parts of the world, these nonliving elements have a greater or lesser impact on the living elements. Here at the St. Marks National Wildlife Refuge, the warm, moderate climate stimulates plants growth almost year round. As temperatures and humidity climb during the summer, animals must adapt to the heat and insects. Students will measure wind speed, wind direction, air temperature, soil temperature, soil type and note animals and plants observed in each of three common habitats found on the Refuge: (1) open, grassy field, (2) shady slash pine flatwoods, and (3) small, freshwater pond.

When setting up your three different sites, consider very different ones based on the living and nonliving elements mentioned above. Try to visit the sites more than once (perhaps each season) at the same time of day.

Methods:

Each team will have copies of the following instructions and data sheets. Teachers should decide if each data sheet goes on one clipboard (so each team would have 5 clipboards) or if all the sheets are put on one clipboard. Allow each team around 20 minutes at each site. Allow time to explain to all participants how to use the equipment. An alternative will be to instruct the adults in each group if participants are too young.

Animal Life Data Sheet

Purpose: To note the various kinds of animals at each site.

Technique: Look for various kinds of animal life such as insects, reptiles, birds, fish, frogs, butterflies, etc.). You should also look for evidence of animals such as tracks, burrows, chewed leaves/pine cones, droppings, etc.

Note this information for each site.

Open Field:

Slash Pine Forest:

Freshwater Pond:

Plant Life Data Sheet

Purpose: To note the various kinds of plants growing at each site.
Technique: Do not worry about exact identification of plant species. Note different types of big trees, little trees, bushes, low plants, grasses, flowers, etc.
Note the most common type of plants found in each location and where each grows relative to the others.

Note this information for each site.

Open Field:

Slash Pine Forest:

Freshwater Pond:

Temperature Data Sheet

Purpose: To measure the temperatures in three places at each site.

Materials: Air and soil thermometers.

- Technique:
1. Measure the air temperature at ground level.
 2. Measure the air temperature about 3 feet above the ground.
 3. Use a small stick to make a hole big enough for the thermometer. Stick the thermometer into the hole and gently press the soil around it. Let it stay for 5 minutes and read temperature before removing the thermometer from the ground.
 4. At the pond site, measure the temperature 1 inch below the surface of the water, at water level, and 3 feet above the water.
 5. All temperatures should be taken in the shade unless otherwise noted.
-

Open Field:

1 inch deep: _____

ground level: _____

3 feet: _____

Slash Pine Forest:

1 inch deep: _____

ground level: _____

3 feet: _____

Freshwater Pond:

1 inch deep: _____

ground level: _____

3 feet: _____

Wind and Sunlight Data Sheet

Purpose: To determine the amount of wind and its direction at each site, and amount of sunlight that falls on each site.

Materials: Strip of paper (or wind meter) and compass

Technique:

1. Hold the strip of paper by one end; holding the paper away from your body.
Note which way the wind is blowing. If your strip of paper does not move, turn around and repeat the process facing another direction. You may be blocking the wind with your body.

If you have a wind meter, follow its directions to determine wind speed.
2. Using the compass, determine from which direction the wind is blowing.
3. If it is a cloudy day, make your best guess as to the amount of sunlight that falls on each site. Note whether you think that each site gets sun most of the day, just in the morning, just in the afternoon, or never.

Open Field

Wind Speed:

Wind Direction:

Sunlight?

Slash Pine Forest

Wind Speed:

Wind Direction:

Sunlight?

Freshwater Pond

Wind Speed:

Wind Direction:

Sunlight?

Soil Data Sheet

Purpose: To determine characteristics of the soil at each site.

Materials: Stick or trowel (we use plastic knives)

Technique:

1. Use the stick to scrape a hole about 2 inches deep.
2. Press together the soil you scraped up. If it sticks together, it is moist.
3. Note the smell of the soil.
4. Note the color of the soil.
5. Describe the texture of the soil (is it sandy? like clay? Fine? Coarse?, etc.)
6. Are there any organisms or plant material in the soil?
7. Note your findings about the soil at each site.

Open Field:

Slash Pine Forest:

Freshwater Pond:

Appendix 3

Pond Study

Objectives:

Students will become familiar with aquatic plants and animals in a freshwater marsh.

Background

A freshwater marsh is an open area, covered with plants and patches of shallow water. Marshes may be flooded for all or only part of the year. The freshwater marsh is one of several kinds of wetlands. If you hike the Plum Orchard Pond Trail, you will observe another type of wetland, the seasonal bog.

The United States is losing 300,000 acres of wetlands each year. Evaluate the pond or the marsh you explore for all living things. One extension of this activity is to instruct students that they are biologists who have been hired by a large hotel chain to survey the pond area to determine what impacts a large hotel complex would have if built on the pond. At the end of the data collecting, discuss the "whys" and "why nots." Another extension is to construct a simple food chain out of the items observed and collected and discuss how they would be affected if the pond experienced a drought, high water, etc.

Method

Teams sample the pond with the long-handled dips nets, buckets, clipboard with ID sheet and data sheet. Dipping the nets will be more popular than recording!

Vocabulary

Food chain - transfer of food energy from organisms in one level to those in another. Energy from sunlight is transferred by plants into food for themselves and animals that eat them. A simple food chain for the pond would be:

Sunlight -duck weed -mayfly larva -killifish -bass - osprey.

Pond Study Worksheet

Name: _____ Date: _____

1. Air temperature: _____
2. Water temperature: _____
3. pH: _____
4. Is the water: (circle one) clear muddy other color? _____
5. What is the condition of the bottom? mud rock gravel sand
6. Describe the habitat type of the water and surrounding area:

7. Is there any erosion along the shoreline? If so, describe what may have caused it.

8. How many different plants can you count in one place for one minute?

9. Write about what the conditions you discovered in your study area may mean about wildlife.

10. Is there any evidence of pollution? If so, describe what you believe to be the cause.

11. If the temperature of the water should change, what effect would you expect to see upon the plants and animals living there?

Appendix 4

Prescribed Fire Activity

Purpose: Students will measure current weather conditions and compare them against the standard for prescribed burning in a certain unit of the St. Marks National Wildlife Refuge.

Equipment: Teams each need one clipboard, this sheet, one sling psychrometer, one wind meter, one compass, and the latest rain information.

Technique: Teams complete the information under the "Today" section on the chart.

St. Marks NWR Prescribed Burning Parameters Data Sheet
 Season: Spring (April - June) Summer (July - Sept.) Winter (Oct. -Mar.)
 (circle one)

Unit: St. Marks Unit S-1 (Visitor Center/Education Cabin)

Parameter	Standard	Today
1. Days Since Rain	1-10 days	
2. Wind Speed (at ground)	2-8 mph	
3. Wind Direction	_____	
4. Relative Humidity	40-50%	
5. Temperature	60-75 F	
6. Burning Season	_____	
7. Number of People (minimum)	4	

Safety Considerations:

All personnel will wear required Nomex clothing, 8" leather fire boots, fire shelter, gloves, hard hat, eye protection at all times. Escape routes will be made known to all fire line personnel. Safety zones will be the fire lines, ponds, creeks, roads, or other safety barriers. The Emergency Medical Evacuation Plan will be reviewed with the Burn Crew during the preburn briefing.

Appendix 5 Saltwater Wetlands

Objectives: Background:

Students will identify saltwater plants and animals.

You are looking at a type of habitat between the ocean and the land. This is a saltmarsh. The tides are the major factor in the life of animals living in the saltmarsh. Because the marsh is constantly flooded and drained, the animals must adapt to constant change in temperature, salinity (amount of salt in the water), moisture, and oxygen concentrations. For example, cordgrass (point out cordgrass) has special glands for ridding itself of excess salt. Animals like fiddler crabs and clams use the mud for shelter. Barnacles close their shells tightly to

keep

from drying out during low tide. Periwinkle snails climb down the cordgrass during low tide to feed and climb up the cordgrass during high tide to escape predators.

The plants in the marsh feed some of the animals here. After the cordgrass has died and been broken down, it is eaten by fiddler crabs, snails, bacteria, and shellfish (e.g., oyster, scallop, crab, lobster). These animals are eaten by other creatures. Raccoons eat crabs and mussels; deer eat cordgrass. Clapper rails, seaside sparrows and marsh wrens nest in the marshes and eat snails, insects, crabs and other shellfish.

Saltmarshes provide temporary habitats for many creatures that live out their lives elsewhere. The marshes are nursery areas for marine animals that inhabit offshore areas. Young shrimp and flounder grow in the marsh. Also, when the marsh is covered with water at high tide, fish and shrimp swim in looking for food. At the same time, the incoming tide brings food to those animals and plants in the marsh.

Methods:

Teams sample the estuary using dip nets, and the seine net. Additional materials needed include buckets, clipboard and the following I.D. sheet. Explain that you hope to find indicators of the different animals that use the marsh. The students have just learned that the saltmarshes provide protection, food, and nursery areas for many types of wildlife. Walk the seine slowly out into the water, keeping the lead line down on the sand. Bring the net around in a horseshoe shape. Walk towards shore, bringing the sticks together, gently pull the lead line up on the beach. Refer to Bay Bingo ID sheet to mark down items collected. If you do not collect anything interesting, mention how "marsh muck" is very important because it provides a root-hold for many sea grasses (there should be some sea grass on the beach at high tide line), and odd marine life and is formed mostly from dead sea plants. Muck is called **detritus**.