

# FOREST STUDY

## Fifth Grade – Rahr Memorial School Forest

### ENDURING UNDERSTANDING

Organisms live in environments that meet their needs.

### ASSESSMENT

Students will be able to demonstrate knowledge by successfully planting a seedling and describing the needs of an organism.

### WISCONSIN'S MODEL ACADEMIC STANDARDS

Science: C.8.2, C.8.6, F.8.8,

Environmental Education: A.8.1, A.8.5, B.8.5, B.8.8

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### CLASS OUTLINE

- I. Set-up
- II. Sample schedule
- III. Introduction
- IV. Forest Ecology
- V. Planting
- VI. Wood's Worth
- VII. Ecosystems
- VIII. Aquatic Life Study
- IX. Nature Journals
- X. Landforms
- XI. Conclusion
- XII. Clean-up

Safety

Optional/ Rainy Day Activities

Additional Information

Resources

School Forest map

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### MATERIALS

#### Forest Ecology

- Forest Layers student pages
- colored pencils
- pencils
- clipboards

#### Landforms

- topographic maps
- aerial photos
- washable markers

#### Planting

- shovels
- seedlings
- gallon jugs
- buckets
- water (faucet on driveway side of Ehlert Lodge)

#### Wood's Worth

- Merritt hypsometers
- Biltmore sticks
- measuring tapes
- How Many Products data sheets
- Board Foot tables
- clipboards
- pencils
- calculators
- labeled trees (5)

#### Ecosystems

- data sheets
- pencils
- clipboards
- bird field guides
- animal tracking guides
- mammals books
- tree identification books
- flower identification books

#### Aquatic Life Study

- nets
- collecting bins
- ice cube trays
- clipboards
- I.D. sheets
- Pond Life books
- data sheets
- pencils
- spoons and ladles

#### Nature Journals

- paper
- staplers
- scissors
- pencils
- colored pencils
- clipboards
- crayons for rubbings
- tape
- Nature Journal books

## CLASS PROCEDURES

### I. Set-up

After setting up a date with the School Forest Secretary, teachers are also responsible for filling out and turning in a field trip request form. Select which activities to include during your visit to the School Forest. Teachers should also schedule a time when the School Forest Coordinator can meet with them at school to discuss the visit. Teachers will be asked to teach or co-teach one of the activities while the student groups rotate through the activities during the day. The School Forest Coordinator can also teach at one of the stations during the day. Preparation time will be needed to review the activity.

All of the materials needed for this day can be set-up at the School Forest. Please let the School Forest Coordinator know of your class needs. Teachers will need to bring a few things from school: first aid kits, emergency contact information, extra clothing, and any additional activities they feel necessary for the class. Students will need to bring a bag lunch (with a drink and nothing that needs a microwave) and adequate clothing for the day.

### II. Sample Schedule:

9:00	Depart from School
9:30	Arrive at School Forest
9:30 – 9:50	Welcome and Introduction
9:50 – 10:45	rotation 1
10:50 – 11:45	rotation 2
11:45- 12:20	Lunch
12:20- 1:15	rotation 3
1:20 – 2:10	rotation 4
2:15 – 2:25	Conclusion
2:30	Depart
3:00	Arrive at school

### III. Introduction

One of the main reasons we have a School Forest today is because of the tradition of fifth grade tree planting. Today, students will carry on that tradition. The class will also learn about different aspects of the forest and what organisms need to survive. Point out where the restrooms are located, share what other groups are at the School Forest, and review the rules for the School Forest.

### IV. Forest Ecology

Forests consist of living and non-living things that make up different forest layers. There is the overstory, understory, shrub, forb, and litter layers. Discuss these layers in detail with the class (see LEAF activity in the additional information section of this lesson plan).

Show the class the example data sheet. The students can work with a partner to complete their study. Hike away from the buildings. Tell the students the boundaries of the study area. Review the rules and what they are to accomplish. They should work to create a sketch of the forest. Ask them to choose a different color to draw each layer. It is important that the drawings show detail and are complete. They should be sure to label the different forest layers.

Gather together and share the data that the students collected.

## V. Planting

The location for planting changes every year. The School Forest Coordinator will let you know where you will be planting. The supplies (seedlings, buckets, shovels, and water) will be available next to the Ivon Greene cabin. Fill up the gallon jugs at the faucet on the side of the Ehlert Lodge, by the driveway and the drinking fountain. Please instruct students on how to carry the equipment safely. The group should carry the trees to the planting site in the bucket(s). Put water in the bucket(s) to keep the roots wet. Have the students work in pairs. Each small group will need to carry 1 shovel and 2-3 gallons of water. Once at the site, give the students a demonstration of how to plant the seedlings.

Directions for planting a seedling:

1. Keep the seedlings root moist while digging a hole. Place it carefully under leaves or wait to retrieve your seedling from the bucket until you have a hole almost ready.
2. Find a location to plant your seedling that is one shovel length away from other trees. Make sure there is sunlight hitting the ground in that spot.
3. When using the shovel, use two hands. Use your foot to kick it in. Spread out two hands on the handles. Pry the dirt up. Go around the spot to make a square/circle hole. The shovel will break if you only pull back on the end of the handle.
4. Dig a hole deep enough for the entire root mass. The hole should allow for the roots to sit naturally in the hole. If the roots are bunched together to fit into a small hole, the tree will not survive.
5. The hole should allow for the root collar (the stem above the roots where the soil line was when it was growing) to be at ground level. If the roots stick out of the soil or if the seedling is too deep, the tree will not survive.
6. One person holds the seedling upright while the other person carefully fills soil around the seedling's roots. If there is air by the roots, the tree will not survive.
7. Pack down the soil around the roots.
8. Water the seedling with  $\frac{1}{4}$  to  $\frac{1}{2}$  of a gallon of water (depending on soil moisture).
9. If there is time, get another seedling to plant.

After the last group, please return equipment to the Lodge area. Make sure everything is cleaned off before putting back in the basement of the Greene cabin.

## VI. Wood's Worth

Lead a discussion with the class about what it means for something to be valuable. List "valuable things." Now ask the students if all of these things are worth a lot of money. Ask how something that is not worth a lot of money can still be valuable. Discuss how things that are important to our lives can be valuable. We are now going to learn about ways that forests are valuable.

Teach the students how to use a Biltmore stick to measure the diameter of a tree. Then demonstrate how to use a Merritt hypsometer to measure tree height. (See the additional information section of this lesson for more details.)

Now head outside and show the students the boundaries for the activity. They can work with a partner to measure the size of the five labeled trees and then figure out how many products can be made from each of the trees. Discuss the group's results. Discuss additional uses for the labeled trees that make them valuable (non-commercial uses).

## VII. Ecosystems

An ecosystem is a natural community of organisms interacting with one another in their non-living environment. An organism is anything that is alive (biotic) – a fungus, a worm, a bird, a tree, a flower, an animal, a human, etc. External (abiotic) conditions include: climate, weather, soil, water, air, light, space

Ecosystem examples:

- Oak trees grow in sandy soil.
- Oak trees like the Wisconsin temperatures. They could not grow in the heat near the equator or in the cold arctic.
- Oak trees need the right amount of precipitation (rain and snow). They could not grow in a desert or in a wet swamp.
- Oak trees depend on squirrels to plant their acorns.
- Squirrels depend on oak trees for food and shelter. Deer and turkeys also eat acorns.
- Bugs lay eggs in the bark of the oak trees.
- Birds eat some of those eggs.

In order to better understand the forest environment, the class will be looking at several different kinds of ecosystems and organisms that live in them. The students will be learning about how those organisms depend on their environment.

Each student should take a pencil, clipboard and data sheet. Go for a hike and stop in various ecosystems (sand dunes, beach, hemlock forest, swamp, mixed forest). Let the student explore (with a partner or group of three) the area to find evidence of organisms that live in that area.

Each group should select one organism to study. They can study a plant that they see, a bird that flies by, an animal whose track they find, or anything else that they can prove lives in that area. *They do not have to know the specific name of the animal.* They can use the field guides to help them get ideas. Record information on the data sheet about each location (how is it different than other locations) and the organism chosen to study. The purpose is to learn that each organism has specific needs and that is why it only grows/lives in specific locations. For example, there are no alligators living here because this environment does not satisfy their needs.

Gather the group together, have a few groups share their ideas about the ecosystems abiotic components and their organism. **Count the field guides before leaving the site to make sure you have them all.** If there is time, continue to another location.

## VIII. Aquatic Life Study

Take your class to the swamp dock (north of Hemlock Trail and west of the dunes). Bring the supplies with you. Gather the group at the end of the dock and review what you will be doing and the rules.

Discuss with the students the definition of a wetland. Are there different types of wetlands? What type are we in right now? How do you know it is a swamp? Do you think it is a healthy ecosystem? Why or why not?

In this session, students will try to determine if the swamp is healthy by studying the critters that live here. The students will collect and observe the small animals (insects, amphibians, etc.). Aquatic animals can be very sensitive to where they live. After collecting the animals, the students will learn to identify the species and then figure out if the swamp is healthy.

Divide the class into small groups of about 3-5 students. Assign each group an area to work. Then pass out the materials. Students should:

1. Fill the bins with about 1 inch of water.

2. Carefully scoop up water (and critters) with net and dump it into the bin of water. It is best to turn the net upside-down and "swish" it in the bin so that the tiny critters swim into the bin. Dump the net in even if you do not see something right away.
3. Many aquatic animals will cling to dead leaves in the water, try to collect a couple of leaves too. Do not try to pick up sticks or other sharp objects with the nets.
4. The students that are not collecting with the nets can search through the gathered life in the bin. They can sort the critters out in the ice cube tray or in the small containers. Use the resources to identify the different animals.
5. Study what is found.

*Note: Amphibians have permeable skin. If students have insect repellent or sun block (or anything else) on their hands, they should NOT pick up any amphibians. If they do, the animal may become injured because whatever is on the student's hands could go through the animal's skin and into its body.*

The teacher may want to collect the nets at some point so that the students will focus on the critters that they have already found. You can use the containers with lids for any frogs or other animals that you want to show all of the students. The class should work on their data sheets.

Near the end of the class, gather everyone to discuss what was found. Is the swamp healthy? Use the data sheets to help figure this out. How can humans help or hinder the health of wetlands? Why is it important to study wetlands?

Wetlands are very important to our environment. Wetlands:

- Hold water from run-off. Some of the water seeps down into the earth to provide water for wells.
- "Lock up" huge quantities of carbon. Carbon dioxide is the primary cause of global warming. The carbon that is locked up in the plants in a swamp is not allowed to get into the atmosphere. Trees do the same. Consider how trees take in carbon dioxide and give off oxygen. That means they keep or "lock up" the carbon.
- Act as a huge water filter.

## IX. Nature Journals

Discuss what a nature journal is... or just what a basic journal is. What is the difference between a diary and a journal? Make your nature journals using paper, crayons, and colored pencils. Hand out clipboards and pencils to all of the students.

Take the class on a hike away from the buildings. Stop along the trail at various points to work in the journals. At each stop you may want to provide a structured writing activity or you may encourage free writing. Some ideas for journal activities include:

- sketching a natural object that is smaller than your hand (make sure to add a lot of details and notes about the object to make it more interesting)
- sketching the landscape
- writing a letter to your favorite forest animal
- poetry
- sensory map – put a small 'x' in the middle of the page, now listen and create a map of the sounds that you hear around you
- write details about a natural process you observe (a bird in flight, the wind through the trees, the way a seedling is pushing through the soil)
- leaf rubbings

When you enter something into your nature journal you should consider including: the date, place, time, weather, first impressions, wind directions, and/or cloud patterns and cover. Encourage students to sit alone and quietly while they are working in their journals and to look at the smallest details. **Observation skills are key!** They can write about what they see, feel, smell, and hear. They can make notes of questions about nature that they may have. Discuss the importance of leaving nature undisturbed. Stop for writing time in many different locations. After each stop, come together as a group to discuss what people worked on and things they experienced.

## X. Landforms

How the land was formed – The Laurentide Ice Sheet covered northern and eastern Wisconsin about 25,000 to 10,000 years ago. When the ice began to melt, it created a glacial lake. You may have noticed ridges that run through the School Forest property, parallel to Lake Michigan. These ridges were formed under water during the later post-glacial stages of Lake Nippising. This glacial lake existed thousands of years ago where Lake Michigan currently sits. Lake Nippising reached much farther inland than Lake Michigan does today.

As giant waves washed in toward shore the leading edge of the waves curled over and dug an underwater trench. As the wave curled under it pulled sand from the trench back toward the lake and dropped it, thus creating an underwater ridge. A fairly rapid drop in the lake level allowed the ridges to exist without being leveled off through erosion. This is what created the swales (trenches) and ridges at the School Forest.

Reading topographic maps – Use the topographic maps of the School Forest area to locate where you are. Discuss what topographic lines are and why they are important. Show the students how to read elevation lines on a map. Ask the students to list jobs where people use topographic maps.

One optional activity is for the student to create topographic maps of their knuckles. Have the students draw circles around their knuckles at certain intervals. Now, when they lay their hand flat, palm down, they will have a topographic map of their hand.

Hike away from the buildings towards the lake. As you go, notice the ridges that run parallel to the beach. Count how many ridges there are on the way to the beach. Examine these features on the topographic map.

Discuss the topics that were covered during this class. The students should be able to explain why it is important to know the topography of an area. They should also understand terms like swale and ridge.

## XI. Conclusion

Today, students learned about many different things regarding the environment. The seedlings that were planted will positively change the School Forest by providing food and shelter for the animals while increasing the beauty of the forest. With a basic knowledge of the importance of the forest and the animals that live there, we can all take better care of the world.

Discuss ways students can care for the earth and what knowledge they gained during this day at the School Forest.

## XII. Clean-up

- Return supplies to building
- Take garbage out to dumpster
- Close windows, shut off all lights, lock doors, shut driveway gate
- Give the School Forest Coordinator feedback on how to make this trip better in the future.

## Safety

While at the School Forest, teachers should carry first aid kits. You can bring these from your school or use the ones at the School Forest. The first aid stations can be found in the Ehlert Lodge office, ELC classroom, and the upstairs of the Krejcarek Building. Please report any safety issues to the School Forest Coordinator.

Students should be supervised at all times. If you decide to go off trail, go in a clear area where branches cannot swing back and hit someone. Be aware of the plants you are traveling around so as not to pass by thorn covered plants.

## Optional / Rainy Day Activities

**Please let the School Forest Coordinator know if you will need these materials provided for you.** Here are a few ideas for indoors activities:

- Dichotomous key activity – Kid key: make a dichotomous key for a group of students (or use shoes)
- Writing and drawing – sit near a window and watch the rain, write about or draw the rainy scenery
- Skull study – explore different types of skulls, learn about meat verses plant eaters
- Watercolor painting – Start the class by having the students sit alone and quietly look around. Then bring the class back together to have a discussion on what they saw. Talk about watercolor painting. The students can now sit alone and paint what they see. Try to focus on a few painting attributes such as the horizon line and dimension. Look over what the students are working on. Assist those students that need help. Review the importance of looking at small details.
- Story writing and telling – each student creates a story about something in nature and then shares it with the group, discuss character development, what makes a story being told aloud interesting?
- Video – there are a few videos available in the Ehlert Lodge office that you could show your class if needed. You could also bring one from school as a backup plan.
- School work – do you have something that you are working on at school that could be brought to the School Forest in case of poor weather?
- Making measuring tools – use the LEAF lessons in the back of this lesson plan, students will create Merritt hypsometers and Biltmore sticks. (materials: yardstick/lumber, markers, student pages)
- Aquatic critters – this can be done back in the building if a sample has been collected.

## Additional Information

### **See following pages**

#### Wetlands:

Millions of acres of swamps and other wetlands have been drained to provide rich, black, soil for growing agricultural crops. Wetlands have been drained by laying drain pipes underground and by digging drainage ditches. Thousands of acres of wetlands have been filled in with “fill dirt.” Fill dirt is ground that is removed from basements being dug or hills removed for highway construction. In recent years, removing the drainpipes and filling the ditches has restored many wetlands. Section 404 of the Federal Clean Water Act requires permission before a wetland can be filled or drained.

## Resources

Eagle Bluff Environmental Learning Center. Insects (and spiders) lesson plan. Lanesboro, MN. August 2001.

Learning, Experiences, and Activities in Forestry. Wisconsin K-12 Forestry Lesson Guide: 5-6 Unit. Wisconsin Department of Natural Resources, 2004.

Leslie, Clare Walker and Charles E. Roth. Keeping a Nature Journal. Storey Books, Pownal, Vermont. 2000.

Waldbauer, Gilbert. The Handy Bug Answer Book. Visible Ink Press, Canton, MI. 1998

Lesson plan compiled by Patty Brodeen Maher, School Forest Coordinator, Manitowoc Public School District, July 2008.





# Ecosystems

Names \_\_\_\_\_

Weather \_\_\_\_\_

Describe the location you are in. Then find an organism (or evidence from that organism) to study. Record your observations below.

Location: \_\_\_\_\_

Site Description: \_\_\_\_\_  
\_\_\_\_\_

Organism's name: \_\_\_\_\_

Organism's needs: \_\_\_\_\_  
\_\_\_\_\_

.....

Location: \_\_\_\_\_

Site Description: \_\_\_\_\_  
\_\_\_\_\_

Organism's name: \_\_\_\_\_

Organism's needs: \_\_\_\_\_  
\_\_\_\_\_

.....

Location: \_\_\_\_\_

Site Description: \_\_\_\_\_  
\_\_\_\_\_

Organism's name: \_\_\_\_\_

Organism's needs: \_\_\_\_\_  
\_\_\_\_\_

# AQUATIC LIFE STUDY

Names \_\_\_\_\_

Draw a picture of the animal	Try to identify the animal. Write the name.	How many did you find?

How many of these animals did you find?

Group A	How many?	Group B	How many?	Group C	How many?
Dobsonfly nymph		Dragonfly nymph		Worms	
Caddisfly larva		Damselfly nymph		Midgefly larva	
Mayfly nymph		Side-swimmer		Leeches	
Snails		Mussel			
		Crayfish			
Group A total:		Group B total:		Group C total:	

(OVER)

Group A: These organisms are generally pollution-intolerant. Their dominance generally signifies **GOOD WATER QUALITY**.  
Group B: These organisms can exist in a wide range of water quality conditions.  
Group C: These organisms are generally tolerant of pollution. Their dominance signifies **POOR WATER QUALITY**.

After collecting your organisms and filling out the two charts on the other side of this page, use the chart above to answer these questions:

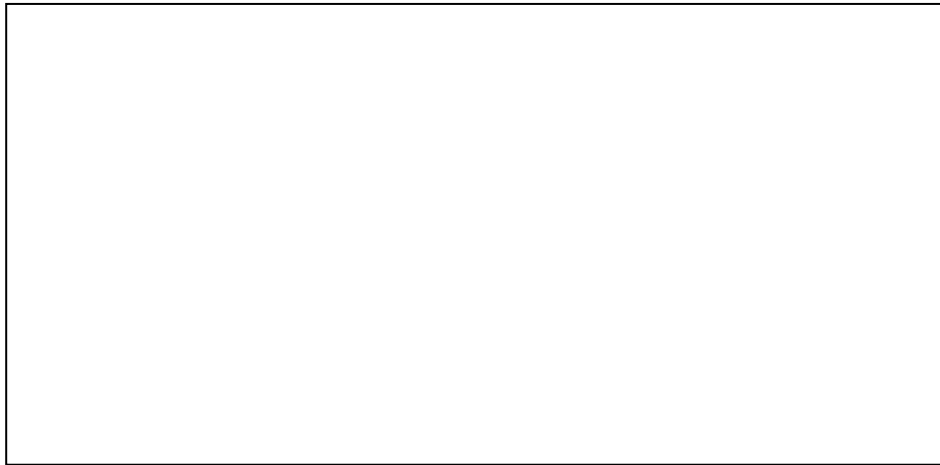
Which group did you have the most animals in? \_\_\_\_\_

What does this tell you about the water in the School Forest swamp?

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Draw a picture of the swamp.



From your study and observations, is the School Forest swamp healthy?  
Explain your answer.

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What can you (and other people) do to help this wetland?

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