2009 Outdoor Resource Guide for Educators

Dear Ohio Educator,

Using your school grounds as an outdoor classroom can make lessons more meaningful and exciting to students. Through the Ohio Department of Natural Resources' Explore the Outdoors program, you can help Ohio's children learn about their natural environment and provide them with a hands-on learning experience they are sure to remember.

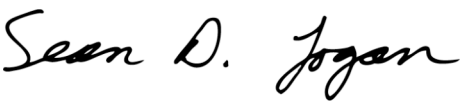
This resource guide provides learning materials that help educators infuse lesson plans with the Explore the Outdoors program, providing lessons that get students outside of their traditional class setting and allow them to experience, first hand, the wonders of our natural world. This tool is designed for professional educators and encourages the exploration of our natural environment through educational activities. Teachers can use the guide to tie some activities into state curriculum standards.

For example, you may take your class outdoors to complete the "Hike or Bike a Trail" activity in the Explore the Outdoors guide. If you have the class collect leaves during this outing, you can then complete the "Looking at Leaves" activity on page 31 of this resource guide to find out more about leaf characteristics as well as how leaves can be used to identify plants. In doing so, students in kindergarten through 4th grade will meet state science and visual arts standards.

In addition to the lessons in this guide, the Ohio Department of Natural Resources is partnering with organizations across Ohio that can help provide resources and information as you take part in some of the activities. For example, for the *Splash in a Stream* activity, ODNR may be able to connect you with an environmental expert who can assist your class in determining the water quality of a stream based on its inhabitants. Or, if you'd like to take your class birding, we can help find a local expert. To help you take advantage of these resources contact information for ODNR and partner organizations is listed in the back of this guide.

Research has shown that children who are in touch with their natural environment are healthier, do better in school, have increased creativity and improved concentration. We hope you'll join us in our effort to make Ohio's kids happier, healthier and smarter by teaching your class the excitement and diversity of our natural world through our Explore the Outdoors program.

Sincerely,



Sean D. Logan

Explore Activities:

Plant a Garden, Recycle Ohio, Get Caught Up in a Clean Up

Name: Take Out the Trash

Grade/Standards/Indicators:

- K-Physical Sciences (K.3 Describe and sort objects by one or more properties (e.g. size, color, and shape)
- K-Science and Technology (K.2 Explore that some materials can be used over and over again)
- K-Scientific Inquiry (K.4 Use the five senses to make observations about the natural world)
- 1-Earth & Space Sciences (1.2 Explain that the supply of many resources is limited but the supply can be extended through careful use, decrease use, reusing, and/or recycling)
- 1-Physical Sciences (1.1 Classify objects according to the materials they are made of and their physical properties)
- 1-Science and Technology (1.3 Identify some materials that can be saved for community recycling projects)
- 4-Physical Sciences (4.3 Describe objects by the properties of the materials from which they are made and that these properties can be used to separate or sort a group of objects)
- 5-Earth & Space Sciences (5.5 Explain how the supply of many non-renewable resources is limited and can be extended through reducing, reusing, and recycling but cannot be extended indefinitely)

Materials: Trash sack containing orange peels, aluminum cans, foil, plastic bags, newspaper, and other kinds of trash; extra sacks

Purpose: To redefine the word "trash" and compare the way people dispose of garbage to nature's way.

Description: To most kids, garbage disposal means an appliance you switch on to get rid of leftovers. Or, it means walking a sack of garbage to the garbage can. They don't think about processes such as decomposition.

"Take Out the Trash" is a chance for children to understand how "trash" can be classified and how nature's trash is disposed of in the forest.

Solid waste is a problem that we are faced with in managing the parks which host millions of visitors each year. As kids develop a better understanding of this problem today, they can help better define solutions for tomorrow.

1. Present a typical bag of trash filled with items that are commonly considered trash.
2. Individually remove each piece of trash from the bag and sort it into sacks marked: RECYCLE, COMPOST, GARBAGE CAN. Disciss the meaning of each labeled sack as the trash is sorted.

3. Encourage the group to go beyond typical answers and do some creative brainstorming for recycled uses of products such as Big Mac cartons, Styrofoam cups, etc.
4. It is hoped that the sack marked, GARBAGE CAN, will end up with the least items.
5. Now, go on a hike to view how nature disposes of its "trash." Categorize the disposed items in nature in the same way as the human discards: RECYCLE, COMPOST, GARBAGE CAN.
6. Examples of nature's disposal system could include:
    a. RECYCLED
        - brush piles are shelter to animals
        - hollow trees become dens for raccoons, opossums
        - hollow trees are homes for woodpeckers
        - fruit that drops to the ground is eaten by animals
    b. COMPOST
        - leaves are composted
        - organic plants and trees are composted
    c. GARBAGE MEN (beetles, flies, vultures, fungus)
        - animal carcasses
        - animal scat
        - decomposting organic matter

Resources: Contact your local Solid Waste Authority District or Keep Ohio Beautiful affiliate for further information.

Ohio Department of Natural Resources
Division of Recycling and Litter Prevention
614-265-6333
drlp@dnr.state.oh.us

Explore Activities:

Recycle Ohio, Hike or Bike a Trail, Get Caught Up in a Clean Up

Name: Litter Legacy

Grade/Standards/Indicators:

- K-Physical Sciences (K.3 Describe and sort objects by one or more properties (e.g. size, color, and shape))
- K-Science & Technology (K.1 Explore that objects can be sorted as "natural" or "man-made")
- 1-Earth & Space Sciences (1.2 Explain that the supply of many resources is limited but the supply can be extended through careful use, decrease use, reusing, and/or recycling)
- 1-Life Sciences (1.4 Investigate that animals eat plants and/or other animals for food and may also use plants or other animals for shelter and nesting)
- 1-Physical Science (1.1 Classify objects according to the materials they are made of and their physical properties)
- 1-Science and Technology (1.3 Identify some materials that can be saved for community recycling projects)
- 4-Physical Sciences (4.3 Describe objects by the properties of the materials from which they are made and that these properties can be used to separate or sort a group of objects)

Materials: Onion sack, organic items, non-organic items, chart, pencil, writing pad

Purpose: To compare biodegradable litter to non-biodegradable litter and to study how nature effectively recycles itself.

Description: The problem with litter is that many items cast aside are often here today and not gone tomorrow! For instance, orange peels are biodegradable and decompose in about one or two weeks. However, styrofoam coffee cups never really decompose! When many discards breakdown, they leave harmful by-products.

Nature, on the other hand, is a master of recycling. Its leftovers provide food, building material, fertilizer, etc. to perpetuate its processes. Even scavengers draw their lifeblood by serving as nature's garbage men.

Below are various activities to help further detail litter's legacy…

1. To begin Litter Legacy, plan a hike or demonstration that will show participants the decomposition of a tree. Find a variety of logs and trees that are in different stages of decay; ask students to guess the age of each. Discuss the concepts of recycling and composting as they relate to nature.

2. If you are carrying a bag lunch on the trail, have students sort and list their trash when finished into these categories: RECYCLE, REUSE, COMPOST PILE or GARBAGE CAN. Next, have students label columns on a sheet of paper with these same categories. As you look at natural items along the trail, have students list each in one of the columns. Examine results when done by comparing lists from lunch and the trail. Where do the items labeled for garbage in our lunches ultimately go? Where does nature's garbage go, and what the are the "garbage men?"
3. Use this idea as an extension of "Litter Legacy." At the beginning of the year, but biodegradable items such as apple, dead leaves, etc. in a mesh onion bag. In another mesh onion bag, place non-biodegradable items such as cans, paper and styrofoam. Record the items in each bag and bury both in a hole that won't be disturbed. These bags will be unearthed several times during the year. Each time you dig up the sacks, compare the natural (biodegradable) items to the "litter" (non-biodegradable) items. Have participants note the stages of decomposition on a chart.

Discuss which items changed the most or least. Try to determine any by-products at the conclusion. Which could have favorable or unfavorable consequences? Here are some representative examples of time it can take for litter to decompose:

- Traffic ticket: 2-4 weeks
- Cotton rag: 1-5 months
- Rope: 3-14 months
- Wool sock: 1 year
- Bamboo pole: 1-3 years
- Painted wooden sticks: 13 years
- Aluminum: 200-500 years
- Plastic 6-pack holder: 450 years
- Glass bottles: undetermined

Resources: Contact your local Solid Waste Authority District or Keep Ohio Beautiful affiliate for further information.

Ohio Department of Natural Resources
Division of Recycling and Litter Prevention
614-265-6333
drlp@dnr.state.oh.us

Explore Activity: Find a Fossil

Name: Crystal Garden

Grade/Standards/Indicators:

- K-Earth and Space Sciences (K.3 Explore that sometimes change is too fast to see and sometimes change is too slow to see)
- 4-Physical Sciences (4.1 Identify characteristics of a simple physical change)

Materials: 6-7 barbecue charcoals or stones (1 to 2 inches across)
shallow bowl (aluminum pie pan works fine)
4-6 tablespoons table salt
4-6 tablespoons liquid laundry bluing (see NOTE below)
4-6 tablespoons water
1 tablespoon ammonia (be careful using ammonia around children)
food coloring

Purpose: To learn how crystals grow.

Description: Collect several small pieces of limestone, brick, coal, or barbecue charcoal. You may want to try a bowl of each to determine which material grows the best crystals. Place the charcoal or stones clustered together in the bowl. Mix all of the ingredients together, except the food coloring, in the order listed using the same amount of salt, bluing, and water for each batch made. Pour the mixture very slowly over the stones with a spoon. The mixture may not be dissolved depending on the number of tablespoons of ingredients used. You may want to make different batches using different amounts of ingredients to see which works best. Drop food coloring over the coated stones. Using different colors produces a variegated crystal garden. Crystals should begin to form in about 20 minutes and continue growing for a day or two. Adding any excess mixture to the bottom of the bowl over the next few days may keep the garden growing longer. This creation will crumble asily, don't move too much.

NOTE: Laundry bluing comes in a small blue bottle and generally can be found in the laundry section of a grocery store next to the starch and bleach products.

Source: Kids create!, Laurie Carlson; and Nevada Mining Association, Lois K. Ports.

Resources: Ohio Department of Natural Resources
Division of Geological Survey
Mac Swinford
614-265-6576
geo.survey@dnr.state.oh.us

Explore Activity: Find a Fossil

Name: Is It A Rock Or Mineral?

Grade/Standards/Indicators:

- 1-Earth and Space Sciences (1.1 Identify that resources are things that we get from the living and nonliving environment and that resources are necessary to meet the needs and wants of a population)
- 6-Earth and Space Sciences (6.1 Describe the rock cycle and explain that there are sedimentary, igneous and metamorphic rocks that have distinct properties, 6.2 Explain that rocks are made of one or more minerals, 6.3 Identify minerals by their characteristic properties)

Materials: various kinds of candy

Purpose: To learn what the difference between a rock and mineral are.

Description: Kids love rocks and minerals. However, many kids (and adults!) do not know the difference between a rock and a mineral. This activity is designed to train K-5 young scientists to observe and classify while learning how to tell the difference between a rock and a mineral.

What is a mineral? A material must fit the following four general criteria to be called a mineral:

1. Minerals are inorganic, meaning they typically do not form from the remains of plants or animals.
2. Minerals are naturally occurring. True minerals are not manmade.
3. Minerals have the same chemical makeup wherever they are found. For example, the mineral quartz always consists of one part silicon (an element) to two parts oxygen (another element). Some minerals, like gold, copper, and sulfur, are made up of only one element. However, most minerals are combinations of several different elements.
4. Minerals have specific repeating patterns of atoms. This orderly arrangement of atoms forms the mineral's characteristic crystal shape. For example, a crystal of quartz is always hexagonal because of the way the atoms of silicon and oxygen join together. However, if a quartz crystal does not have much room to grow, it may not look hexagonal on the outside, even though the atoms on the inside are arranged in the same orderly pattern.

What is a rock? Minerals are the building blocks of rocks. A rock is made up of one or more minerals. Rocks can be placed in one of three categories depending on how they form:

1. Igneous rocks form from magma (molten rock) either deep within the Earth (for example, granite), or on the Earth's surface when lava cools and hardens (for example, pumice).
2. Sedimentary rocks are layered rocks that form primarily from the accumulation and compaction of sediment which is derived from

preexisting rocks by erosion (weathering by water, wind, or ice) (for example, sandstone). Some sedimentary rocks form by precipitation from solution (for example, gypsum).

3. Metamorphic rocks form when preexisting rocks' igneous, sedimentary, or metamorphic are subjected to extreme temperatures and pressures deep within the Earth. The intense heat and pressure cause the mineral composition and grain size to change. For example, limestones become marbles and shales become slates.

Now that you know the general definitions, how can you tell the difference between rocks and minerals? This is where observation and classification becomes important. Minerals are homogeneous (the same throughout). A mineral will generally have the same appearance both on the interior and exterior of the sample. The properties of color and texture generally do not vary sharply because of this homogeneity. However, color and texture generally do vary sharply in rocks because rocks are made up of a variety of different minerals.

Before having the students classify actual rocks and minerals, have them observe and classify some things they may like better . . . candy. For this exercise you will need to choose bags of the following candies. Make sure you have some candies from both the "rock" list and the "mineral" list. The more variety, the better the exercise. The "rock" list could include: Peanut M & M's, Nestle's Buncha Crunch, Butterfinger BB's, and Hershey Kisses with Almonds. The "mineral" list could include: Hershey Kisses, gummy bears, jelly beans, and chocolate or peanut butter chips. (This activity assumes that none of the students is diabetic or allergic to chocolate, peanuts, or almonds.)

After explaining to them the difference between rocks and minerals, distribute to each child a variety of candies making sure each child has some "rocks" and some "minerals." Tell the students that geologists generally break open rocks and minerals to help them identify (or classify) a rock or mineral sample. Therefore, the students should bite open their "rocks" and "minerals" to help them with their classification. Remind them that half of each sample is to be eaten and half is to be saved to observe and classify. They can eat the other half after the exercise is finished.

Have the students keep a record of their observations. Which samples seem to be homogeneous? Which samples are made up of more than one substance or "mineral"? Which samples would they classify as "minerals"? Why? Which samples would they classify as "rocks"? Why?

After they are through classifying the candy, they may want to try classifying real rocks and minerals. You can have them bring in their collections (if they have one) from home, take them outside and let them do some collecting during class time, or give them a homework assignment to collect a variety of rocks and minerals on their own.

When the students bring their collections into class, have them classify (group) the samples as rocks or minerals. Once again, have the students keep a record of their observations. Let them decide on their own criteria for classification. They will probably find it difficult to classify the real thing. It may take a while for them to get the hang of it. However, after they catch on, you may want to suggest that they classify their groups of rocks into subgroups, determining which rocks are the same and which are different. They will probably end up with two subgroups: igneous/metamorphic and sedimentary.

After the classifying is complete, have the students say how they decided which samples were rocks and which were minerals. Then ask how they decided to subdivide their rock group. Remind them that no criterion is dumb, and what appears dumb may even be a better way to classify. You will probably find that they used color, shape, texture, and possibly a few unique criteria! Let them know that the exercise they just completed on observation and classification is what scientists do in real life. Now, they are scientists too!

Sources: Food For Thought: Edible Earth Science, Betty Crocker, Barbara Reed, and Eddie Shaw, 1992, Idea Factory, Inc. (1-800-331-6204); and Fairly Simple Exercises in Geology, John J. and Barbara R. Thomas, 1994, Geology Department, Skidmore College, 100 p.

Resources: Ohio Department of Natural Resources
Division of Geological Survey
Mac Swinford
614-265-6576
geo.survey@dnr.state.oh.us

Explore Activity: Find a Fossil

Name: Everyone Loves Fossils

Grade/Standards/Indicators:

- 3-Life Sciences (3.5 Observe and explore how fossils can find evidence about animals that lived long ago and the nature of the environment at that time)
- 4-Life Sciences (4.4 Observe and explore how fossils can find evidence about animals that lived long ago and the nature of the environment at that time)
- 6-Earth and Space Sciences (6.2 Explain that rocks are made of one or more minerals)

Materials: sea shell, twig, or other small object
plastic fork
petroleum jelly
1/4 to 1/2 cup plaster of paris
1/4 to 1/2 cup water
paper cup
small plastic margarine dish

Purpose: To learn what fossils are and how they are formed.

Description: What exactly are fossils? Fossils are the remains of past life. This definition includes anything that is a clue to past life, such as the bones of dinosaurs and mammoths, the tiny shells of one-celled animals, trails and footprints, worm burrows, leaves, tree trunks, seeds, and microscopic spores of fungi.

Fossils occur in sedimentary rocks such as limestone, shale, and sandstone. Because Ohio is covered with sedimentary rocks, fossil collecting is a popular hobby for many Ohioans.
How do fossils form? Some of the plants and animals that died in the geologic past were buried by sediments before they could decompose. After burial, the soft tissue of the organism slowly decomposed, but the harder parts of the plant or animal remained intact.

The sediments eventually were hardened into rocks, preserving the harder parts of the organisms, such as bones, shells, teeth, leaves, and stems, that we find as fossils today.

Fossils are preserved in a variety of ways. The hard parts of some organisms are permeated by minerals in a process called permineralization. Petrified wood is an example of permineralization. Many plants are preserved as compressions. In this process, the remains of the organism are squeezed by the rocks that surround it until all of its liquids and gases are removed, leaving only a thin film on the surface of the rock. The hard parts of many

Ohio fossils were dissolved by ground water moving through the sediment or rock and replaced with minerals in the water. This process is called replacement. In Ohio, common replacement minerals are pyrite and silica. Ground water also may dissolve the original material without replacing it with other minerals. If the sediment hardened into rock before the fossil was dissolved, the rock retains the imprint of the fossil, which is called a mold. A mold may later be filled with other sediment or minerals precipitated from ground water, making a cast of the fossil. A cast is a replica of the original fossil in a different material.

The following classic activity illustrates the concepts of molds and casts.

Each student will need the following materials:
sea shell, twig, or other small object
plastic fork
petroleum jelly
1/4 to 1/2 cup plaster of paris
1/4 to 1/2 cup water
paper cup
small plastic margarine dish

Cover the small object, representing a dead organism, with a thin layer of petroleum jelly to keep it from sticking in the plaster of paris when it hardens. Put the plaster of paris into the margarine dish. Add water gradually to the plaster of paris, stirring gently with the fork until the plaster is thick and creamy.

Gently tap the bottom of the dish onto the table to force out any air bubbles in the plaster. This layer represents the soft sediment that the organism fell into when it died. Let the plaster harden for about 1 minute so the object wonÕt sink to the bottom of the container. Press the small, petroleum-covered object into the plaster and allow it to dry thoroughly, preferably overnight. Remove the object from the plaster. You now have a mold of your object. Leave the mold in the container and coat the entire surface of the dry plaster with a thin layer of petroleum jelly. Mix another batch of plaster of paris in the paper cup. Pour this mixture over the mold and allow it to dry. This layer represents the overlying sediments or the minerals precipitated from ground water that fill in the mold, making a cast of the original object.

When the plaster is dry, separate the cast from the mold. It should separate easily along the layer of petroleum jelly. You now have a fossil cast and a fossil mold of your original object.

Source: Ohio fossils, ODNR, Division of Geological Survey; Water, stones, & fossil bones, National Science Teachers Association; and The earth science book, Dinah Zike.

Resources: Ohio Department of Natural Resources
Division of Geological Survey

Mac Swinford
614-265-6576
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Explore Activity: Spot a Bird

Name: Wildlife Is Everywhere!

Grade/Standards/Indicators:

- K-Scientific Inquiry (K.4 Use the five senses to make observations about the natural world)
- 1-Scientific Inquiry (1.4 Work in a small group to complete an investigation and then share findings with others)
- 3-Life Sciences (3.3 Classify animals according to their characteristics)
- 4-Scientific Ways of Knowing (4.3 Explain discrepancies in an investigation using evidence to support findings)
- 5-Scientific Ways of Knowing (5.2 Develop descriptions, explanations and models using evidence to defend/support findings)

Materials: None

Purpose: To search their surroundings for evidence of wildlife and to compare human and wildlife habitat as well as to generalize that wildlife is present around the world.

Description: Many people think of wildlife as the large animals of Africa, such as the lion and elephant, or the large animals of the North American forests, such as the grizzly bear and elk. However, wildlife includes all animals that have not been domesticated by people.

What may be surprising is that wildlife includes the smallest animal organisms—even those that
can be seen only through a microscope. Spiders, insects, reptiles, amphibians, and most species
of fish, birds, and mammals may be considered wildlife. Even when animals are silent or not visible, they exist somewhere around us. Thousands of organisms live in and on human skin, hair,
and bodies. In fact, the organisms that inhabit human bodies play a part in human survival.
Some form of animal life is always near.

By investigating microenvironments or microhabitats, students will be able to generalize that wildlife exists in every country on the planet.

Activity: NOTE - Ask students to observe, but not touch or disturb, any animals they may see.

1. Invite the students to explore the room looking for signs of wildlife. Even in the cleanest rooms, some signs of life can be found. It might be a spider web, dead insects near lights, or insect holes along baseboards and behind books. After the search and a discussion with the students about what they might have found, introduce the idea that

people and other animals share the same environment. Sometimes people do not even notice that they are sharing the environment with other living things.

2. Take the search for animals outside. Divide the students into pairs, and give each pair five minutes to find an animal or some sign that an animal has been there. Look for indirect evidence such as tracks, webs, droppings, feathers, and nests (be sure not to harm or seriously disturb any evidence that is found). Afterward, sit down and discuss what everyone found.

3. Discuss with the students what they have learned. Emphasize that the experience shows that people and wildlife share the same environment. Ask the students to predict where different kinds of animals are found all over the Earth—in the deserts, oceans, mountains, and cities. They may draw from their own experiences and talk about places they have been and have seen animals.

Extensions:

1. Observe wildlife in yards, kitchens, neighborhoods, and city parks.

2. Search magazines and books for pictures of wildlife from all over the planet.

3. Invent names and descriptions for the wildlife found during wildlife searches. Students can observe the animals, write descriptions, and then check their invented names and descriptions against the scientific names and information found in reference materials.

4. Using state maps, look up towns, cities, and counties named after wild animals.

Aquatic Extension: Survey your school grounds or neighborhood for any aquatic wildlife habitats. Check puddles, sprinkler systems, and, if possible, streams, beaches, and ponds. Look for evidence—direct or indirect—of any wildlife that lives in or near these water-related areas. Tell or show someone what you find, taking care not to damage any wildlife or its habitat.

Evaluation:

1. In which of the following places would animals be living: in a forest; in a hot, dry, desert; in a lake; at the top of a mountain; at the North Pole; in New York City? What kinds of animals would be found in those places? Name areas on Earth where animals would not be found.

2. What evidence did the class have (using the five senses) that showed that wildlife lives in any location where this activity was conducted?

3. Draw a picture of a place and include as many different animal species as possible that would be found living there. Explain your picture to a friend or adult.

4. Identify and describe three things that people could do to increase the numbers and kinds of wildlife living in an area that has little evidence of wildlife.

Resources: These activities were provided courtesy of Project Wild. Educators in Ohio can receive the complete guide by attending a Project Wild workshop. For more info contact…

Ohio Department of Natural Resources
Division of Wildlife, Project WILD Coordinator
1-800-WILDLIFE
outdoor.education@dnr.state.oh.us

Explore Activity: Spot a Bird

Name: Schoolyard Field Study

Grade/Standards/Indicators:

- 3-Life Sciences (3.3 Classify animals according to their characteristics)
- 3-Scientific Inquiry (3.2 Discuss observations and measurements made by other people, 3.5 Record and organize observations)
- 4-Scientific Ways of Knowing (4.2 Record the results and data from an investigation and make a reasonable explanation)
- 5-Scientific Inquiry (5.2 Evaluate observations and measurements made by other people and identify reasons for any discrepancies, 5.3 Use evidence and observations to explain and communicate the results of investigations)
- 5-Scientific Ways of Knowing (5.5 Keep records of investigations and observations that are understandable weeks or months later)

Materials: At least one set of each for every 2-3 students (pencils, clipboards, Waterford
Press Birds of Ohio Field Guides, Data Sheet).

Purpose: To teach students how to use a field guide by playing a game about field marks

Description: This field study can be completed within the schoolyard and utilizes the skills learned in the previous lessons. Students begin by generating a hypothesis about the link between the habitats found in the schoolyard and number of birds they will observe during the field study.

Procedure: Prepare for the lesson by visiting your schoolyard and finding at least 3 different types of habitats to study (a lawn, forested area, playground, ball field, shrub area, front, back, or side). Create a data sheet with a table that allows the students to record the number of birds and number of types of birds found within each habitat. Students are not responsible for accurately identifying and recording the species of birds. They are counting the total number and total type within each habitat.

Prior to the field study explain to the class that you are going to visit three different areas of the schoolyard that provide a different habitat type for birds. Review each habitat and ask students to hypothesize which habitat they suspect to have the highest number of birds and the highest number of types of birds. Explain the difference between abundance and diversity and record students' hypotheses.

Explain that the group will test their hypotheses by visiting each habitat and counting the total number of birds observed and total number of different birds observed. Distribute materials and assign tasks for each member of each group of 2-3 students; one spotter, one counter, one data recorder.

Once the data is collected the team may work together to try and identify the birds and make notes on their data sheet. Visit each habitat and spend at least 15 minutes observing birds and recording data.

After each habitat is visited and the data is recorded instruct each group to use the data sheet to make a bar graph displaying the number of birds and number of different birds found in each habitat.

When the graphs are completed allow each group to present their data and state if it supports or does not support their group or personal hypothesis. Use the data to make inferences about habitat quality and food ability for birds on your schoolyard.

Resources: Doreen Whitley
Grange Insurance Audubon Center
www.grangeinsuranceaudubon center.org/
614-224-3303

Explore Activities: Spot a Bird, Learn from a Naturalist

Name: Homemade Gadgets and Equipment

Grade/Standards/Indicators: None

Materials: Various, read each gadget description for details

Purpose: To create outdoor gadgets easily and without much cost.

Description: Two reasons for not being able to acquire a piece of equipment you need for an outdoor activity:

- Too expensive
- They just don't make such a thing

In either case, with some creativity and items found around the house, you (and your students) may be able to concoct some amazing tools and gadgets. The following is a brief list of ideas. Most are not new or particularly unique, but they may help to spark your imagination to invent an extended list for yourself.

1. Chummy Scope – For pointing out distant objects, one observer sights with right eye through left side of scope, other observer peers through right side of scope with left eye to see same object. To make a chummy scope, tape two paper towel rolls togther so they are parallel. Use a block of wood or other material to space the tubes apart about one eye's width.

2. Diameter Tape – Make a cheap tree diameter tape by using a cloth measuring tape (like those you can get from a sewing shop). The side already marked in inches measures circumference. On the backside, mark off 3-1/7 inch units beginning at "0" – this will give the diameter.

3. Everyday Objects and Discards – An ordinary kitchen strainer can make a useful dipper for aquatic studies. Plastic liter bottles make good mini terrariums. (Remove the bottom piece, cut the neck and remove from the top, invert back into the bottom piece.)

    - Egg cartons make good collection trays for rocks, seeds, etc. Small plastic bags filled with water are good for temporarily holding aquatic creatures to view them.

    - Tin cans become stargazers when spray painted black on the inside and holes for a constellation are punched through the bottom with a nail or awl. A can with a funnel in the top serves as a rain gauge. (To calibrate the amount of rain in the

can which represents inches of actual rainfall, use the formula below…)

$$\frac{\text{diameter of funnel}^2}{\text{diameter of can}^2} = \text{height of 1" of rainfall}$$

4. Plexiglass – Keep space pieces of plexiglass. They can be used with a grease pencil or crayon to trace leaf shapes, cloud patterns, etc. With a small mirror, a piece of plex also makes a good locomotion detector. Place caterpillars or other small critters on the plexiglass, and angle the mirror underneath to observe how the creatures move from below.

5. Underwater Viewing Scope – This can be made as simply as taping plastic wrap to the bottom of a tin can with both ends removed; or, a more elaborate model can be made by permanently affixing a round piece of plexiglass to one end of a length of plastic drain pipe. Use the regular plastic pipe cement or a silicone caulk. Use black pipe or spray paint inside for best viewing.

Resources: Naturalists are available at various State Parks around the state. Contact your closest State Park to see what Naturalist programs are available www.ohiostateparks.org

Explore Activity: Spot a Bird

Name: Fun With Field Marks

Grade/Standards/Indicators:

- 3-Life Sciences (3.3 Classify animals according to their characteristics)

Materials: Waterford Press fold-out Birds of Ohio Field guides (one per every 2-3 students) and diagram of field marks. The diagram can be found at the website below and enlarged for the entire class to view or print copies, one per every 2-3 students.
(http://www.birds.cornell.edu/AllAboutBirds/birding123/identify/field_marks)

Purpose: To teach students how to use a field guide by playing a game about field marks

Description: Often the biggest challenging to a rewarding and successful day of birding with students is the improper use of a bird field guide. For this reason the staff of the Grange Insurance Audubon Center suggests spending time practicing the use of field guide and understanding field marks.. In this activity students learn how to identify birds by using a field guide and the language of field marks.

Procedure: Begin by asking students to call out the different categories of birds that they find on their fold out guides. They should find that the birds are organized into the following categories:

- Perching
- Water
- Owls & Hawks
- Woodpeckers

Explain that you are going to play a game to help them find birds within the guide. Ask the students to look at the field mark sheet. Call out different field marks and ask them to point to each one on the diagram to familiarize them with the field markings of birds. Next, explain that you will call out the category and 3 field marks of a bird in their guide. They are to use the guide and the field mark diagram to help them find the bird that you are describing. Instruct the group to work in teams and raise their hand when they think the found the bird. Start with water birds and continue to play the game with the other categories until students consistently answer accurately.

Resources: Doreen Whitley, Grange Insurance Audubon Center
www.grangeinsuranceaudubon center.org/
614-224-3303

Explore Activity: Spot a Bird

Name: Binocular Best Practices

Grade/Standards/Indicators: None

Materials: One pair of binoculars for each student or one for each pair of students in your group. We suggest starting with a simple 7 (power of magnification)X 35(diameter of objecting lens). At least three small hanging bird models of backyard birds, Christmas ornaments, photographs attached to a string, or Audubon plush toys.

Purpose: To prepares students for a schoolyard field study about birds by providing instruction on the proper use of binoculars

Description: Often the biggest challenging to a rewarding and successful day of birding with students is binocular use. For this reason the staff of the Grange Insurance Audubon Center suggests spending time indoors and completing the following lesson on binocular basics. In this activity students learn how to adjust their binoculars and troubleshoot problems in the field without the anxiety of missing a bird in the field amongst peers.

Procedure: Hang the bird models in hard to find areas of the classroom before students enter the classroom. Explain to your students that you are going to complete a field study in the schoolyard investigating birds. Ask them to list the tools they think they may need and write these items down on chart paper or a blackboard. Explain that the first and most important tool to use when you begin a bird watching session is your eyes. It is easier to find birds with your eye first and then use binoculars to magnify the image. Ask students to look around the room and locate the 'birds' (your bird models). After all of the birds are found explain that the group is now going on a 'mock' bird watching trip. Distribute binoculars and instruct students to keep them to roll the eyecups of the binoculars if they wear glasses and place the neck strap around their neck until given directions.
Choose a bird model to watch with the entire group. Ask students to find the selected bird with their naked eye and point to it. The entire group should be pointing at the same bird. Next, instruct them to take their index finger (the one that was just pointing at the bird) and bring in to the side of their eye and keep their eye fixed on the bird. Finally, without taking their eyes off of the bird instruct them to bring their binoculars up to their eyes. This called "spotting" a bird.

Call out the following steps for proper binocular adjustment.

1. Although it may be unclear at this time, they should see the bird model through their binoculars since they did not take their eye of it before bringing the binoculars up to their eyes.

2. Keep looking through the binoculars and bend them until only a single image is in view. It should still be focused on the bird model.
3. Cover the right lens with your hand and move the focus wheel until the image is sharp.
4. Cover the left lens with your hand and move the focus wheel until the image is sharp.
5. Adjust the right eyepiece until the image is sharp.

The binoculars are now ready for bird watching. Instruct students to remove the binoculars from their eyes and repeat spotting and binocular adjustment steps (as needed) with the remaining birds.

Resources: Doreen Whitley
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Explore Activity: Hike or Bike a Trail

Name: Every Tree for Itself

Grade/Standards/Indicators:

- K-Earth and Space Sciences (K.2 Explore that animals and plants cause changes to their surroundings)
- K-Life Sciences (K.5 Investigate observable features of plants and animals that help them live in different kinds of places)
- 1-Physical Sciences (1.8 Recognize that the sun is an energy source that warms the land, air and water)
- 1-Life Sciences (1.5 Recognize that seasonal changes can influence the health, survival or activities of organisms)
- 2-Life Sciences (Identify that there are many distinct environments that support different kinds of organisms)
- 4-Scientific Inquiry (4.2 Analyze a series of events and/or simple daily or seasonal cycles, describe the patterns and infer the next likely occurrence)

Materials: 8 ″ x 10 ″ pieces of paper or paper plates; pieces of blue, yellow, and green paper

Purpose: To gain an understanding of the conditions that trees need to live and grow and to learn how trees compete for their needs

Description: What do trees need so they can grow? Some of their needs are the same as those of people and other animals. For example, trees need air and plenty of water and food. But while people and animals eat their food, trees get food in a different way. They produce it in their leaves from carbon dioxide and water using energy from the sun. And just as people and animals need certain vitamins for growth, trees need mineral nutrients, such as nitrogen and phosphorous, which they get from the soil.

If trees don't get enough water, sunlight, or nutrients, they may grow slowly or die. Growth rings show this graphically. In general, wide rings indicate good conditions for growth (plenty of water, sunshine, and nutrients) while narrow rings often indicate less favorable conditions for growth (drought, insect damage, lack of nutrients, competition).

Getting Ready: Cut two 3 ″ x 3 ″ squares out of blue, yellow, and green construction paper for each student. To save time, you could use colored math cubes. They work much better than paper if you're during the activity outdoors on a breezy day.

Depending on the individual student's skill level, plan to skip Steps 1-4 and have the student use a plain paper plate for Step 5.

1. Pass out cross-sections from several trunks or branches (tree cookies), and have your students examine the growth rings. (If you don't have an actual cross-section, draw a big one on the board.) Explain that the number of rings indicates the age of the tree trunk or branch at the time it was cut.
2. Give a large piece of paper (at least 8 ″ x 11 ″) or a white paper plate to each student.
3. Using events from your life as an example, show students a timeline of your life. Then model how to translate the timeline to make growth rings on a paper plate.
4. Tell students to imagine that they are trees. Have then draw a cross-section of themselves, representing their age in growth rings.
5. Have students stand about three feet (91 cm) apart on pieces of paper or their paper plates. Tell students that they'll be playing a game called "Every Tree for Itself." The object of the game is for the "trees" to gather as many squares as they can. Explain that each colored square represents a tree requirement. Blue represents water, yellow represents sunlight, and green represents a nutrient such as nitrogen or phosphorous.
6. Equally distribute the colored squares on the floor around the students so the squares are about one to two feet (30-61 cm) apart.
7. Give a signal to start the first round. Have student trees reach with their branches (arms) to gather their requirements. Tell students that their feet are their roots and must remain planted on their paper at all times. They are not allowed to slide their paper along the floor or step off it; they will be disqualified for doing so.
8. Allow student trees to gather these requirements for one 30-second round. (They can either collect all types of requirements at once or one type of requirement each round.) Have students use a notebook to record how many of each color requirement they gathered. Use the following questions to discuss the results of the first round:
    a. How many requirements did each tree get?
    b. Do any trees lack a particular requirement?
    c. What might happen to a real tree that lacked one of its requirements? (It might grow slowly or eventually die. Point out to the students, though, that different species of trees have different requirements.)
    d. Is there such a thing as too much water, sunlight, or nutrients? (Yes, every species has optimum levels beyond which the tree becomes stressed.)
9. Have students stand on their papers in groups of three to five. Gather the colored squares and spread them around the room again. Play another round and have student trees record their results.
10. Compare the results of this round with those of the first. In most cases, students will notice that each tree gathered fewer requirements. Ask if they can reach any conclusions about trees that grow close to each other. (Such trees compete for requirements. Often they don't grow as well as trees that are more widely separated from one another.) Ask if any trees "died" because they couldn't get a particular

requirement. (You can allow trees to fall down or look tired and droopy if they haven't received their vital requirements.)

11. Ask students how foresters might use their knowledge of competition in caring for a stand of trees. (Foresters plant trees a certain distance apart so the trees will be able to get enough nutrients. The distance varies depending on the species of the tree. Foresters also thin young stands of trees.)
12. Try several more rounds, comparing the results each time. Here are suggestions for setting up additional rounds. As before, each student should examine his or her results in each round. Older students can record those results and later graph or chart the results of each round and draw conclusions. Discuss what the results might tell students about strategies for managing forests (for example, thinning trees that are too close together).
    a. Have all of the students stand closer together.
    b. Put students closer together, but have only half of the class participate.
    c. Use fewer water squares (representing a drought).
    d. Use fewer sunlight squares (representing lack of sunlight for young trees because of overcrowding).
    e. Use fewer nutrient squares (representing poor quality soil).
    f. Add a new color of square (red, black or brown), but don't tell students what it represents. After playing the round, tell them that the new color represents fire (red) or an insect infestation (black or brown) like bark beetles or gypsy moths. How would this new element affect the trees?

Variation For Older Students:

1. Before playing the game, pass out cross-sections from several trunks or branches (tree cookies), and have your students examine the growth rings. (If you don't have an actual cross-section, draw a big one on the board.) Explain that the number of rings indicates a tree's age. Point out that wider rings show years when the tree grew more, and narrower rings show years when it grew less. This variation in growth shows differences in the tree's ability to get its requirements.
2. You may want to include more colors in the game: one for sunlight, one for water, one for nitrogen, one for CO2, and so on.
3. Play round one of the game as described, but do not distribute the chips equally around the students. Discuss what happens when tree requirements are not equally distributed in the environment.
4. After each round of the game, have students draw a "ring" on their piece of paper or paper plate to represent how much their tree grew that year based on the requirements they got.
5. At the end of the game, students can write a life story of their tree to go along with the cross-section they created on the paper or paper plate.

Enrichment:

- Assign values to the amounts of requirements the students gather in the activity. For example, a collection of three or more of each requirement could represent superior growth. Two of each requirement could represent average growth. And one or fewer of each could represent poor growth. Using these values as a basis, have students record the numbers of trees that are growing very well, fairly well, and poorly for each round. Older students can use graphs to show results.
- For a visual way to portray water absorption by roots, try the following:
    i. Explain that, for many species of trees, the diameter of the spread of the tree's roots is roughly equal to the tree's height. Have students measure themselves and then make a circle (using chalk or string) with a diameter equal to their height.
    ii. Play "Every Tree for Itself" with each student standing in the center of his or her circle. Tell the student trees they can gather water squares only within their circle of roots.
    iii. Play the game again using root circles, but this time have trees stand in clumps. Afterward, discuss the results of root competition.

Resources: These activities were provided courtesy of Project Learning Tree – Ohio. Educators in Ohio can receive the complete guide by attending a PLT workshop.

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Explore Activity: Hike or Bike a Trail

Name: Tree Cookies

Grade/Standards/Indicators:

- K-Life Sciences (K.1 Explore differences between living and non-living things.
- K-Scientific Inquiry (K.5 Draw pictures that correctly portray features of the item being described)
- 1-Life Sciences (1.5 Recognize that seasonal changes can influence the health, survival or activities of organisms)
- 2-Scientific Ways of Knowing (2.3 Describe ways in which using the solution to a problem might affect other people and the environment)

Materials: tree cookies; copies of student pages; overhead transparency of student page Reading Tree Cookies; string; pins; small paper labels; paper plates; optional hand lenses; poster paper; adding machine tape

Purpose: To learn about tree growth by examining its annual rings

Description: By counting a tree's growth rings, you can tell the age of that part of the tree at the time it was cut. Every growth season, a tree adds a new layer of wood to its trunk and limbs. Each ring has two parts: a wide, light part (early wood) and a narrow, dark part (late wood). The early wood grows during the wet, spring growing season. During the transition from the drier summer to fall and winter, growth slows and the late wood forms. The rings provide clues about the climate, or weather, of the area over time and evidence of disturbance to and around the tree, such as fires and floods.

The shape and width of the annual rings often differ from year to year because of varying annual growth conditions. During a moist growing season, a tree in a temperate region may produce a particularly wide ring. During a drought, a colder-than-average winter, or an unseasonable frost, a tree will produce a particularly narrow ring. In a science called dendrochronology (which literally means the study of tree time), scientists have found that they can learn about past climates by studying the ring patterns of very old trees.

Many factors besides weather can affect a tree's growth. Accordingly, tree rings reflect a tree's response to such stressors as insects and disease. Sometimes a disturbance will occer after a growth season, producing a narrow or misshapen ring in the following year.

To study a tree's growth rings without harming the trees, foresters or forest scientists use a technique called coring. By drilling into the center of a tree trunk with a hollow instrument called an increment borer, they can remove a long, narrow cylinder of wood (called a core sample). The growth rings of the tree appear as lines on the core sample.

Getting Ready: From the trunk or limb of a fallen tree, saw cross sections 1"-2" thick. (Cross sections, or tree cookies, can usually be obtained from a local tree-trimming service, county or state forester, or from a utility, forest products, or firewood company.) If the wood is not dry, you will need to dry it to prevent splitting. You can do so by placing the tree cookies on foil in a kitchen oven set to warm (for five hours), putting them on a hot, sunny driveway (for five days), or laying them on a dry, well-ventilated surface under low humidity (for 10 days). Whichever method you use, turn the cookies over periodically so that both sides dry. When the cookies are dry, you may need to sand them so that the rings are clearly visible.

SAFETY! If using an oven to dry the wood, set the temperature to the warm setting only. Higher temperatures may cause some wood species to give off fumes or to ignite.

If you cannot obtain tree cookies, make photocopies of the Tree Cookie student page.

Obtain an overhead projector and make an overhead transparency of the student page, Reading Tree Cookies.

Doing the Activity...

Part A: Cookie Counting

1. Pass out the tree cookies, if available, or photocopies of the Tree Cookie student page to individuals or small groups.
2. Using either the tree cookies or student page, have the students estimate how old this part of the tree was when the tree cookie was cut. Ask the students how they estimated the age.
3. Give students a copy of the student page Reading Tree Cookies. Explain how to count the rings to find the age of a cross section (count only the light or only the dark rings). Using a transparency, count with the class the number of rings on the Tree Cookie Parts cross section. Then, using their sample tree cookies, have them count the rings to determine the age of the section they have.
4. List the following terms on the board: outer bark, phloem or inner bark, cambium, xylem or sapwood, and heart-wood. See the activity Tree Factory for a discussion of the function of each of these tree parts. Have the students label the diagram Tree Cookie Parts with these terms. Use a labeled transparency to review their responses. Next, have students identify these parts on their own tree cookies.
5. Using the Background information, explain the different kinds of markings that tree cookies display (scars from a forest fire or a dead branch, narrow rings from insect attacks or drought, etc.). Have them look for clues in the markings of the three tree cookies on the bottom of the Reading Tree Cookies student page, and guess what might have happened to the tree that time. Discuss their responses.

Part B: Tree Stories

1. On a very large piece of paper, have students draw a life-size cross section of a redwood tree trunk (or of a large tree native to your area). An average mature redwood is about 6 feet in diameter. Draw an appropriate number of growth rings for the tree's size, about 2-4 rings per inch in diameter. Remember, there should be some variety in the growth rings to reflect changing environmental conditions. As a group, decide on the year the tree began growing and the year it was cut.
2. Divide the group into teams. Assign each team a category of research for finding information related to the tree. Categories should include (1) possible significant events in the tree's lifetime, such as years of drought, flood, or fire; (2) significant world events during the life of the tree; (3) significant events in the state or national history during the life of the tree; (4) significant events of people in your classroom, school, or community during the life of the tree. Teams should identify at least 5 dates for events in their category.
3. Have each group select a color from its event labels and make the labels. Students can staple the cross section to a bulletin board, place labels around the outside margin, and connect the labels with strong to a tack inserted at the appropriate year,
4. Using three feet of adding machine tape, make a core sample for the same tree. Mark lines on the tape that correspond to the tree's rings (from the bark to the tree's center). Add the core sample to the bulletin board, and have students use string to connect the event labels to the appropriate places on the core sample.

Variation My Life as a Tree

1. Show students a tree cookie and explain how it was obtained from a tree. Let students feel and examine the tree cookie.
2. Explain what the rings on the cookie are and what they tell us about the tree (age of tree or limb, years of rapid or slow growth). Show students how to count the rings to determine the tree's (or limb's) age and let them practice.
3. Using white paper plates with ridges, demonstrate for students how to create a "tree cookie" using the bumpy perimeter as the bark, the smooth inside edge as the cambium, and center circle as the heartwood.
4. Have students each use a paper plate and crayons to create a tree cookie the same age as themselves. Have them identify when important events in their lives took place, such as when they were born, when they started school, and so on. They might then use this information to write an autobiography.

Enrichment

- Invite a forester to talk with your group about how he or she uses core sampling to learn about trees and the forest environment. If possible, have the forester bring an increment borer and demonstrate its use on a tree in your schoolyard or

neighborhood (get necessary permission to sample the tree beforehand).

Resources: These activities were provided courtesy of Project Learning Tree – Ohio. Educators in Ohio can receive the complete guide by attending a PLT workshop.

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Explore Activity: Hike or Bike a Trail

Name: Looking at Leaves

Grade/Standards/Indicators:

- K-Scientific Inquiry (K.4 Use the five senses to make observations about the natural world)
- K-Life Sciences (K.4 Investigate variations that exist among individuals of the same kind of plant or animal)
- 2-Life Sciences (2.4 Compare similarities and differences among individuals of the same kind of plants and animals, including people, 2.6 Investigate the different structures of plants and animals that help them live in different environments)
- 4-Life Sciences (4.3 Classify common plants according to their characteristics)

Materials: tree leaves, pencils, tree field guides (optional)

Purpose: To take a closer look at leaves and find out more about leaf characteristics as well as how leaves can be used to identify plants

Description: Locate an area where the students can collect leaves (from the ground, if possible) from several different kinds of trees. You may want to collect a sample (try to include some needle-shaped ones from coniferous trees, collecting the entire cluster in which they grow). In temperate climates, this activity is easiest to do in the fall. Make sure you have the landowner's permission to collect leaves from the area.

1. Take students outside and ask each to collect 3-5 different kinds of leaves. Encourage them to only pick leaves from off the ground. Students can scan their leaves to create digital images to be inserted into other software programs. Images of leaves and needles can also be collected from the Internet. Establish clear rules of behavior for students, including respect for plants and other living things.

2. Back inside, have students form pairs or small groups. Ask them to examine their leaves and sort them into groups according to criteria that they determine.

3. Have students share some of the ways they sorted the leaves. Ask:
   - What are differences between the leaves?
   - What do the leaves have in common?
   - Do any leaves have teeth?
   - Do any have hairs? Where?
     What do the leaves feel like?
   - Who found the biggest leaf? The narrowest leaf? The smallest leaf?

- Have any leaves been eaten by insects? How can they tell?
- Can they trace the veins on their leaves with their fingers?

If no one collected needles, pass out some that you collected earlier or show them a picture of needles. Have students compare the needles to the other leaves.

4. Take students back to the same location as in Step 1. Have each student give one of their leaves to another student. Explain that they will find what kind of tree that leaf came from. Walk from tree to tree, and have students compare their leaves with leaves on the tree. If a student has a leaf that matches a plant, stop and examine it more closely.
    - Where on the branch do leaves grow?
    - How are they attached?
    - Do the leaves grow far apart from each other, close together, or in clumps?
    - If the leaves are needle-like, how many needles are in each cluster?
    - Are all the clusters the same? Are all the needles in the cluster the same length?
    - Do all leaves on the tree match exactly?
    - What color are the leaves?
    - Also examine other characteristics of the tree. For example, what is the bark of the tree like?
    - What color is the bark?
    - Are flowers, nuts, or fruit on the tree? What do they look like?

5. Continue looking at trees until all students have identified the tree that their leaf came from. As they examine each tree, be sure to ask questions to make students compare trees that they've looked at. For example, ask:
    - Are this tree's leaves larger or smaller than the last tree's leaves?
    - This tree's leaves grow in a clump. Have we looked at any other trees with leaves that grow in a clump?
    - What's similar or different about these two trees?

6. (Optional) Use field guides to identify the trees.

Enrichment

Have students use one of the following methods to make prints of the leaves they collected in the activity. You can also make leaf print cards for playing "Concentration" or for creating a class index of plants.

- **Leaf Crayon Rubbings**

  Materials

  Dark-colored crayons, plain drawing paper

  Directions

Set the leaf on a smooth surface, preferably vein-side up; then cover it with a plain piece of paper. Rub a crayon sideways back and forth across the paper above the leaf. The margin of the leaf as well as its veins should begin to show on the paper as you rub gently.

- **Spatter Prints**

  Materials

  9" x 12" wire, plastic, or nylon net screen; toothbrush; straight pins; tempera paint; paper

  Directions

  Place a leaf on a sheet of paper and secure it with pins. Then place the screen over the leaf and paint across the screen using a toothbrush. Afterward, lift off the screen, unpin the leaf, and carefully lift the leaf away.

- **Pressed Leaves**

  Materials

  Iron, towel,wax paper

  Directions

  Place a leaf between two layers of wax paper and then cover with a towel. Press the towel with a warm iron, being sure to iron over the entire area of wax paper. (This will seal the leaf between the two layers of wax paper.) Afterward, you can cut out each leaf, leaving a narrow margin of wax paper around the entire edge of the leaf. Then you can punch holes through the wax paper at the top margin of the leaf and hang the pressed leaf. Use several leaves to make a hanging leaf mobile.

- **Leaf Print T-Shirts**

  Materials

  Clean, poly-cotton-blend T-shirt; acrylic paints; paintbrush; piece of cardboard; wax paper; paper towels

  Directions

  Place the shirt on a clean, flat surface; then slide the cardboard between the front and back of the shirt to keep paint from soaking through. Place a leaf on a sheet of wax paper and coat it with a thin layer of paint. Make sure your fingers are clean; then carefully lift the painted leaf up and place it (painted side down) on the shirt. Cover the leaf with a paper towel and press it down. Lift the leaf straight off the shirt. Make as many more leaf prints on the shirt as you would like; then hang the shirt to dry. *Note:* Do not use fabric softeners to clean or dry your shirt before you start printing. Also, to help make the prints last longer, rinse the finished shirt in a mild water and vinegar solution before washing it for the first time.

- **Cherokee Leaf Printing**

  Materials

  A medium-sized, flat-headed hammer (a flat rock will also work); masking tape; a large, flat board; a supply of newspapers;wax paper; pieces of white cloth or clothing to print on (100% cotton or unbleached muslin works best); leaves from marigolds, tulip poplars, red or white oaks; carrot tops; strawberries.

  Directions

  The idea is to transfer the natural dyes from a leaf to a fabric, while retaining the design of the original leaf. Do this by beating the leaf's chlorophyll directly into the cloth, which will set the dye through natural chemical action. Use this technique to decorate any natural cloth surface such as table cloths, curtains,wall hangings,T-shirts, handkerchiefs, and headbands. Lay several thicknesses of newspaper on a flat board. Spread your cloth, right side up, on top of the newspaper. Put leaves on the cloth in a pattern of your choice. Place wax paper over the leaves and tape it around the edges. Use a hammer to pound the leaf until the color transfers to the cloth. Pound evenly for a good print. If the leaf does not print evenly, crumple up another leaf, dip it in water, and use it to "paint" the unstained spots. The dyes from the leaves must be set into the fabric to resist fading. This process also affects the color. For bright colors, soak the fabric in a solution of 3 tablespoons of ferrous sulfate per gallon of water for 1-2 minutes (or use the same solution of alum for a lessbrilliant color set). For rich, reddishbrown hues, use a solution of 1 cup wood ashes to 3 gallons of cold water for 5 minutes. Rinse the fabric in clean water, and air dry it away from direct sunlight. To help retain the natural colors, you can soak the finished piece in 1/2 cup of salt to 2 gallons of water for 10 minutes [or in a solution of 3 tablespoons of baking soda to 1 gallon of water]. Rinse and dry as directed above.

- **Leaf Batik**

  Materials

  100% cotton cloth squares, pencils or pens, yellow and/or orange fabric dye, red and/or brown dye, household paraffin, hot plate, heavy saucepan, metal spoons, natural bristle paintbrushes, large glass or metal bowls, clothesline and clothespin, leaves for tracing patterns, newspaper, glass cups or dishes for melted paraffin, iron, rubber gloves for students and adults.

  Directions

  Trace a leaf pattern onto a cloth square with pencil or pen. Using yellow and/or orange dyes only, dip each square in dye. Hang squares on the clothesline to dry. After they have dried, " paint

" the leaf shape on the cloth with melted paraffin, filling in the outline of the leaf you have traced. Constantly reheat the paraffin; if it is not sufficiently heated, it will turn white (cool) immediately after being painted onto the fabric and will not protect the fibers from receiving the final dye color. Ask students what they think will happen when they dip the cloth into the next colors of dye. (The dye will affect only those areas not covered by the paraffin.) Crumple the prepared cloth, then dip it into the red and/or brown dye(s). Hang the cloth on the clothesline to dry. When it is dry, iron the cloth between layers of newspaper. Change the paper when it becomes saturated with paraffin. When no more paraffin melts onto the paper, the batik is finished. You might display the finished squares of cloth as a quilt.

Resources: These activities were provided courtesy of Project Learning Tree – Ohio. Educators in Ohio can receive the complete guide by attending a PLT workshop.

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Explore Activity: Catch a Fish

Name: Plug Golf

Grade/Standards/Indicators: None

Materials: rod and reel
Casting plug tied to the end of the fishing line
Space to set up a couple targets or holes

Purpose: To practice casting skills which can later be used to go fishing.

Description: Plug golf is a great way to have fun with a group of people while practicing basic casting skills that can later be used to go fishing. It is also a great way to improve casting accuracy. The game is just like regular golf, but the club and ball are replaced with a casting rod & reel and a casting plug.
Participants take turns just as they would in a game of golf or Frisbee golf.

1) Set up targets, such as hoola hoops, trashcans, dishpans, or even trees that don't have low hanging branches, to be used as the holes.
2) The first player takes a turn casting the plug towards the hole.
3) After the plug has landed, the player reels in line and walks towards their casting plug.

After everyone playing has taken their shot, actions are repeated beginning with the player furthest from the hole.

Resources: Ohio Division of Wildlife
www.ohiodnr.com/wildlife
Numerous publications are available online for download
To order publications, please call your local Wildlife District Office
District 1 – Columbus: 614-644-3925
District 2 – Findlay: 419-424-5000
District 3 – Akron: 330-644-2293
District 4 – Athens: 740-589-9930
District 5 – Xenia: 937-372-9261

Explore Activity: Catch a Fish

Name: Fishing Fun

Grade/Standards/Indicators: None

Materials: No additional items needed

Purpose: To have some fun while you fish.

Description: Do you like to fish? Then you probably know that fishing is more than just trying to catch something. Fishing is a great way to enjoy the outdoors!

The best fisherman work hard on their skills, learn about the fish they are after, and get to know the natural world in general.

Next time you go fishing, think about these ideas to add fun to your trip and to help improve your chances for success:

- Combine fishing with a hike. You can explore along the way and find some great spots that others have missed.
- Try fishing at dawn and dusk when most fish are active.
- Learn the types of habitat and water temperatures that fish like. Each species is different.
- Fish near "structure"…spots like rocky points, weeds, dead trees and docks.
- Be a good observer. By watching quietly, you can often see where and what fish are eating. You may also see some amazing sights from pond dwellers like beaver, turtles and water birds.

Resources: Ohio Division of Wildlife
www.ohiodnr.com/wildlife
Numerous publications are available online for download
To order publications, please call your local Wildlife District Office
District 1 – Columbus: 614-644-3925
District 2 – Findlay: 419-424-5000
District 3 – Akron: 330-644-2293
District 4 – Athens: 740-589-9930
District 5 – Xenia: 937-372-9261

Explore Activity: Splash in a Stream

Name: Stream Quality Monitoring

Grade/Standards/Indicators:

- K-Scientific Inquiry (K.7 Use appropriate tools and simple equipment/instruments to safely gather scientific data)
- 1-Scientific Inquiry (1.6 Use appropriate tools and simple equipment/instruments to safely gather scientific data)
- 2-Scientific Inquiry (2.7 Use appropriate tools and simple equipment/instruments to safely gather scientific data)
- 3-Life Sciences (3.3 Classify animals according to their characteristics)
- 3-Scientific Inquiry (3.5 Record and organize observations, 3.6 Communicate scientific findings to others through a variety of methods)
- 4-Scientific Ways of Knowing (4.2 Record the results and data from an investigation and make a reasonable explanation)
- 5-Scientific Inquiry (5.2 Evaluate observations and measurements made by other people and identify reasons for any discrepancies)

Materials: two shovel poles or broom handles, a white garbage bag, a small thermometer, a shallow bowl or plastic container, old tennis shoes or rubber boots to wear, and a fine mesh net called a "seine" (if you don't have a seine net, then you can make one using metal window screening from any hardware store)

Purpose: To test water quality and learn what lives in various streams

Description: Stream quality monitoring (SQM) is a simple way to test water quality. Instead of using expensive chemical kits and microscopes, all you need are the materials listed above. Most importantly, make sure you have at least one friend to help you.

SQM relies on the presence or absence of aquatic macroinvertebrates. Macroinvertebrates are very small animals that lack a backbone but can usually be seen with the naked eye. Macroinvertebrates are an important food source for larger animals like fish. Fish, in turn, are a food source for birds, mammals, aquatic snakes and humans.

Some aquatic macroinvertebrates, like mayflies, stoneflies and gilled snails, cannot survive in polluted water. While others, such as dragonfly and damselfly nymphs, can tolerate low levels of pollution. A few organisms, including midges and leeches, can survive and even thrive in polluted water. In a healthy stream, there will be a variety of pollution sensitive macroinvertebrates. In an unhealthy stream, only a few types of macroinvertebrates may survive.

STEP 1: Make the SQM net. Fold or wrap one side of the mesh around one handle. Then wrap the opposite edge around the second pole. Anchor the mesh to each pole with heavy-duty staples.

STEP 2: Find a riffle area in the river or stream that you wish to monitor. *For safety reasons, the water should be no more than a foot deep.* A riffle area is a rocky or stony area in a running waterway where the fast motion of the water constantly mixes with the air above. Not only do macroinvertebrates (small insects, insect larva, mollusks and crustaceans) find cooled temperatures and protection from predators there, but this air-mixing process gives the riffle what is called a high dissolved-oxygen content. Gilled macroinvertebrates and the fish that eat them breathe this oxygen-rich water through their gills.

STEP 3: Set your net. Pick a spot in the riffle you wish to sample. The net should be stretched out to its full width with the bottom edge lying firmly against the stream bed. No water should wash under or over the net. It may help to use small rocks to weigh down the bottom edge of the net.

STEP 4: Pick up the rocks. While one of you holds the net in place, the other will pick up the riffle rocks in front of the net and carefully brush them off so that the animals that live there will wash into the net. Make sure that you don't move the net.

STEP 5: Kick up the bottom…gently. Once you have brushed off all the rocks in front of the net, kick up the river bottom to dislodge any animals that burrow there. Be careful—you want to collect living creatures, not mangled bug parts.

STEP 6: Find the macros. Lift the net out of the water with a forward scooping motion, being careful not to let everything that you've caught flow over the top of the net and away. Carry net onto the bank and lay it flat on top of a white garbage bag. The bag will catch anything that is able to get through the mesh so that you can see it. Fill your container with an inch of river water and place everything moving in the net into the water. Use a magnifying lens to locate anything very small.

STEP 7: Figure out what you've found. Once you're sure that you have everything out of the net and into the bowl, you're ready to identify your catch using an identification sheet.

STEP 8: Rinse and repeat. Rinse off the net in the river water. Pick a different spot in the riffle and repeat the process. Compare what you find to the first sample. See if you can figure out why the two samples are different or the same. Once you've done your best to identify everything in the collection bowl, release the macroinvertebrates back into the riffle.

STEP 9: Share your experience! If you choose a state scenic river to test, then join other SQM volunteers. Download an SQM Assessment Form from

www.dnr.state.oh.us/Home/Scenic_Rivers/rivers/assessmentform/tabid/976/Default.aspx. Fill it out and send it to the address at the bottom of the form. Your findings will be added to those sent in by other SQM volunteers and your name will appear in the annual Ohio Scenic Rivers Stream Quality Monitoring Project report.

Resources: If you are interested in doing a stream quality monitoring with your group, call your local/county Soil and Water Conservation District.

Ohio Department of Natural Resources
Division of Scenic Rivers

Central Ohio
Big and Little Darby Scenic River
Kokosing Scenic River
Mohican Scenic River
Olentangy Scenic River
Central Ohio Scenic Rivers District
2045 Morse Rd., Bldg. F-1 - Columbus, OH 43229
614-265-6422

Northeast Ohio
Ashtabula State Scenic River
Chagrin State Scenic River
Conneaut Creek Wild and Scenic River
Grand Wild and Scenic River
Little Beaver Creek Wild and Scenic River
Upper Cuyahoga Scenic River
Northeast Ohio Scenic Rivers District Office
11027 Hopkins Rd. - Garrettsville, OH 44231
330-527-4184

Northwest Ohio
Maumee Scenic and Recreational River
Sandusky Scenic River
Northwest Ohio Scenic Rivers District Office
1435 TR 38 W. - Tiffin, OH 44883
419-981-6319

Southwest Ohio
Little Miami Scenic River
Stillwater/Greenville Creek Scenic and Recreational River
Southwest Ohio Scenic Rivers District Office
5349 Wilmington Rd. - Oregonia, OH 45054
513-934-0751

Explore Activity: Learn from a Naturalist

Name: Looking at Spiders

Grade/Standards/Indicators: None

Materials: string/yarn

Purpose: To make a spider web

Description: The silk a spider makes is stronger than steel. The web a spider builds with this silk helps the spider catch insects for food. See if you can make a spider web by using string or yarn between the branches of a tree.

Resources: Naturalists are available at various State Parks around the state
Contact your closest State Park to see what Naturalist programs are available
www.ohiostateparks.org

Explore Activity: Explore a Wetland

Name: Sounds, Sights and Animals

Grade/Standards/Indicators:

- K-Life Sciences (K.6 Investigate the habitats of many different kinds of local plants and animals and some of the ways in which animals depend on plants and each other in our community)
- K-Scientific Inquiry (K.1 Ask "What if" questions, K.4 Use the five senses to make observations about the natural world)
- K-Scientific Ways of Knowing (K.3 Interact with living things and the environment in ways that promote respect)
- 1-Life Sciences (1.4 Investigate that animals eat plants and/or other animals for food and may also use plants or other animals for shelter and nesting)
- 1-Scientific Inquiry (1.1 Ask "What happens when" questions)
- 2-Life Sciences (2.2 Identify that there are many distinct environments that support different kinds of organisms, 2.6 Investigate the different structures of plants and animals that help them live in different environments, 2.7 Compare the different habitats of many different kinds of Ohio plants and animals and some of the ways animals depend on plants and each other)
- 2-Scientific Inquiry (2.2 Ask "How do you know" questions)
- 3-Scientific Inquiry (3.5 Record and organize observations)
- 4-Life Sciences (4.5 Describe how organisms interact with one another in various ways)
- 5-Life Sciences (5.3 Trace the organization of simple food chains and food webs)

Materials: Old clothes, sunscreen, bug spray, notebook, pen, dip-net, binoculars, and magnifying glass

Purpose: To learn more about what lives in a wetland.

Description: Wear clothes that can get dirty, including old shoes or boots, and be sure to wear sunscreen and bug spray! If you want, bring a notebook and pen to write down observations or draw what you see. Other things that are useful but not needed: dip-net, binoculars, magnifying glass.

Remember getting dirty doesn't have to be gross—feel free to use your hands when exploring the wetland. If you pick up small organisms, please return them to their habitat after you are done observing them. Be careful to avoid poison ivy!

Consider preparing a journal of your observations. Make sketches or take photographs of the things you see.

Activities:

Sounds Activity – Find some dry soil or a log and sit down. Be as quiet and as still as you can for as along as possible. After a while you will hear new sounds. Do you hear the croak of a frog or the song of a bird? Why are they making those noises? Do you expect you would hear different sounds in different seasons (Spring, Summer, Fall, Winter)? Why?

Plants Activity – Do you see plants that live in the water? Do you know that different species of plants have different water requirements? How are plants in the water different from plants that live out of the water? Do you see plants that are floating on or "emerging" from (sticking out of) the water so you can see their leaves?

Animals Activity – Do you see animals? Look for tracks in the mud. What animal made those tracks and what do you think it was doing? Are there any birds floating on the water or diving into it? What are they doing? Does anything live *in* the water?

If you have a net, quickly dip it in the water. Be sure to gently scrape it along the bottom and get some mud, leaves, rocks, or sticks in your net. This will ensure you collect any critters that may be crawling on the soil, clinging to a rock or stick, or seeking shelter under a fallen leaf. Now, use your hands to sift carefully through the net and inspect the sticks and both sides of each leaf. Look for very tiny aquatic insects that may be wriggling or crawling. Is there anything big, like a fish? If you see multiple organisms, think about how they might interact. Is one organism the food of another? Did you find organisms that can only live in water? Are there organisms that can live both in *and* out of the water?

If the wetland is seasonally wet—meaning it dries up late in the summer—you probably won't find fish, since they need water year-round. A vernal pool is a type of seasonal wetland and is good for amphibians that need to be born in water and would otherwise be eaten by fish.

Summer Scavenger Hunt – How many can you find?

- Frog
- Tadpole
- Dragonfly (adult with wings)
- Dragonfly nymph (aquatic)
- Damselfly
- Fairy shrimp
- Water beetle
- Aquatic worms
- Turtle
- Snake
- Salamander
- Bird nest
- Aquatic snail (in water)
- Terrestrial snail (out of water)

- Crayfish
- Mosquito
- Fish
- Floating-leaved aquatic plant (*e.g.* water lily)
- Submersed aquatic plant (*e.g.* pondweed)
- Emergent aquatic plant (*e.g.* cattail)

Resources: For more information or if you have questions about wetlands, contact…

Mad Scientist & Associates
www.madscientistassociates.net/
614-818-9156

Explore Activity: Swim with a Buddy

Name: Observations of Shore Material

Grade/Standards/Indicators:

- K-Life Sciences (K.1 Explore differences between living and non-living things)
- K-Physical Sciences (K.3 Describe and sort objects by one or more properties)
- K-Scientific Inquiry (K.7 Use appropriate tools and simple equipment/instruments to safely gather scientific data)
- 1-Physical Sciences (1.1 Classify objects according to the materials they are made of and their physical properties)
- 1-Scientific Inquiry (1.4 Work in a small group to complete an investigation and then share findings with others, 1.6 Use appropriate tools and simple equipment/instruments to safely gather scientific data)
- 2-Scientific Inquiry (2.4 Use appropriate tools and simple equipment/instruments to safely gather scientific data)
- 3-Earth & Space Sciences (3.4 Observe and describe the composition of soil, 3.5 Investigate the properties of soil)
- 3-Scientific Inquiry (3.2 Discuss observations and measurements made by other people)

Materials: Ziploc-type bags or plastic containers
magnifying glass
digital camera

Purpose: To see what kinds of material there are on a shoreline or beach.

Description: This activity works well on a beach. Or, if you can not take a trip to the beach, collect a variety of samples of shore material from various beaches and/or various locations on one beach, placing the samples in Ziploc-type bags or plastic containers. Label each collected sample, with the date, time, beach name and location of where the sample was collected. If possible, record weather conditions and take a picture(s) of the collection site.

Have students divide into pairs or groups. If you have samples of shore material from more than one shore, either give each student/group a turn with each sample, or divide the samples among the pairs/groups and have them compare answers afterward, discussing how and why their sand samples are different.

Have students look at, touch and sift through shore material. If possible, have students observe the shore material through a magnifying glass, jeweler's lope or microscope. Students should write down their responses to the following questions. Feel free to develop additional questions on your own.

1. From your general observation (prior to magnification):
    - What color(s) do you see in the shore material?
    - Draw the shape(s) that you observe the individual grains of shore material to be.
    - Describe what the shore material feels like when you touch it.
    - Where do you think the sample of shore material came from on the beach (by the water, near the upland, or somewhere in between)? Does the shore material look like material found on a beach that you have visited? If so, name that shore area.
    - In addition to sand, cobble, rocks, etc., do you observe anything else mixed in with the beach material and if so, what?
2. Now, using a magnification method, observe the shore material to answer the same questions:
    - What color(s) do you see in the shore material?
    - Draw the shape(s) that you observe the individual grains of shore material to be.
    - Describe what the shore material feels like when you touch it.
    - Where do you think the sample of shore material came from on the beach (by the water, near the upland, or somewhere in between)? Does the shore material look like material found on a beach that you have visited? If so, name that shore area.
    - In addition to sand, cobble, rocks, etc., do you observe anything else mixed in with the beach material and if so, what?
3. Is any of your sand black? If your answer is yes, rub a magnet through the sand. If the sand sticks to the magnet, it is made up of either iron or magnetite— both are magnetic minerals sometimes found in sand that are black in color.

After the groups/pairs of students have made their observations, if you have pictures of the shore material collection sites, ask a representative from each group to come select the picture(s) of the shore that match their shore sample. If students chose the wrong picture, have the group take a quick second look at their observations and select again. Have students compare observation responses to gain a better understanding of the variety of materials found along the coast.

Resources: Ohio Department of Natural Resources
Division of Coastal Management
Brenda Culler
419-626-7980
coastal@dnr.state.oh.us

Explore Activity: Swim with a Buddy

Name: The Ever Changing Coast

Grade/Standards/Indicators:

- K-Earth & Space Sciences (K.3 Explore that sometimes change is too fast to see and sometimes change is too slow to see)
- K-Physical Sciences (K.5 Investigate ways to change how something is moving)
- K-Scientific Inquiry (K.1 Ask "what if" questions)
- 1-Physical Science (1.1 Classify objects according to the materials they are made of and their physical properties, 1.6 Investigate a variety of ways to make things move and what causes them to change speed, direction, and/or stop)
- 1-Scientific Inquiry (1.1 Ask "What happens when" questions)
- 3-Earth & Space Sciences (3.3 Describe that smaller rocks come from the breakdown of larger rocks through the actions of plants or weather, 3.4 Observe and describe the composition of soil, 3.5 Investigate the properties of soil)
- 4-Earth & Space Sciences (4.8 Describe how wind, water, and ice shape and reshape Earth's land surface by eroding rock and soil in some areas and depositing them in other areas producing characteristic landforms)

Materials: Ziploc-type bags or plastic containers
sand from beach/coast
cardboard box
two jars of water

Purpose: To show students how sand moves and why certain types of sand move more than other types.

Description: Sand is almost always in constant motion. The goal of this activity is to show students two ways in which sand moves, and what sizes of sand move the most.

Part 1: Go to a beach or coast and collect some sand. Choose two samples of sand from your group, one with a small, fine grain size and one with a larger, courser grain size. If you are at a beach, take samples of sand from two different locations: one at the back of the beach (upland) and one from the front beach (by the water). Typically the sand closest to the upland will be smaller in grain size than that closest to the water.

Take a pinch or two of sand from the finer-grained sample and drop the sand into a jar of water. Once the sand has been added, close the jar lid tightly. Follow the same procedure with the larger grained sand sample. Once both jars have sand and are tightly closed, shake both vigorously. Put them down side-by-side on flat surface. In which jar does the sand settle to the bottom

first? (*The larger sand should settle out first.*) Now swirl the jars. Does all of the sand swirl in both jars? Sometimes the larger size grains will not swirl.

Discuss with students why larger material settles first and may not swirl. Discuss how this relates to water flowing down a river and/or moving along a shore. What will happen to all of the material suspended in the water that flows down the river/ along the shore? What will settle out first? What will settle out last? Ask students to make a hypothesis on what they think will happen if the wind is blowing the sand instead of the water moving the sand.

Part II: Draw a line down the middle of the lid of a cardboard box. Take small amounts of the same two sand samples, placing one on each side of the line on the lid, but both close to the line. It is preferable to use dry sand samples for this experiment. Place the cardboard box lid on a flat surface. Have a volunteer stand at one end of the lid and blow gently on the sand. Which sand grains move? (The finer may, or may not). Have the volunteer blow harder until one of the other sand samples moves. How much more wind force does it take to get the larger grain size to move?

Discuss with students why larger material settles first and may not swirl. Discuss how this relates to water flowing down a river and/or moving along a shore. What will happen to all of the material suspended in the water that flows down the river/ along the shore? What will settle out first? What will settle out last?

- Beaches are rivers of sand.
- Sand grains on a beach may be entirely replaced by others in a few weeks.
- Beaches can form wherever water deposits sediments onto a shore.
- Some sand is produced right at the shore where waves crash on rocks, headlands and reefs.
- Quartz, a glass-like mineral, is the most common mineral on earth and is often the most common component of transported sediments.
- Another way that sand moves is being blown by the wind.
- Smaller grains of sand can be blown farther as the wind sorts the grains by size.
- The finest grains of sand can become airborne in the wind, and are often deposited high on the beach in the dunes.
- Silt-sized particles are typically only found inside protected marshes or bays, or far offshore on the deep sea bottom where the water is barely moving.
- The effects of wind and water can cause the accumulation of sand (accretion) and the erosion of material from the shore.
- The natural process of beach building (accretion) and erosion has been altered by extensive development of much of the coast. Prior to development, natural loss of sand from beaches, largely to dunes and submarine canyons, and natural sand supply, mostly from rivers and streams, were roughly in balance.

Resources: Ohio Department of Natural Resources
Division of Coastal Management
Brenda Culler
419-626-7980
coastal@dnr.state.oh.us

Ohio Department of Natural Resources
Educational Resources

The Ohio Department of Natural Resources is proud to provide a multitude of resources and educational information to teachers. For specific information on interdisciplinary learning opportunities to investigate environmental issues and encourage young people to make informed responsible decisions, go to…

http://ohiodnr.com/Home/Education/default/tabid/9521/Default.aspx.

Information on lessons, speakers, outdoor activities, and correlations to state content standards are just a click away!

The Project WET, Project WILD, and Project Learning Tree Curriculum and Activity Guides are only available after participation in an Educator Workshop. Educator workshops vary in time and cost and are conducted throughout the state by a network of volunteer facilitators. Please see the descriptions of the individual projects below.

Workshops are anywhere from 3-8 hours in length and usually require at least 12 people to participate. Workshops can be held at most any location having a classroom type setting with access to the outside. Workshop costs vary from $0 to around $30 for participants.

If you'd like to help host a workshop in your area for one or a combination of the Projects, please feel free to contact any of the coordinators below. Here is a list of the programs we currently offer:

Project WILD - is a supplementary education program emphasizing awareness, appreciation, and understanding of wildlife and natural resources. Whether you teach science, math, language arts, social studies, or physical education, Project WILD can spark a new interest for your students and provide new and exciting ways to approach traditional subjects.

Attractive and easy to use, Project WILD is an ideal way to supplement your curriculum and fire the imagination of your students. Workshops are usually free or very low in cost. The Project WILD materials are provided free of charge by the ODNR-Division of Wildlife.

For more information, contact Jen Dennison at the Division of Wildlife at 1-800-WILDLIFE or email at outdoor.education@dnr.state.oh.us.

Project Learning Tree - is an award winning, multi-disciplinary environmental education program for educators and students in Pre-K through grade 12.

PLT, a program of the American Forest Foundation, is one of the most widely used environmental education programs in the United States and abroad. PLT continues to set the standard for environmental education excellence.

PLT provides educator workshops in which participants receive the PLT PreK-8 activity guide and/or the secondary thematic modules (Forest Ecology, Focus on Forests, Solid Waste, Risk, Places We Live) for use with older youth.

Project Learning Tree is sponsored in Ohio by the ODNR-Division of Forestry and Project Learning Tree-Ohio. Workshop fees are usually around $15 - $30, depending on curriculum materials selected for the workshop.

For more information, contact Sue Wintering at the Division of Forestry at 614-265-6657 or email at plt@dnr.state.oh.us.

Project WET - is a collection of innovative, water-related activities that are hands-on, easy to use, and fun!

Project WET activities incorporate a variety of formats, such as large and small group learning, whole-body activities, laboratory investigations, discussion of local and global topics, and involvement in community service projects. Project WET provides educator workshops in which participants receive the K-12 curriculum and activity guide.

Project WET in Ohio is sponsored by OWEP which includes the Water Management Association of Ohio / Water Resources Foundation of Ohio, the Ohio Department of Natural Resources, The Ohio State University Water Resources Center, and the Ohio Environmental Protection Agency. The guides cost $22. Small workshop fees may apply.

Project WET USA has additional curriculum guides and other materials available for purchase without taking a workshop.

For more information, contact Lenn Black at the Division of Water at 614-265-6758 or email at leonard.black@dnr.state.oh.us.

And below are the upcoming workshops…

Combined Project WILD, Aquatic WILD and PLT Workshop

Tuesday May 12, 2009 8:00am to 4:00pm
Location: West Geauga High School, 13401 Chillicothe Rd., Chesterland, OH 44026
Registration is required. Contact Jamey Graham at 330-245-3020 to register

Combined Project WILD/Aquatic WILD/WILD School Sites Workshop

June 2-3, 2009 9:00am to 4:00pm both days
Location: Fayetteville Church of Christ, Brown County
To register, contact Brenda Reed at 513-875-2083.
Ashland College credit may be available.

Aquatic Project WILD Workshop/Stone Lab Field Trip

June 18, 2009 9:00am to 5:00pm at Old Woman Creek Research Reserve
June 19, 2009 8:15am to 5:00pm at F.T. Stone Laboratory

The first day of this two-day workshop will run participants through the Project WILD Aquatic Curriculum, which emphasizes aquatic wildlife and aquatic ecosystems. The second day, as a compliment to Aquatic WILD, participants will visit F.T. Stone Laboratory on Gibraltar Island where they will experience additional aquatic ecology lessons. For more information, contact Alisa Schaffer, Huron SWCD, at 41-668-4113 x 3 or download and print off the registration form here.
Registration deadline is June 4, 2009
Cost is $40.00 to cover travel to Stone Lab.
Ashland University graduate credit is available upon attendance of both days. Fee is $185 for 1 credit.

Combined Project WILD, Aquatic Project WILD and Project WET

July 14-15, 2009 8:00am to 3:30pm both days
Location: Various sites throughout Cuyahoga Falls, OH
Registration is limited, deadline is June 15, 2009
Cost is $30 for WET books. Please pack a lunch both days.
To register, contact Gene Easter at 330-928-6691 or gleaster@sbcglobal.net

Combined Project WILD/Aquatic WILD, WET, PLT, and Flying WILD Workshop

Thursday and Friday, July 30-31, 2009 9:00am to 4:00pm both days
Location: Friendly Hills Grange Camp, 5880 Friendly Hills Rd., Zanesville
Cost is $40 (covers WET, PLT and Flying WILD guides as well as lunch both days)
Click here to print off registration form, or contact Nicole Hafer, Muskingum SWCD, 740-454-2027

Resource Guide for Explore the Outdoors

The following is a list of resources for each activity in the Explore the Outdoors activity book. Please utilize these resources if you have specific questions about various aspects of the activity. For further information about Explore the Outdoors, please call 614-784-PLAY or email explore@dnr.state.oh.us.

Plant a Garden

Recycle Ohio/Get Caught Up in a Clean Up

Contact your local Solid Waste Authority District or Keep Ohio Beautiful affiliate for further information

Ohio Department of Natural Resources
Division of Recycling and Litter Prevention
614-265-6333
drlp@dnr.state.oh.us

Find a Fossil

Ohio Department of Natural Resources
Division of Geological Survey
Mac Swinford
614-265-6576
geo.survey@dnr.state.oh.us

Camp Under the Stars

Ohio Department of Natural Resources
Division of Parks and Recreation
614-265-6561
OhioStateParks@dnr.state.oh.us

Spot a Bird

Doreen Whitley
Grange Insurance Audubon Center
www.grangeinsuranceaudubon center.org/
614-224-3303

Project WILD
Educators in Ohio can receive the complete guide by attending a Project Wild workshop. For more info contact…
Ohio Department of Natural Resources
Division of Wildlife, Project WILD Coordinator
1-800-WILDLIFE
outdoor.education@dnr.state.oh.us

Hike/Bike a Trail

Ohio Department of Natural Resources
Division of Parks and Recreation
614-265-6561
OhioStateParks@dnr.state.oh.us

Project Learning Tree – Ohio
Educators in Ohio can receive the complete guide by attending a PLT workshop.
Sue Wintering, Ohio PLT State Coordinator
Ohio Department of Natural Resources
614-265-6657
plt@dnr.state.oh.us

Paddle a Canoe

Ohio Department of Natural Resources
Division of Watercraft
Emily King
1-877-4BOATER
614-265-6480
watercraft@dnr.state.oh.us

Catch a Fish

Ohio Department of Natural Resources
Division of Wildlife
Numerous publications are available online for download
To order publications, please call your local Wildlife District Office
District 1 – Columbus: 614-644-3925
District 2 – Findlay: 419-424-5000
District 3 – Akron: 330-644-2293
District 4 – Athens: 740-589-9930
District 5 – Xenia: 937-372-9261

Splash in a Stream

If you are interested in doing a stream quality monitoring with your group, call your local/county Soil and Water Conservation District.

Ohio Department of Natural Resources
Division of Scenic Rivers

Central Ohio
Big and Little Darby Scenic River
Kokosing Scenic River
Mohican Scenic River
Olentangy Scenic River
Central Ohio Scenic Rivers District
2045 Morse Rd., Bldg. F-1 - Columbus, OH 43229
614-265-6422

Northeast Ohio
Ashtabula State Scenic River
Chagrin State Scenic River
Conneaut Creek Wild and Scenic River
Grand Wild and Scenic River
Little Beaver Creek Wild and Scenic River
Upper Cuyahoga Scenic River
Northeast Ohio Scenic Rivers District Office
11027 Hopkins Rd. - Garrettsville, OH 44231
330-527-4184

Northwest Ohio
Maumee Scenic and Recreational River
Sandusky Scenic River
Northwest Ohio Scenic Rivers District Office
1435 TR 38 W. - Tiffin, OH 44883
419-981-6319

Southwest Ohio
Little Miami Scenic River
Stillwater/Greenville Creek Scenic and Recreational River
Southwest Ohio Scenic Rivers District Office
5349 Wilmington Rd. - Oregonia, OH 45054
513-934-0751

Learn from a Naturalist

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www.ohiostateparks.org

Explore a Wetland

For more information or if you have questions about wetlands, contact…
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www.madscientistassociates.net/
614-818-9156

Swim with a Buddy

Ohio Department of Natural Resources
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