



UNIVERSITY OF MINNESOTA | EXTENSION



MINNESOTA MASTER NATURALIST

Minnesota Master Naturalist Explorers Spring Curriculum

A TIME FOR NEW ARRIVALS AND THE AWAKENING OF NATURE



IN PARTNERSHIP WITH:



Minnesota Master Naturalist Explorers Spring Curriculum

A TIME FOR NEW ARRIVALS AND THE AWAKENING OF NATURE

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GETTING STARTED WITH EXPLORERS

The Minnesota Master Naturalist Explorers program, developed in 2011, worked with elementary students across the state of Minnesota to foster their curiosity about the world and provided an opportunity for Master Naturalist volunteers to share their knowledge and passion for the outdoors with youth. The Minnesota Master Naturalist program, a partnership between the University of Minnesota Extension and the Minnesota Department of Natural Resources, operated the Explorers program with generous support from the Legislative-Citizen Commission on Minnesota Resources (LCCMR) through the end of the grant period on June 30, 2015. The following materials were developed to assist Master Naturalist volunteers as they planned one hour sessions, once each week for four to eight weeks.

First Day Schedule

Arrive early and be prepared with supplies to set the room up. You should have familiarized yourself with the activities you will be conducting prior to this day.

Welcome individuals as they arrive. Attendance should be taken to assist with learning names. When all participants have arrived, introduce yourself. Share something interesting about yourself with the group. Introduce the Explorers Program and briefly mention that you are a volunteer with the Master Naturalist Program, a program sponsored by the Minnesota Department of Natural Resources and University of Minnesota Extension. It is helpful to share basic information about the structure of the program, “For the next six Mondays we will be learning about the outdoors and nature. Each week we will be spending some time outdoors so be sure you dress for the weather.”

Conduct an ice breaker activity to start the day.

Hand out Explorers backpacks, journals, tree cookie name tags, pencils and permanent markers. Have participants put their names on these items. Ask what it means to be an Explorer. Refer participants to page 1 of their journal for what Explorers do and what the rules for Explorers are.

Introduce the Minnesota Weatherguide Environment Calendar by showing the day’s date and the calendar features. Briefly mention that each week participants will be using the calendar to look at average temperature and phenological events. Phenology and the study of seasonal changes can be introduced on the first day.

It is recommended to take a brief hike around the schoolyard the first day. The hike can be used to make basic nature and weather observations.

Wrap up for the day. Ask the participants what they observed outdoors and summarize the topic of the day. Collect backpacks, journals, pencils and name tags. Take materials home with you in the materials bin.

Every Day

Consider bringing in a natural “object of the day” that relates to the topic you will be teaching about. This can be placed at the front of the room for the participants to look at as they come in to see if they can figure out what it is and what they will be exploring that day. Suggestions can be found at the beginning of each main activity.

Welcome participants, take attendance, hand out backpacks, journals, pencils and name tags.

Refer to the Minnesota Weatherguide Environment Calendar for weekly phenology, average temperatures and other relevant information.

ICEBREAKERS

The ice breaker activities are designed to be used at the beginning of each session or incorporated throughout the daily lessons. They can help participants feel comfortable with each other and the leader as well as help transition from the normal school day to the Explorers program.

Nature Makes Me Feel

Have everyone stand in a circle. Explain that each person should start by saying, “Nature and/or being outdoors makes me feel _____” and then respond with an expressive gesture. The leader gives an example, “Being outdoors make me feel HAPPY” and then he/she smiles or “Rain makes me want to jump in puddles” followed by jumping up and down. Adapt question based on the season and/or the current weather. When everyone has taken a turn, you can go around again with a different response.

Who Am I?

Place a name tag with an animal or plant found in Minnesota during the fall on the back of each individual. Participants are only permitted to ask one yes or no question per person about their animal or plant. They can go back through the group a second time and ask one question per person if the group is small or more time is needed. The goal is for the participant to guess the plant or animal on his or her back. This activity can also be done by giving only one participant the name of a Minnesota plant or animal and have the class ask questions to figure out the answer.

Animal Search

Prior to the participants’ arrival, come up with a list of five native Minnesota animals. This number might vary depending on the size of the group. Spread the participants out around the classroom or outdoors. Whisper the name of one of the animals into each participant’s ear. There should be at least two participants with the same animal name. When all players have been named, instruct them to find the rest of their “species” or fellow animals by making the sound or acting like the animal. The activity ends when all animals have found their fellow partners. Examples of animals might include owl, bear, wolf, wild turkey, frog or snake.



NATURE JOURNALING

Adapted from a *Keeping a Journal*, Monarch Lab, University of Minnesota.

Objective

To learn the basics of a nature journal.

Supplies

Explorers' nature journals

Pencils

Thermometer

Minnesota Weatherguide Environment Calendar

Objects of the Day: Examples of nature journals, plant and animal sketches and field guides

Magnifying glass (optional)

Camera (optional)

Background

Keeping records and taking measurements are important to being an Explorer. Good observations come from spending time looking at natural surroundings and making recordings through data collection and drawings. These recordings can be important for short and long term understanding of the environment.

The nature journal can be used to keep track of observed natural characteristics and changes in the environment made through written observations, recorded data and/or drawings. Observations might be based on the senses; sight, smell, touch or recorded data such temperature (actual vs. average), clouds types and wind. The journal is also a tool to record the seasonal phenology and changes around the schoolyard and surrounding neighborhood.

Emphasize that the participants do not need to be expert artists or writers to be good at journaling. Every journal entry is a good entry. Encourage participants to notice as many details as possible. Add labels to the drawings and note details like the date, location and weather. Provide examples of journal entries for the participants either from your own experience or in the Explorers' nature journal to help them get started.

Phenology is the science of seasonal changes and their effect on the natural world. A phenologist is someone who studies the changing of the seasons. Tracking events takes time and patience. First, you have to learn to be a good observer. Second, you have to become an accurate recorder of what you observe. Third, you have to become a critical thinker, finding links among the phenomena you are observing.

Activity

1. Explore and discuss the objects of the day.
2. Ask the participants why it is important to keep nature related records and measurements. What tools and supplies are needed? What would cause us to all have different observations?
3. Encourage participants to practice observation and description skills using words and drawings. Journal prompts are often helpful with weekly entries. Prompts might be sentences or key words that often help to initiate a journal entry. Refer to *Nature Observation* in the Explorers' nature

journal (page 3). The first time the journals are used, take a brief field trip around the schoolyard and record things the participants see. Share the list with each other.

4. One way to practice recording observations is to map the area of the schoolyard that will be visited during the Explorers program. Note key features like buildings, trees or paths. See Draw a Map of Your Site in the Explorers' journal for the mapping exercise (pages 4-5). The key can be used to draw symbols such as trees, shrubs or other landscape features to place on the map. The compass rose can be used to label the cardinal directions of North, South, East, and West. A good way to remember the letters and order on the compass rose is Never Eat Soggy Waffles. Consider sharing an aerial map of the schoolyard from a program such as Google Maps to show the participants another perspective of the area. Participants might also select a site in the schoolyard or a tree to observe once a week through the Explorers program. Drawings and photographs may be used to document the changes week by week. Assign a date to each of the recordings.
5. Record weekly weather observations such as temperature and general weather conditions such as precipitation and clouds on the Weather Tracker pages in journal (pages 10-11). Clouds may be classified by type or by the amount of coverage – clear, partly cloudy, mostly cloudy or overcast. Ask the participants how making weather observations is different when outside versus looking out the window or viewing photographs. Encourage the participants to compare the weather forecast printed in newspaper or on TV for a particular day with the actual weather conditions. Was the meteorologist accurate? Refer to the Minnesota Weatherguide Environment Calendar as a reference for average temperature data and weekly phenology.
6. Share the information presented in the phenology section of the Minnesota Weatherguide Environment Calendar. It is found after each month's calendar page. Define "phenology" and discuss seasonal changes to watch for in the upcoming month. Show participants the checklist of typical seasonal changes on the *Spring Phenology* page of the Explorers' nature journal and invite them to look for these changes as they go outside (page 7). Participants should observe and record any of the signs of fall in their journals and share with the group.
7. Other questions refer to the season. What are signs of spring? Refer to the Minnesota Weatherguide Environment Calendar and the Explorers' nature journal (page 7). Why it is important for naturalists and scientists to notice as many details as possible? Encourage participants to make general predictions of seasonal phenology. How do fall temperatures and hours of daylight/darkness change as the season changes and what effects do these changes have on plants, animals and weather in the area? What changes happen outdoors when spring arrives, temperatures decrease, etc.? Encourage the participants to observe changes as the seasons change from fall into winter and winter into spring on the *Phenology* page of the Explorers' nature journal (page 6).



Extensions

Constructing a Nature Journal

Objective: To construct a take-home nature journal.

Supplies: Colored cardstock paper, white paper, hole punch, straight stick, and a rubber band.

Activity: Construct nature journal by folding at least five sheets of white paper and place inside a folded cardstock cover. Punch two holes near the folded edge and wrap a rubber band around one end of the stick, guide the rubber band down through the hole then along the back of the journal and up through the second hole. Finally, wrap the rubber band around the other end of the stick. Illustrated directions can be found at www.makingbooks.com/elastic.shtml. The nature journal can be personalized with the participant's name and drawings. Journals can be constructed at any point during the Explorers Program. Encourage participants to make journal entries near their school, neighborhood or favorite outdoor location. Participants are also welcome to add photos to the journal along with a description of the object.

Onion Hike

Objective: To follow a trail using only your sense of smell.

Supplies: Scents that are easy to follow such as an onion. You may also use flavor extracts from the spice aisle at the grocery store.

Activity: Mark out a trail using only an onion or other smells such as mint, anise or vanilla. Rub the scent on trees through the woods. Have participants try to follow the scent. You may consider hiding a treasure at the end of the trail as an added incentive. Ask participants if it was difficult to find the scent. What other scents did they discover? What makes this activity hard or easy? How do animals use their senses of smell in the spring? Have participants mark the scent trail on their Explorers' nature journal map and journal about what they discovered.

NATURE OBSERVATION BASICS

Objective

To explore the schoolyard using multiple senses and record observations in the Explorers' journal.

Supplies

Explorers' nature journals

Pencils

Objects of the day: Ruler, magnifying glasses or binoculars

Linnaeus List or other field guides (optional)

Background

Making detailed observations of the environment is important to scientists, naturalists and everyday people. Using all the senses can result in a well-rounded understanding of the surroundings.

Every known living organism is classified and named by a set of rules and guidelines. Those rules are used by all scientists around the planet. The names scientists use are called scientific names, not common names.

Common names are the ones you might use when talking with your friends or family. You call your pet a dog or a cat which is the common name. Scientists call those animals by a set of several names like *Felis catus*. That's a domestic cat. Common names for organisms can be confusing because anyone can make them up, and they may apply to more than one species. For example, the mountain lion also has other common names such as panther, cougar, or puma. The scientific name for the mountain lion in North America is *Puma concolor*. *Puma concolor* refers to only one animal.

Scientific names follow a specific set of rules. Scientists use a two-name system called a binomial naming system. Scientists name animals and plants using the system that describes the genus and species of the organism. The first word is the genus and the second is the species. The first word is capitalized and the second is not. A binomial name means that it's made up of two words (binomial). Humans are scientifically named *Homo sapiens*. The name is always in Latin because when this naming process started, most people everywhere knew Latin. Scientific names help scientists to study organisms, especially when working with other scientists since they know which species is being discussed no matter where in the world they may be.

The descriptions used in field guides often refer to the characteristics such as color, size and shape in addition to feeding and nesting habits and the distribution or range of the plant or animal. The range map on the *Field Guide* page can be used to show where the organism is found in Minnesota (page 16).

Activity

1. Explore and discuss the objects of the day.
2. Discuss what tools (if any) are needed to make nature observations. How might the tools assist with making observations?
3. Ask the participants if they have made any recent nature observations.
4. Review the expectations/rules for going outside.



Tips to share with the participants:

- Wildlife is often easily scared by sudden movement and loud noises.
 - Participants should be within view and be able to hear the instructor at all times.
 - Stay on the trails and pathways, unless told otherwise.
 - Walk slowly.
 - Look up, down and all around. If something catches your interest, stop to sketch it or write about it.
5. Refer to *Nature Observation* in the Explorers' nature journal (page 3). Spread the participants throughout the schoolyard. Encourage them to complete the observation page by using their senses. Senses may be used at the same time or you may encourage participants to isolate one sense at a time. Gather the participants together and compare and contrast the lists.
 6. While focusing on their sense of hearing, participants should close their eyes and concentrate on the sounds around them. You may also use blindfolds if available. Have participants list the different sounds - natural and those caused by humans. Ask how sounds could be different during different times of the day. With a partner or the whole group, have students share what they noticed when they closed their eyes.
 7. Ask the participants what unusual items they recorded. What sense resulted in the longest list? What sense was the most challenging to use? Encourage the participants to make nature observations when they go home and report their findings at the next gathering.
 8. Refer to the *Field Guide* page in the Explorers' nature journal (page 16). Also show the participants examples of field guides such as the Linnaeus List. Discuss what features help to identify plants and animals and review what information is included in a typical field guide. The field guide page in the journal provides an opportunity for the participant to create an imaginary or real plant or animal. The field guide includes information such as common name, scientific name, description, picture and range map.

Extensions

Closer Look

Objective: To amaze participants with the details not readily observable in nature and to practice using scientific tools.

Supplies: Magnifying lenses or binoculars

Activity: Review how to use the tools and give each individual or pair of participants binoculars or a magnifying lens and allow them to explore. Consider narrowing the focus of a hand lens exploration by challenging participants to discover the smallest living thing or something they never knew existed. Test the binoculars use by asking participants to read words or count something far away. In what ways do these tools help you explore nature? In what ways do they hinder your exploration?

Paint Chips

Objective: To challenge observation skills and increase awareness of nature's many details.

Supplies: Paint sample strips

Activity: Distribute paint sample strips from a hardware or paint store to each participant. Instruct each participant to find a color in nature that exactly matches a color on the paint sample. Did you find an exact match? Is an exact match possible? Why or why not? Were you surprised by how easy or challenging it was to find a match?

Slice of Silence

Objective: To establish a sense of place by using all senses to explore.

Supplies: None

Activity: Have participants find a quiet place to sit alone in a natural area. Give them at least ten minutes to sit and savor the quiet. Discuss the experience: What did you see? Hear? Smell? Touch? How did your experience change as time passed? You may also use blindfolds if available to help participants focus on their senses of hearing. Have participants list the different sounds - natural and those caused by humans. Ask how sounds could be different during different times of the day. With a partner or the whole group, have students share what they noticed when they closed their eyes



SPRING WEATHER WATCH

Objective

To determine and record basic weather observations such as cloud cover, precipitation and temperature.

Supplies

Explorers' nature journals

Pencils

Minnesota Weatherguide Environment Calendar

Cloud photos/drawings

Thermometer

Objects of the day: Weather page cut from a newspaper or glass jar with frozen water to observe condensation as the ice melts

Background

Meteorologists are scientists who study the weather and the atmosphere. They are best known for forecasting the weather. In this activity, participants will make and record their own weather observations. They will also make connections between changes in the weather and seasonal changes in nature by using the Minnesota Weatherguide Environment Calendar.

High and low temperatures - by recording the daily high and low temperatures throughout the season and comparing them to the rest of the year, participants will see that fall and spring experience greater temperature differences than summer and winter months. By comparing the average temperature for the date and actual readings participants can make seasonal connections and know what kind of weather to expect.

The water cycle is the process through which water molecules move between the atmosphere and the Earth's surface. The main components are precipitation, condensation, evaporation, infiltration, and transpiration.

- Precipitation - moisture, often in the form of rain or snow, that falls to the ground
- Evaporation - when water molecules turn to vapor form and rise into the atmosphere
- Condensation - the opposite of evaporation, when water vapor in the air converts into liquid form
- Transpiration - when plants give off water vapor through tiny pores in their leaves
- Infiltration - the process of water soaking into the soil from the ground level

A cloud is made up of many tiny droplets of condensed water or ice crystals. Clouds help return water to the earth through condensation and precipitation.. Note that the warmer summer months usually result in more variety in cloud types.

A few common cloud types include:

- Cirrus - High wispy, thin clouds spread out high in the sky, horsetails

- Stratus – Clouds in low flat layers, spread out over most or all of the sky, fog
- Cumulus – Big puffy clouds, like giant cotton balls, reduce transpiration and evaporation
- Cumulonimbus – Clouds that can grow very large and tall, often bring rain and storms

The back of the Minnesota Weatherguide Environment calendar and the Explorers' nature journal provide photos of different cloud types. In addition, check out the following websites:

<http://cloudappreciationsociety.org/collecting/> has a helpful diagram of cloud types.

Web Weather for Kids – Clouds: <http://eo.ucar.edu/webweather/cloud3.html>

Activity

1. Explore and discuss the objects of the day.
2. Ask participants what they might typically observe in nature during this time of year. Refer to the *Spring Phenology* checklist in the Explorers' nature journal (page 7). Explain that weather can affect how animals behave.
3. Highlight daily weather information along with phenology information for the week found in the Minnesota Weatherguide Environment Calendar. Refer back to this information when outside with the group.
4. With the help of participants, draw, label and discuss the main parts of a water cycle including: precipitation, condensation, evaporation, infiltration and transpiration. You can do this on a white board or large sheet of paper as well as with the Explorers' nature journal (page 8).
5. Discuss the water cycle's connection to weather, the movement of water and ways water moves through the cycle in the spring.
6. Have participants look at the different cloud types in their journals (page 9). In addition, show photos in the Minnesota Weatherguide Environment Calendar or copies of cloud photos from websites. Discuss how clouds are formed. Ask where clouds fit in the water cycle. Which type of cloud brings us rain? Thunderstorms?
7. Go outside and have participants lie on their backs to observe the clouds. They can sketch their shapes in their journals. Ask participants how many different cloud types they observed. Are there differences in the clouds depending on the direction you look? Can you predict what the weather might be tonight? What types of clouds do you see? What else do you notice in the sky?
8. Use the Explorers' nature journal *Temperature* page to explain how to read a thermometer (page 10). Have one person from the group determine the actual temperature by looking at the thermometer you brought along. Have participants record the temperature in their journals. As an instructor, you can keep a graph of daily temperatures and average daily temperatures found in the Minnesota Weatherguide Environment Calendar. Together, look at trends across the weeks of the Explorers program. Discuss how changes in temperature can affect organisms.
9. While outside also record wind speed, cloud conditions and precipitation for the day on the *Weather Tracker* pages in the Explorers' nature journal (pages 12-13). Compare and contrast conditions from week to week. Also, notice if there is a difference in the number of birds you see or other animal behaviors depending on the various weather conditions.
10. Highlight that Severe Weather Awareness Week is in April. Cumulonimbus clouds are often the sign of a strong storm brewing, refer to picture in journals. In case of severe weather it is



important to know what to do. Look at the *Severe Weather Safety* in the Explorers' nature journal for severe weather terms and what to do in case of bad weather (page 11). Fill in the dates of Severe Weather Awareness Week; this changes annually but can be found at <http://weatherawareness.dps.mn.gov>.

11. Gather items and head inside. Ask participants to watch the evening weather forecast during the week or review the forecast online then check to see if the meteorologist's forecast was correct the following day. When you return the following week, discuss what participants noticed about the forecast during the week.

Extensions

Beaufort Scale

Objective: To understand how to describe wind speed.

Supplies: Copy of Beaufort scale from www.weatherwizkids.com/weather-wind.htm

Activity: Determine wind speed using the Beaufort scale which is an empirical measure for the intensity of the weather based mainly on wind power. The wind speed is determined by making basic environmental observations.

Find the Wind

Objective: To determine which the direction the wind is traveling.

Supplies: Container of bubbles

Activity: Since we cannot see the wind participants, investigate the direction and speed of the wind using bubbles. Ask if participants can feel the breeze. How can you tell if it is a windy day? Have them look for different signs of the wind blowing (the movement of plants, branches on trees, exhaust in the air, etc.). Make a list of ways to "see" the wind. Now blow bubbles and try to determine which way the wind is blowing. Do the bubbles change direction? When? Why? Are the bubbles moving in the same direction as the clouds? Winds often blow in different directions. Warm air can blow in one direction and cold air in another. Check out www.weatherwizkids.com/weather-wind.htm to learn more about wind.

Transpiring Leaves

Supplies: Plastic bags, twist ties

Activity: Have participants tightly tie a plastic bag over one to three different types of leaves outside. Come back later and notice the condensation on the bag showing that transpiration is taking place. Are the different leaves transpiring equally? Why or why not?

Cloud Formation

Objective: To understand how a cloud forms.

Supplies: Clear two-liter plastic bottle, warm water, matches

Activity: Demonstrate how a cloud is formed by three main ingredients. Fill a clear plastic two-liter bottle one-third full of warm water then cap. Water vapor (1st ingredient) fills the inside of the bottle from the evaporating warm water. Take the cap off, light a match and hold it near the bottle opening. Gently blow out match, drop it into the bottle and quickly cover with cap. Smoke, dust and other particles (2nd ingredient) help make clouds. Squeeze bottle hard and release. What happens? A cloud appears when you release and disappears when you squeeze. The 3rd ingredient needed is a drop in air pressure.

Lightning Freeze Tag

Objective: To understand how to protect oneself from lightning.

Supplies: None

Activity: This variation of freeze tag will model ways to be safe from lightning. Designate the game zone. Have one to two people represent lightning; they are considered “it.” The lightning can chase other participants and tag them. If a participant is tagged, her or she is out. People can protect themselves from the lightning by crouching down and putting their hands on their knees, but they are only allowed to hold this pose for five seconds. If a participant is lying on the ground, hiding next to a tree/object or running around the lightning can tag them. Continue until one person is left and that person replaces one of the lightings.



INTRODUCTION TO A TREE

Objective

To understand how to observe and record the different types of trees growing in the schoolyard and compare their characteristics.

Supplies

Explorers' nature journals

Pencils

Magnifying glasses

Rulers

Branches with both opposite and alternate arrangements as well as buds

Tree cookie name tags, large tree cookie or photo of tree cookie

Objects of the Day: Deciduous and coniferous tree branches with buds and/or leaves

Tree field guides (optional)

Background

Trees can be found on most schoolyards and are a great way to watch the season progress as daylight gets longer. The main part of this activity will occur on the first visit but throughout the weeks make sure to take a little time every session to have participants observe their trees, looking for any changes and noting them in their journals.

There are two main types of trees. In general, deciduous trees lose all of their leaves in one season and coniferous trees keep their sharp and narrow leaves called needles on the tree year-round. Coniferous trees produce cones that carry their seeds. In fall, deciduous trees begin to shed their leaves to conserve energy and limit damage to the tree from the snow and storms during the winter.

Many people think you can't tell trees apart once the leaves have fallen off. However, by closely examining the buds and bark, you are often able to identify trees.

The main parts of the inside of a tree include:

- inner wood - supports the tree, stores growing compounds and sugars
- xylem - carries water and minerals from roots to leaves
- cambium - makes trunk, branches and roots thicker
- phloem - carries food (sap) from leaves to rest of tree
- outer bark - dead tissue that protects the tree from injury (much like human skin).

More information can be found at

<http://www.mndnr.gov/forestry/education/treeforallseasons/index.html>

Activity

1. Explore and discuss the objects of the day.

2. Ask participants how they might identify trees in the spring. Make a list of tree features that may be helpful in identification: height, diameter, bark texture, leaves, shape, etc.
3. Point to a tree or show a spring tree photo and ask participants to make some general observations. How might those features change in the summer, fall, and winter seasons? How many different kinds of trees do participants think they will find on the school grounds? Have them write their predictions in their Explorers' nature journals.
4. Show and discuss the differences between a deciduous and coniferous tree.
5. Open to *Buds, Leaves and Branches* in the Explorers' nature journal (page 20). Using real branches, show the difference between an opposite and alternate branch and have participants make a quick sketch of each in the appropriate circle. Then show at least two different kinds of spring buds and have participants sketch one in the bottom circle.
6. Have each participant predict the number of kinds of trees in the schoolyard and write it in their journals. Go outside and give participants five to ten minutes to find and count as many different species (not numbers) of trees as they can within the boundaries you set. When time is up call them back in and have them write their answers in the Explorers' nature journals. How close were they to their predictions?
7. Group participants in pairs and have them select a tree to adopt in the schoolyard. Have participants tie a small piece of yarn on a low branch to identify their trees. Pass out rulers and magnifying glasses for participants to make detailed observations.
8. Ask participants to record and sketch their trees on *Nature Observations/Field Sketches* in their Explorers' nature journals (pages 25 or 26). They should include: leaves or buds (color, shape, size, and other observations), bark (color, shape, size, and other observations), tree height and shape and any other observations. Make sure participants write down the date of their observations. If they have made a map in their journal of the schoolyard add the location of their tree to this map (pages 4-5).
9. If time, include other observations like what the tree smells and feels like. What signs are there that animals have used the tree? Do a bark rubbing. Determine the circumference (C) around the tree. Using a flexible tape measure, measure to the nearest inch the distance around a tree at a point 4½ feet up from the ground (C). Then convert this number into the tree's diameter (D) using one of these formulas $D = C \times .3183$ or $D = C/3.1416$.
10. Take a few minutes every week to have participants revisit their tree and record the date and any changes they see.
11. Gather participants together and return to the classroom. Using their tree cookie name tags, refer to the *Inside a Tree* page and review the different parts, how to pronounce them and what they do (page 21). Could they see any of these parts on their tree? Why or why not? Do they think the phloem is active now? Why or why not? What about the xylem?
12. Ask participants to notice the different trees that they see on their way home or when traveling to other places.

Extensions

Know Your Branch

Objective: To recognize characteristics of tree branches by touch.



Supplies: One branch for each participant, blindfolds (optional)

Activity: Place a stack of branches on a table or the floor. Ask each participant to be blindfolded or close his or her eyes and find a branch. Once each participant has a branch, ask participants to get to know their branches by feeling and recognizing characteristics like length, branching pattern or texture. Place the branches back in the middle, have the participants take the blindfolds off and then find the branch they were holding. The branches can be a mix of deciduous and evergreen species, shapes and sizes.

Connect the Branches

Objective: To closely observe tree branches and pay attention to all characteristics.

Supplies: Pairs of branches

Activity: Before the Explorers session, cut branches of several different tree species in half. Assign each branch to a participant and ask him or her to find its matches in the classroom by using clues like color and texture of bark, branching, buds, shape or size.

Meet a Tree

Objective: To identify trees using senses other than sight.

Supplies: Blindfolds

Activity: In groups of two or three, participants blindfold one member of their group and carefully lead the person to a tree. The blindfolded person gets to know the tree by feeling, smelling, listening to it, feeling for the tree's neighbors, etc. When the blindfolded person is confident that he or she knows the tree, the rest of the group leads the blindfolded person back to the starting point. After removing the blindfold, the newly sighted person attempts to relocate his or her tree. Rotate jobs until everyone has had a turn. Were participants able to find their trees? How did participants identify their trees? How are some trees different from other trees?

Tree Height

Adapted from *Teachers' Guide to Arbor Month*, Minnesota Department of Natural Resources.

Objective: To estimate the height of a tree using ratios.

Supplies: Twelve inch ruler, masking tape, measuring tape

Activity: Height is the hardest tree measurement to obtain. Use a ruler and follow the instructions below to estimate the height of trees in the schoolyard.

1. On a 12-inch ruler, mark the 1-inch and 10-inch lines with tape.
2. Group participants in pairs.
3. Person A stands at the base of the tree.
4. Person B, while holding the ruler up in front of their eyes at arm length, moves back until they can see the whole tree from top to bottom between the 0-inch and the 10-inch mark on the ruler.

5. Person B then moves the ruler until the base of the tree is exactly at 0-inches and the top of the tree is sighted exactly at 10-inches.
6. Person B sights out from the ruler's 1-inch mark to a point on the trunk above the base.
7. Person A marks this spot on the trunk with tape.
8. Measure the distance from the base of the tree to the 1-inch mark (X) on the tree.
9. Multiply by 10 to get an approximate height of the tree.



SOIL SURVEY

Objective

To learn about the different types of soil.

Supplies

Soil samples

Different-sized athletic balls for demonstration

Clear jar with cover

Water

Hand wipes or paper towels

Magnifying glass

White paper

Shovel or hand trowel

Object of the day: Soil samples

Flour and sugar (optional)

Background

Soil is the main reason why certain plants grow in some places and not in others. Other environmental factors such as temperature, moisture/precipitation and sunlight play a role as well. Soil is the foundation for life on planet Earth. It is composed of mineral particles (non-living), organic matter (plant and animal material that was once living), water and air. Different soils are categorized based on their parent material (where the soil originated) and the size of the mineral particles. Refer to the soil profile (page 17) in the Explorers' nature journal.

Soil scientists describe soil types by the amount of sand, silt or clay that is present. Sand is often made up of larger particles with a lot of space for air. Sand cannot hold water well and tends to lose nutrients quickly. Silt soil has medium sized particles and is often made up of organic matter like dead leaves along with some sand and clay. Silt soil is often smooth and slippery to the touch when wet. Clay has small particles and often sticks together in clumps; this leaves little room for air and water. Clay is often sticky when wet. Loam soil is a combination of all three soil types and is ideal for plant growth.

Activity

1. Explore and discuss the objects of the day.
2. If available, use athletic balls to represent soil by the size of the particles and how water drains through. You may also wish to draw the different size particles on a white board or in the Explorers' nature journal (page 17).

Sand - Use a basketball to show that large particles do not fit well together and leave large spaces between. Water drains quickly through sand and particles do not stick together.

Silt - Use a baseball to show how medium particles fit together with less space between them. Soil with a high percentage of silt retains some water. It can form a ball but will break apart.

Clay - Use a golf ball or marble to represent small particles with small spaces between. Wet clay forms a ball or a clump and does not break up easily.

3. Ask participants to bring in small samples (about a cup) of soil from their homes. In addition, the instructor should bring in samples to share. Each sample should have documentation as to where it was collected and what was growing at the location.
4. Place a small amount of the soil sample on a white sheet of paper. Examine each sample using a magnifying glass. Ask some of the following questions: What does the soil look like? What does it feel like? What does it smell like? What color is the soil? Why might soils be different colors?
5. In order to learn more about a specific sample of soil, empty the sample into a clear jar with a lid. Fill the jar half full with soil and the rest with water. Shake for several minutes until the large clumps are broken apart. Let the jar settle for the rest of the class period and examine how the different soil particles have settled. The leader might also perform this same experiment the day before to demonstrate how the soil settles over time. The top layer will be clay which includes the lightest and smallest particles. The middle layer will be silt and the bottom will be sand, or the largest particles. The sand also settles first and at the bottom because it is heavier. Compare different soil samples side by side upon completion of this experiment. The soil samples can be taken from various locations around the schoolyard.
5. Head outside and look around the schoolyard for areas of exposed soil. Feel the soil and determine if it is sand silt or clay. What plants are growing nearby?
6. As a wrap-up, ask participants: What happens to plants when soil drains quickly or slowly? What are some examples of plants found in areas with sand or clay? Does soil stay in the same location or does it move around? Discuss erosion and the historical movement of soils due to glaciers.
7. If you do not have athletic balls or access to different soil types, you may use common baking items to demonstrate the different types of soil particles. Compare textures with sugar (sand), flour (silt/loam) and flour/water mixture (clay). Pass out samples of the three types of soil to each small group. Determine what type of soil each is. How do the soils compare to the sugar, flour and dough?

Extension

Searching for Worms

Objective: To find earth worms in the schoolyard.

Supplies: Mustard powder (from the spice aisle at the grocery store), one gallon milk jug with tap water, clean water to rinse worms.

Activity: Most people think of earthworms as friendly creatures that can be helpful to gardeners. However, what many people do not know is that earthworms are not native to Minnesota and can have a negative effect on forests because they change the pace at which nutrients are cycled in soil. You can easily find worms in your backyard or a forest by using a mixture of mustard powder and water. Mix $\frac{1}{4}$ cup mustard powder with 1 gallon of water, shake well and slowly pour onto a small area of soil. The mustard mixture irritates worms' skin but it does not harm them. The worms will crawl to the surface where participants can pick them up, rinse them and observe. How many different kinds of worms can participants find? Using magnifying glasses, what do you see? How do worms move?



ALL ABOUT DANDELIONS

Adapted from *Dandelions*, Vermont Institute of Natural Science (VINS) www.VINSweb.org.

Objective

To learn the basic parts of a dandelion flower.

Supplies

Explorers' nature journals

Pencils

Magnifying glasses

Clear tape

Object of the day: sunflower, sunflower seeds

Small shovel (optional)

Plastic table knife (optional)

Other flowers (optional)

Background

Dandelions grow in many different places and were brought to the United States by people from Europe who used the plant for medicine and food. Most people consider the dandelion a weed since it grows easily in lawns. A weed is often described as a plant out of place or a plant that grows where we do not want it. They have the potential to out compete other desired plants such as turf grass.

The word "dandelion" comes from the French "dents de lion," or teeth of a lion, which describes the deeply toothed leaves. During the first year of life, these leaves are the only part of the dandelion plant above ground. The leaves produce food from the sun which is then stored in the long carrot-shaped tap root. It does not start producing flowers until the second year.

The main parts of the dandelion include the tap root, leaves, stem and flower. Broken pieces of root may grow into new plants and leaves from dandelions that have not been sprayed with pesticides or herbicides can be eaten.

What looks like the yellow head of the dandelion flower is really composed of a cluster of many tiny flowers. Dandelions belong to the plant family Asteraceae, also called the Daisy family. This family contains plants that have many flowers grouped together on a flower head, like the sunflower. One dandelion flower head contains about 300 small dandelion flowers called florets.

Parts of the dandelion flower include:

- Anther - the part of a stamen that produces and contains pollen and is usually borne on a stalk
- Petal - one of the modified often brightly colored leaves of the flower
- Stigma - usually the top part of the pistil of a flower which receives the pollen grains and on which they germinate
- Ovary - bottom portion of the pistil that bears the ovules

- Pappus - an appendage or tuft of appendages that crowns the ovary and functions in dispersal of the seed
- Bracts - modified leaves that cover the flower when it is closed, otherwise found at the base of the flower head
- Floret - the complete flower that contains yellow petals, white hairs (pappus), the female part (pistil of) (ovary, style, stigma), male part (anthers)
- Pollen - powdery and yellow in dandelions, this is the male part that fertilizes the female part
- Stamen - small stem like features with anthers at the end

Most flowers have male (pollen) and female (ovule) parts. The pollen of one plant fertilizes the ovule of another like plant. Maybe you have seen a bee or other insect with pollen on its body moving from flower to flower. Insects help pollinate many flowers including dandelions. However, dandelions are interesting because they can also reproduce without being fertilized. This is called apomixis. In fact, most dandelions produce seeds by apomixis, where unfertilized ovules in the ovaries produce seeds that will become clones of the parent plant. That is why dandelions look so much like each other in an area, because they are! Dandelions can also grow a new plant from a piece of their tap root left in the ground.

Activity

1. Explore and discuss the objects of the day.
2. Tell participants they will be going on a lion hunt today. The lions they will be looking for live outside this building, have a shaggy yellow mane and sharp teeth. What kind of lions are we looking for? Dandelions. Note: This activity works best on sunny days when the dandelion flowers are open. On rainy or cloudy days you can open up the closed flower heads in a plastic bag indoors.
3. Work as individuals, pairs or small groups to find and collect dandelion flowers in these life stages: leaves only, with a closed flower head, with an open flower head, and as a plant with a seed head.
4. Go outside and collect the above items, then gather together in a large group and review the life stages and some of the larger parts of the plant: root, leaves, stem, and flower head. Make sure you have permission if you are going to dig up a dandelion to show the long tap root. Compare these parts and life stages of the plant to the pictures on the *Dandelion Parts* page in the Explorers' nature journal (page 16). Did you find all of the above parts? Why or why not?
5. If it is not windy, take the dandelion heads to a hard surface such as a sidewalk or playground. If not, return inside to an area where you will be able to dissect your dandelion heads. Using the picture on the *Dandelion Parts* page in the Explorers' journal and magnifying glasses, look for the different parts of the flower head: disc floret, ray floret, anther, petals, stigma, ovary and pappus (page 16). Have participants tape at least two of these parts into their journals. Is the flower releasing pollen? Why or why not? How can you tell?
7. Look inside an ovary for the ovules. These are super tiny! When fertilized they will become seeds. Explain the three ways dandelions reproduce (piece of a root, pollination, apomixis). What might pollinate the dandelion? What do the ovules look like?



8. Count how many florets (little flowers also called disc flowers) are in one head and write the number in the Explorers' journals. Florets in the center that are not open yet should still be counted. Who has the most?
9. Try to estimate how many seeds will be produced. Count the number of seeds on a dandelion seed head then count the number of blossoms or seed heads on a plants in the lawn. Multiply the two numbers and you'll have the number of seeds the plant produces. It is a lot! How can dandelions spread so easily?
10. Clean up your area and recycle your flower pieces outside.

Extension

Fun with Dandelions

Objective: To look at dandelions in a new light.

Supplies: Dandelion flowers and leaves, spoons, salad dressing (optional)

Activity: Try these variations to exploring dandelions – A. Some people believe if you rub a dandelion flower under your chin and your chin turns yellow it means you like butter. B. Take a stem, push one end into the hole of another and make a bracelet. You could also hook many circles together and make a dandelion chain. C. Blow the seeds into the air and have a partner see how many they can catch. D. With a safe, clean leaf, dip it into some salad dressing and have a taste. E. Make rubbings of dandelion leaves by placing the leaves under a sheet of paper and rubbing the paper with the back of a spoon.

ANT SEARCH

Objective

To develop an awareness of ants and their connection to the environment around them.

Supplies

Explorers' nature journals

Pencils

Object of the day: Plastic or preserved insect specimen

Magnifying glasses (optional)

Background

Insects are the most numerous type of creature on the planet. Insects play an important role on earth. Ants are social insects and live together in big groups called colonies. Ants communicate by tapping their antennae to pass signals. Good communication is important for ants because they need to work together to survive. Highly successful, ants range from the Arctic to the tropics in large numbers. There are several hundred species of ants living in North America and over 10,000 worldwide. Each colony of ants has a hierarchy (ordered system) usually composed of a single queen that lays eggs, attendant females that care for the queen, female worker ants that care for young and provide food, and female soldier ants that protect the colony. The male ant population is usually small and they often die after mating.

Ants have three body parts; head, thorax and abdomen. Their six legs are attached to their thorax (see Explorers' nature journal page 23). Ants work together in teams to ensure the colony survives. Ants use their antennae to touch, taste and smell. While on the search for food, ants leave a trail with pheromones (odors). If you were to put all in the ants in the world together they would weigh as much as all the people in the world; they have the same total biomass. Ants are the strongest creatures in relation to their size and can carry objects 10-50 times their body weight.

Activity

1. Explore and discuss the object of the day.
2. Prior to the activity, search the schoolyard for ant colonies along sidewalks and other paved areas. Place some food (cracker, cat food, honey, soda, etc.) near active ants.
3. With participants, provide some basic rules for observing and interacting with the ants. These may include using caution when observing because some ants might bite, be careful around ant hills because these are the ants' homes and treat ants with respect when interacting with them.
4. Show participants to the ant trails you found earlier. Ask some of the following questions: Where are the ants coming from and going to? Why might they be moving in these directions? Estimate the number of ants observed in the colony. Describe the behavior of the ants. What are they doing? Are all the ants the same size?
5. Ask the participants to journal about what it would be like to be an ant. What would the view be like? Participants could try lying on the ground and looking across the grass/landscape. What would be some of the challenges with moving around in nature? What would the ant's home look like?



Extension

Life in the Sidewalk

Adapted from *Schoolyard, Ecology and Exploration*, University of Minnesota.

Objective: To find ants in unexpected places.

Supplies: Toothpicks or small sticks, Explorers' nature journal, rope or hula hoops, magnifying glasses, white paper (optional)

Activity: Find an area that has a cracked sidewalk or asphalt. Carefully examine what is in the crack. A toothpick or small stick can be used to extract some of the items from the crack. Look for any natural and human-made items (plants, seeds, soil, trash, insects, etc.) and make a list of these items in the Explorers' nature journal. The items extracted from the crack may be placed a white sheet of paper and examined with the use of a magnifying glass. Encourage the participants to compare their list. Locate an area covered with grass. Use a three meter section of rope to make out a circle area on the grass (hula hoops also work for this activity). As with the sidewalk crack make a list of any nature and human-made items.

What was the most interesting thing that you found in the sidewalk crack? In the grass? Compare the number of nature and human-made items from the sidewalk and grass areas. Which area had more of each item? How was the sidewalk crack environment similar and different from the grass area?

MIGRATION MANIACS

Objective

To define migration and identify obstacles that may be encountered during migration.

Supplies

Bird field guide

Explorers' nature journal

Pencil

20 foot piece of blue yarn or rope

Container of colored toothpicks

Paper plates (one per participant)

Object of the day: Pictures of birds that migrate

Linnaeus List (optional)

Binoculars (optional)

Background

Migration is the movement of animals from one place to another. Many animals migrate including some bats, the monarch butterfly and a variety of birds. Migration takes place mainly because animals are looking for food and warm climates for better survival. It is the change of seasons that causes this behavior to occur.

Minnesota is home to over 130 migratory bird species. Some birds travel a short distance while others migrate thousands of miles. Migratory bird species use different senses and cues to navigate and orient during migration such as looking for landmarks or sensing the changes in the earth's magnetic field (geomagnetism). Many birds embark on a 20-hour-plus nonstop flight over as much as 660 miles of the Gulf of Mexico. Neotropical migrants are those that migrate to Central or South America. They live in forests, wetlands and prairies including those in Minnesota during the summer and then migrate to forests, wetlands, grasslands and beaches during the winter months.

Birds may encounter many obstacles along the way including collision with windows, wind turbines or power lines, predators such as cats, habitat loss and lack of shelter, exposure to pesticides or bad weather, or lack of food or water.

Long migrations require birds to accumulate fat on their bodies to fuel their flight before they leave. Depending on the species they may eat a variety of seeds, grains, fruit, nectar and insects. Spring migrants return to Minnesota in order to raise their young. Human actions can have a positive or negative impact on these migrating birds. We can help bird migrants by putting up bird feeders, houses and watering stations, keeping cats indoors and hanging items over windows to deter collisions.

Activity

1. Explore and discuss the objects of the day.



2. Introduce the word migration and what it means. Migration is the movement of animals from one place to another. Can you think of any animals that migrate? Today we will be focusing on migrating birds. There are about 130 bird species that migrate in and out of Minnesota.
3. Show pictures of the ruby-throated hummingbird, common loon and American robin using the field guide or other sources. Have participants vote to choose one of these three bird species to investigate.
4. Look at the *Bird Migration* in the Explorers' nature journal (page 14). These are birds that live and breed in Minnesota during the summer, and then migrate south during the winter. Most of the birds listed here will be returning to Minnesota this spring. The dark-eyed junco is the exception as it actually travels further north in the summer. Some birds, like the robin, may be found here all winter if there is open water and berries to eat. Where does our chosen species migrate to? How does that compare to other birds on the page? Which birds are neotropical migrants? Many bird species spend the entire winter here; name a few. Migration is like going on a long trip. Discuss what you need when you go on a long trip. What do you think the class species needs to migrate? Is it the same thing we need when going on a long trip?
5. Head outside to with supplies to complete the bird migration obstacle challenge.
6. Set up the bird migration obstacles around the schoolyard with the group. At each area explain how these obstacles affect the birds and that participants will need to get through all of the obstacles in order to survive.
 - a. Place some blue yarn in the shape of a large oval on the ground. Explain that this represents the Gulf of Mexico or other large body of water some birds have to pass over. Participants will need to jump over the "water" without touching it.
 - b. Scatter red, green, yellow and natural colored toothpicks around a grassy area. Explain that the toothpicks represent food the birds will need to find and collect as they pass by (they will need at least one red and one green toothpick to survive but do not tell them this).
 - c. Next, they must climb over some playground equipment without touching the ground in order to avoid ground predators such as cats.
 - d. Then they run a lap around a designated area while flapping their wings quickly, if they stop running or flapping they die.
 - e. Last, they must land on some shelter, represented by paper plates. Have one fewer shelter than participants in the group, only one person is allowed on each shelter in order to survive and spend the night safely. Note: change the order of the course to fit the site.
7. Return to the beginning of obstacle course. Ask participants which bird species of the three discussed earlier they will represent; robin, hummingbird or loon. Often birds migrate in a flock (group) so try to keep up with each other. Say "Migrate!", and then watch as the "birds" migrate north. You may call them out if they do not complete an obstacle correctly, then they are dead. Have the "dead" birds assist you in watching the other migrants until the course is complete.
8. How many birds survived? What was the hardest obstacle? Explain that there are many other obstacles migrating birds encounter along the way. Can you think of others? By the time they arrive in Minnesota birds are often very tired and hungry. What are ways we can help them when they return?

9. If there is time and participants are interested, run the course one more time. Did more or fewer birds survive? Why?
10. As a group walk around the schoolyard and look and listen for birds. Can you find any new birds that have returned? How can you tell? If you don't know what a bird species, see if you can find it in the bird field guide. Look for newly migrated birds or flocks of distant birds weekly, listen for new bird calls too, record these in your journal.

Extensions

Bicycle Spokes

Objective: To challenge the senses of sight and hearing and change participants' perspectives on making observations.

Supplies: None

Activity: Have participants sit in a circle, then scoot directly back and lie down on their backs forming the shape of a wheel with spokes. Be silent for two minutes (or whatever amount of time seems appropriate). Describe what you heard. How many different sounds did you hear? What proportion of the sounds were non-human? How many bird calls did you hear? Were you surprised or impressed by anything you heard? What did you see from this perspective? Did you see any birds? In what ways would you act differently if this was your perspective all the time? Try this activity at the base of a tree with everyone's feet on the tree's trunk. How is the tree different from the perspective of the roots?

Slice of Silence

Objective: To establish a sense of place by using all senses to explore.

Supplies: None

Activity: Have participants find a quiet place to sit alone in a natural area. Give them at least ten minutes to sit and savor the quiet. Discuss the experience: What did you see? Hear? Smell? Touch? How did your experience change as time passed? You may also use blindfolds if available to help participants focus on their senses of hearing. Have participants list the different sounds - natural and those caused by humans. Ask how sounds could be different during different times of the day. With a partner or the whole group, have students share what they noticed when they closed their eyes



NATURE BINGO

Objective

To explore the schoolyard using a nature bingo card.

Supplies

Explorers' nature journals

Pencil

Field identification guide (optional)

Background

Nature bingo encourages participants to summarize what they observed over the past several weeks. Nature bingo is a good way to wrap up the seasonal Explorers Program.

Activity

1. A bingo card is included with the Explorers' nature journal (page 19). As an alternative, each square of a blank bingo card can be filled in with items that the participants have observed throughout the program. Include a variety of plants, animals and other natural features of the schoolyard. The images of the items can be copied from clipart or the text/name can be included and the participant can sketch each item found.
2. Before going outside review each of the items included on the bingo card.
3. The goal is to get bingo (five squares in a row) or blackout (all spaces crossed off) on the card.
4. Review nature bingo items that were found and not found in the schoolyard.
5. Ask the participants to suggest items for future bingo cards that were not listed. Small prizes/treats could be provided for those who get bingo.

Extension

Question Trail

Adapted from *Exploring The Outdoors With Aldo Leopold*, Pheasants Forever.

Objective: To improve observation skills and practice formulating testable questions.

Supplies: Blank tags with string, pencils

Activity: Give each participant a tag and a pencil, and inform them of the boundaries of activity. Allow them to wander along the trail and come up with a question about something they see. Do not allow simple questions like, "What is this called?" but instead encourage more investigative questions such as, "Why is this bark different on the branch than on the trunk?" "How did this cob of corn end up in the woods?" "How did this squirrel die and what will happen to it?" When participants come up with questions, they should write the question on the tag and hang it from the questioned object or nearby.

Then, gather all participants at the head of the trail and walk down the trail addressing one question at a time. At each tag, facilitate a discussion on how to make the question listed into something they could test or investigate.

EXPLORERS SCAVENGER HUNT

Objective

To explore the schoolyard to find a variety of natural and human-made items.

Supplies

Explorers' nature journals

Pencils

Activity

1. Refer to *Scavenger Hunt* in the Explorers' nature journal (page 22), for items to find around the schoolyard.
2. Review and discuss each item before going outside.
3. Record in writing or with a sketch the items found around the schoolyard and surrounding area.
4. When done searching, ask the following questions: What are some additional items not included on the scavenger hunt form? What things are alike? Which ones are different?
5. Refer to the spring activity *Nature Observation Basics* for more ideas on making observations.

Note: Other items to include on the scavenger hunt might be something: green, with needles, twisted, curly, round, sticky; a seed, tree bark on the ground, feather, pinecone, something flat, something smooth, rough, red, a flower, leaf, dead twig, weed, or ant. Also, ask participants to compare two different areas such as a sidewalk/paved area to grassy/natural area. List the things that are similar and different between these sites.

Extensions

Nature Alphabet Search

Objective: To search nature items and find each letter of the alphabet.

Supplies: Digital camera (optional), Explorers' nature journals, pencils

Activity: This activity can be completed as a group or individually. Groups and individuals can be assigned groups of letters (i.e. A-F, G-L, M-R, S-Z) to search for. The 26 letters of alphabet can be printed on a sheet of paper to assist with the activity. Provide examples of what different letters might look like in nature before going outside. For example, a branched twig might look like the letters V or Y. The nature letter can be captured with photos or the participants can sketch the items in their journal. Ask, which letters were easy to find? Are there common patterns and shapes found in nature?

Scavenger Hunt with a Twist

Objective: To foster reflection on scientific objectivity.

Supplies: Value-laden words on index cards

Activity: Give participants cards with a value-laden word such as gross, unnecessary, special or valuable and instruct them to find something in nature that their word describes. Have them show



their findings to the group and explain how the object is described by their words. Were there participants who couldn't find something for their word? Does everyone agree with everyone else's choices? To what extent do our values predict and/or dictate our actions? What impact do our values have on how we view nature? How can you, as a scientist, remove human values from your descriptions of nature? Should you?

Nature Wristband

Objective: To create a wristband of natural items collected from the schoolyard.

Supplies: Tape (masking tape, duct tape or packing tape), natural items like small rocks, seeds, small leaves, pine needles, flowers, sticks, etc.

Activity: Measure around the participant's wrist and cut a piece of tape slightly larger than the wrist to fit over the hand. The tape needs to be sticky side out. Identify an area outside to collect natural items to stick to the wristbands. Do not stick live insects to the wristband. Try to find items on the ground versus picking them off plants. Ask the following questions: What did you find? Where did the items come from? Compare the wristbands and look for similarities and differences in natural items found. Encourage the participants to make a nature wristband at home and compare it with the one they just made.

Note: Natural items can be collected prior to class and this activity can be completed indoors.

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