

*Creepers, Crawlers,  
Runners and Flyers*

*animals, insects, and interrelationships*

# ANIMAL SUPER SLEUTH

- Focus** To use field investigations and creative problem solving in observing and recording evidence of animals along the Cispus River.
- Group Size** 10-12 students
- Time Required** 1 hour
- Materials**
- |                              |                              |
|------------------------------|------------------------------|
| <u>Entire group:</u>         | <u>Per student:</u>          |
| Animal track guides          | Pencil                       |
| Spray shellac                | Clipboard                    |
| Plaster of Paris             | 2 small milk cartons         |
| Vaseline                     | Handout: <i>Sleuth Sheet</i> |
| Tagboard (or thin cardboard) |                              |
| Paint                        |                              |
- Physical Setting** Cispus River
- Process**
- Activity 1:**
1. Prepare the milk cartons before your class begins. Fill each carton, one per student, 3/4 full of Plaster of Paris powder. It's best to keep all these filled cartons together in a box during the hike to the river.
  2. Discuss the animals that are found in the Cispus area (there is a chart outside the Library that has a record of wildlife sightings in the area). Explain that the Cispus river is an area where many animals will come to drink and to graze on plants. Discuss evidence that could be found in the sandy areas along the river.
  3. Take the trail past the Pavilion and on to the Cispus river. **Caution** students to look carefully before they walk to avoid damaging any prints that may be in the sand.
  4. When you find a track, record your observations on the record sheet, write a description of the area where you found the track, and draw a picture of it. Then try to identify the track.
  5. Next, using your imagination, recreate the scene when the animal was here. What was it doing? What did it see and hear? Write or draw your ideas on the record form.

6. *Make an impression cast of the track:*

- a) Using a stick, draw a square around the track in the sand. Put the stick into the ground on the outside edge of the square.
- b) Carefully clean away any debris from the track, then spray it with shellac.
- c) Encircle the track with a 2" band of tag board.
- d) Take one milk carton filled with Plaster of Paris and another carton filled with water from the river. **Slowly** mix water into the powder, stirring until it is the consistency of thick pancake batter.
- e) Pour the plaster mixture over the track. Allow time for the cast to harden (15-30 minutes, depending on the weather). Put the clean milk carton upside down on your stick to mark your track so that you can find it later.
- f) When it's hard, lift the impression cast carefully and mark it on the back with your name. Pick up any debris left in your area and take the cast back to camp. Clean it carefully and coat with vaseline.

7. *Make a relief cast using the impression cast:*

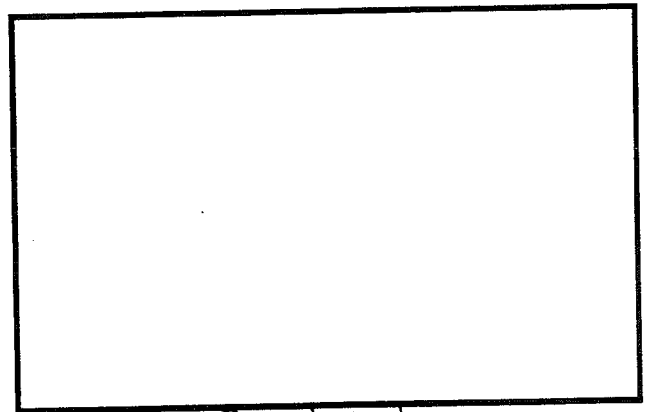
- a) Surround the impression cast with a wide strip of tagboard and pour plaster into the track, level with the mold.
- b) When this is hard, separate the two layers of casting. Clean vaseline from the casts and smooth with sandpaper or a knife blade.
- c) When the relief cast is very dry, students may paint the inside of the track.

**Activity 2:**

When you return to school, do an in-depth study of the animal who made your cast track. Give an oral report which includes your on-the-scene observations and plaster cast.

# *Sleuth Sheet*

Carefully locate an animal track. Describe the area (include any other tracks, plants, and insects) and draw it below:



Draw the track

Animal identity: \_\_\_\_\_

From your observations, recreate the scene during the time the animal was in this location. What events took place? What was this animal doing? What did it see and hear? Draw or describe in words what you think happened:

## ***BLIND CREATIVITY***

- Focus** To experience the bird blind at Cispus while sketching or writing, preferably after a lesson on birds or wildlife. Can be used in conjunction with ***DISCOVERY JOURNAL***.
- Group Size** Entire class (*due to limited space, only 10-12 students per visit*)
- Time Required** 30 minutes
- Materials** Paper and pencils  
Clipboards and bird seed (*housed in the bird blind*)  
Bird I.D. book and bird blind key (*available in the front office*)
- Physical Setting** Bird blind (*south side of the center, near the playground and archery station*)
- Process**
- Activity 1: ATTRACTING BIRDS**  
To insure a good bird turn-out, plan to do this lesson later in the week. Upon arrival assign a counselor and his/her cabin group to feed the birds at least once a day, starting immediately and continuing until the lesson is done.
- Activity 2: WATCHING BIRDS**
1. Take the students to the bird blind and have them find a seat near a one-way window. Hand out clipboards and have everyone get their paper and pencils out and ready to use.
  2. Review the pictures on the bird blind walls showing local birds and the characteristics used to identify them. These are resident birds at Cispus. Discuss what "resident" means. Take at least five minutes to observe the birds. Everyone should be as quiet as possible to avoid scaring them away.
  3. Each student can choose to sketch the birds and their setting, or write a creative story, journal entry, or poem.

# COMPLETE THE CYCLE

<b>Focus</b>	To provide basic information about what materials are necessary to construct a good compost pile. Students will also gain an understanding of how composting reduces household wastes.
<b>Group Size</b>	Entire class
<b>Time Required</b>	1 hour
<b>Materials</b>	Pencils Organic wastes from the kitchen Worm bin and plastic food collection container from the office Handout: <i>Composting Questions</i>
<b>Physical Setting</b>	Large classroom in the education building.
<b>Process</b>	<ol style="list-style-type: none"><li>1. Request the worm bin and food collection container.</li><li>2. Using the plastic food collection container from the office, have the students collect their lunch scraps. Make sure that there are no bones, meat, grease, or other materials that may attract rodents and pests. Tell the students to collect the wastes inside the plastic container, but not to overfill it. After the wastes have been collected, weigh the container to make sure that the materials do not weigh over 3 pounds.</li><li>3. Have the students spread the kitchen scraps over the top layer of dirt in the bin. Then have them sit down and discuss the questions on composting. Explain to the students that the composting will take about 2 days, and that they return later to see what the worms have eaten.</li></ol>

## Additional Resources

(taken from *A-Way With Waste* curriculum guide, a program of the Washington State Department of Ecology)

Peterson, Christina, et al. *Energy, Food and You, Secondary Guide*. Seattle, WA.: Washington State Office of Environmental Education, Northwest Section, 1983.

Dindal, Daniel L. *Ecology of Compost: A Public Involvement Project*. Syracuse, N.Y.: Office of Public Service, State University of New York, 1976.

Rodale, Robert, Ed. *The Basic Book of Organic Gardening*. New York, NY: Bobbs-Merrill Co., 1975.

*Organic Gardening and Farming* Staff and Ed. "The Compost Heap that Grew into the 14-Day Method," *Calendar of Organic Farming: A Guidebook to Successful Gardening Through the Year*. Emmaus, PA: Rodale Press, Inc., 1973.

## Phone Numbers

City of Seattle Composting Hotline: (206) 625-2089 (Seattle Engineering Department, Solid Waste Utility)  
King County Extension Service: (206) 344-7984, 9:00a.m.-1:00p.m. (Tape No. 444 "Making a Compost Pile")

## *Composting Questions*

1. What is composting?
2. What are the necessary "ingredients" for starting a compost pile or worm bin?
3. Name some similarities between composting and recycling--how are the two processes related?
4. How does composting reduce waste?
5. What are the benefits and advantages of composting?
6. Give some examples of places composting occurs naturally:

# ***DIFFICULT DECISIONS***

<b>Focus</b>	To provide stimulus for personal decision making on the issue of animal rights. <i>Adapted from an article by Jal S. Parakh and Irwin L. Slesnick, biology dept. Western Washington University.</i>
<b>Group Size</b>	Entire class
<b>Time Required</b>	1 hour
<b>Materials</b>	Handouts: <i>Who Decides?</i> <i>Questions and Decisions</i>
<b>Physical Setting</b>	Standard classroom
<b>Process</b>	<ol style="list-style-type: none"><li>1. Allow the students time to read the handout and answer the questions.</li><li>2. Divide the class into small groups, no more than six to a group. Have them discuss their answers and the reasoning behind them.</li><li>3. If there is time, have the whole class discuss and draw-up guidelines for animal use in research (medical, commercial), manufacturing (clothing, hygiene/cosmetic products, medicines), product testing (cosmetic, medical), and food production.</li></ol>

## References

- Fox, M.A. (1986). *The Case for Animal Experimentation: An Evolutionary and Ethical Perspective*. California: University of California Press.
- Regan, T. (1983) *The Case for Animal Rights*. California: University of California Press.
- Singer, P. (1975). *Animal Liberation: A New Ethics for Our Treatment of Animals*. New York: Random House.
- Tannenbaum, J., and A.N. Rowan. (1985). "Rethinking the Morality of Animal Research." *Hastings Center Report*, 15(5):32-43.



## *Who Decides?*

Throughout history, humans have used other, nonhuman, animals in scientific research. Each year millions of animals are used for research in medical experimentation and the toxicity testing of thousands of compounds, from pesticides to household products and cosmetics. As the use of animals in research increases, so does the opposition to its use. Some antivivisection (*vivisection* : experimental research on a living animal for medical purposes) groups believe that all animal research should stop, while some researchers feel that any experimentation in pursuit of new knowledge should be allowed.

One of the points of debate has been whether all sentient vertebrates (animals with backbones that are capable of feeling--consciousness) have rights. The struggle to decide if and/or what these rights might be has led to protests, demonstrations and break-ins at animal research labs. Although the debate still continues, there are three ethical positions that seem to cover the majority of views. These are dominionism, abolitionism, and utilitarianism (Tannenbaum and Rownan, 1985). The basis for these viewpoints are listed below, along with some of the objections to them.

DOMINIONISTS	ABOLITIONISTS	UTILITARIANS
<i>OPINIONS</i>		
<ul style="list-style-type: none"> <li>•nonhuman animals have no rights</li> <li>•there are no moral boundaries on animal use, even for trivial human purposes</li> <li>•cite a passage from Genesis stating that God gave humans dominion over all other creatures</li> </ul>	<ul style="list-style-type: none"> <li>•animal research is morally wrong because animals have the same rights as humans</li> <li>•if humans have a right not to be harmed, then so do other animals</li> <li>•prejudice in favor of humankind is "speciesism"</li> </ul>	<ul style="list-style-type: none"> <li>•animals have rights</li> <li>•the pain and death of non-human animals is outweighed by the research-related reduction in death, disease, and suffering of humans and other animals</li> </ul>
<i>OBJECTIONS</i>		
<ul style="list-style-type: none"> <li>•the passage from Genesis is being used selectively, there is also a passage in Genesis about the stewardship of humans to animals</li> </ul>	<ul style="list-style-type: none"> <li>•rights are seldom absolute, and when the rights of humans and other animals compete, human rights are first</li> </ul>	<ul style="list-style-type: none"> <li>•how do we set the standards for weighing good and bad?</li> </ul>

## *Questions and Decisions*

1. Is there a difference between using animals for food or clothing and using animals for research?
2. Should a medical research center be allowed to use thousands of test animals in research on plastic surgery (for cosmetic purposes, to correct a congenital defect)? What about research on a fatal disease?
3. Some research involves little or no pain to animals, or any shortening of their life spans. Other research involves significant animal pain and death. Should we consider these factors when deciding whether to allow certain research projects, or should we only look at the possible beneficial outcomes of the experiments?
4. Do researchers have the right to experiment on animals for the sake of knowledge alone? For example, do scientists interested in brain anatomy have the right to operate on cats' brains, causing the cats permanent disabilities?
5. Do cosmetics manufacturers have the right to test the safety of a new eyeshadow or lotion by placing samples of these products in rabbit's eyes? Do you think new products should be sold without first undergoing safety tests?
6. Does it matter what kinds of animals are used in animal research? Is it "more alright" to use a worm or other invertebrate, than to use vertebrates such as rabbits and dogs?
7. What alternatives can you think of to using animals in research?
8. What scientific discoveries have been made without the use of animal research?
9. The ability to reason, to communicate, and to be conscious of one's mortality are among the differences between humans and other animals that often are cited to deny claims that nonhuman animals can have rights. If these criteria are to determine possession of rights, then what rights are held by fetuses, newborns, and people in irreversible comas?
10. Reformers and animal protection advocates often propose the following guidelines:
  - I. Only permit experiments that will lead to a significant increase in our knowledge.
  - II. Repeating the same experiments with different species of animals is unnecessary and should not be permitted.
  - III. Alternatives to animals, such as computer simulations and tissue cultures should be used to test drugs and other chemicals.To what extent are the above restrictions realistic in terms of the nature of science?
11. The Draize test, which involves applying cosmetics and household products to the eyes of rabbits, and the LD 50 test, which involves finding the dose of a substance that is lethal to 50% of the animals exposed to it, are both controversial on scientific and humane grounds. Have students investigate the arguments for and against these tests.
12. Should all living things--bacteria, plants, worms, mammals--be equally protected from the "abuse" of scientific research? Do all life forms have equal rights?

# ECOSYSTEMS

<b>Focus</b>	To understand the cyclic relationships between earth, water, plants, humans, and animals.	
<b>Group Size</b>	Entire class	
<b>Time Required</b>	1.5 hours	
<b>Materials</b>	Compass Metric tape measure Stakes Dentist mirror Handouts:	Twine Hammer Magnifying glass Discovery Journal

## *Plot Descriptions*

**Physical Setting** Flat area supporting a variety of plant and animal life

**Process** **Activity 1:**  
Complete *A Window Into The Past*, or discuss cyclic relationships and food webs before going out.

### **Activity 2:**

1. Divide the students into groups of eight. Measure out a one-meter square "ecoplot" for each group. Use compasses, metric tape measures, stakes and twine to construct the borders and quadrants of the plot.
2. Discuss and identify the plant and animal species you expect to find. Then, make a detailed count of the plants and animals that are inside your ecoplot. Write all of the information into your Discovery Journal.
3. Complete the site information about your plot. Then, divide into pairs and assign each pair to a quadrant of the original square. List the plants and animals you discover.
4. Compile the information you collected about your plot. Make a sketch of it.

### **Activity 3:**

1. Using a dental mirror, look at the underside of twigs, needles, mushrooms, etc. in your plot. Note the patterns and textures of the things you see. Write descriptive sentences for these "mysteries of the underworld".
2. As time allows, share the mysteries of the underworld as a guessing game.

## **GUIDELINES**

- We are counters of what is there
- We may need to move leaves aside to see what is under them; we will do so carefully
- We will make a minimum impact on the environment
- We will take only information
- We will leave only footprints

*Plot Descriptions*

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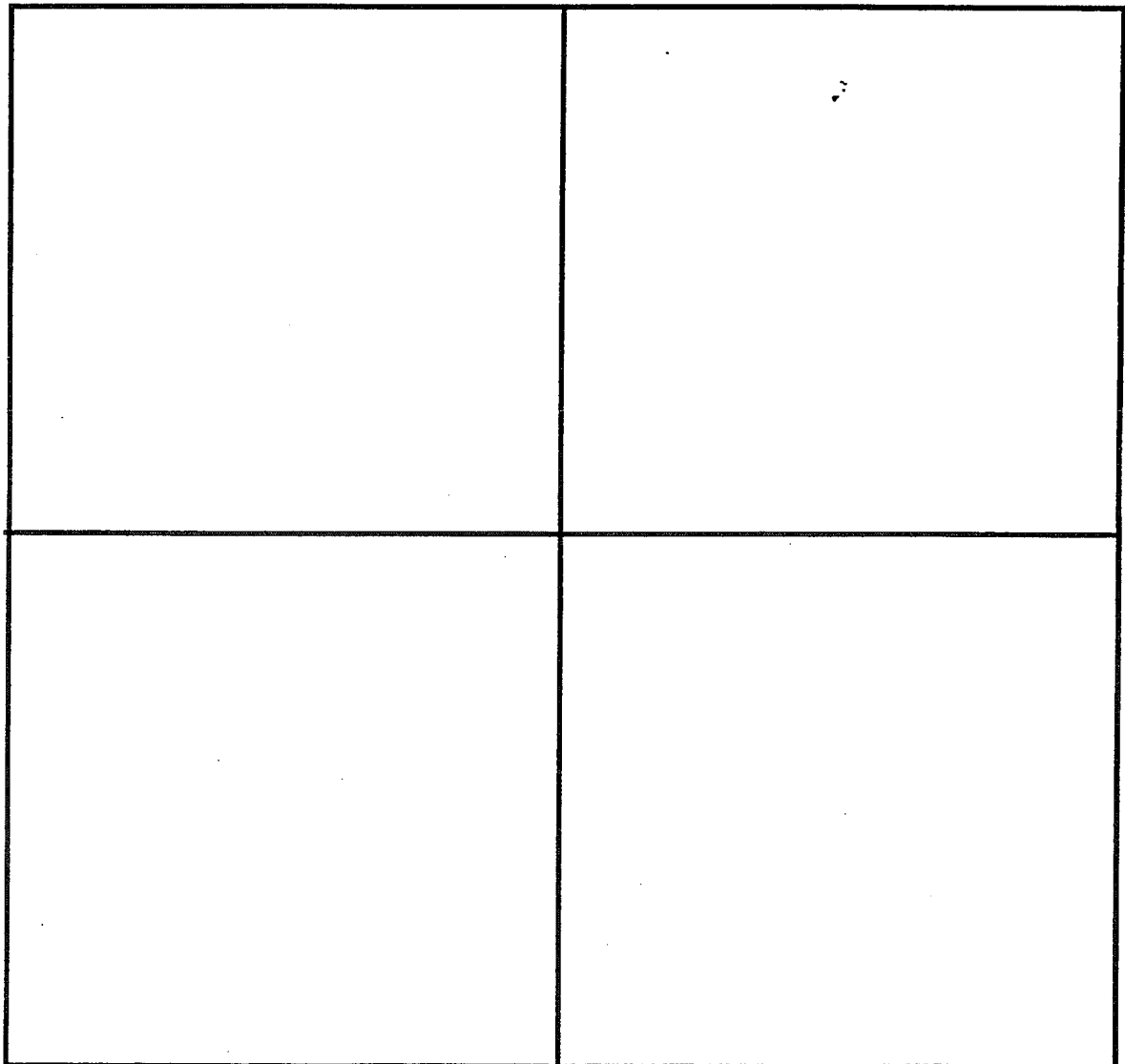
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## *Mysteries of the Underworld*

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**Non-Living**

**Invertebrates**  
(identify Mollusks, Annelids  
and Arthropods)

**Vertebrates**  
(identify Amphibians, Reptiles,  
Aves, and Mammals)

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**Green Plants**

(identify Fungi, Lichens, Mosses, Ferns, Flowering Plants, Woody Shrubs, and Trees)

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# ***HERE TODAY, GONE TOMORROW***

<b>Focus</b>	To introduce active role playing that will allow students to learn and discuss their thoughts on the effect humans have on animals and habitat.
<b>Group Size</b>	Entire class
<b>Time Required</b>	1 hour
<b>Materials</b>	No additional materials
<b>Physical Setting</b>	Large classroom or outdoors
<b>Process</b>	<ol style="list-style-type: none"><li>1. Divide the students into equally sized groups of: Grizzly Bears, Wolves, Leopards, Poachers, Farmers, Loggers, and Tourists.</li></ol>

2. Have the animal groups come to the front of the room. Explain their situation to each group: Leopards are roaming around freely in the high mountain areas, Grizzly Bears are roaming around the forest mountain areas eating berries, and Wolves are running and hunting in the forest mountain areas.

3. Separate the other groups into different areas of the room and explain that they are going to go into the areas where the animals are and impact their habitat in some way. Loggers will cut down trees, Farmers will go into the habitat and use it to grow crops and livestock. Poachers will shoot or trap animals for trophies. Lastly, Tourists will make trails and campgrounds in each of the habitats. Whenever one of the groups impacts the animal habitats, tell one animal from each group to sit down because they couldn't survive the change to their environment (a variation would be to allow the students to decide how many animals the human activity would kill).

4. Continue with each human group impacting the habitats (pollution of water from logging, pesticides and chemical fertilizers, erosion of hills from improper trail use, waste left by humans, etc.) until all the animals are dead.

## **Discussion:**

1. What can be learned from this exercise about human activities like hunting, poaching, farming, and tourism and their effects on animal habitats?



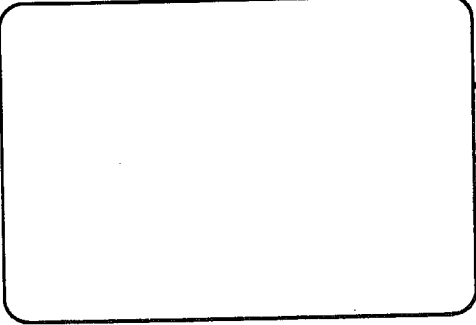

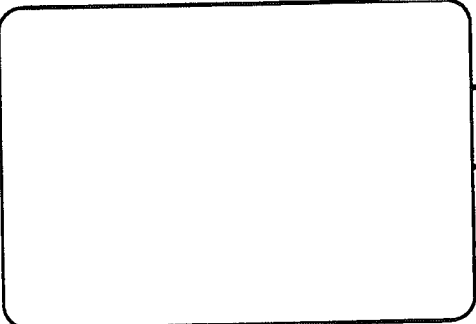

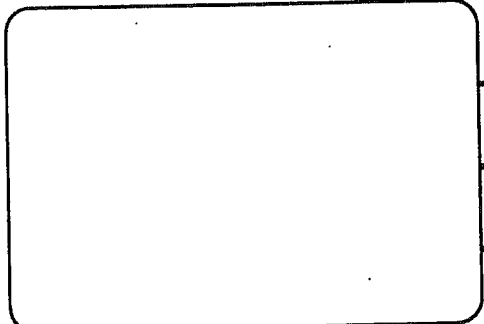

2. Do you think one activity was more impacting than another, or was the combination of activities more damaging?

3. What do you think humans can do to lessen their impact on animal habitats and help endangered animals survive?





# *Insect Mystery Sheet*

Insect Sketch	Insect Description	Insect Name
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# **LITTLE BROWN BATS**

- Focus** To give the class general information and understanding of a species of bat commonly found in the Cispus area.
- Group Size** Entire class
- Time Required** 1 hour (*additional time for evening visits to the roost site at the U.S. Forest Service building overhang, street lights, or the bat boxes around the Center*)
- Materials** Bat specimen  
Bat illustrations  
Handouts:  
*The Little Brown Bat*  
*Bat Questions*
- Setting** Standard classroom (*with outside visits to roosting sites and hunting areas in spring and summer*)
- Process**
1. Read *The Little Brown Bat* story to the class, or let them read it on their own.
  2. Divide the class into groups of 5 or 6 (group sizes can vary with class size) and let them discuss and answer the question sheet, referring to the story, diagrams, and provided specimen as necessary.
  3. After a sufficient discussion time has elapsed (20-30 min.), discuss as a class the various observations and answers generated by the groups.

## **Further Reading**

- Allen, Glover Morrill. (1967). *Bats*.  
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- Lauber, Patricia. (1968). *Bats: Wings in the Night*.  
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- Mohr, Charles E. (1976). *The World of the Bat*.  
Philadelphia, New York: J.B. Lippincott Co.
- Pitt, Valerie. (1976). *Bats*. New York London:  
Franklin Watts, Inc.
- Stephens, Daniel A. (1987). *A Guide to the Mammals  
of the Cispus River Drainage*. Washington: Cispus Press.

# The Little Brown Bat

BY LORENE SANFORD

Myo lives in the overhang of the U.S. Forest Service (U.S.F.S.) building at Cispus. She is a *Myotis lucifugus*, or little brown bat. Myo is about 84-98 mm long, has a wing span of 33-40 mm, and weighs about half an ounce. Myo's coat, or pelage, is soft and thick with a shiny cinnamon or dark brown color on her back, and a buffy brown to pale gray on her sides and stomach. Little brown bats live in various forest habitats and usually live near a source of water, like Covell Creek. They like to make their homes, or roosts, in caves, tunnels, hollow trees and buildings where they live together in groups called colonies. Myo's colony of little brown bats lives in the overhang of the U.S.F.S. building, where they can find plenty of moths, flies and mosquitoes to eat under the streetlights when they go out to hunt at night.

Right now, Myo is resting. Her feet hold her in place while she hangs upside down, sleeping on her perch. Myo's thin wings are made of two layers of skin called a membrane, they are stretched between her long finger bones, legs and tail in much the same manner that webbing is stretched between the toes of a duck (fig. 1). When she sleeps, Myo wraps her wings around her body, the way you would wrap a blanket around yourself at night to keep warm. When dusk arrives Myo, and the other bats in her colony, will begin to wake-up and groom themselves. Bats groom themselves often: when they wake-up in the evening, before they eat, after they eat, and while they are resting. Using their feet they clean the soft fur on their bodies, their pointed teeth, and their thin, supple wings.

When she is finished grooming, Myo flies to Covell or Yellow Jacket Creek for a

drink of water. Swooping down to the surface of the creek, she opens her mouth and scoops up a drink of water with her lower jaw, then flies up into the air to begin hunting for her dinner. Using a method called echolocation to find her prey, Myo beams arcs of ultrasonic sound out of her mouth and into the air ahead of her as she is flying (fig. 2). These sound arcs bounce off of objects in her path, and the returning echos tell Myo where and how far away the objects are. The shape of Myo's ears, nose and mouth are all developed to aid in the accuracy of echolocation. Her ears are large and long, set far apart on her head and cupped to capture sound. She also has a tragus, or lance-like projection in front of each ear that helps to channel sound into her outer ears (fig. 1). Because she sends the ultrasonic sounds out through her mouth, Myo's mouth is grooved and wrinkled to have better accuracy in directing the sounds. Some of Myo's cousins send ultrasonic sounds out through their noses. They have folds of skin around their noses that are shaped like leaves, spears, snouts, and horseshoes, depending on the different species. These features are called nose leaves and do the same thing that the grooves and wrinkles on Myo's mouth do—direct and project the ultrasonic sounds that the bats use to guide themselves in the dark and find their food.

As she hunts, Myo swoops and dives, flexing her knuckles to change the shape of her wings, and using echolocation to search for her dinner. When she locates an insect, Myo chases after it until she is close enough to throw her legs forward, forming a pouch with her tail membrane, then she scoops

the bug into the pouch with her wings. Myo then ducks her head down to snap up her treat. By herself, Myo can catch and eat as many as fourteen insects in a minute. With appetites like that, even a small colony of ten to fifteen bats can be very effective in controlling insects in the area around their roost. Myo and her colony will continue to hunt for most of the night, returning occasionally to the creek for a drink of water. As the sun begins to rise, Myo catches one last mosquito and then heads back to the roost, where she will sleep away the daylight hours.

This spring, Myo is preparing to have a baby. Last fall, before she went into hibernation, Myo mated with a male little brown bat. She has stored the live sperm all winter long in her reproductive tract, waiting for springtime, when it will be time for her to ovulate. This will allow her egg and the stored sperm to meet inside her reproductive tract and then grow into a baby bat. About eight weeks after the egg is fertilized, Myo will give birth to a little brown bat baby. Many of the other females in her colony will also be having their babies between May and August, and the building overhang will be filled with the squeaking of baby bats. When the time comes for Myo to give birth, she will raise her body up, grasping the perch with her thumbs, and then let go of the perch with her feet; so that she hangs upright with her thumbs supporting her body. Then, Myo will tuck her tail forward and up between her legs, forming a little pouch with her tail membrane. This pouch will catch the baby when it is born and keep it from falling to the floor and being injured. Myo's baby will be born feet first, and as soon as its' feet emerge, Myo will tear off the birth sac surrounding the baby. Then the baby will help Myo in its own delivery, by grasping and pulling with its feet. The delivery will be over in about fifteen to twenty minutes, but the umbilical cord connecting Myo to her baby will remain intact

for another ten minutes; in which time it will dry up and break on its' own. If the cord were cut or broken immediately after birth the baby would bleed to death. The newborn bat (Little M) will be naked, with its eyes closed and its ears pressed close to its head. Little M will look something like a winged, baby mouse, and weigh between 1.45 to 1.55 grams. Right after it is born, the baby bat will start to nurse, and continue to do so until Myo goes out to hunt at night. Then, Myo will leave Little M perching in the overhang, while she looks for food; coming back every hour to nurse her baby. A bat's childhood is very short. Within a few days Little M's eyes will open, and after about two weeks the baby bat will be half-grown and covered with wooly, sooty gray fur. By then, Little M will no longer hang onto its mother to nurse, instead it will roost beside Myo in the overhang and hunt with her at night.

The little brown bat colony will continue to feed during the Spring and Summer; building up a store of fat to sustain them during the winter when there will be no insects to feed on. When fall arrives, the little brown bats will begin their mating season, ensuring a new generation of baby bats next year. Then, Myo and her colony will group together under the overhang and sleep away the winter, anticipating the arrival of spring.

## *Bat Questions*

1. Compare the structure, texture, and uses of a bat's hands to your own.
2. What does your home have in common with Myo's roost? What things are different?
3. Compare the way you use the senses of touch, sight, and sound to the way Myo uses them.
4. What things do bat babies and human babies have in common? What things are different?
5. Why do you think it is helpful to have bats around?
6. What would you do if you found a bat inside your house?

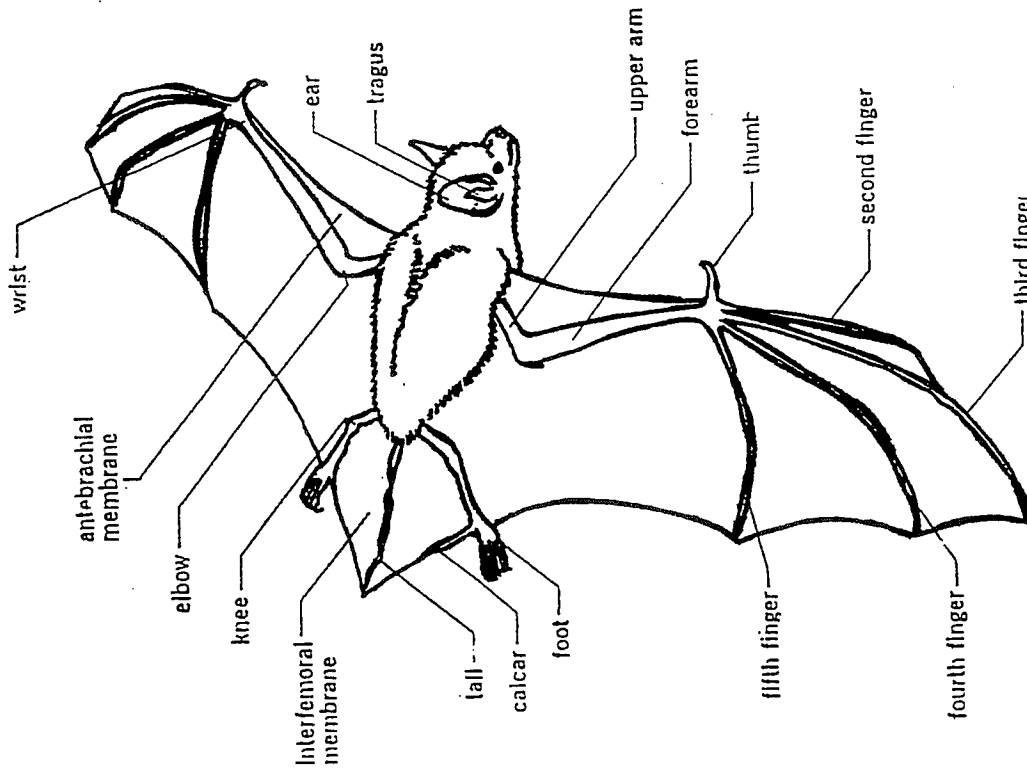


Figure 1: Bat Anatomy

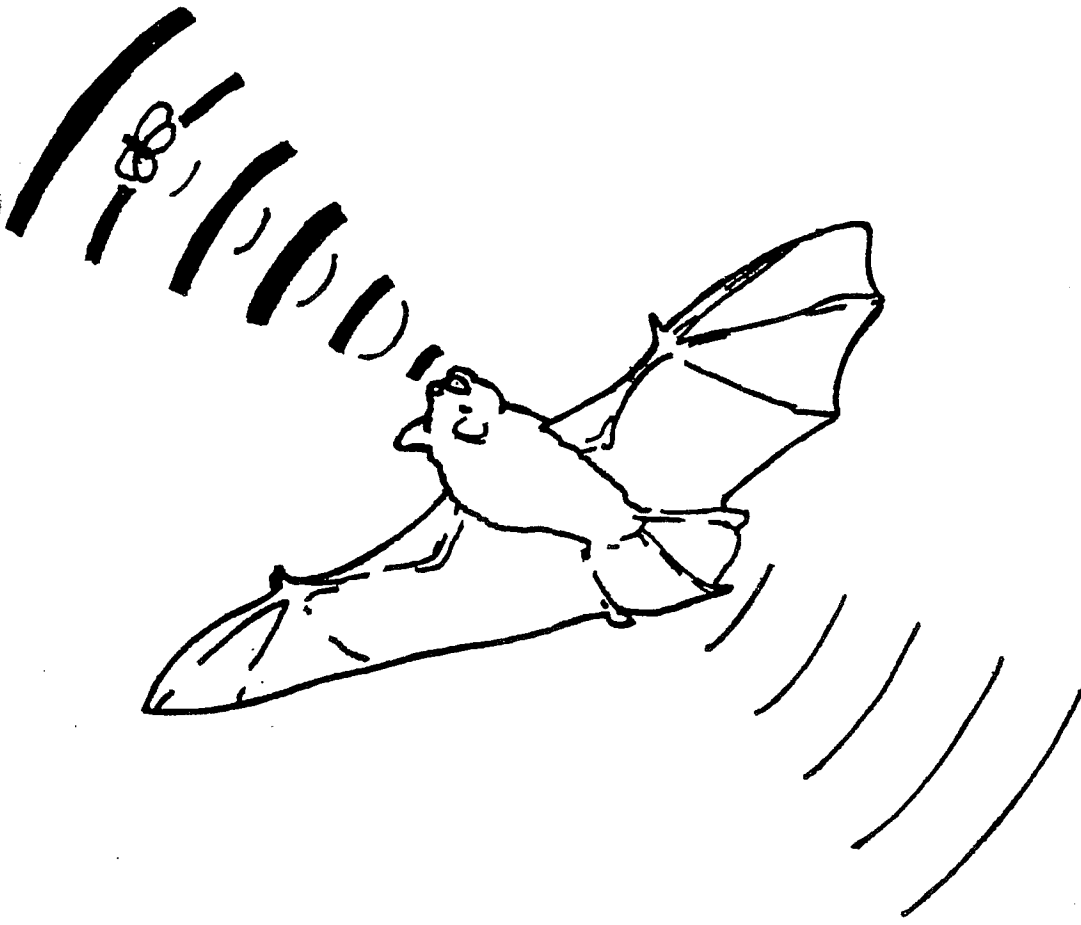


Figure 2: Bat Using Echolocation

# *MOSQUITO SALMON BEAR*

- Focus** To teach food chain and predator/prey interrelationships.
- Group Size** Entire class
- Time Required** 20 minutes
- Materials** Objects to mark starting lines and home bases
- Physical Setting** Level field/clearing
- Process**
1. Separate students into two teams. The teams decide in secret whether they will be mosquitoes, salmon, or bears. Just as in rock-paper-scissors, there is a hierarchy. Bears eat salmon, salmon eat mosquitoes, and mosquitoes eat bears. The teams need to have a first choice and a back-up choice. That way if the first choice of each team is the same they can go to the second choice without having to regroup.
  2. The teams then line up along two parallel lines, spaced about ten feet apart, opposite a chosen opponent. When the moderator yells "one...two...prey!", students act the part of their chosen fauna (bears raise their arms and roar, mosquitoes point and buzz, and salmon wiggle their fins and snap their mouths), and either chase their prey or run from predators to their home base; ten feet behind the starting lines. If caught, players then become members of the opposing team.

## **MIX & MATCH**

<b>Focus</b>	To use imagination in the study of animal specialization.
<b>Group Size</b>	Entire class
<b>Time Required</b>	1 hour
<b>Materials</b>	Markers/crayons Drawing paper Handout: <i>Special Specializations</i>
<b>Physical Setting</b>	Standard classroom or trail clearing
<b>Process</b>	<p><b>Activity 1: CREATURE FEATURES</b></p> <ol style="list-style-type: none"><li>1. Discuss the concept of animals becoming adapted to their habitats: The animals that have helpful characteristics tend to survive, have off-spring, and pass on those helpful traits to their young. These survival traits, or specializations, cover many different areas.</li><li>2. Have the students name some specializations first, guess what the specializations of the animals on the handout are, or guess what the specializations do for the animal.</li></ol> <p><b>Activity 2: BITS &amp; PIECES</b></p> <ol style="list-style-type: none"><li>1. Using the information from the discussion, paper and markers/crayons, have the class design (singly or in small groups) their own ecosystem. They can use characteristics and food chains that are familiar, or go wild and make up their own.</li><li>2. Require them to name the type of habitat, a producer, primary consumer, and secondary consumer. The goal here is to emphasize that we have specializations for a reason. No feature is too strange--it simply needs to have a survival rationale behind it.</li></ol> <p><b>Debrief:</b> Have student(s) give a tour of their ecosystem.</p>



## *Special Specializations*

<b>Animal</b>	<b>Specialization</b>
<i>Coloration:</i> fawn chameleon monarch butterflies	spotted coat skin pigment changes to match surroundings bright colors warn predators of bad taste/poison
<i>Features:</i> bat cat pig	nose, ear and face are shaped to catch and send echo-location whiskers for "night vision" and navigating in tight spaces strong, prominent snout for rooting and smelling
<i>Teeth:</i> guinea pig leopard human woodpecker	long, flat, front teeth for cutting pieces of plant; flat, knobby teeth in back to grind it up long, sharp, front teeth for tearing meat; flat, sharp back teeth for cutting it up long, flat, front teeth; long, sharp, front teeth; flat, sharp back teeth; flat, knobby, back teeth strong beak and tongue to get into trees and reach insects
<i>Eyes:</i> pigeon wolf monkey	large part of their life is spent avoiding predators, side-set eyes allow it to see in two directions at once front-set, small eyes allow it to see the prey it is following with its powerful and prominent nose binocular vision (just like binoculars), two circles of vision that overlap to give depth perception-- very handy if you're swinging through trees
<i>Bodies:</i> kangaroo robin trout	big, long feet to bounce and fight with; big, long tail to balance the feet hollow, light bones; feathers for flight and warmth gills to take oxygen from the water; fins and strong tail to move in the water; scales that minimize water resistance and do well when wet
<i>Seasonal:</i> snowshoe hare black bear Canada goose	brown coat in the summer, white coat in the winter slows down metabolism and hibernates in the winter, energy saving mechanism--lack of food in the winter migrates in the spring and fall to reach desired climate and food

## ***PREDATOR-PREY***

<b>Focus</b>	To stimulate discussion about strategies and adaptations of both predator and prey using simulations and games.
<b>Group Size</b>	10-20 students ( <i>larger groups should be broken down for some of the exercises</i> )
<b>Time Required</b>	40 minutes
<b>Materials</b>	Two blindfolds
<b>Physical Setting</b>	Braille Trail, Covell Creek Trail
<b>Process</b>	<p><b>Activity One:</b></p> <ol style="list-style-type: none"><li>1. Begin by heightening the group's sense of hearing--both prey and predator need a good sense of hearing in order to survive. Have the group form a circle and place one blindfolded person in the middle of it. The people in the circle take turns clapping, while the person in the middle (the predator) tries to point to the person who is clapping (the prey).</li><li>2. The simulation can be taken a step further. Keep the group in a circle, but in the center there will be both predator and prey. Participants may want to pick specific prey and predator to simulate. Both will be blindfolded to simulate a night-time hunting situation, while the predator tries to catch his/her prey within the circle.</li></ol> <p><b>Discussion:</b> Discuss the different strategies used by both the prey and predator:</p> <ul style="list-style-type: none"><li>Did they hide?</li><li>Did they use camouflage?</li><li>Did they use speed?</li><li>How did they use their different senses?</li></ul>

**Activity 2:**

*The last exercise is basically a type of hide-and-seek. It can get a bit rowdy, so it's best to play in a safe area with a smaller group of people. Take special care to set boundaries.*

1. One person is the predator and must always be touching a specific tree or rock. The rest of the group are prey. When the predator shuts his or her eyes and counts to a given number (usually no more than ten) the prey will hide.
2. Once the count is over, the predator looks for the prey, while still touching her/his special tree or rock. If the predator sees any part of the prey he/she calls out their name and that person/prey has been eaten.
3. When the predator has seen everyone possible, she or he calls out "I've see all I can see", shuts his or her eyes and counts again for a shorter amount of time. During the count the prey must move closer to the predator, finding a new hiding spot. Continue this process until all the prey have been found.

**Discussion:**

1. Discuss the different adaptations that worked for the prey:  
What colors blended in best?  
How did the prey use their different sizes?
2. Look up information about local animals and study the special adaptations that have allowed them to survive.

# TOOLS OF THE TRADE

<b>Focus</b>	To assist students in understanding the adaptation of birds to specific habitat.														
<b>Group Size</b>	Entire class ( <i>in groups of 10</i> )														
<b>Time Required</b>	1 hour														
<b>Materials</b>	<p><u>Habitats:</u></p> <ul style="list-style-type: none"><li>a) cup filled with water and small rocks</li><li>b) tray filled with dirt and sunflower seed mix</li><li>c) tray filled with leaf and small birdseed mix</li><li>d) test tube filled with small bird seed and the opening covered with a piece of balsa wood</li><li>e) test tube filled with water and an empty test tube</li><li>f) tray filled with dirt and yarn pieces</li><li>g) block of wood</li></ul> <table><tr><td><u>Beaks:</u></td><td><u>Feet:</u></td></tr><tr><td>Spoon</td><td>Tennis shoe</td></tr><tr><td>Hook</td><td>Thong</td></tr><tr><td>Pliers</td><td>Hook</td></tr><tr><td>Chopsticks</td><td>Swimming fin</td></tr><tr><td>Ice pick and Q-tip</td><td>Clothes pins on a stick</td></tr><tr><td>Eyedropper</td><td></td></tr></table> <p>Bird guide with pictures/photos Handout: <i>Habitats and Tools (instructor's cheat sheet)</i></p>	<u>Beaks:</u>	<u>Feet:</u>	Spoon	Tennis shoe	Hook	Thong	Pliers	Hook	Chopsticks	Swimming fin	Ice pick and Q-tip	Clothes pins on a stick	Eyedropper	
<u>Beaks:</u>	<u>Feet:</u>														
Spoon	Tennis shoe														
Hook	Thong														
Pliers	Hook														
Chopsticks	Swimming fin														
Ice pick and Q-tip	Clothes pins on a stick														
Eyedropper															
<b>Physical Setting</b>	Near the bird blind, at a distance that won't disturb birds														
<b>Process</b>	<p><b>Activity 1:</b></p> <ol style="list-style-type: none"><li>1. Start the activity by asking the students what they think the word adaptation means. Ask them for examples of how people have adapted to their habitats, and how habitats have been adapted to meet people's needs (ie...clothing, building houses, industry).</li><li>2. Have the students pretend to lose the use of their thumbs and ask how they might have to adapt to this new situation. Discuss how many animals, such as birds, do not have the capacity to adapt as rapidly as we do to new situations and environments. Explain how birds behave instinctively to survive, and that they don't always have the same capacity that humans do to change their lifestyles to meet a rapid change in habitat.</li><li>3. Set out the different representatives of bird feet. Ask the students to figure out which shoe might represent each type of bird, and what specializations were incorporated to suit the birds to their habitat.</li></ol>														

**Activity 2:**

1. Set out the different habitats and bird beak types. As with the feet, discuss the possible functions for the various beaks.
2. Based on the beak usage discussion, have each student (or group of students) select a beak and go to the habitat that they feel it is suited for. The student(s) should then try to "feed" for five minutes using the beak they have selected.

***Feeding instructions:***

- a) the small stones must be removed, keeping as much water as possible in the cup (fishers)
  - b) seeds need to be picked out and crushed (seed eaters)
  - c) seeds need to be individually removed (insect eaters--ground)
  - d) piece of wood must be removed from the test tube so that the bird seed can be reached and individually removed (insect eaters --tree)
  - e) water needs to be removed from the full tube and placed in the empty tube (nectar eaters)
  - f) yarn pieces need to be individually removed from the dirt (insect eaters--marsh/dirt)
  - g) pieces of wood need to be removed/torn/gouged from the block (meat eaters)
3. After five minutes, see how well the students "ate" with their chosen utensils and discuss why or why not they were successful at feeding. Have the students select a different tool or habitat and try to feed for another five minutes.

**Discussion:**

1. Discuss the results from the feeding sessions and how the specializations of birds to their specific habitats would affect their success at adapting to a new or radically altered habitat.
2. Ask the students which type of birds they feel would be able to adapt and possibly survive in a different habitat? Which type of birds would have problems in adapting?

**Activity 3:**

Move on to observe at the bird blind. Have students try to identify the different types of birds, paying close attention to their beaks and feet and the way that they are used. Count the number of different species spotted.

# Habitats and Tools

(instructors cheat sheet)

## Birds, Beaks, and Habitats

a) Pelican <i>fisher/scooper</i>	<ul style="list-style-type: none"> <li>•spoon</li> <li>•cup of H<sub>2</sub>O and small rocks</li> </ul>
b) Cardinal <i>seed eater</i>	<ul style="list-style-type: none"> <li>•pliers</li> <li>•tray filled with dirt and sunflower seeds</li> </ul>
c) Chickadee <i>insect eater--ground</i>	<ul style="list-style-type: none"> <li>•chopsticks</li> <li>•tray filled with leaves and small bird seed</li> </ul>
d) Woodpecker <i>insect eater--tree</i>	<ul style="list-style-type: none"> <li>•ice pick and Q-tip</li> <li>•test tube filled with bird seed and covered with balsa wood</li> </ul>
e) Robin <i>insect eater--marsh/dirt</i>	<ul style="list-style-type: none"> <li>•tweezers</li> <li>•tray filled with dirt and yarn pieces</li> </ul>
f) Hummingbird <i>nectar eater</i>	<ul style="list-style-type: none"> <li>•eyedropper</li> <li>•test tube filled with water</li> <li>•empty test tube</li> </ul>
g) Eagle <i>meat eater</i>	<ul style="list-style-type: none"> <li>•hook</li> <li>•block of wood</li> </ul>

## Feet

Tennis shoe <i>grouse</i>	lives on the ground and spends a lot of time running
Thong <i>bittern</i>	shore bird that walks in the water and on the shore
Hook <i>hawk, eagle</i>	predator that uses feet for grasping and tearing
Fin <i>duck</i>	spends a lot of time swimming and paddling
Clothes pin on a stick <i>sparrow</i>	spends a lot of time perching on limbs

## **WEB OF LIFE**

- Focus** To teach students the interrelationships of all living components of an ecosystem.
- Group Size** Entire class
- Time Required** 15 minutes
- Materials** 60' of string
- Physical Setting** Anywhere at Cispus, preferably in a small clearing on one of the trails.
- Process**
1. Students form a circle. Stand inside the circle near the edge, with the ball of string. Then begin asking: "Who can name a tree that grows in the Cispus area? ..Silver Fir...Good. Here, Miss Silver Fir, you hold the end of the string. Is there anything living around Cispus that might eat the Silver Fir? ..Wood ants...Great. Mr. Wood Ant you take hold of the string here; you are connected to Miss Silver Fir by your dependence on her for your lunch. Now who needs Mr. Termite for their lunch?"
  2. Continue connecting the students with string as their relationships to the rest of the group emerge. Bring in new elements, such as other animals, soil, water and so on, until the entire circle of students is strung together in a "Web of Life". You have just created your own ecosystem.
  3. To demonstrate how each individual is important to the whole community, take away, by some plausible means, one member of the web. For example, a fire or logger kills a tree. When the tree falls it tugs on the string that it's holding. Anyone who feels a tug on her or his string is in some way affected by the death of the tree. Now everyone who felt a tug from the tree gives a tug. The process continues until every individual is shown to be affected in some way by the destruction of the tree.

### **Discussion:**

1. Have everyone describe how they were affected by the destruction of the tree. Were the affects on each organism equally important to their survival?
2. Discuss what might happen if:
  - deer in the Cispus area were hunted
  - the Cispus River flooded
  - hikers picked most of the wildflowers
  - a disease killed many of the woodpeckers

# WELCOME TO OUR FOREST

- Focus** To become familiar with the animals and plants of the forest, and to understand the relationships between plants, animals and the forest. *This activity will be most effective with grades K-6*
- Group Size** Entire class
- Time Required** 30-60 minutes
- Materials** Felt board (*Forestry room*)  
Felt pieces (*obtain from Cispus staff*)
- Physical Setting** Forestry room
- Process**
1. Students sit on the floor around the felt board (make sure the board is blank). Tell the students to close their eyes and imagine that they are in a forest. Have them visualize for about 5 minutes, then, open their eyes and share the images they imagined.
  2. Tell them that they are going to visit a beautiful forest and meet a friendly bear named Fred (or whatever name you choose). Explain to the students that they must be quiet, so that Fred and his friends will come out to meet them. Bring out the felt bear and introduce him to the students. Put Fred on the board by himself and tell the students that he's lonely. Ask them to remember what they visualized when they thought about a forest and ask what they could add to the board to keep Fred company.
  3. After the students have given some responses, spread the remaining felt pieces out, and ask for volunteers to come up and give Fred some forest friends. After the students have put the pieces they want on the board, ask them to sit quietly so that Fred and his friends will not be afraid. Now you can introduce the felt pieces and explain what each one does in the forest (ex: relationship between plants and the sun, how every living thing is dependent on the sun in some way, relationships between animals and plants).
  4. When you're finished with your stories, tell them that Fred thanks them for being such nice visitors to his home!
- Extension:**
- Find stories about the forest and use the felt board to illustrate them.
  - Make up your own story to use on the felt board.



# WHAT WAS FOR LUNCH?

- Focus** To investigate a link of the food chain and discover the unique digestive traits of the owl.
- Group Size** Entire class
- Time Required** 1 hour
- Materials** Dark construction paper  
Rubber cement/glue  
Tooth picks  
Small water containers (*to moisten the pellets*)  
Owl pellets (*can be found in barns and abandoned rural buildings, or ordered through science catalogues, check to see if Cispus has any available*)  
available from Cispus staff:  
Charts: varied thrush, mole, shrew, vole (*skeletons*); bone sorting chart; food web chart  
Owl Pellet Kit (*teachers guide*)  
*The Barn Owl and the Pellet* by B. Gaussoin & J. Lapsansky  
Handout: *How To Dissect Lunch*
- Physical Setting** Standard classroom with working space
- Process**
1. Introduce the activity by briefly reviewing the food-chain cycle. Discuss the owl's contribution in that process and present the details of the owl's digestive system.
  2. Place students in groups of 4-7, so they can share their discoveries and questions with each other. Supply each group with an owl pellet, dark construction paper (the light colored bones will be easier to see), small water container, 2-3 toothpicks, and rubber cement.
  3. As the groups dissect their pellet they may need to moisten it to loosen the bones from the fur of the regurgitated animal.
  4. Make sure that the bone charts are placed where students can refer to them for bone identification. See if they can reconstruct a complete skeleton. Monitor the activity by encouraging student inquiries as well as interjecting questions requiring critical thinking skills.
  5. When all bones have been extracted, students can adhere their new-found collection into a display
- Discussion:**  
Lead a group discussion sharing the students' discoveries and unanswered questions.

## *How To Dissect Lunch*

1. Inspect your pellet and note the size, bones, feathers, whitewash, or any clues about where it may have come from.  
*You are a scientist.*
2. Gently pull apart the pellet, be very careful not to break any of the bones. You may want to add a few drops of water to soften up the fur. Carefully separate the bones from the fur or feathers, using the toothpicks. Be especially careful with the skulls and jaws, because they are the best way to identify an animal.
3. Look for evidence of the wool-eating moth in one of its life cycle phases: eggs, pupae casings, cocoons, or larvae.
4. Roll the last bits of fur between your fingers to find little bones or teeth that you may have overlooked.
5. Try to identify and reconstruct the skeletons of the animals you have found. How many animals were in your pellet?

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# GOING BUGGY!

<b>Focus</b>	To learn about identifying features and habitat of local aquatic insects.	
<b>Group Size</b>	Maximum of 20	
<b>Time Required</b>	2 hours ( <i>varies according to class size and depth of investigation</i> )	
<b>Materials</b>	<u>Collecting equipment</u> <u>Per group:</u> Magnifying glasses Collecting net/screen White observation pans Several glass viewing jars Tweezers/forceps Wet gear ( <i>for group members collecting the specimens</i> ) Handout: <i>Aquatic Insects of Yellowjacket Ponds</i> ( <i>available from Cispus staff</i> )	<u>Per student:</u> Drawing journal  <u>Class chart:</u> Sheet of butcher paper Marking pens
<b>Physical Setting</b>	Yellowjacket Ponds	
<b>Process</b>		

## Activity 1: COLLECTING GUIDELINES

1. Before beginning, explain to the class that you will be in an area that is home to a variety of creatures and that you want them to be able to explore it while creating as little disturbance as possible. Brainstorm ways to collect and study insects while doing as little harm to them and their habitat as possible.

Measures that should be included:

- Share specimens with other groups.
- Treat insects gently and release them as soon as possible.
- Have only one person from each group assigned to remove insects from their homes.
- Release insects into the same environment you found them in.

## Activity 2: COLLECTING AND STUDYING

1. Explain techniques for collecting insects:

- Use collecting net or screen to carefully capture insects
- Place into water-filled observation pans or viewing jars using forceps
- Keep insects cool and release them as soon as you can

2. Divide the class into groups of 4-5 and equip each with collecting materials and an identification guide.

3. Have each group select a section of the ponds to explore (the Additional Information section in the insect guide gives some suggestions about where the most common aquatic insects can usually be found). There are a variety of responsibilities to choose from (collecting insects, writing and drawing data,

organizing collection equipment, looking for insects, taking care of captured insects) and all group members should be involved in the process.

4. When an insect is discovered, capture and observe it carefully (Be careful, some of them do bite!). The students should sketch in their journals or write notes about where the insect was found (on a plant, in the mud, on the water's surface, etc.) and what it looked like. Then, using the insect guide, identify it. If no identification is made, write and draw as many details as possible, release the insect, and try to identify the insect using a more detailed guide. Share insects as much as possible with the other groups.

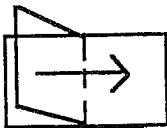
5. Make a class chart showing what insects were discovered, where they were found, how many there were, and whether they were immatures or adults.

#### **Discussion:**

1. Where did you find most of the insects?
2. Were they in places you expected to find them?
3. What similarities are there among the insects that you found?
4. What differences did you find?
5. What other life would you expect to find in this stream?
6. Pick one or two of the insects that your group found and describe the characteristics that make it suitable for its role in its environment.
7. Would you be likely to find the same specimens in a different aquatic environment? Why or why not?
8. What were the most difficult things about identifying your specimens? Is there a classification system you think would be easier to use in identification?
9. Pick seven objects that are lying around you. They can be anything: sticks, rocks, sand, dirt, leaves, etc. Now, imagine that you have to show an alien, from a world that has few similarities to our own, how to identify these objects. Use familiar identification systems or make up your own. When you've finished, test out your identification system by having someone in your group pretend to be the alien and identify the objects you chose.

#### **Assembly for Aquatic Insects of Yellowjacket Ponds:**

1. Remove booklet from the curriculum guide; keeping the pages in the same order.
2. Fold the entire sheaf in half, forming a booklet



3. Staple securely down the middle.