

“Only those who know the most about the land can appreciate how little we know about it. The last work in ignorance is the one who says of an animal or plant: ‘What good is it?’ If the land mechanism as a whole is good, then every part is good, whether we understand it or not.”

- *Aldo Leopold*

Wildlife

<i>time</i>	Three Hours
<i>objective</i>	To develop an appreciation for the variety and roles of wildlife in the Smokies and to practice observation skills
<i>concepts</i>	<ul style="list-style-type: none">🐾 Wildlife exists in many sizes and varieties.🐾 Each animal has a specific niche within a community, through which it affects the whole ecosystem.🐾 Wild populations are limited by the carrying capacity of their habitat.
<i>methods</i>	Students will explore a variety of Great Smoky Mountains habitats by looking for signs of wildlife; play active games in order to become familiar with the characteristics of Smokies wildlife as well as learn interactions between predators and prey; and build micro-habitats incorporating knowledge learned during preceding lesson activities.
<i>subject area</i>	Math, science
<i>materials</i>	Photos of Smoky Mountain animals, clothespins with animal names, animal sample question sheet, bear game sheet, bear game food cards, bears and boars chart, and study skins
<i>time</i>	<h2>INTRODUCTORY ACTIVITIES</h2> <h3>WHAT IS WILD?</h3> Ten Minutes
<i>lead-in</i>	<p>After meeting the group, walk to the open field. Explain that over the next few hours the students are going to examine various aspects of wildlife existence in Great Smoky Mountains National Park. They are going to hike while looking for signs of wildlife, but they will also be stopping to play a number of different games and activities which will help them understand more about the wildlife around them.</p>
<i>procedures</i>	<p>Ask the students some questions to get them thinking about wildlife. First of all, what is wildlife? (Wildlife can be any organism that lives in a natural, undomesticated environment, regardless of size or physical classification; and includes reptiles, amphibians, mammals, insects, etc.)</p> <p>What animals might live here in the Smoky Mountains? (Examples: deer, boar, fox, squirrel, opossum, snakes, birds, lizards, mice, beetles, ants, etc.) Even though these animals all live in this area, they can be found in other habitats as well. What is a <i>habitat</i>? (the place or type of environment where an animal gets its food, water, shelter, air, and living space)</p>



wrap-up

time

lead-in

procedures

wrap-up

Today they are going to be looking for wildlife or signs of wildlife activity in several areas. Do they think they will be more apt to see the animal or to see a sign that the animal has been there?

What signs of animals be seen? (deer browse on trees and shrubs, animal tracks, claw or scratch marks, animal scat, holes or nests in trees, etc.)

What type of habitat are the students standing in? What species of animals might be found in that habitat?

WILDLIFE EXPLORATION

Ten Minutes

Tell the students that they are now becoming detectives in search of the elusive animals of the Smoky Mountains. They are really going to have to keep their eyes, ears, and noses alert to observe clues of wildlife.

Divide students into pairs and ask each pair to find at least one sign of wildlife. Explain that one possible way of looking for signs of wildlife is to have each member of the pair specialize their observations for either the ground or above the ground.

The ground-lookers examine the ground for tracks, animal diggings, burrows, matted-down grass, or scat. Soft ground, snow, or sand along the trail should be examined for tracks with particular care.

The other search area is in the trees and shrubs. These areas should be scoured for buck rubs, bear claw marks, browse lines, or any signs of animals eating twigs or parts of trees (i.e., woodpecker holes). They should look in each area visited. This activity continues throughout the whole lesson.

Use this activity as an ambulator to get to the next area, and make sure each child finds one sign of wildlife. Subtle hints help sometimes. If everybody is having trouble finding signs of wildlife and the ground is dry, have the students lie in a wagon wheel with feet touching and heads fanned out in a circle to look in the tree tops for wildlife and signs of wildlife.

Gather the entire group together in a circle, if they are not already in a wagon wheel, and examine or discuss all signs of wildlife found. Discuss how being in pairs might have helped the group to find animal signs that may otherwise have been overlooked. Allow each child to speak. Ask the students if people have had an impact on wildlife. How?

time

lead-in



procedures

wrap-up

CENTRAL ACTIVITIES

MYSTERY CRITTERS

Twenty-five Minutes

Now that the students have been hiking and looking for wildlife signs, stop at a wide spot along the trail. Explain to the students that they are going to play a game of mystery in which each of them will have a clothespin with the name of an animal on their back. Show pictures of animals that live in the Smokies and address several of the animal sample questions towards each of the photos as you show them. In order to determine what their animal is, they need to ask questions of the group concerning the size, shape, habits, whether the animal is a carnivore, herbivore, or omnivore, and whatever they feel might be helpful. The person they ask can only respond with “yes,” “no,” or “maybe” in each case.

Begin by demonstrating the questioning procedure yourself. Have a child pick out an animal name tag and put it on your back. You will then ask the students the following questions, as well as any others that seem pertinent, until you guess the animal. Explain the difference between omnivore, carnivore, and herbivore when you ask that sample question.

ANIMAL SAMPLE QUESTIONS

- 1) Am I a mammal? A reptile? An amphibian? A bird? An insect?
- 2) Am I bigger than a rabbit? Smaller than a fox?
- 3) Do I have four legs? Two legs? Six legs? Eight legs?
- 4) Do I have a tail? Is it longer than a rabbit's?
- 5) Am I brown? White? Black? Am I more than one color?
- 6) Am I an omnivore? Carnivore? Herbivore?

Keep in mind that these are only sample questions, and they may want to make up more of their own.

After you have guessed your animal, put a clothespin on the back of one student at a time and allow the first student to stand up and turn slowly around so all students see his animal tag. Have the students in the group answer the questions asked by this student. Take turns until all students have discovered their animal. Alternatively, you may have the students work in pairs, with each partner wearing a clothespin.

Ask the students the following questions:

- What have they learned about the animals of the Smokies?
- Can they name the herbivores? (examples: rabbit, deer, mouse, squirrel, beaver)

time

lead-in



procedures

- Who are the carnivores? (examples: owl, hawk, snake, bobcat, wolf)
- Which group of animals is left? (omnivores)
- Did the students have animals that did not fit in to the categories of birds, mammals, or insects? What other groups were there? (arachnids, crustaceans, gastropods, annelids, fish...)

Next, the students are going to look at one type of interaction that takes place between animals living in the same or similar habitats.

PREDATOR-PREY

Thirty Minutes

Continue to look for signs of wildlife along the trail. Stop in an open flat area with as few obstructions as possible. Have the students sit in a circle. Review with them the definition of *habitat*. (a place where an animal lives) What is needed in this habitat? (food, water, shelter, and space) What might a rabbit or ground hog need in its habitat? (grasses and plants for food, trees and burrows for shelter, a stream for water, enough space to contain all these elements) What else might be in the habitat? The rabbit or groundhog may not want it there. (a predator)

Tell the students that they are going to play a game to learn more about the relationship between predators (animals which eat other animals), and their prey (the animals which are eaten).

Have all the students collect ten small rocks, sweetgum balls, acorns, or other objects to use as food tokens. Place the tokens in a circle. This is where the prey will get its food. They are now ready to play a game in which both predators and prey try to gather food and survive.

Divide the group so that three-fourths of the students are the prey species and one-fourth are the predator species.

The predators will be bobcats, common yet secretive animals in the park. They must capture three prey animals to survive.

The prey will be rabbits, which are one of the bobcat's major food sources in the park. A rabbit must collect five food tokens to survive.

Designate one area at least twenty yards from the food supply as the safe zone; this will represent a bush or thicket impenetrable to bobcats. The prey are to line up along the safe zone. As the game is being played, the prey are safe behind this line. When the prey are out on the game field, they can also be safe if they remain completely frozen. Rabbits hide in thickets or remain still when threatened. By remaining still, the students simulate this hiding.

The prey must collect five tokens to survive, but they can only collect one at a time. Each token must be brought back across to the safe zone before another can be collected.

wrap-up

The bobcats scatter throughout the playing field to begin the game. They can succeed in capturing prey by tagging a moving rabbit. If caught, the rabbit must accompany the bobcat to its den (the edge of the field). A bobcat cannot catch another rabbit until the first is left on the sidelines.

Play continues until all rabbits have either been caught or have collected five tokens.

Ask the students how it felt to be a predator or prey. Ask them if it was easier to be the predator or prey. (This question usually spurs mixed feelings and rarely leads to a group agreement on which was easier.)

Ask the students what they learned about wildlife from this activity. (Predators and prey both have to work at survival.) Why is predation (animals eating other animals) important? (It keeps populations in check.)

Play another round, but this time become overloaded with predators. Discuss the consequences of too many predators. In nature, what would the bobcats have to do if they wanted to survive? (move away, change food source, etc.)

Play a round with too many rabbits and not enough food for them. Try playing without any predators. What happens now? (habitat deterioration) Are predators necessary? What has happened to the populations of many predator species? Why?

You can also play a normal round, but secretly label some of the food as poisonous. Poisons, such as pesticides, can build up along a food chain. One poisonous token will not kill a rabbit outright, but a bobcat which has consumed three poisoned rabbits can be killed. There are many variations which you can try.

Hike further along the trail while looking for more animal signs and habitats.

time



lead-in

BEAR CARRYING CAPACITY GAME

Thirty Minutes

Explain that there are limitations on the numbers of any species in a given area, such as the Smokies. This is known as the area's *carrying capacity*. These limitations are often closely related to the amount of food available. In this game everyone will be bears competing for limited food resources.

procedures

Scatter the food cards over a fifty by fifty-foot area. Have students go to a place they designate as their den. Do not tell the students what the color, initials, and numbers on the cards represent just yet.

Tell them only that the pieces of paper are different kinds of bear food. Since bears are omnivores (like people), they like a wide assortment of foods, so they should gather different colors to represent the variety of food.

Have students collect cards, keeping in mind that bears do not run after their food and they must take it back to their den one piece at a time. No bear can steal food from another bear's den. When all the food has been collected, the students should bring their cards and sit in a circle.

Ask students about how it felt to be competing for their food. Explain that the numbers on each card represent the amount of energy available from that food source in a given area of bear habitat:

- **green cards** are grasses and plant leaves;
- **maroon cards** are berries and other fruit;
- **orange cards** are hard mast (acorns);
- **red cards** are animal matter;
- **yellow cards** are insects.

Have each student add up the points on his or her own cards, and explain that it takes eighty pounds per ten-day period to keep a bear alive. If a bear does not have eighty pounds of food, what happens? (The bear would either starve, migrate out of the area, or kill another bear and take over its territory.)

Discuss the idea that a given bear habitat can only support a limited number of bears. How many bears in this activity could have survived? The number of bears an area can support is called that area's carrying capacity. Have students calculate the carrying capacity by dividing the total number of points obtained by the group collectively by eighty (the number of pounds to keep a bear alive for ten days). Apply the carrying capacity idea to other animals (example: if the carrying capacity for deer in Cades Cove is three hundred animals, what happens if the Cades Cove herd contains five hundred deer?)

Play the game again, but explain to the group that not all bears are equally prepared to survive. Designate some students as having had cubs. These students will have to collect one hundred twenty pounds of food to feed themselves and their cubs. Blindfold a student. This bear tried to kill a raccoon, was scratched in the eyes, and is now blind. Designate others as old, crippled, injured by hunters, etc. Another variation includes having the students "bear walk" on hands and feet to obtain their food.

Discuss the results of each round.

wrap-up

Ask the students what different activities are that animals undertake in order to meet their needs for shelter, food, water, and space. What is the carrying capacity of an area for a certain species?

Do they think most species, not just bears, have a carrying capacity in a specific habitat?

If people destroy forests, build roads, or otherwise disturb the natural checks and balances in nature, do they think a certain area will be able to provide all the resources for the community of animals that live there, enabling each to reach its carrying capacity in that area? Why or why not?

Do they think the earth has a carrying capacity for people?

time



BEARS AND WILD HOGS

Thirty Minutes

Hike near the hog trap near the lagoons trail or along the West Prong loop but *do not get close enough to see it yet*. Seat the students in a group.

lead-in

Tell the students the following information:

Great Smoky Mountains National Park is one of the last remaining areas in the southeastern United States which is capable of maintaining a healthy and productive black bear population. For many, the black bear is the symbol of the park and eastern wilderness. Today one of the greatest threats to the bear comes from a non-native animal, the wild boar, more properly known as the wild hog. The hogs are descendants of European wild boars which escaped from a hunting ranch in North Carolina in the 1940s and interbred with domestic hogs. These animals compete with the native bears for food. They are particularly devastating in the fall when both animals eat acorns and other nuts. For the black bear, the fall food supply will determine how well they survive the winter and how many cubs are born.

Over three hundred exotic plants and animals inhabit the park. Because of the competition with native species and the threats that they create, they are an important management issue.

Ask the students:

- What is an *exotic* species? (any species not naturally found in an area)
- What are some examples? (hogs, mimosa trees, kudzu, witchgrass, and many fungi, such as chestnut blight and dogwood anthracnose)
- Why doesn't the National Park Service want these here? (competition, disease, habitat damage, etc.)

There are also introduced species like the rainbow trout. These are not truly exotic, because they are native to North America, but nonetheless are not native to the Smokies and have harmed the native fish.

procedures

Hand the "Bears and Hogs" charts out to the students and go over the information with them, then complete the population model at the bottom.

	<u>HOGS</u>	<u>BEARS</u>
Sexual maturity	16 months	3-4 years
Average offspring per year	4-8 piglets (5 is average)	1 cub (twins may be born every other year)
Mating life span	7 years	11 years

Ask the students for the average number of offspring for a female hog and bear, both called sows, over their lifetimes (hogs: 35 piglets, bears: 11 cubs). Now examine how a population might really work. Assume the current bear population is 1200 animals, half of which are females. The current hog population is about 600 animals, half of which are also females. Complete the following chart.

	<u>HOGS</u>	<u>BEARS</u>
Starting Population	600	1200
# of mature females (1/2 pop.)	# sows? (300)	# sows? (600)
Ave. litter size	5 piglets	1 cub (2/year every 2 years)
# offspring after 1 year	# piglets? (1500)	# cubs? (600)
Total new population	# animals? (2100)	# of animals? (1800)
# mature females 2nd year	# sows? (1050)	# sows? (900, but only 600 mature, assuming the same # died as came into maturity; remember, bears need 3 years to mature)
# offspring 2nd year	# piglets? (5250)	# cubs? (600) (2/year for 2nd year)
Total new population	# hogs? (7350)	# bears? (2400)

Ask the students:

- What does this tell us about these animals?
- Do wild populations really increase this fast? (no)
- What keeps them in control? (disease, predation, food, etc.)

As a native species, bears have all these controls, but as an exotic species, hogs lack some of these controls. Their population is less controlled than bears and therefore able to grow faster.

wrap-up

Divide the students into small groups. Ask them to imagine that they are the managers of this park. Have them work in their group to find a solution to the hog problem which falls within the guidelines of the park (minimal personnel, no Green Berets, no nuclear weapons, no massive forest fires, etc.). Discuss their recommendations.

Now hike up to the trap. Open the trap and have a student crawl in to set it: pull the stick attached to the rope down and slip it into the notched pegs in the ground. Slowly lower the door until the stick catches in the notches. **Keep students away from the door.** The National Park Service uses live trapping of hogs as one management technique. Baiting the trap with corn draws hogs in the area into the trap. Most animals caught in these traps are relocated to state lands where hunters can hunt them in season. Make sure everyone is away from the door, then tell the student inside to push the trigger stick.

Some animals caught in the traps are destroyed. The National Park Service has also hired well-trained hunters, the 'hog busters', to remove hogs. These hunters walk the high country at night with rifles which have been specially outfitted with spotlights. When an animal is heard in the woods, they are spotlighted. If it is a hog, the animal is shot and then moved away from any trail. Its remains will feed bears, crows, and turkey vultures, as well as the soil. Although it is sad to think of an animal dying, the native animals in the park will have better lives if there are fewer hogs.

CONCLUDING ACTIVITY

MODEL HABITATS

Thirty Minutes

Continue on the trail searching for signs of wildlife for a while. Stop at an area that is fairly flat and without much ground cover. Tell the students that they have seen some of the adaptations of animals and examples of possible interactions between animals. They are going to put all this knowledge together and build some habitats. What the students are going to do now is imagine that they are an animal. They can be any animal that might live here in the Smoky Mountains, including one from any previous activity. You may elect to use the animal tags used in the Mystery Critter activity.

Explain to them that they are going to construct a micro-habitat for their animal. Remind them that a habitat must contain all of the basic living requirements for their animal.

time



lead-in

procedures

Ask the students what the basic living requirements are. (water, food source, shelter, and enough space) Emphasize that what they are building is a habitat, not just a home, and all the basic living requirements are often not close to the den or nest. The place where the deer sleeps is not the only part of his habitat, because he may need to get water and browse quite far away from where he sleeps. Summer and winter requirements may also be different.

Have each student select an animal tag. Limit the students to two-foot square plots, or just let their imaginations go wild if you choose. They can use any kind of forest litter like pine needles, hemlock cones, sticks, leaves, etc. to represent their animal's shelter, water and food.

Help each student estimate how much space their animal might need to survive for a year. This is the animal's territory, and many species protect their territory from others of their kind. A wolf's territory may be more than twenty-five square miles, while a chipmunk may only need a quarter-acre. There are six hundred forty acres in a square mile.

Give the students ten to fifteen minutes to work on their habitats.

wrap-up

Once everyone has had sufficient time to construct a habitat, gather the group together and make a circuit of the habitats, allowing each person to describe her or his habitat to the rest of the group. Ask the students to explain their reasoning for each part of their model and the territory needed by their animals. Are there any special requirements which the animal needs for winter or summer? Leave all habitats as they are for now.

After touring all the habitats, tell the students that a new industry has made plans to open a factory nearby. This factory will be using water from the rivers in the area and will be dumping some treated waste into the rivers also. What impact will this have on their animals?

The factory may also be cutting trees in the area. Again, what is the impact on their animals?

So that people can get to this factory and their product can get to stores, a new road will be built through each area. Will this have any impact?

For wildlife, habitat loss is the single most important issue today. Most endangered species become threatened or extinct because of damage to their habitat. In the 1800s and early 1900s, the settlers watched huge flocks of passenger pigeons fly over the Smokies. In less than five years, the flocks went from numbers that resulted in their completely blocking out the sun when they passed to extinction. Homes, factories, farms, roads and stores were built on their habitat. Extensive hunting also lowered numbers to critical levels.

How can each person help save wildlife habitat? (REDUCE, REUSE and RECYCLE; share concerns with each other and elected officials, etc.)

*lesson
wrap-up*

Conclude by reviewing the concepts from the beginning of the lesson and discussing what the students discovered during the lesson. What types of wildlife did they see or find evidence of? What is the smallest example of Smokies wildlife they can think of? The largest? The rarest? The most common? What roles do different types of wildlife play in their ecosystems? What can cause populations to increase? To decrease? Why is it important to preserve wildlife habitat?

time



lead-in

OPTIONAL ACTIVITY

STUDY SKINS

Thirty Minutes

Hike to the Activity Center. Tell the students that they have had the opportunity to experience being animals, as well as looking for signs of wildlife activity around them. Explain that since it is not always possible to see the wildlife, they are going to participate in an activity in which they will learn more about animals through the use of study skins. Use bear, deer, and raccoon skins from the Mountain Room.

procedures

Seat the students in a circle. Tell them that you will be handing each one of them an animal skin and, with blindfolds on, they will have to study their animal. Explain that all of the things which have been discussed earlier in the lesson will be important. They do not need to know what their animal is, but they will need to determine what adaptations it has and where it might live. Tell the students that once they put on their blindfolds, no one can speak unless asked to do so. Pass out the blindfolds and have the students put them on.

Now bring out the study skins and give one to each student. Emphasize the importance of handling the animals with care so that future groups will have study skins to use.

After everyone has a study skin, go around the group (still with blindfolds on) and ask each student to describe their animal's adaptations (tail, size, fur, etc...) and tell where they think it might live.

After every student has had a turn, have them remove their blindfolds. **Please put study skins away!**

wrap-up

Ask the students if they noticed any adaptations by touching the animal that they might not have noticed otherwise. How did they feel about actually touching the animal rather than just talking about it?

*For other activities related to wildlife, see *The Forest in Winter, Life in the Forest, Little Creatures, and Stream Ecology**



BEARS AND HOGS CHART

	<u>HOGS</u>	<u>BEARS</u>
Sexual maturity	16 months	3-4 years
Average offspring/ year	4-8 piglets (5 is average)	1 cub (twins may be born every other year)
Mating life span	7 years	11 years

What is the average number of offspring for a female hog and bear, both called sows, over their lifetime?

Now, let's see how a population might really work. Assume that the current bear population is 1200 animals (half of which are females). The current hog population is about 600 animals, again about half of which are females. Complete the following chart.

	<u>HOGS</u>	<u>BEARS</u>
Starting Population	600 animals	1200 animals
# of mature females (1/2 pop.)	# of sows? _____	# of sows? _____
Avg. litter size	5 piglets	1 cub (2 per year every 2 years)
# offspring after 1 year	# of piglets? _____	# of cubs? _____
Total new population _____	# of animals? _____	# of animals?
# mature females 2nd year	# of sows? _____	# of sows? _____
# offspring 2nd year	# of piglets? _____	# of cubs? _____
Total new population	# hogs? _____	# bears? _____



BEAR CARRYING CAPACITY FOOD CHART

<u>KIND</u>	<u>LBS.</u>	<u>%DIET</u>
NUTS	20	25
BERRIES	20	25
PLANTS	20	25
INSECTS	12	15
MEAT	8	10
IN 10 DAYS	80	100