

INSECTS AND SPIDERS

Theme:

Grade Level: Second

Best Time to Plan Trip: Fall or Spring

Unit Rationale

Great Smoky Mountains National Park serves as a refuge for one of the most diverse collections of plants and animals in the temperate world. Some scientist estimate that over 100,000 different species of living organisms reside within the Park. A large percentage of these species include invertebrate such as insects and spiders.

This incredible diversity makes the Smokies an ideal location for study of classification by second grade students. In only a few hours, students will be able to locate and study many insects and spiders.

Visiting the Park also offers a wonderful opportunity to explore habitats and communities that are much different than that of a classroom or schoolyard. As they interact with this unique environment and it's inhabitants, they begin to realize that community elements, whether living or non-living, depend on the presence and contributions of all others.

Teachers can use Great Smoky Mountains National Park maps to teach students about legends and symbols and directions. Students will also learn to recognize the importance of maps in scientific research as they use their map on-site and develop a similar map of their schoolyard.

State Education Standards

Tennessee

Social Studies

Geography 2.3.01, 2.3.03

Science

Embedded Inquiry 0207.Inqs.1,2,3

Embedded Technology and Engineering 0207.T/E.2

Cells 0207.1.1

Interdependence 0207.2.1,0207.2.2, 0207.2.3

Flow of Matter and Energy 0207.3.1

Biodiversity and Change 0207.5.1

English

Communication 0201.2.1, 0201.2.2

Math

Number and Operations 02.06.2.1

//2009 standards//

State Education Standards

Tennessee

Social Studies

Geography

2.3.01 Understand how to use maps, globes and other geographic representations, tools and technology to acquire, process, and report information from a spatial perspective

2.3.03 Demonstrate how to identify and locate major physical and political features on globes and maps

Science

Embedded Inquiry

GLE 0207.Inq.1 Observe the world of familiar objects using the senses and tools

GLE 0207.Inq.2 Ask questions, make logical predictions, plan investigations, and represent data

GLE 0207.Inq.3 Explain the data from an investigation

Embedded Technology and Engineering

GLE 0207 .T/E.2 Apply engineering design and creative thinking to solve practical problems

Cells

GLE 0207.1.1 Recognize that plants and animals are made up of smaller parts and use food, water, and air to survive

Interdependence

GLE 0207.2.1 Investigate the habits of different kinds of local plants and animals

GLE 0207.2.2 Investigate living things found in different places

GLE 0207.2.3 Identify basic ways that plants and animals depend on each other.

Flow of Matter and Energy

GLE 0207.3.1 Recognize that animals eat plants or other animals for food

Biodiversity and Change

GLE 0207.5.1 Investigate the relationship between an animal's characteristics and the features of the environment where it lives.

English

Communication

GLE 0201.2.1 Develop critical listening skills essential for comprehension, problem solving, and task completion

GLE 0201.2.2 Develop critical speaking skills essential for effective communication

Math

Numbers and Operations

GLE 0206.2.1 Understand and use place value concepts to 1000.

//2009 standards//

North Carolina
Science

Competency Goal 1: The learner will conduct investigations and build an understanding of animal life cycles.

1.02 Observe that insects need food, air and space to grow.

1.03 Observe the different stages of an insect life cycle.

Competency Goal 4: The learner will conduct investigations and use appropriate technology to build an understanding of the concepts of sound.

4.01 Demonstrate how sound is produced by vibrating objects and vibrating columns of air.

4.02 Show how the frequency can be changed by altering the rate of the vibration

4.03 Show how the frequency can be changed by altering the size and shape of a variety of instruments.

4.04 Show how the human ear detects sound by having a membrane that vibrates when sound reaches it.

4.05 Observe and describe how sounds are made by using a variety of instruments and other “sound makers” including the human vocal cords.

//2004 standards//

TABLE OF CONTENTS

Activity	Page
Unit Rationale.....	1
State Learning Standards for Tennessee.....	2
State Learning Standards for North Carolina.....	3
Table of Contents.....	4
Planning Your Trip.....	5
Safety.....	6
Pre-Site Activities	
Pre Test.....	7
Teacher Key to the Pre-Test.....	9
Them versus Us.....	11
A Cricket Chorus.....	13
On-Site Activities	
Which Way do I go?.....	14
What Lies Beneath?.....	15
Journey Across the Sea.....	18
Post-Site Activities	
Service Learning Extension.....	20
Explore Your National Parks.....	21
Appendices	
Park Essentials to Know Before You go.....	22
What to Carry/ How to Pack for Your Trip.....	24
Resources and References.....	25

PLANNING A SUCCESSFUL TRIP INSECTS AND SPIDERS

Schedule for a day of activities in Great Smoky Mountains National Park

Morning:

Arrive at Metcalf Bottoms Picnic Area

- Use rest rooms
- Teacher Overview

Activity 1: Smoky Mountain Maps

Activity 2: Find and Observe Insects

- Lunch

Activity 3: HWA search

- Clean Up

Return to School

Planning a Successful Trip

- Check the weather before you go. There is a pavilion at Metcalf bottoms but occasionally groups have reserved it for a fee. If no one has reserved it, you may wish to conduct portions of the activity under the pavilion.

- School busses are not allowed to cross the one lane bridge in the Metcalf Bottoms picnic area. If you travel into the park through the Gatlinburg area, this will not be a concern. Schools from Blount County will need to enter from the Townsend Wye or from the Gatlinburg area. Entering from Wears Valley is not an option.

- Plenty of chaperones are recommended for the purposes of supervision the activities. We recommend that for the purposes of safety, one adult should be available for every four students.

INSECTS AND SPIDERS

SAFETY CONSIDERATIONS AND OTHER IMPORTANT INFORMATION

•Park Rules and Regulations

Great Smoky Mountains National Park is a federally protected public use area. Certain activities are prohibited by visitors. Be sure to read the rules and regulations of the National Park found in the appendix of this lesson. For further information or questions, you may contact the National Park at 865-436-1713. Please use common sense and appropriate planning whenever you participate in outdoor activities.

•Dressing for the Weather

Please remind your students to wear appropriate footwear and clothing for an extended outdoor program. Short pants, flip flops, or sandals are not recommended. Temperatures in the mountains can be 10-15 degrees colder than at your school. You may wish to alter portions of the program should inclement weather appear.

•Restrooms and Water

Restrooms and water fountains are located at Metcalf Bottoms picnic area. Water fountains are disconnected in the winter months. The pavilion is not available in the winter.

•Packing Lunches

Lunches may be eaten at any of the picnic tables in the area. If other groups have reserved the pavilion for a fee, then those few tables will not be usable. For ease of planning and for safety, teachers may wish to pack lunches and drinks in coolers and keep them on the bus until lunch. Outdoor grills are available at each picnic site. If you decide to grill out, NEVER leave food unattended.

•Group Size

The location and parking lot at this area can accommodate a large group (several classes). For the activities, students shall be put into small work groups, therefore, plenty of adult assistance is suggested.

•Cell Phones and Emergency Contacts

Within the National Park, cell phones are not always reliable. Be sure to stick to your agenda. Cell phones will pick up outside the Park in Wears Valley and Gatlinburg. In case of emergency call 911. For non-emergencies, contact Park Rangers at 865-436-1294. Again, if you do not have phone reception, contact the nearest Park Employee and they can assist using the Park's radio communication system.

•Poison Ivy

Poison ivy can be found in all locations of the park. Be sure you can identify this three-leaved plant. It can grow on "hairy" looking vines against trees, as well as on the ground. The leaves can be a shiny or dull, red or green in color.

PRE-SITE TEST

Pre- Site Score _____

Post-Site Score _____

Name: _____

Please circle the correct answer.

1. How many legs do insects have?

- (a) 3
- (b) 6
- (c) 8

2. How many body parts do insects have?

- (a) 4
- (b) 7
- (c) 3

3. What do all people, spiders, and insects have?

- (a) wings
- (b) antennas
- (c) eyes

4. Which one of these is one of the stages of a butterfly's life?

- (a) beetle
- (b) caterpillar
- (c) seed

5. Which of the following words is one of the four cardinal directions?

- (a) right
- (b) east
- (c) center

6. In which state map would you find part of Great Smoky Mountains National Park?
- (a) A map of South Carolina
 - (b) A map of North Carolina
 - (c) A map of Georgia
7. Which of these can you take away from the National Park?
- (a) A Jumping spider
 - (b) A Tiger Swallowtail Butterfly
 - (c) An empty soda can
8. What is the structure called on a spider that includes both the head and thorax?
- (a) cephalothorax
 - (b) antenna
 - (c) pedipals
9. An insect's habitat includes food, water, and_____.
- (a) sunlight
 - (b) shelter
 - (c) atmosphere
10. What does the Hemlock Woolly Adelgid look like on a Hemlock tree?
- (a) little patches of cotton
 - (b) red bumps
 - (c) water drops

PRE-SITE TEST

(Teachers: Administer this test once before teaching the pre-visit activities and once after the post site activities for comparable results of comprehension and retention)

Please circle the correct answer.

1. How many legs do insects have?

(a) 3

(b) 6

(c) 8

2. How many body parts do insects have?

(a) 4

(b) 7

(c) 3

3. What do all people, spiders, and insects have?

(a) wings

(b) antennas

(c) eyes

4. Which one of these is one of the stages of a butterfly's life?

(a) beetle

(b) caterpillar

(c) seed

5. Which of the following words is one of the four cardinal directions?

(a) right

(b) east

(c) center

6. In which state map would you find part of Great Smoky Mountains National Park?

(a) A map of South Carolina

(b) A map of North Carolina

(c) A map of Georgia

7. Which of these can you take away from the National Park?

(a) A Jumping spider

(b) A Tiger Swallowtail Butterfly

(c) An empty soda can

8. What is the structure called on a spider that includes both the head and thorax?

(a) cephalothorax

(b) antenna

(c) pedipals

9. An insect's habitat includes food, water, and_____.

(a) sunlight

(b) shelter

(c) atmosphere

10. What does the Hemlock Woolly Adelgid look like on a Hemlock tree?

(a) little patches of cotton

(b) red bumps

(c) water drops

PRE-SITE ACTIVITY

THEM VERSUS US

Duration: 30 minutes

Class Size: any

Materials:

As an introduction to the on-site activities, the following information will assist students in distinguishing invertebrates from one another.

Background information for the Class:

Close to one million invertebrate species have been named and described worldwide. Invertebrates are animals without backbones. A scientist attempting to identify invertebrates would try to classify (sort) an animal based on its characteristics. The broadest classification of any living creature is to determine what Kingdom it falls into. All animals are grouped in the Kingdom Animalia. Even humans belong to this Kingdom. Insects and spiders are very different from humans however. On an elementary level, humans are different from spiders and insects in their size, number of legs and skeletal make up. Scientifically, a taxonomist would identify characteristics of any species with classification taxonomy. For example, the second character description is to determine what phylum a species belongs to. Animals having a segmented body, paired limbs a hard outer skin (known as an exoskeleton) with flexible legs, bilateral symmetry (meaning each side of the body is a mirror image of the other) belongs to the phylum Arthropoda- this would include spiders and insects as well as a variety of other invertebrates.. 80 percent of all invertebrates belong to this Phylum. (Humans, having a notochord would be identified in the phylum Chordata)

From the Phylum description, we can begin to describe orders of animals based on other visible characteristics that students will be searching for on

the field trip. The first challenge is for students to understand how insects are different from spiders. The next step is to compare differences between the human body and insects and spiders.

Set Up:

Because they are very closely related, insects and spiders are sometimes confused upon identification. An observer can tell them apart by observing several different physical and behavioral characteristics. Ask the students to observe how a creature looks and behaves to determine if it is an insect or a spider or another member of the phylum arthropoda. Examples of arthropods for this activity can be gathered from numerous internet sites, picture books or even collecting specimens from the school yard to be passed around class in securely closed containers.

As a group, discuss the differences between insects and spiders only. Make a list like the one below on the board or on a flip chart of all the correct answers. Be sure to encourage answers about behavior and habitat as well as physical characteristics. Now add a third column to the list called "Me". Ask the students to compare insects and spiders characteristics to those of themselves. See the following page for an example chart.

Resources and References

National Wildlife Federation. "Incredible Insects."
Ranger Rick's Naturescope (1998)

PRE-SITE ACTIVITY

THEM VERSUS US TEACHER GUIDE

Insects	Spiders	Me
6 legs	8 legs	2 legs
3 main body parts (head, thorax, and abdomen)	2 main body parts (cephalothorax and abdomen)	2 main body parts
live in water and on land	usually live on land	live on land
have 2 antennae	have no antennae	have no antennae
eat plants and animals	usually eat other animals	eat plants and animals
most don't make webs	most make webs or use silk in different ways	don't make webs but do make houses
usually have 2 compound eyes and several simple eyes	usually have 8 simple eyes and no compound eyes	have simple eyes
usually have two pairs of wings	don't have wings	no wings
can bite or sting	can bite; all have poison to catch prey	can bite & hit; cannot sting
exoskeleton	exoskeleton	have skeleton on the inside

PRE-SITE ACTIVITY

A CRICKET CHORUS

Duration: 30 minutes

Class Size: any

Materials: Insect calls from various internet sources (search “Insect Sounds”), rhythm sticks, hand drum, maracas, tambourine

Using a variety of musical instruments suggested below, allow students to imitate insect sounds. For a challenge, help them write and perform their own “insect instrumental”.

Background information for the Class:

As with most species in the animal world, insects have methods of creating sounds to attract mates, and as a defense mechanism to protect themselves from predators. Primarily it is the males who make the loudest, if not the only sounds for their species. Sounds are generated through scraping of wings flaps against each other, rubbing of legs together (termed *stridulation*) or popping of membranes through muscle contractions (termed *crepitation* or *wing snapping*) against the ground or other surfaces.

Directions for this Activity:

Prepare students for this activity by searching internet sites (see suggested Resources at the end of this page) for insect sounds. Play a variety of these sounds for students to hear. Ask the students to imitate some of these sounds using their voices or other parts of their body. Explain to students the differences in how people communicate and how insects communicate.

Resources and References

Mankin, Richard, “Bug Bytes” USDA, 18 April 2007 <http://www.ars.usda.gov/pandp/docs.htm?docid=10919> (3 December 2007)

DeMary, John “The Insect World” Discovery Education 2007 <http://school.discoveryeducation.com/lessonplans/programs/insectworld/> (3 December 2007)

Insect	Instrument	Actual Sound
Crickets and some grasshoppers	Rhythm sticks with edges	Stridulation
Cicadas	Rhythm sticks	Vibrations of membranes called tymbals
Some beetles some grasshoppers, cockroaches	Hand drum	Striking part of the body against a surface
Gnats, mosquitos, hornest, wasps and bees	Brushing tambourine head	Vibration of wings or other body parts

ON-SITE ACTIVITY

WHICH WAY DO I GO ?

Duration: 30 minutes

Class Size: any

Materials: Free publications from Great Smoky Mountains National Park on the web or through the mail.

Background information for the Class:

Maps are a useful tool used by scientists and other park researchers to determine the location of species (plant or animal) in a location such as Great Smoky Mountains National Park. By noting on a map where plants are found to be living, researchers can locate the specimens again and again. This keeps researchers from the need to take species (such as picking plants) for study. Unlike plants, animals are mobile, so marking an animal's location may not lead a researcher back to the exact same animal, however, plotting animal locations on a map can help to identify the habitat, or home range for that animal, within an ecosystem. This short exercise will familiarize students with their own location on the class trip.

Set-Up

Pass out the following maps to the students in small teams: National park road map, regional map and map of the United States and or the state of Tennessee. The Park road map and regional map can be printed off at <http://www.nps.gov/grsm/planyourvisit/maps.htm> if you do not have access to a color printer, or cannot download the files, you may request free copies of these maps by calling 865-436-1713. The maps of the United States and of Tennessee should be brought from your school.

Using any technique (question/answer, team challenge, trivia), challenge the students to answer questions about their maps. Use the following list as a suggested guide.

Questions About Maps:

1. Find a body of water on your map
 - What color is water on a map?
- Find a town or city close to your school.
- Find the area/boundary of Great Smoky Mountains National Park.
- Find a road (name or route number) that leads into Great Smoky Mountains National Park
- Find the compass rose on your map.
 - What is a compass rose?
 - Why does it only show us North?
- Find a campground on your map
 - What is the symbol for a campground
- Find a picnic area on your map
 - What is the symbol for a picnic area?
- Find our location today (Metcalf Bottoms)

Continue activity by asking students what direction they would travel to get from one location to another (ex. If you are at Elkmont, which direction must you travel to get to Fontana Lake?)

Review:

Remind the students that maps serve a number of purposes. Maps can be used to find things- trails, rivers, people and even animals and plants. In a specific area of this picnic area, we will be looking for invertebrates. If we want to return to this spot during another month, or if we want to compare results with next year's class, we would want to return to this same area. Maps help us do all of this.

Resources and References

Maps Great Smoky Mountains National Park 14, August 2007. <http://www.nps.gov/grsm/planyourvisit/maps.htm> (3 December 2007)

ON-SITE ACTIVITY

WHAT LIES BENEATH?

Duration: 30 minutes

Class Size: any

Materials:

Background Information for the Class

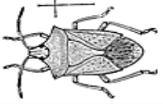
Students will use a natural area within the picnic grounds to seek and observe invertebrates. Animals and plants that live anywhere inside of Great Smoky Mountains National Park are protected by law. It is against the law to wilfully harm, destroy or take anything from the Park. Please be sure students understand this before continuing with this activity.

Set Up

Find an area along the perimeter of the picnic area or walking path suitable for students to study. Be certain that poison ivy has been identified by all participants and precautions are taken to avoid it. (For this reason, students should wear long pants and covered shoes during the outdoor experience).

In small teams, assign each group a clipboard with a tally sheet (see sample provided). The objective of this activity is to find a variety of invertebrates and to identify them by order and generate a tally of totals. This task assists students in recognizing the large diversity of life that is all around us. Great Smoky Mountains National Park is known for its diversity and abundance of the not only the great, but especially the small.

Order	Number Found	Total
<p data-bbox="167 237 435 296">Coleoptera Beetles and Weevils</p> 		
<p data-bbox="167 606 459 665">Lepidoptera Butterflies and Moths</p> 		
<p data-bbox="167 919 475 978">Hymenoptera Ants, Bees and Wasps</p> 		
<p data-bbox="167 1241 448 1299">Diptera Flies and Mosquitoes</p> 		
<p data-bbox="167 1509 524 1568">Orthoptera Grasshoppers and Crickets</p> 		

Order	Number Found	Total
Hemiptera Stink Bugs and Squash Bugs 		
Homoptera Leafhoppers, Cicadas 		
Arachnids Spiders 		
Isoptera Sow Bugs 		
Not an Insect or a Spider Centipedes, Millipedes, Snails, Worms    		

ON-SITE ACTIVITY

JOURNEY ACROSS THE SEA

Duration: 30 minutes

Class Size: any

Materials: Maps of Hemlock Woolly Adelgid (HWA) infested areas within Great Smoky Mountains National Park
Laminated photos of HWA, Dead Hemlock Trees, & Control Methods (these items available for loan by calling 865-436-1713)
White Cotton Towel (optional)
6 construction paper “Branches” with evergreen needles (optional)

Background Information for the Class:

Scientists at Great Smoky Mountains National Park now believe the hemlock woolly adelgid (pronounced *a-DELL-jid*) may pose the greatest threat to the ecology of the Smokies since the chestnut blight devastated the region in the mid 1900’s. This tiny insect is an *invasive exotic*- a creature that was accidentally introduced to the United States through nursery stock which now has a devastating effect on hemlock trees due to lack of natural predators. Without successful intervention, the hemlock woolly adelgid is likely to kill most of the hemlock trees in this 800 square mile national park. The Eastern hemlock tree (a conifer) is one of the most common trees in the Smokies. It thrives in a variety of habitats, from stream valleys and north slopes at lower elevations to ridges at elevations of 3,500 - 5,000 feet. Eastern hemlocks are evergreens that live to be over 600 years old and reach heights of greater than 165 feet.

Ecologically, the evergreen hemlocks are significant for a number of reasons. In ravines, dense stands of the evergreens shade streams, keeping them cool in the summer. This cooling effect (as much as 4 degrees Celsius) makes the stream hospitable for native brook trout and a host of other fishes and aquatic life. The shelter of hemlock groves is also a

preferred habitat for several species of migratory song birds. Public land managers do have a number of tools that have been proven effective against the hemlock woolly adelgid. The methods include: Insecticidal soap sprayed on the trees, applying insecticides to the soil around the base of hemlock trees to be absorbed through the root system, and the use of biological control including the lab-rearing and releasing of the predator beetles *Sasajiscymnus tsugae* and *Laricobius nigrinus*. The following activity allows students to visualize and portray the journey of the adelgid as it entered this country and began its damage.

Directions for this Activity

Ask students why insects are important? (pollinators, food web, decomposition) Ask students if insects can ever be harmful? (disease carriers, destructive in homes, nuisance) Tell students that sometimes insects are beneficial in their natural environments, but harmful in a different environment. (i.e. termites). Explain to students that you are going to introduce them to an insect the size of a pin head that has destroyed forests throughout eastern North America!

Optional: Involve the students by having them act out the following story. Refer to directions in parenthesis to instruct students.

A hemlock tree grows in Asia (have one student hold 2 branches). The tree is transported to the United States by boat to be sold to a landscaping company. A homeowner purchases the tree and it is planted in their lawn. An unsuspecting hitchhiker hidden in the tree awakens from the long journey and is pleasantly surprised to find new, lush green hemlocks in the forest surrounding his new home. This is the Hemlock Woolly Adelgid. (put cloth over a new student's head to represent HWA). The wind blows and the HWA is transported to the nearby

forest (3 students with branches become the forest) and has now infested the natural area outside the lawn...and his brothers and sisters are with him! These pests don't have any predators so they continue to multiply.

Tell students how Hemlock Woolly Adelgids (HWA) arrived in the eastern US (accidental introduction from nursery stock) over 50 years ago in Richmond, VA. Use the world map to show students how far HWA traveled (Asia to North America). Explain to students that HWA has native predators in Asia that control its population size. In the United States, HWA doesn't have any natural predators. Show them a photo of HWA and explain to them how HWA feeds on our native hemlock trees. (see the Resource section for sources of images)

Ask students what will happen if our hemlock trees die. (loss of habitat, increase in soil/stream temperatures, loss of species dependent on hemlock) Ask students if they have ideas on how we can stop the destruction left by HWA. (quarantine nursery stock, insecticides, introduction of predators)

Explain to students that National Park Service Rangers are challenged to protect all native species in Great Smoky Mountains National Park. The second portion of this activity (below) will allow students the opportunity to see how scientists use maps, insect observations, and graphs to monitor the spread of HWA in the Park and plan where the best control (chemical and biological) measures should occur.

Divide students into 2 teams. Send one group to monitor hemlock trees near the river (trees by the river are not eligible for chemical spray do to runoff that would enter the water source). Send one group to monitor hemlock trees that are not near water (trees which would be eligible for chemical spray) Have students check the tree for a white or blue paint mark on the bark near the base of the tree, indicating a systemically treated tree. Some trees on

stream banks may have been treated via stem injection and will have a paint mark as well. Divide the teams into small groups. Give each group a clip board, data sheet, and ruler. Students should count HWA on 5 different branches (**must be from the same tree**). Students should measure 10 cm from the tip of each branch and count all HWA found within that 10 cm section. If no woolly spots are found on each of the 5 branches, then this is entered into the data (enter zero). Use the data sheet to tally HWA. Have students add up their tallies and record the total number of HWA for all 5 branches. The Adelgids are identifiable as small cotton-like balls on the underside of the branches with needles. Each cottony spot can count as one adelgid although one spot may contain multiple adelgids. *Note: Hemlock Woolly Adelgids are easiest to see from mid-October through June, when ovisacs ("woolly" coverings) are fresh.

Gather both teams together. Make a large bar graph and illustrate for the students how many adelgids were found in each habitat. Discuss the similarities and differences. Ask students to evaluate how successful treatments have been in these two different areas. Students should make a recommendation for treatment.

Review:

Remind students how scientists use maps to record insect infestation data so that they can make management decisions for the entire Park. Mapping the information allows scientists to better evaluate which areas are most in need of treatment. They can also determine how close infested areas are to water (this is important because some treatment chemicals cannot be used near water.)

Resources and References

Hemlock Trees. Great Smoky Mountains

Association: National Park Service. 2006

POST-SITE ACTIVITY

SERVICE LEARNING EXTENSIONS

Duration: As much as needed

Class Size: any

Materials: Wooden picture frame, triangular pieces of wood, ground post or weatherproof string.

Background Information for the Class

Spiders can be beneficial to humans when they exist in their natural habitats. Spiders are a part of any food chain; they exist as predators, gobbling up flies, earwigs, crickets and various other creatures that are commonly found around building foundations. This activity will encourage students to appreciate the talents of spiders in their web weaving ability as well as encourage spiders to protect our homes from other pesky insects.

Caution: Be aware that once this project is completed, students should not directly handle any spiders that are attracted to the web frames. Spiders can bite if provoked but generally the venom is minimal and merely causes a reddened area of the skin. Some people may exhibit a local reaction to a bite and would want to consult a physician especially if the bite is slow to heal. The most dangerous spider bites can come from brown recluses and black widows. These spiders are very reclusive however, and have been found to make 3 dimensional webs. They leave the web in search of prey. The frame for this project will result in a 2 dimensional web, and may attract the common garden variety spiders, such as orb weavers.

Set Up

To build the web frame, a variety of techniques can be tested. One simple approach is to purchase a wooden picture frame (any size will do). Using 2 thin small pieces of wood, make a “spider nook” by cutting the wood into triangles and glue them in to

one corner of the frame. (Place them on the same corner of the frame, placing one on each side. Leave space between the two places like a pocket so a spider can hide while it awaits prey. Find a location with little disturbance activity, in a flower bed or on the edge of a forest or field. You can hang the frame from a tree limb, or fasten a post to it so that it can be stuck firmly in the ground. Remember, some of these spiders will be hoping to capture insects in flight, so be sure neither side of the frame is blocked.

Resources and References

Spiders are Good Guys. 19 August 2000.
<http://web.extension.uiuc.edu/champaign/homeowners/000819.html>

Build a Spider House. 30 May 2008. <http://www.spiderroom.info/buildaspiderhouse.html>

POST-SITE ACTIVITY

EXPLORE YOUR NATIONAL PARKS

Duration: 30 minutes

Class Size: any

Materials: internet access

The Great Smoky Mountains are world renowned for their diversity of plant and animal species. This great variety makes the park an exemplary outdoor laboratory for the study of relatively undisturbed native flora, fauna, physical environs and processes of the Southern Appalachians. The park is the largest federally preserved and protected upland area east of the Mississippi River offering park visitors a refuge from the stresses of everyday life.

You and your students can learn more about this special place as well as participate in on-line activities to further your knowledge of the National Park Service and other federally protected lands. Please check out the following web addresses:

Especially for Kids

To become a web ranger for the National Park Service, go to:
www.nps.gov/webrangers

To become a Junior Park Ranger at Great Smoky Mountains National Park or other parks, go to:
www.nps.gov/learn/juniorranger.htm

Especially for Teachers

For a comprehensive understanding of the background and development of the National Park Service that is perfect for teachers and others those who need the maximum amount of accurate information in the minimum amount of time, go to:
<http://wwwParkTraining.org>

The U.S. Department of Education is pleased to

announce the newly remodeled and updated Federal Resources for Education Excellence (FREE) website. It now provides richer, more expansive resources to teachers and students alike. There are over 1500 resources to take advantage of at FREE, ranging from primary historical documents, lesson plans, science visualizations, math simulations and online challenges, paintings, photos, mapping tools, and more. This easily accessible information is provided by federal organizations and agencies such as the Library of Congress, National Archives, NEH, National Gallery of Art, National Park Service, Smithsonian, NSF, and NASA. Go to:
<http://www.free.ed.gov/>

APPENDIX A

PARK ESSENTIALS TO KNOW BEFORE YOU GO

Traffic and Travel Tips

Restrictions on Large Vehicles

Trailers, RVs, and buses are prohibited on some secondary roads in the park, including Balsam Mountain Road, Greenbrier Road past the ranger station, Heintooga Ridge Road, Rich Mountain Road, Roaring Fork Motor Nature Trail, and the road exiting the park at Metcalf Bottoms Picnic Area. Caution is also advised when traveling on Little River Road between the Townsend entrance to the park and Elkmont Campground, and on the road leading into Cataloochee Valley.

Overheated Engines and Brakes

When traveling uphill on hot days, watch your engine temperature carefully to make sure it is not overheating. If overheating occurs, stop at a pullout to allow your vehicle to cool down before continuing.

When driving downhill on steep mountain roads, it is important that you shift to a lower gear to use the braking power of your engine to prevent your brakes from over heating and failing. If your vehicle has an automatic transmission, use “L” or “2.” (Overheated brakes smoke and give off an acrid smell.) Keep an extra cushion of distance between you and the vehicle in front of you as protection against sudden stops.

Avoid Collisions with Animals

Watch for animals crossing roads, especially at night. Scores of bears and other animals are killed by motorists every year. Following posted speed limits will reduce your chances of hitting wildlife.

Use Pullouts if Driving Slowly

As a courtesy to other park visitors, slow moving vehicles should use pullouts to let other cars pass. Pullouts are located every mile or so on most park roads.

Gas Stations

There are no gas stations or other related services available in the park. Complete services are available in Cherokee, NC, Gatlinburg, TN, and Townsend, TN.

Emergency Number

In the event of an emergency, call 911. For non-emergency calls to park headquarters, dial (865) 436-1200.

Pets

Dogs are allowed in campgrounds, picnic areas, and along roads, but must be kept on a leash at all times. The leash must not exceed 6 feet in length. Dogs are only allowed on two short walking paths—the Gatlinburg Trail and the Oconaluftee River Trail. Pets are not allowed on any other park trails. Pet excrement must be immediately collected by the pet handler and disposed of in a trash receptacle. Pets should not be left unattended in vehicles or RVs. Large national parks that have extensive backcountry areas as a rule do not allow dogs on trails. These include parks such as Yellowstone, Yosemite, Grand Canyon, Glacier, Rocky Mountains, and several others. Great Smoky Mountains National Park has prohibited dogs in the backcountry since the park was first established in the 1930s.

Hiking Safety

You are responsible for your own safety! Travel in Great Smoky Mountains backcountry areas has inherent risks and hikers assume complete responsibility for their own safety. Rescue is not a certainty! Carry a current park trail map and know how to read it.

- Carry 2 small flashlights or headlamps—even on a day hike. If you have trouble on the trail, darkness may fall before you can finish your hike.

APPENDIX A CONTINUED

PARK ESSENTIALS TO KNOW BEFORE YOU GO

Take adequate water—minimum 2 quarts per person per day. All water obtained from the backcountry should be treated either by filtering or boiling.

- Carry a small first aid kit.
- Check the current weather forecast and be prepared for quickly changing conditions.
- Wear shoes or boots that provide good ankle support.
- Avoid hypothermia (the dangerous lowering of body temperature) by keeping dry. Avoid cotton clothing. Dress in layers that can be easily removed or added as you heat up or cool down. Always carry a wind-resistant jacket and rain gear—even on sunny days!
- Don't attempt to cross rain-swollen streams; they will recede rapidly after precipitation stops and the wait may save your life! When crossing any stream more than ankle-deep: unbuckle the waist strap of your pack, wear shoes, and use a staff to steady yourself.

Ice and Wet Leaves

In winter, most trails at high elevation will be covered with ice. Use crampons or other traction devices for your boots. In autumn, loose, slick leaves on the trail cause many hikers to fracture their ankles. Be certain to wear ankle supporting boots.

Safety Around Wildlife

•Encounters With Bears

Bears in the park are wild and their behavior is unpredictable. Although extremely rare, attacks on humans have occurred, inflicting serious injuries and death. Treat bear encounters with extreme caution.

•Venomous Snakes

Two species of poisonous snakes live in the Smokies, the northern copperhead and timber rattlesnake. Although very few snake bites occur here, visitors should be cautious where they place their hands and feet, especially around old buildings and stone fences. No fatalities from snakebites have

ever been recorded in the park.

•Insects

Yellow jacket wasps are the insects of greatest concern. They build nests in the ground along trails and streams and are aggressive when disturbed. Avoid perfume, powder, and scented deodorants which may attract yellow jackets. Stings cause local swelling and can lead to severe allergic reactions in a few sensitive individuals. Such persons should carry epinephrine kits.

•Poison Ivy

Please be aware of the presence of Poison Ivy throughout the park, particularly in the spring, summer and fall. Poison ivy is a three leaved plant which can grow on the ground as well as on “hairy” vines up trees. To avoid chances of an allergic reaction, stay on trails and avoid direct contact with vegetation. If contact occurs or is a concern, wash affected parts in cold soapy water immediately.

APPENDIX B

WHAT TO CARRY/ HOW TO PACK FOR YOUR TRIP

The following information is recommended to assist students in packing for their trip.

From experience it has been found that students will often bring too many items on a class trip, or not enough of the right items.

For the **Insects and Spiders** trip,

Students should wear:

- Sturdy walking shoes. Hiking boots are not necessary, but flip flops or slip on shoes are not appropriate for the walking portion of this trip.
- Long pants are suggested any time you visit the National Park. This is the best precaution against cool temperatures, bee stings and ticks.

Students should bring:

A lunch which includes water to drink, and healthy meal to provide them with energy for extended periods of walking and learning.

These lunches will be packed and kept on the bus until lunchtime.

Other reminders:

Students will not need anything except the materials that the teacher provides. iPods or other electronic devices (if permitted on the bus) should not be brought off the bus during any part of the program.

- Cameras are recommended to preserve memories of the trip and to share with family members.

APPENDIX C

RESOURCES AND REFERENCES

Build a Spider House. 30 May 2008. <http://www.spiderroom.info/buildaspiderhouse.html>

DeMary, John “The Insect World” Discovery Education 2007
<http://school.discoveryeducation.com/lessonplans/programs/insectworld/> (3 December 2007)

Mankin, Richard, “Bug Bytes” USDA, 18 April 2007
<http://www.ars.usda.gov/pandp/docs.htm?docid=10919> (3 December 2007)

Maps Great Smoky Mountains National Park 14, August 2007.
<http://www.nps.gov/grsm/planyourvisit/maps.htm> (3 December 2007)

National Wildlife Federation. “Incredible Insects.” Ranger Rick’s Naturescope (1998)

Spiders are Good Guys. 19 August 2000.
<http://web.extension.uiuc.edu/champaign/homeowners/000819.html>