

BIODIVERSITY



*Ranger Led
Program*

THEME: Biodiversity
GRADE LEVEL: 6th, 7th, and 8th grade
BEST TIME TO PLAN TRIP: Fall or Spring

UNIT RATIONALE

Great Smoky Mountains National Park is made up of a variety of ecosystems. To help better understand the complexity of these ecosystems, an inventory is being taken of all the living organisms in the park. The All Taxa Biodiversity Inventory (ATBI) is a project of Discover Life in America (DLIA) that seeks to inventory the estimated 100,000 species of living organisms in Great Smoky Mountains National Park.

STATE CURRICULUM STANDARDS - TENNESSEE

SIXTH GRADE

SCIENCE

Embedded Inquiry

- SPI 0607 Inq. 1
- SPI 0607 Inq. 2
- SPI 0607 Inq. 3
- SPI 0607 Inq. 4
- SPI 0607 Inq. 5

Independence

- SPI 0607 2.1
- SPI 0607 2.2

English/Language Arts Communication

- SPI 0601.2.4
- SPI 0601.2.5

SEVENTH GRADE

SCIENCE

Embedded Inquiry

- SPI 0707 Inq. 1
- SPI 0707 Inq. 2
- SPI 0707 Inq.3
- SPI 0707 Inq. 4
- SPI 0707 Inq. 5

English/Language Arts Communication

- SPI 0701.2.7
- SPI 0701.2.8

EIGHTH GRADE

SCIENCE

Embedded Inquiry

- SPI 0807 Inq. 1
- SPI 0807 Inq. 2
- SPI 0807 Inq. 3
- SPI 0807 Inq. 4
- SPI 0807 Inq. 5

Biodiversity and Change

- SPI 0807.5.1
- SPI 0807.5.2
- SPI 0807.5.3
- SPI 0807.5.4

English/Language Arts Communication

- SPI 0801.2.7
- SPI 0801.2.8





SIXTH GRADE

SCIENCE

Embedded Inquiry

SPI 0607 Inq. 1 Design a simple experimental procedure with an identified control and appropriate variables.

SPI 0607 Inq. 2 Select tools and procedures needed to conduct a moderately complex experiment.

SPI 0607 Inq. 3 Interpret and translate data into a table, graph, or diagram.

SPI 0607 Inq. 4 Draw a conclusion that establishes a cause and effect relationship supported by evidence.

SPI 0607 Inq. 5 Identify a faulty interpretation of data that is due to bias or experimental error.

Interdependence

SPI 0607.2.1 Classify organisms as producers, consumers, scavengers, or decomposers according to their role in a food chain or web.

SPI 0607.2.2 Interpret how materials and energy are transferred through an ecosystem.

ENGLISH/LANGUAGE ARTS

Communication

SPI 0601.2.4 Select the most appropriate behaviors for participating productively in a team (e.g., contribute appropriate and useful information and ideas, understand the purpose for working as a team, understand the responsibilities of various roles within the team).

SPI 0601.2.5 Identify the functions and responsibilities of individual roles within an organized group (i.e., reporter, recorder, information gatherer, leader, timekeeper).

SEVENTH GRADE

SCIENCE

Embedded Inquiry

SPI 0707 Inq. 1 Design a simple experimental procedure with an identified control and appropriate variables.

SPI 0707 Inq. 2 Select tools and procedures needed to conduct a moderately complex experiment.

SPI 0707 Inq. 3 Interpret and translate data into a table, graph, or diagram.

SPI 0707 Inq. 4 Draw a conclusion that establishes a cause and effect relationship supported by evidence.

SPI 0707 Inq. 5 Identify a faulty interpretation of data that is due to bias or experimental error.

ENGLISH/LANGUAGE ARTS

Communication

SPI 0701.2.7 Select the most appropriate behaviors for participating productively in a team (e.g., ask primarily relevant questions that move the team toward its goal and contribute to the topic of discussion, articulate the goals that have been provided for the team work and ask clarifying questions, come to agreement by seeking consensus or following the majority).

SPI 0701.2.8 Identify the functions and responsibilities of individual roles within an organized group (i.e., reporter, recorder, information gatherer, leader, timekeeper).





EIGHTH GRADE

SCIENCE

Embedded Inquiry

SPI 0807 Inq. 1 Design a simple experimental procedure with an identified control and appropriate variables.

SPI 0807 Inq. 2 Select tools and procedures needed to conduct a moderately complex experiment.

SPI 0807 Inq. 3 Interpret and translate data into a table, graph, or diagram.

SPI 0807 Inq. 4 Draw a conclusion that establishes a cause and effect relationship supported by evidence.

SPI 0807 Inq. 5 Identify a faulty interpretation of data that is due to bias or experimental error.

Biodiversity and Change

SPI 0807.5.1 Use a simple classification key to identify an unknown organism.

SPI 0807.5.2 Analyze structural, behavioral, and physiological adaptations to predict which populations are likely to survive in a particular environment.

SPI 0807.5.3 Analyze data on levels of variation within a population to make predictions about survival under particular environmental conditions.

SPI 0807.5.4 Identify several reasons for the importance of maintaining the earth's biodiversity.

ENGLISH/LANGUAGE ARTS

Communication

SPI 0801.2.7 Select the most appropriate strategies for participating productively in a team (e.g., gain the floor in orderly ways, meet or set deadlines for completing each task, come to agreement by seeking consensus or following the majority).

SPI 0801.2.8 Identify the functions and responsibilities of individuals within an organized group (i.e., reporter, recorder, information gatherer, leader, timekeeper).





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PLANNING A SUCCESSFUL TRIP

BIODIVERSITY



SCHEDULE FOR A DAY OF ACTIVITIES IN GREAT SMOKY MOUNTAINS NATIONAL PARK

- Arrive at Twin Creeks Science and Education Center for restrooms and to meet rangers
- Activity for half of the group: ground plots
- Activity for half of the group: microscopes
- Eat lunch then switch activities
- Reload bus and return to school

Planning a Successful Trip

- The location for this trip is at the Twin Creeks Science and Education Center, located near Gatlinburg.

Directions:

- Turn at traffic light #8 (can only turn one way) onto Airport Road/Cherokee Orchard Road/Roaring Fork Motor Nature Trail.
 - Continue for 2 miles (stay to right on Cherokee Orchard Road at intersection with Park Vista Hotel).
 - Turn right at sign for Twin Creeks Science and Education Center.
 - Science and Education Center will be on your left.
 - Take first right (toward picnic pavilion) and park at pavilion or in bus parking along road (cars can park in gravel lot on right)
- There is no cost to use this site.
 - Arrange to have a teacher or chaperone available for every 10 students.
 - Safety is of the utmost importance, especially in a National Park. Be sure to read the safety



SAFETY CONSIDERATIONS AND OTHER IMPORTANT INFORMATION



- Great Smoky Mountains National Park is a federally protected public use area. Please help the rangers keep all of the plants and animals protected in the park by not picking the plants or taking anything from the park.
- Please remind your students to wear appropriate footwear and clothing for this extended outdoor experience. Flip flops, slip-on shoes, or sandals are not appropriate for the program.
- Temperatures in some parts of the park can be 10-15 degrees colder than at your school. Long pants and layers are suggested for the program. Pants are the best precaution against cool temperatures, bee stings, ticks, and poison ivy.
- Within the park, cell phones are not always reliable. Rangers will follow the on-site agenda. If an unexpected problem occurs, rangers do carry park radios to make contact with the park dispatch office. For non-emergencies, call the Park Ranger dispatch at 865-436-1230 or contact a park employee.

Animals and Plants of Concern in the park

- All animals in the park are wild and their behaviors are unpredictable. Treat all animals with caution.
- Venomous snakes - Two species of venomous snakes live in the Smokies, the copperhead and timber rattlesnake. Students should be cautious where they place their hands and feet.
- 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. Stings cause local swelling and can lead to severe allergic reactions in sensitive individuals. Such persons should carry epinephrine kits.
- Poison Ivy - 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 wear long pants, stay on trails, and avoid direct contact with vegetation. If contact occurs or is a concern, wash affected parts in cold soapy water immediately.
- It is extremely helpful to rangers leading the program for students to wear clearly labeled name tags with first names only.
- Pets are not allowed on most park trails. Please do not bring them on the field trip.
- For more information about the park (Things to Know Before You Come) please visit the park’s website: <http://www.nps.gov/grsm/planyourvisit/things2know.htm>



PRE-SITE ACTIVITY: BACKGROUND INFORMATION OF BIODIVERSITY IN THE SMOKIES



Grade Level: Middle
School

Subject Area: Science

Activity time: 30 minutes

Setting: Indoors

Skills: Analyzing; Assessing;
Connecting; Listening

Vocabulary: Biodiversity;
Organism; Species

Objective: To understand the biodiversity of the Great Smoky Mountains National Park.

Materials: Internet access

Background:

The Great Smoky Mountains National Park is a 2,200 square kilometer (800 square mile) reserve that straddles the mountainous divide between the states of Tennessee and North Carolina. With some of the highest peaks in eastern North America, the geology of the park is complex. Although known for its temperate forest richness and extensive old-growth forests, the park is challenged with a number of threats to its ecological integrity. These threats include invasive, exotic organisms in both terrestrial and aquatic systems; very high depositions of nitrogen and sulfur, high ozone levels; and increasing insularity as a result of human development and fragmentation of adjacent natural areas.

To help better understand the complexity of park ecosystems, an inventory is being taken of all the living organisms in the park. The All Taxa Biodiversity Inventory (ATBI) is a project of Discover Life in America (DLIA) that seeks to inventory the estimated 100,000 species of living organisms in Great Smoky Mountains National Park. The project has developed checklists, reports, maps, databases, and natural history profiles that describe the biology of this rich landscape to a wide audience. The species level of biological diversity is central to the ATBI. However, the project is developed within an ecological and conservation context. It also encourages understanding at other levels of organization, including genetic variation within species and ecosystem descriptions. As of January 2010, discoveries include 907 species new to science and 6,582 species new to the Park.

Procedure:

View the Biodiversity podcast video at <http://www.thegreatsmokymountains.org/eft/10modules.html>. Turn the microscope knob that appears on the computer screen to Section 1, Understanding Biodiversity. Click “Watch Video” and view video.

Discuss reasons for the vast biodiversity in Great Smoky Mountains National Park. Compare and contrast to other regions’ biodiversity.



ON-SITE ACTIVITY PARK RANGER DIRECTED LESSONS



Grade Level: Middle School

Subject Area: Science

Activity Time: 3 hours

Class Size: Maximum 50 students

Setting: Outdoors/Indoors

Skills: Analyzing; Categorizing; Classifying; Collecting Information; Comparing; Constructing; Contrasting; Demonstrating; Hypothesizing; Observing; Recording Data; Research

Vocabulary: biodiversity; class; dichotomous key; family; genus; hypothesis; kingdom; micro-organisms; order; organism; phylum; scientific method; scientific plot; species

Objectives: Students will explore biodiversity in different ecosystems within Great Smoky Mountains National Park.

Materials: Study equipment provided by park rangers

Background:

The following is a brief description of your on-site activities. These activities will be led by park staff, but please be familiar with them, as the classroom teacher may be asked to assist on-site.

Smokies Ground Plot (1.5 hours)

To help scientists understand what biotic and abiotic elements are present in an ecosystem, small areas will be explored. Students will construct plots, inventory the biotic elements, and record environmental conditions. Scientific tools will be provided for students to collect and identify macroinvertebrates.

Microfauna Extraction and Observation (1.5 hours)

Students will be given an introduction to micro-organisms that are found in Great Smoky Mountains National Park. Using microscopes, students will have the opportunity to see and identify microscopic organisms.



POST-SITE ACTIVITY

STEWARDSHIP



Grade Level: Middle School

Subject Area: Science

Activity time: 30 minutes

Setting: Classroom

Skills: Applying;
Communicating; Connecting

Vocabulary: conservation;
protection; stewardship

Objectives: To understand what the term “Stewardship” means and how students can become a steward in their school and their community.

Materials: Internet access

Procedure:

To view the Stewardship podcast video go to

<http://www.thegreatsmokymountains.org/eft/10modules.html> Turn the microscope knob that appears on the computer screen to Section 7, Backyard Stewardship. Click “Watch Video” and view video. Ask students how they can become stewards within their own school and community.



POST-SITE ACTIVITY

EXPLORE YOUR NATIONAL PARKS



Grade Level: Middle School

Subject Area: Science

Activity time: 30 minutes

Setting: Indoors

Skills: Varying skills depending on activities selected

Vocabulary: Varying vocabulary depending on activities selected

Objective: To teach students about the various aspects of the National Park Service.

Materials: Internet access

Background:

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

To learn how 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://www.ParkTraining.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 1,500 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, National Endowment for the Humanities (NEH), National Gallery of Art, National Park Service, Smithsonian, National Science Foundation (NSF), and National Aeronautics and Space Administration (NASA). Go to: <http://www.free.ed.gov/>



PARENT/CHAPERONE LETTER



Greetings Parents/Chaperones:

Park rangers are pleased to be presenting an educational program to the students in Great Smoky Mountains National Park. In order to achieve the goals for a successful program, the park rangers will need your assistance in the following ways:

(These points will help to ensure that park rangers and teachers will be able effectively conduct the lessons and activities throughout the trip.)

- The program will be conducted outside and there will be some hiking throughout the trip. Prepare your student with appropriate footwear, long pants, layers, and rain gear.
- If your child is bringing a lunch from home, we recommend that students bring water to drink and a lunch with minimal packaging. Soft drinks are usually left unfinished by students, and remaining sugary drinks cannot be poured out on the ground. (Minimally packaged lunches lead to less trash being left behind or scattered by the wind. Additionally, this reduces the accumulated trash to be disposed).

If you are a chaperone attending the field trip:

- Please be an active part of the lessons. Keep up with the group and listen to the information being given in the case that you may be called upon to assist (handing out materials, sub-dividing groups etc.).
- Please do not hold conversations with other chaperones or use a cellular phone while the rangers are teaching the students.
- Refrain from smoking during the trip. If you must smoke, please alert a ranger or teacher and remove yourself from the group.
- Please be aware that the program will be conducted outside and that there will be some hiking throughout the trip. Prepare yourself with appropriate footwear, long pants, layers, and rain gear.
- We recommend that parents and students bring a small towel in their backpacks to sit on at lunch (there are no picnic tables at the program site).

Thank you for your needed assistance. We look forward to meeting you on the program!

Sincerely,

The Education Staff at Great Smoky Mountains National Park

