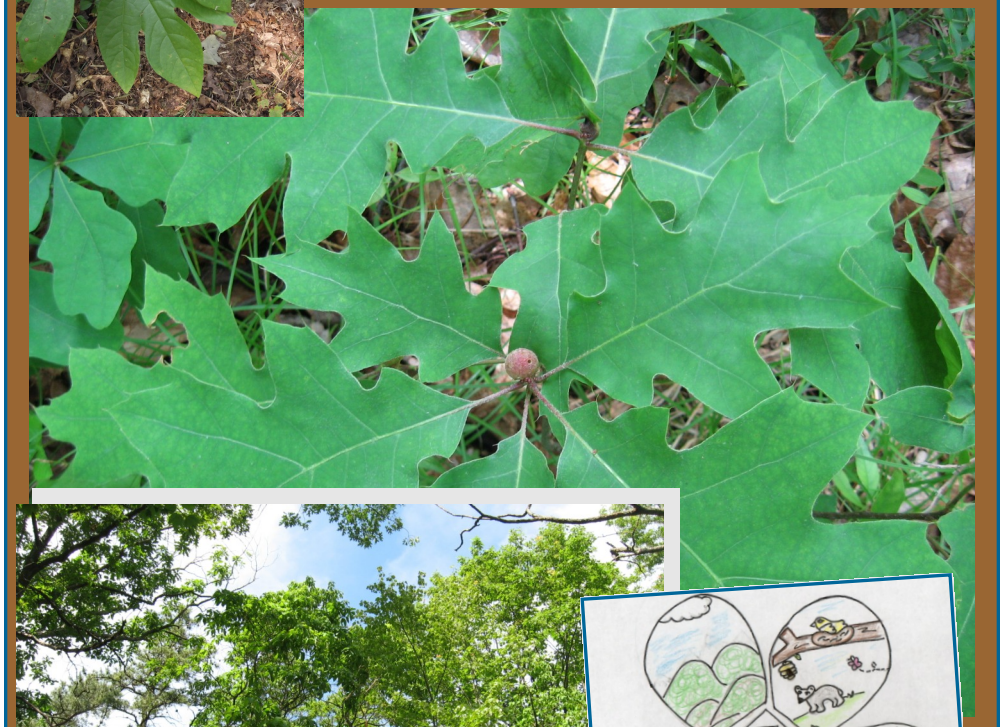
Glossary of Relevant Terms:

- **Browse:** Parts of woody plants that are eaten by animals.
- **Deciduous:** Trees that shed their leaves each fall.
- **Evergreen:** Trees that do not shed their leaves annually.
- **Lobe:** When the edges of a leaf include relatively large, rounded projections from the main leaf.
- **Phloem:** Part of a tree's vascular system, phloem is responsible for moving sugars from the leaves to the roots of a tree.
- **Stand:** A group of trees.
- **Standing dead:** Also known as "snags" these are dead trees that have not fallen to the forest floor. They can provide habitat to other animals and insects.
- **Xylem:** Another part of a tree's vascular system, xylem transports water and minerals throughout the tree.

Development of this guide was the result of a partnership between the East Stroudsburg Area School District, the Pike County Conservation District and the Pike County Office of Community Planning. Support from the Pike County Board of Commissioners and grant funding from the Pennsylvania Department of Environmental Protection's Environmental Education Grants Program contributed to the production of these materials.

Trees

At East Stroudsburg Area School District's North Campus



Outdoor Learning Guide

How to use the Outdoor Education Guide

This Outdoor Education Guide is intended to provide faculty and staff with a background knowledge of what can be found on the North Campus Trail. While the Interpretive Trail Guide provides a brief overview of the natural features found along the North Campus Trail, the Outdoor Education Guides go into greater detail on five of the Trail's most salient features. The five Outdoor Education Guides augment the topics presented in the Interpretive Trail Guide with case studies, discussion questions, and examples found along the North Campus Trail. These guides are not meant to take the place of existing lessons and instruction; instead, this guide should be used to help draw connections between the North Campus Trail and existing classroom instruction.

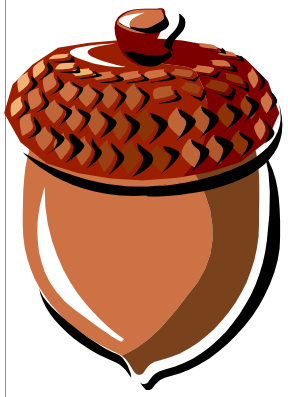
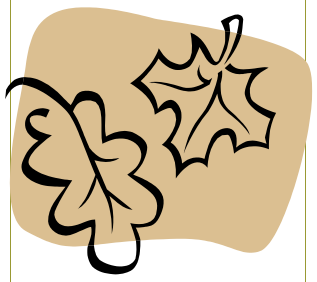
Access Road to North Campus Trail (PCCP Photo)

Outdoor Education Guide Series:

- **Green: Interpretive Trail Guide**
- **Red: Invasive Species**
- **Blue: Water and Watersheds**
- **Grey: Local Geology and Soils**
- **Brown: Trees**
- **Orange: Ecology and Species Habitat**

What can you see?

Watch for these things while on your adventure! Please don't pick up or disturb any items on your hunt. Want another challenge? Take a picture of all the items you find so you can look for them at home too!

Pinecone	Acorn	Two different leaves
		
An animal living in a tree	**A "Snag"**	Something living on a tree
	 (PCCP Photo)	 (PCCP Photo)

Information Referenced:

Chastagner, Dr. Gary. "Tree Physiology and Growth." *University of New Hampshire Cooperative Extension.* March 2008. http://extension.unh.edu/resources/files/Resource000986_Rep2351.pdf (accessed March 1, 2013).

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Pennsylvania Natural Heritage Program. *Pike County--Natural Heritage Inventory 2011.* Pittsburgh: Western Pennsylvania Conservancy, 2011.

Roth, Paul; Harmon, Rance; The Penn State University. "Identifying Pennsylvania Trees: Pennsylvania Forest Stewardship Program." *Pennsylvania Department of Conservation and Natural Resources.* January 2002. http://www.dcnr.state.pa.us/cs/groups/public/documents/document/dcnr_002216.pdf (accessed March 1, 2013).

United States Department of Agriculture: Natural Resources Conservation Service. *Fact Sheets & Plant Guides.* http://plants.usda.gov/java/factSheet (accessed March 1, 2013).

United States Forest Service Rangeland Management Botany Program. *Celebrating Wildflowers: Lichens.* http://www.fs.fed.us/wildflowers/interesting/lichens/index.shtml (accessed March 5, 2013).

Trees 101

What kinds of trees are in this area?

The Bushkill area of southern Pike County is characterized by oak forest. This includes a variety of oaks, including white, red, and black oak, as well as red and sugar maple, blackgum (also known as the sourgum or black tupelo), black and red spruce, and white pine. Other trees, such as the pitch pine and the sassafras have been found in the area. Approximately 78% of Lehman Township is covered by forest.

Why do some trees choose this area over other areas?

Trees, like other organisms, reside in some areas over others based upon the amount of sunlight, climate, soil type, availability of water, nutrients, and other factors.

Why are trees important?

Trees provide a number of benefits, including shade and temperature control, habitat, soil retention, conversion of carbon dioxide to oxygen, and stormwater management.

How can you identify the type (or species) of tree?

A tree can be identified through several characteristics: its shape, bark, leaves, size, flowers/fruits, buds, twigs, and branching pattern. Generally speaking, the more of these items that are available, the easier it becomes to identify a tree. One of the basic divisions between trees is whether or not they shed or keep their leaves each fall. Trees that annually shed their leaves are **deciduous**, while those whose leaves remain are considered to be **evergreens**.

What are the names for the major parts of a tree, and what do they do?

Leaves: Leaves are generally located at the end of twigs, on the outermost parts of a tree. Leaves take in carbon dioxide gas during the daytime to create sugars that can be used for food by the tree. This process, called photosynthesis, takes in sunlight and carbon dioxide to produce glucose (a simple sugar) and oxygen.

Stems/Branches/Trunk: The tree's trunk is the "woody" part of the tree, that links the roots to the leaves. This section of the tree transfers water, hormones, sugars and minerals between the leaves and roots through its vascular network of **phloem** and **xylem**. The glucose produced by the leaves during photosynthesis is transferred through the tree's vascular system of phloem and is stored in this section and the roots until needed for use by the tree. The network of xylem in the tree is used for transport of water and minerals.

Above Photo: Lichen on bark found on the North Campus Trail (PCCP Photo)

Many trees along the North Campus Trail provide habitat for other plants, animals, and organisms. The Trail Guide provides examples of how shelf fungi feeds off of the dead tissue of trees, or how pileated woodpeckers drill holes into trees in search of insects. Another organism you will find on trees and rocks in the forest is a unique organism--lichen. Lichens are the blue-green colored "mats" that will stick to tree bark and rocks. Lichens are actually a combination of two organisms, a fungi and an algae (or a bacteria, in the case of cyanobacteria). The algae component provides sugar to the lichen by way of photosynthesis, and the fungi provides habitat for the algae.

Roots: Roots anchor trees into the soil. They aid in the absorption of water and nutrients. Roots may form a symbiotic relationship with mycorrhizal fungi in the exchange of nutrients needed by both the tree and the fungi. Roots are also used by a tree to store sugars until needed by the tree for growth, and at night, when photosynthesis is not possible.

For a more detailed discussion on plant anatomy, please see Pennsylvania's Department of Conservation and Natural Resource's publication, "Common Trees of Pennsylvania." The link to this PDF can be found in the resources section towards the back of this guide.

est stewardship, white-tailed deer, and sustainable forestry. Lesson plans, educational materials, and quizzes are also included. As of January 2013, the site can be accessed at: **http://ecosystems.psu.edu/youth/sftrc/from-woods**

- The *Natural Enquirer*, a middle school science journal from the United States Department of Agriculture has several issues that may be of interest, including "The World's Forest" and "Wildland Fire." These publications contain information and activities for students. As of January 2013, the link to the website is: **http://www.naturalinquirer.org/**. Journal issues can be downloaded for free from the website, click "View & Order Journals."

- *Project WILD:* Project WILD is an interdisciplinary conservation and environmental education program emphasizing wildlife. This program periodically publishes a Curriculum and Activity guide for Grades K-12. To receive further information and materials from this program, the contact for Pennsylvania is Theresa Alberici with the Pennsylvania Game Commission. She can be reached at: (717) 787-1434 (talberici@pa.gov). While activity and curriculum information can be accessed through this contact, the Pike County Conservation District has a copy of the guide that may be accessed for reference. Relevant activities in the 2000 Edition of Project WILD include "Forest in a Jar" an activity for grades 9-12 that explores forest succession through an easy-to-assemble hands-on activity (Pages 137-139). For grades 5-8, "Smokey Bear Said What?" explores the positive and negative effects of fire on forests (Pages 318-320). For grades K-4, "What's That, Habitat?" allows students to examine the needs for food, water, shelter and space (Pages 54-55). Accessed January 2013: **http://www.projectwild.org/**.

- *Sustaining Penn's Woods:* Produced in 2000 specifically for Pennsylvania educators, *Sustaining Penn's Woods* is a curriculum guide for forest education, grades 5-10. Every school in Pennsylvania received a copy of this program. Activity of interest for grades 7-10 "Adopt-a-Forest." This activity encourages students to identify a specific forest plot, and identify the plants and animals that live there. This activity can be found as a pdf (as of December 2012) at: (**http://www.hlma.org/pennswoods/online/activities/Sec2-1.pdf**); the student pages can be accessed here: (**http://www.hlma.org/pennswoods/online/studentpages/Sec2-1sp.pdf**) Another activity "Who's Invading Pennsylvania's Forests?" for grades 5-10 provides an overview on the American Chestnut Blight and exotic species introduced to Pennsylvania. This activity can be accessed (As of January 2013) at: **http://paforestproducts.org/pennswoods/online/activities/Sec2-6.pdf**.

Activities and Resources:

- Pennsylvania Department of Conservation and Natural Resources (DCNR)'s Bureau of Forestry has published *Common Trees of Pennsylvania.* This guide provides pointers to tree identification on many Pennsylvania trees through descriptions and illustrations of leaves, twigs, fruit, and bark. This publication is available from DCNR, and is also available as a PDF on the Bureau of Forestry Website. Accessed March 2013: **http://www.dcnr.state.pa.us/ucmprd2/groups/public/documents/document/dcnr_003489.pdf**

- iConservePA, a program managed by Pennsylvania DCNR has a "Plant Smart" website that allows users to discover local native plantings that can be used in place of non-native plants that could pose an invasive threat. This database includes photographs and detailed descriptions of native plants. Accessed April 2013: **http://www.iconservepa.org**

- Dr. Gary Chastagner, a plant pathologist and extension specialist at Washington State University gave a presentation in March 2008 on tree physiology and growth. The presentation is available as a PDF on the University of New Hampshire's Extension website, and provides a helpful introduction to tree physiology. Accessed March 2013: **http://extension.unh.edu/resources/files/Resource000986_Rep2351.pdf**

- A presentation prepared by the Penn State University, entitled *Identifying Pennsylvania Trees: Pennsylvania Forest Stewardship Program* provides another identification guide to local trees in Pennsylvania, including photographs and descriptions. Accessed March 2013: **http://www.dcnr.state.pa.us/cs/groups/public/documents/document/dcnr_002216.pdf**

- The US Department of Agriculture's Natural Resources Conservation Service has a plant database that includes fact sheets with images and information for over 1000 different plants. Accessed March 2013: **http://plants.usda.gov/java/factSheet**

- National Geographic has a collection of videos on a wide variety of science topics, including tree identification, plant growth, and forest ecology. Accessed February 2013: **http://www.natgeoeducationvideo.com/**

- Penn State University's College of Agricultural Sciences has an educational program on trees for teachers, "From the Woods." Topics include maple syrup, for-

Common Trees on the Trail

In your travels along the North Campus Trail, you may come across some of the following trees. While a more exact species identification will likely require examination of bark, arrangement of leaves, fruits, and other factors, these images should provide a basic reference to its genus.

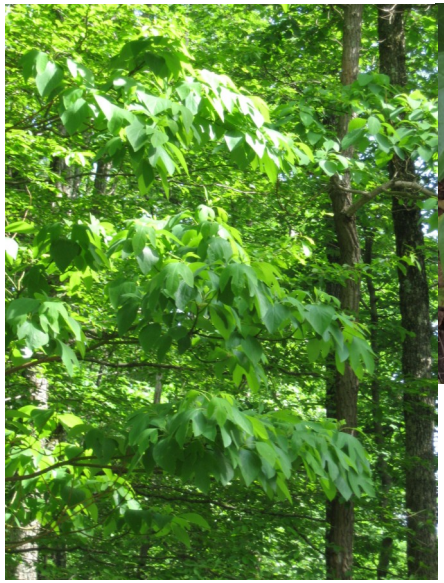
Above Photos: Oak leaves found along the North Campus Trail (PCCP Photo)

Oak:

One of the more common trees along the North Campus Trail and throughout parts of Pike County. While these areas would also have included American Chestnut, the chestnut blight beginning in the early twentieth century eliminated the chestnut tree from the landscape. Several different species of oak trees have been found on the trail, including pin oak and white oak.

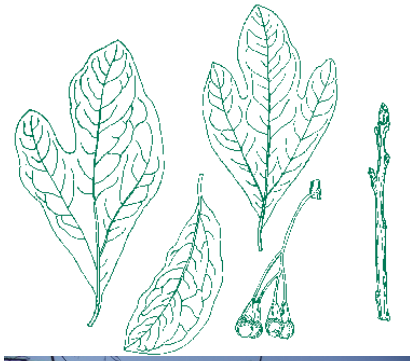
Their leaves are fairly distinctive, and generally follow the same pattern as seen in the examples on this page. They will generally have 5 or more lobes (projections outward or inward from the main part of the leaf).

The oak tree's fruit is the acorn.



Above Photos: Sassafras tree and leaves found along the North Campus Trail (PCCP Photo). Leaf image source: PA DCNR)

Sassafras:



The sassafras tree is unique in that its leaves are not uniform in shape, but rather come in three different shapes: a single leaf, a leaf with two lobes, and a leaf with three lobes (as seen in the picture above). Sassafras was once used to flavor root beer, until it was discovered in the mid-twentieth century that a chemical in the sassafras root could cause cancer in mice.

Pines:

The pitch pine (*Pinus rigida)* is one of the few evergreens found along the North Campus Trail. This tree has uniquely adapted to survive forest fires. Pitch pines have a thick bark that protects them during periods of fire disturbance. Their pine cones can not only withstand a forest fire but will also open and release seeds after a fire.

Left Photo: Pitch Pine found along the North Campus Trail (PCCP Photo).

Discussion Questions

These questions are suggested starting points to help spur discussion and critical thinking about trees and their impact on a local ecosystem.

- Should people cut down trees? Why or why not?
- What can trees offer us while in the forest? What can trees offer when harvested?
- Describe the benefits and drawbacks of cutting trees: a) From an environmentalist's perspective; b) From a business's perspective; c) From a scientist's perspective; d) From a plant's perspective; e) From an animal's perspective. Where are they similar? How do they differ?
- Select a tree found along the North Campus Trail. What plants, animals, and other organisms depend upon that specific tree? Speculate as to the changes to the forest if that individual tree was removed. What if all trees of that species were removed from the North Campus area?
- Take students to a cleared area similar to the photo on the previous page. After identifying several of the species, have them speculate as to which species may succeed in reaching the forest canopy. Which species may have an advantage? Which species may have a disadvantage?
- Speculate as to why trees have developed certain shaped leaves over others. Are there advantages to different leaf shapes?

Did you know?

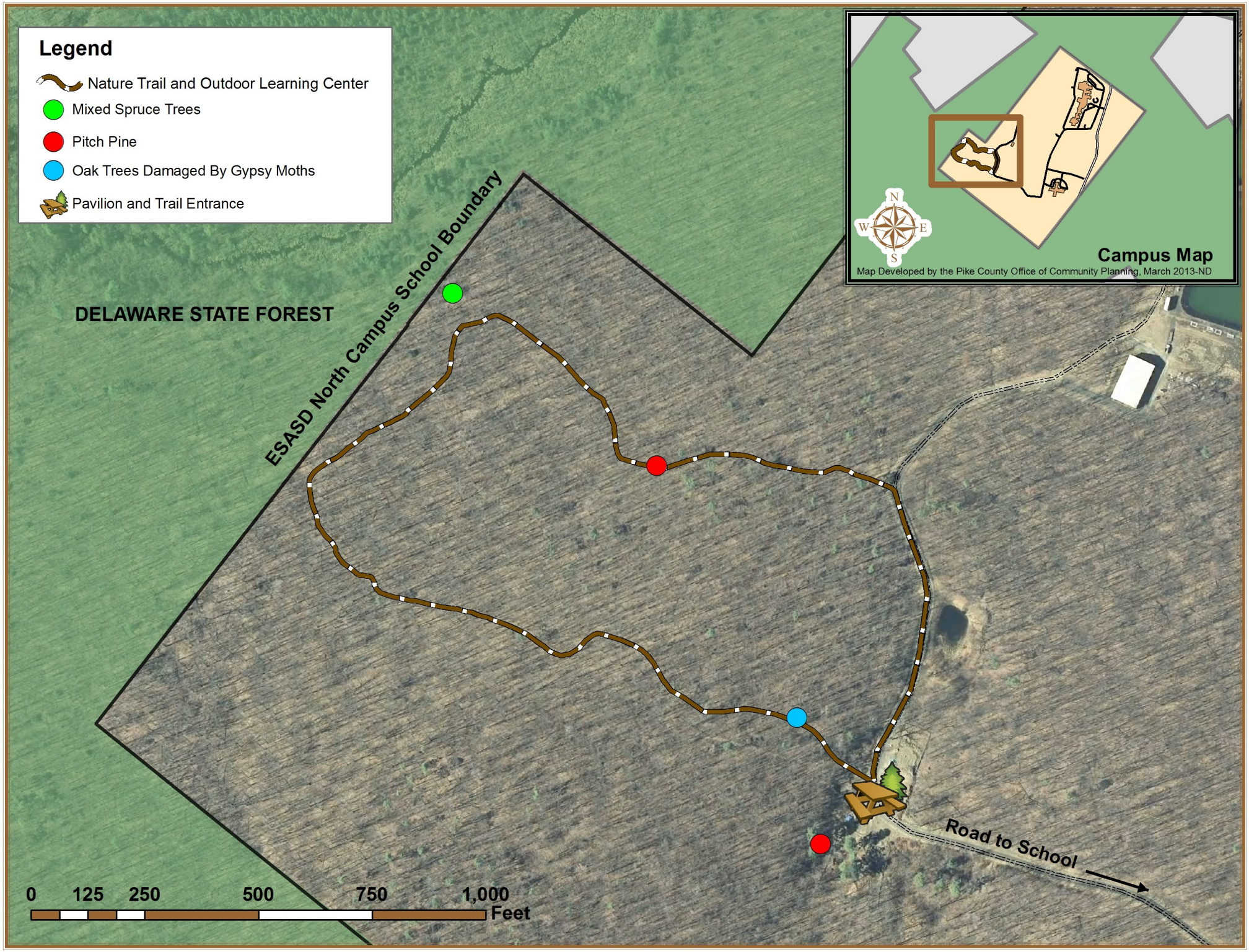
The North Campus Trail, and the entire Bushkill Campus of East Stroudsburg School District is surrounded by State Forest? Pennsylvania's Delaware State Forest is 80,267 acres in size, and spreads across Pike, Monroe, Carbon, and Northampton Counties!

Above Photo: Clearing along North Campus Trail has created an opportunity for tree seedlings to grow. How many of the seedlings can you identify? (PCCP Photo)

Maple:

Maple trees are recognizable by their three to five lobed leaf shape. In the above image of a Red Maple (Acer rubrum), three of the lobes are distinctive, while two lobes towards the base of the leaf are barely noticeable. Other maples, such as the Silver Maple (*Acer saccharinum L.*) will have more distinctive lobes towards the base. Maples are known for their sweet sap, that can be tapped in early spring for the production of Maple Syrup. While several maple species can produce maple syrup-quality sap, the most popular tree for this use is the Sugar Maple (*Acer saccharum*). Trees are tapped, in a process known as "sugaring" in late winter and early spring months, when the sap begins to flow through the tree. This will take place when the temperature at night goes below freezing, but the daytime temperature rises above freezing. Once the sap is collected, it is boiled down to remove excess water, as well as concentrate and carmelize the sugars into maple syrup. It takes over 40 gallons of sap to produce one gallon of syrup. The maple fruit is known as a samara, which are popular with kids. The samara can be thrown into the air and it will float downward in a spinning motion.

Images: Red maple leaf and seed (Source: PA DCNR)


Legend
Nature Trail and Outdoor Learning Center
Mixed Spruce Trees
Pitch Pine
Oak Trees Damaged By Gypsy Moths
Pavilion and Trail Entrance
DELAWARE STATE FOREST
ESASD North Campus School Boundary
Road to School
0 125 250 500 750 1,000
Feet
N
W
E
S
Campus Map
Map Developed by the Pike County Office of Community Planning, March 2013-ND