

After Your Visit to the Forest Discovery Trail: Post-visit Information and Activities



Students will learn most from the *Forest Discovery Trail* if they reinforce the key concepts after returning from their visit to the trail.

Key concepts/themes to reinforce

1. The northern forest ecosystem is a complex system of natural and human-influenced interrelationships, processes, and cycles.
2. The northern forest, both historically and at present, has ecological, scientific, economic and social value.
3. Humans manage forestlands for multiple uses by researching forest ecology, establishing management objectives, and determining and carrying out management practices.

Post-visit activities for students

PLT Activities

The following pages list PLT activities that help teach the core themes addressed at the Forest Discovery Trail. PLT materials are free of charge to teachers who take a low-cost, one-day training course. Contact your state's PLT coordinator to find out about upcoming workshops.

New Hampshire PLT:

- Phone: 603-226-0160
- Toll-free: 800-677-1499
- Email: info@nhplt.org
- Website: www.nhplt.org

Maine PLT

- Phone: 207-626-7990
- Email: meplt@zwi.net
- Website: <http://www.mainetreefoundation.org/programs/plt.html>

What's My Habitat?

Take students to a forested site near your school. Using the *What's My Habitat?* worksheet and the *Optimal Regeneration Conditions for Selected Tree Species* chart, help students to explore the factors that influence the tree species growing on your site. Pay particular attention to the composition of the forest (the forest layers, species present, etc.), to the wildlife sign in the forest, and to the light conditions.

Correlations to NH Frameworks of Learning:

English Language Arts: Writing 2.

Science: Science as Inquiry 1a.

Life Science 3a.

Life Science 3b.

Earth/Space Science 4c.

Correlations to ME Learning Results:

English Language Arts: E. Processes of Writing and Speaking.

Science & Technology: B. Ecology.

J. Inquiry and Problem Solving.

Written Down in Wood: The Story of Tree Rings

This activity will help students learn how tree rings can be used to age a tree, determine the tree's rate of growth, and "read" the life history of the tree. (Note: This ties well to PLT Activity #76: Tree Cookies.)

Correlations to NH Frameworks of Learning:

Science: Science as Inquiry 1a.

Life Science 3a.

Mathematics: Geometry, Measurement & Trigonometry 4c.

Correlations to ME Learning Results:

Science & Technology: B. Ecology.

J. Inquiry and Problem Solving.

Mimicking Nature: Forest Management Practices

Take your students to a forested area near your school. Using the *Mimicking Nature: Forest Management Practices* worksheet, have students explore the management practice that has been conducted at the site. Pay particular attention to the perceived management objectives (recreation, wildlife, aesthetics, etc.), the forest composition (forest layers, species composition, etc.), benefits to wildlife, etc. If possible, invite a local forester to tour the site with you. (Note: This could also be done as a homework assignment. Have each student choose an area near their home, complete the information and return to school ready to present their findings. This is a great way for students to become aware of the variety of management practices being done in their hometown.)

Correlations to NH Frameworks of Learning:

Language Arts: Writing 2.

Science: Science as Inquiry 1a.

Life Science 3a.

Life Science 3b.

Earth/Space Science 4c.

Correlations to ME Learning Results:

Language Arts: E. Processes of Writing and Speaking.

Science & Technology: B. Ecology.

J. Inquiry and Problem Solving.

Forest Products in Your Community

As your students learned on the *Forest Discovery Trail*, resource managers strive to manage the forest in ways that maintain the forest's health while meeting a wide variety of other social and resource objectives. One way to benefit the human community while maintaining the forest's health is to ensure that every tree removed from the forest contributes the highest possible value to the community. Use the *Forest Products in Your Community* worksheet to guide your students in an exploration of value-adding forest products businesses in your community.

Correlations to NH Frameworks of Learning:

Science: Science, Technology & Society 2d.

Science, Technology & Society 2e.

Social Studies: Geography 14.

English Language Arts: Speaking, Listening and Viewing 3.

English Language Uses 6.

English Language Uses 7.

Correlations to ME Learning Results:

Science and Technology: L. Communication

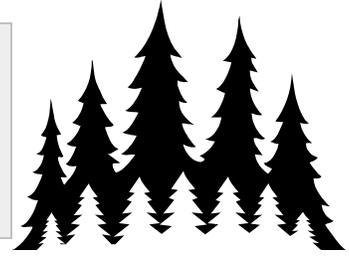
M. Implications of Science and Technology

English/Language Arts: E. Processes of Writing and Speaking

Evaluation Questions

Use the *Evaluation Questions* worksheet to assess your students' understanding of the major concepts addressed by the *Forest Discovery Trail*. Included in this section are the evaluation questions and the answers to each question.

Recommended Post-visit PLT Activities Grades 9 through 12



Each recommended activity is correlated to the NH Curriculum Frameworks and the ME Learning Results. Abbreviated correlations are listed below. The full listing is available online at <http://www.plt.org>.

Note: The referenced activities are including in the Project Learning Tree PreK-8 Activity Guide (herein referred to as PreK-8) and the secondary modules The Changing Forest: Forest Ecology and Exploring Environmental Issues: Focus on Forests (herein referenced to as FE and FF, respectively).

NOTE: The following abbreviations have been used in noting correlations.

Correlations to NH Frameworks of Learning:

Abbreviation: Science: Life Science 3b
Framework: Science: Life Science: Students will demonstrate an increasing ability to understand how environmental factors affect all living things (i.e. individuals, community, biome, the biosphere) as well as species interactions.

Abbreviation: Social Studies: Geography 14.
Framework: Social Studies: Geography: Students will demonstrate an understanding of the connections between Earth's physical and human systems; the consequences of the interaction between human and physical systems; and changes in the meaning, use, distribution, and importance of resources.

Correlations to ME Learning Results:

Abbreviation: Social Studies: Geography: A. Skills and Tools SG #1
Learning Result: Social Studies. Geography.
A. Skills and Tools.
Secondary Grades (9-12)
1. Use mapping to answer complex geographic and environmental problems.

Abbreviation: Science and Technology: A. Classifying Life Forms SG 2.
Learning Result: Science and Technology.
A. Classifying Life Forms.
Secondary Grades (9-12)
2. Describe similarities and differences among organisms within each level of the taxonomic system for classifying organisms (kingdom through species).

Theme: The northern forest ecosystem is a complex system of natural and human-influenced interrelationships, processes, and cycles.

FE2: Cast of Thousands

Overview: Students will further explore the variety of life in their adopted forest and will discover the importance of this biological diversity. They will take measurements, in much the same way as a forester does, to draw conclusions about the overall health of their forest. As an extension, students will compare the information they have collected with that of another class in a different region.

Correlations to NH Frameworks of Learning:

Science: Science as Inquiry 1a.

Science, Technology, and Society 2a.

Science, Technology, and Society) 2b.

Life Science 3a.

Life Science 3b.

Unifying Themes and Concepts 6a.

Unifying Themes and Concepts 6b.

Social Studies: Geography 10.

Geography 11.

Geography 12.

Mathematics: Problem-Solving and Reasoning 1a.

Problem-Solving and Reasoning 1b.

Communication and Connections 2b.

Numbers, Numeration, Operations, and Number Theory 3c.

Numbers, Numeration, Operations, and Number Theory 3d.

Geometry, Measurement, and Trigonometry 4b.

Geometry, Measurement and Trigonometry 4c.

Geometry, Measurement and Trigonometry 4d.

English Language Arts: Speaking, Listening, and Viewing 3.

English Language Uses 5.

English Language Uses 6.

English Language Uses 7.

Correlations to ME Learning Results:

English Language Arts: D. Informational Texts SG 3.

D. Informational Texts SG 5.

H. Research-Related Writing and Speaking SG 1.

H. Research-Related Writing and Speaking SG 12.

Mathematics: B. Computation SG 1.

Science and Technology: J. Inquiry and Problem Solving SG 1.

Social Studies: Geography: B. Human Interaction of Environments. SG #1

Theme: The northern forest, both historically and at present, has ecological, scientific, economic and social value.

PreK-8 #33: Forest Consequences

Overview: Few issues, if any, have simple solutions – and resolving them usually involves compromise. In this activity, your students will learn about some of the effects that human activities can have on a forest> They will explore some of the trade-offs involved in working out a land use issue.

Correlations to NH Frameworks of Learning:

Science: Science, Technology & Society 2e, 2f.

Earth/Space Science 4c.

English Language Arts: Speaking, Listening & Viewing 3.

English Language Uses 6, 7.

Social Studies: Economics 9.

Geography 14, 15.

FF3: Tough Choices

Overview: We ask a lot of our forests. We expect them to provide beautiful surroundings for hiking and recreation, wildlife habitats, and steady supplies of wood and other products. As populations grow and more people use forests and wood products, it's getting tougher to meet all of their demands. In this activity, your students will read and discuss several short articles on issues related to the demands we put on our forests. Students will propose solutions to some real-life dilemmas about forests.

Correlations to NH Frameworks of Learning:

Science: Science, Technology ,and Society 2e.

Social Studies: Economics 9.

English Language Arts: Speaking, Listening, and Viewing 3.

English Language Uses 5.

English Language Uses 6.

English Language Uses 7.

Correlations to ME Learning Results:

English/Language Arts: A. Process of Reading SG 1.

A. Process of Reading SG 2.

A. Process of Reading SG 3.

A. Process of Reading SG 4.

A. Process of Reading SG 5.

A. Process of Reading SG 8.

A. Process of Reading SG 9.

A. Process of Reading SG 11.

B. Literature and Culture SG 3.

B. Literature and Culture SG 8.

C. Language and Images SG 1.

D. Informational Texts SG 1.

D. Informational Texts SG 2.

D. Informational Texts SG 3.
 D. Informational Texts SG 5.
 D. Informational Texts SG 6.
 E. Processes of Writing and Speaking SG 1.
 E. Processes of Writing and Speaking SG 2.
 E. Processes of Writing and Speaking SG 3.
 E. Processes of Writing and Speaking SG 4.
 F. Standard English Conventions SG 1.
 F. Standard English Conventions SG 3.
 G. Stylistic and Rhetorical Aspects of Writing and Speaking SG 2.
 G. Stylistic and Rhetorical Aspects of Writing and Speaking SG10.
 H. Research-Related Writing and Speaking SG 1.
 H. Research-Related Writing and Speaking SG 2.
 H. Research-Related Writing and Speaking SG 3.
 H. Research-Related Writing and Speaking SG 4.
 H. Research-Related Writing and Speaking SG 5.
 H. Research-Related Writing and Speaking SG 6.
 H. Research-Related Writing and Speaking SG 7.
 H. Research-Related Writing and Speaking SG 8.
 H. Research-Related Writing and Speaking SG 9.
 H. Research-Related Writing and Speaking SG 10.
 H. Research-Related Writing and Speaking SG 11.
 Science and Technology: K. Scientific Reasoning SG 6.
 Social Studies: Geography B. Human Interaction with Environments. SG 1.

FF7: Words to Live By

Overview: Throughout history people have seen forests in different ways, for example, as obstacles to agricultural progress, as havens for recreation and wildlife, and as a source of income from wood products. The writings of different authors reflect the views of their time periods, as well as their own personal feelings towards forests. In this activity, your students can express their own views about forests, and then can explore different perspectives by reading excerpts from the writings of different authors.

Correlations to NH Frameworks of Learning:

Social Studies: Geography 11.
 History 16.
 English Language Arts: Speaking, Listening, and Viewing 3.
 Literature 4.
 English Language Uses 5.
 English Language Uses 7.

Correlations to ME Learning Results:

English Language Arts: B. Literature and Culture SG 3.
 D. Informational Texts SG 3.
 G. Stylistic and Rhetorical Aspects of Writing and Speaking SG 2.
 H. Research-Related Writing and Speaking SG 9.

Social Studies: History: B. Historical Knowledge, Concepts and Patterns SG 3.
History: C. Historical, Inquiry, Analysis & Interpretation. SG 1.

Theme: Humans manage forestlands for multiple uses by researching forest ecology, establishing management objectives, and determining and carrying out management strategies.

PreK-8 #50: 400-Acre Wood

Overview: In this activity, students will play the role of managers of a 400-acre (162 hectare) piece of public forest. Through this role, students will begin to understand the complex considerations that influence management decisions about forest lands.

Correlations to NH Frameworks of Learning:

Science: Science, Technology & Society 2e.

Earth/Space Science 4c.

Unifying Themes & Concepts 6b.

Social Studies: Economics 5, 9.

Geography 10, 12, 14, 15.

Mathematics: Problem Solving & Reasoning 1a, 1b.

Communication & Connections 2b.

Numbers, Numeration, Operations & Number Theory 3c.

FE4: Home Sweet Home

Overview: Species that are introduced into nonnative environments can be beneficial or detrimental to the ecosystem. In this activity, students will identify “exotics” that have already been introduced into the North American environment and will determine their effect. Students will also gather information about a selected plant or animal species within their adopted forest and determine its natural range.

Correlations to NH Frameworks of Learning:

Science: Science, Technology, and Society 2e.

Life Science 3b.

Earth/Space Science 4c.

Unifying Themes and Concepts 6a.

Unifying Themes and Concepts 6b.

Social Studies: Economics 9.

Geography 11.

Geography 14.

Correlations to ME Learning Results:

Science and Technology: B. Ecology SG 4.

Social Studies: Geography: B. Human Interaction with Environments. SG 1

Civics & Govt: Rights, Responsibilities & Participation. SG 1

Visual and Performing Arts: SG #9.

FE5: Saga of the Gypsy Moth

Overview: In this activity, students will become more aware of the effects of the gypsy moth. They will formulate management plans that deal with large-scale disturbances like the gypsy moth. Students will have the responsibility of advocating their specific management perspective.

Correlations to NH Frameworks of Learning:

Science: Science, Technology, and Society 2e.

Life Science 3a.

Unifying Themes and Concepts 6b.

Social Studies: Economics 9.

Geography 14.

History 16.

English Language Arts: Speaking, Listening, and Viewing 3.

English Language Uses 6.

English Language Uses 7.

Correlations to ME Learning Results:

English Language Arts: G. Stylistic & Rhetorical Aspects of Writing & Speaking. SG 10.

D. Informational Texts SG 5.

G. Stylistic and Rhetorical Aspects of writing and speaking. SG 5.

Science and Technology : K. Scientific Reasoning SG 1.

Social Studies: Civics & Government: Rights, Responsibilities & Participation. SG 1.

Economics: Personal and Consumer Economics SG 1.

FE8: Fire Management

Overview: Students will learn about the many interdependencies of forests and fire in healthy ecosystems. They will research plant and animal species that depend on fire, and will determine some of their relationships. They will also look at problems that occur when humans live in or near forested areas.

Correlations to NH Frameworks of Learning:

Science: Science, Technology, and Society 2e.

Science, Technology, and Society 2f.

Life Science 3a.

Life Science 3b.

Earth/Space Science 4c.

Unifying Themes and Concepts 6a.

Unifying Themes and Concepts 6b.

Unifying Themes and Concepts 6c.

Social Studies: Civics and Government 1.

Economics 9.

Geography 12.

Geography 14.

Geography 15.

History 16.

Correlations to ME Learning Results:

Science and Technology: B. Ecology SG 4.

M. Implications of Science and Technology SG 2.

Social Studies: Geography: B. Human Interactions with Environments SG 1.

Civics & Government: A. Skills and Tools

Civics & Government: Rights, Responsibilities & Participation. SG 1.

Geography: B. Human Interactions with Environments SG ???

What's My Habitat?



4. If this habitat had the following light and soil moisture conditions, what plant species might you find? (Use the chart, “Optimal Regeneration Conditions for Selected Tree Species.”) How might specific wildlife species use the site (i.e. food source, den site, corridor between two habitat types)?

a. Moist soil, partial shade

b. Moist soil, direct sun

c. Dry soil, partial shade

d. Dry soil, direct sun

Optimal Regeneration Conditions for Selected Tree Species*



This chart lists the conditions under which the seeds of certain tree species will most readily germinate and grow.

Tree Species	Light Level	Soil Moisture Level
White pine	Partial shade	Dry to moist
Red pine	Partial shade to full light	Dry to moist
Pitch pine	Full light	Dry to wet
Hemlock	Partial to full shade	Moist to wet
Balsam fir	Partial shade	Moist
Red spruce	Partial shade	Moist
White spruce	Partial shade	Moist
Atlantic white cedar	Partial shade	Moist
Northern white cedar	Partial to full shade	Moist to wet
Eastern red cedar	Full light to light shade	Dry to moist
Larch	Full light	Moist to wet
Red maple	Not critical	Dry to wet
Sugar maple	Partial shade	Moist
Silver maple	Full light	Moist to wet
Paper birch	Full light	Moist
Black birch	Partial shade	Moist
Yellow birch	Partial shade	Moist
Beech	Partial to full shade	Moist
Ash	Full light to light shade	Moist to moderately wet
Basswood	Partial shade	Moist
Black cherry	Partial shade	Moist
Butternut	Full light to light shade	Moist
Red oak	Partial shade to full light	Moist
Black oak	Partial shade to full light	Dry to moist
Scarlet oak	Partial shade to full light	Dry to moist
Chestnut oak	Partial shade to full light	Dry to moist
White oak	Partial shade to full light	Dry to moist
Shagbark hickory	Partial shade	Moderately moist
Other hickories	Full light	Dry to moist
Yellow poplar	Light shade	Moist
Aspen; poplars	Full light	Moist
Elm	Partial shade	Moist

* Adapted from Table 14, "Optimal Conditions for Regeneration of Major Tree Species." Working With Your Woodland, by Mollie Beattie, Charles Thompson, and Lynn Levine. University Press of New England: 1983. pp 142-3.

Mimicking Nature: Forest Management Practices



Visit a forested area in your town that has been managed, and answer the following questions:

1. What kind of management practice do you think was used at this site? What clues did you use to come to this conclusion (i.e. stumps, age of new growth)?
2. What kind of natural processes does this management practice mimic (i.e. blowdown from wind, fire)?
3. Look up at the tree canopy. How much sky can you see through the leaves? Draw a sketch of what you see, filling in the leafy canopy and leaving the sky white.
4. In this managed area, is the forest floor shaded or sunlit for most of the day? How do you think this area's soil moisture and temperature compare with the surrounding forest? What kinds of trees would you expect to sprout under these conditions?
5. On the back of this page, sketch the forest layers present in this area. Be sure to note snags (standing dead trees) and downed logs if you see them.
6. How might wildlife benefit from the changes created by this management practice? Which wildlife species might benefit?

Forest Products in Your Community



As you learned on the *Forest Discovery Trail*, resource managers strive to manage the forest in ways that maintain the forest's health while meeting a wide variety of other social and resource objectives. One way to benefit the human community while maintaining the forest's health is to ensure that every tree removed from the forest contributes the highest possible value to the community. This activity explores value-adding forest products businesses in your community.

Have students brainstorm the value-adding forest products businesses in your community. They might come up with logging operations, sawmill operations, kiln drying facilities, truckers, furniture makers, etc.

Now ask them to brainstorm non-timber forest product producers, which can include maple sugarers, wreath and garland makers, people who harvest wild edibles, etc.

Individually, or in small groups, have students choose one of the value-adding businesses to study in greater depth. They should take the following steps.

1. Identify a local business to interview. (You can often find this information in the phone book or by contacting the Chamber of Commerce in your town.)
2. Contact the business owner to set up an interview time.
3. Generate a list of questions to ask the business owner. These could include:
 - a. What does the business do?
 - b. How does the business use forest products?
 - c. How many people are employed by the business?
 - d. How much of the wood they use comes from your state?
 - e. Where do the finished product (if applicable) go?
4. Write a short report about their chosen business.
5. Creatively display their findings in the school, local library, town hall, bank or other setting. Alternatively, students could individually work with the local newspaper to publish a short article about the business they chose, or work as a group to publish one article about the range of businesses in the community.

Post-Study Evaluation Questions



1. What are the three steps foresters take in order to decide how to best take care of the White Mountain National Forest? Briefly describe each. Why is it important that foresters complete each step?

2. Every forest is made up of many vegetative (plant) layers. Describe the layers, and name an animal that might live in each layer.

3. How does a forester determine the best management practice to use in a given forest stand? Describe three management practices you witnessed on the Forest Discovery Trail, and indicate the impact of each practice on the forest stand.

4. What is succession? What natural and human impacts might affect succession?

5. Name three naturally occurring disturbances that create openings in the forest.

6. Name 10 ways you use trees in your daily life.

7. What is the USDA Forest Service and what is its purpose?

8. Give one example of each of the following:
 - e. Economic values of the forest

 - f. Ecological values of the forest

 - g. Scientific values of the forest

 - h. Social values of the forest

Post-Study Evaluation Questions



Answers

- 1. What are the three steps foresters take in order to decide how to best take care of the White Mountain National Forest? Briefly describe each. Why is it important that foresters complete each step?**
 - Researching forest ecology: They study the forest to understand the natural processes at work on the land, in the air and water, assess the area's biodiversity, and map natural communities, cover types, and natural features. That way, they can make management choices that fulfill the multi-use mandate of the forest, maintaining the forest's health while meeting a wide variety of other social and resource objectives.
 - Establishing management objectives: The White Mountain National Forest follows a multiple-use mandate that stipulates that they manage for a wide range of objectives, including conservation of forest health, habitat improvement and protection, timber production, and recreation.
 - Determining and implementing management practices: It is very important to realize that forestry is an art as well as a science. Forests are managed for a variety of objectives; sometimes these objectives can be achieved simultaneously and sometimes objectives are mutually exclusive. There are innumerable management options that will achieve a desired objective – the resource manager will balance all of these to determine the most appropriate course of management.
- 2. Every forest is made up of many vegetative (plant) layers. Describe the layers, and name an animal that might live in each layer.**

Forest floor – Robins root for insects in the soil.
Grasses and flowers – Rabbits eat grasses.
Shrubs – Deer and moose eat buds and new growth.
Understory – Some birds build nests in the understory.
Canopy – Bears eat beech nuts from the canopy.
- 3. How does a forester determine the best management practice to use in a given forest stand?** Consider the scientific research and best management practices, the forest's ecology, and the management objectives. in the case of public lands, such as the White Mountain National Forest, they also consider public needs and values.

Describe three management practices you witnessed on the Forest Discovery Trail, and indicate the impact of each practice on the forest stand.

- Single-tree selection - cut down several individual trees, rather than large groups of trees. Minimal change to forest habitat. Some change in sun/shade levels, moisture, etc. Some change in plant species present.
- Permanent forest opening – clear small area, primarily for wildlife habitat Major change to forest habitat. Major change in sun/shade levels, moisture, etc. Definite change in plant species present.
- Shelterwood cut – cut small patches of trees, leaving a few sturdy ones still standing. Major change to forest habitat. Some change in sun/shade levels, moisture, etc. Some change in plant species present.

Post-Study Evaluation Questions



Answers

- Small group selection harvest – cut down small groups of trees. Moderate change to forest habitat. Some change in sun/shade levels, moisture, etc. Some change in plant species present.
 - Clearcut – cut down large area of trees (>10acres). Major change to forest habitat. Major change in sun/shade levels, moisture, etc. Definite change in plant species present.
 - Managing for wilderness qualities – no cutting of trees. No change to forest habitat. NO change in sun/shade levels, moisture, etc. No change in plant species present.
 - Vegetation buffer – no cutting of trees within a certain area surrounding a stream. No change to forest habitat. No change in sun/shade levels, moisture, etc. No change in plant species present.
- 4. What is succession? What natural and human impacts might affect succession?**
Succession is the gradual replacement of one community by another (change over time). It can be affected by seasonal changes, windstorms, fires, timber harvest, etc.
- 5. Name three naturally occurring disturbances that create openings in the forest.**
Windstorms, forest fires, succession
- 6. Name 10 ways you use trees in your daily life.**
Lumber, furniture, carpeting, paper products (newspaper, writing paper, magazines, paper towels, etc.), fruits, nuts, spices, syrup, cider, etc.
- 7. What is the USDA Forest Service and what is its purpose?**
The Forest Service manages public lands in national forests and grasslands. The Forest Service is also the largest forestry research organization in the world, and provides technical and financial assistance to state and private forestry agencies.
- 8. Give one example of each of the following:**
- i. Economic values of the forest**
Timber harvest and wood products industry
Jobs for loggers and foresters
Income from syrup and fruit sales
 - ii. Ecological values of the forest**
Homes for wildlife and plants
Clean air
Clean water
 - iii. Scientific values of the forest**
Research
 - iv. Social values of the forest**
Recreation
Aesthetics
A place to live