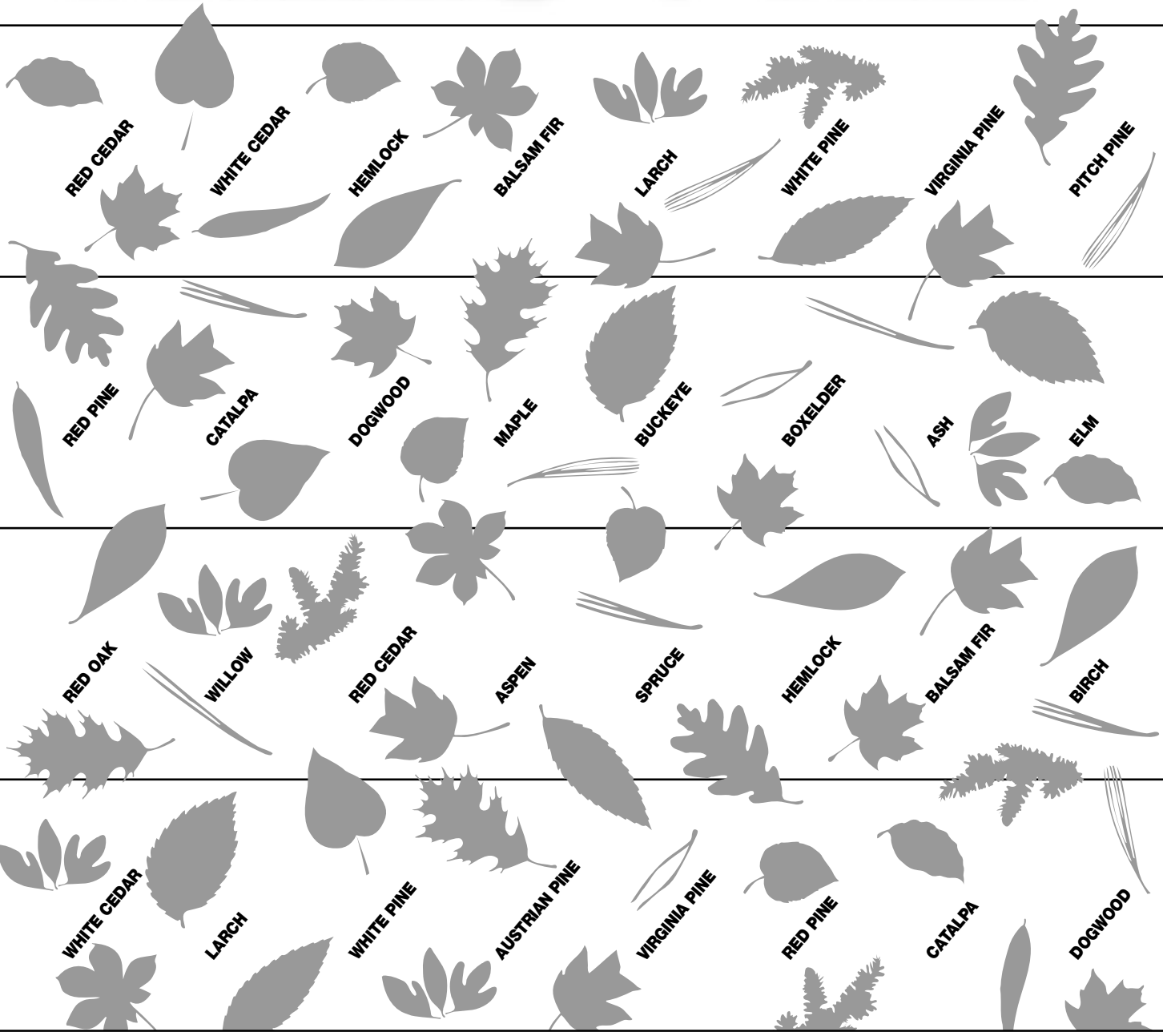
TREES + ME=



FORESTRY

18 U.S.C. 707

Adapted for use in Pennsylvania by
Robert S. Hansen, extension forester in Bradford County, and
James C. Finley, assistant professor of forest resources.

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Chapter 1

TREES + ME = FORESTRY
An Introduction to Forest Resources

VISITING A NEW WORLD

Imagine that you're an alien from another planet. You have just landed in the middle of a strange, yet beautiful, place. Giant living plants surround you. The air smells clean and fresh. Welcome to a forest!

A forest is an area of plants and animals made up mostly of trees. Every forest has layers of plants. These main layers are the **canopy,** the **understory,** and the **forest floor.**

The canopy is formed by the branches and leaves from the tallest trees. Beneath the canopy is the understory, where shorter trees and shrubs grow. The forest floor has seedlings, grasses, ferns, and crumbling plants and logs. Different kinds of plants and animals live in different layers of the forest.

Different kinds of plants and animals live in different kinds of forests, too. Why? Because forests have different soils, climates, and amounts of water. For example, a hemlock tree grows best in a wet, moist, cool, forest. A chestnut oak grows better where it is dry and warm.

Forest ecology is the study of how soils, sunlight, water, and other parts of nature work together to make a unique forest.

Any product or benefit that comes from the forest is a **forest resource.**

On page 5 you'll find a crossword puzzle of forest resources.

Fill in the blanks to learn what the forest has to offer!

Forests are important because they:

— feed and shelter wildlife

— protect soil from blowing or washing away

— make the world beautiful

— provide a place for recreation

— help keep rivers and streams clean

— provide timber for wood products

Forests help all of us in many ways.

Each person in the United States uses enough wood products in one year to make up a tree 100 feet tall and 16 inches in diameter!

RESOURCES FOR EVERYONE

Forestry is the study and practice of managing wooded lands. Forestry is a science. It also is a business and an art. Forestry is part of the field of **conservation**—the practice of caring for natural resources. **Foresters** are people who are trained to oversee the woods. They make sure that the forest makes the resources we need. They also make sure we will be able to enjoy these same things in the future.

Forests are **renewable resources**. For example, even though millions of Christmas trees are cut every year, there will be more in the future because they are renewable. If forests are taken care of, they will regrow.

Managing a forest for more than one benefit or product is **multiple resource management**. Foresters take care of forests not just for wood but also for wildlife. They plan for hikers. They make sure the forest stays healthy. They protect the soil and water. Foresters try to find the best balance among all products and benefits.

In Pennsylvania, the wood products industry is a very important user of forest resources. The industry employs thousands of people. These people make billions of dollars worth of wood products each year.

Place an **R** *by the items below that are renewable resources. Plane an* **N** *by the items that are nonrenewable (cannot be replaced once used).*

___ black cherry

___ natural gas

___ raccoons

___ garter snakes

___ copper

___ sunfish

___ white ash

___ diamonds

___ zinc

___ coal

Re-Tree-Ve the resource!

ACROSS

1. This sweet, sticky substance comes from the sap of a sugar maple tree.
2. This involves lunches, fun, and ants.
3. This needs a worm, hook, and lots of luck.
4. These come from maple and like to be "knocked out" when you bowl.
5. Made from the pulp of trees, this can be found "rolling around" in bathrooms.
6. These are made from tree pulp and hold lots of lemonade.

DOWN

1. This requires a tent, cookstove, and lantern.
2. When trees breathe, they make this.
3. These come from white ash trees and turn kids into real sluggers!
4. Made from wood, these help you do your homework.
5. Trees protect this by keeping soil and pollution from entering streams.
6. This requires healthy minds, strong feet, and a walking stick.
7. This comes from logs and is used to build houses.

FORESTS PROVIDE MANY JOBS.

Can you match each drawing with a career?

CAREER CONSIDERATIONS

A forester manages woodlands. A forester looks at all of the things a forest provides—timber, recreation, water, wildlife, and beauty—to make decisions. A forester's goal is to provide many benefits from the forest. To become a forester, you should start by entering a college or university that has a forest resources program.

LEAVE THE ANSWER TO ME

Imagine that you are a chef. You are in charge of writing a recipe for a forest. What ingredients would you include?

TREE-VIAL PURSUIT

Did you know that the forest industry ranks among the top 10 employers in 40 of the 50 states?

YEARNING TO LEARN

Additional Activities

In the following activities, remember the basic rules of conservation. Do not damage or destroy the plants and animals you are studying. Leave all animal homes unchanged. Have a positive impact on the forest.

Take a walk in a park, nature area, forest, or wooded backyard. Look at the trees, plants, and animals and decide in which area each lives—the canopy, understory, or forest floor. Collect an item from each layer. Answer the questions on the next page under "Points to Ponder on Your Nature Walk" after you have completed your nature walk.

QUIZ FOR THE REAL WHIZZES

Fill in the blanks below using the words at the end. Whiz through this!

1. The _____ is the top of the forest and is made up of branches and leaves from the tallest trees.
2. _____ is the study of how soil, sunlight, water, and living things work together, blending to make a unique forest.
3. Proper care of our natural resources is called _____.
4. _____ is a science, a business, and an art that includes conservation and management of forests.
5. Management of the forest for more than one resource is called _____ management.
6. Forests are a _____ because they can regrow and renew themselves.
7. The layer of shorter trees and shrubs directly below the canopy is called the _____.
8. The _____ is the bottom layer in a forest ecosystem, where seedlings, grasses, and wildflowers grow.

renewable resource	forest ecology
forest floor	multiple resource
conservation	understory
forestry	canopy

COUNTY 4-H ROUNDUP REQUIREMENTS

1. The exhibit should not exceed 12 inches deep by 18 inches wide by 22 inches high.
2. Exhibits should include a project title and your name.

TIPS FOR MAKING A THREE-SIDED DISPLAY

— It's a good idea to get your leader, parent, or other adult to help you.

— Use a material such as hardboard, particleboard, or plywood. Sturdy poster board can be used.

— Open displayed dimensions should not exceed 12 inches deep by 18 inches wide by 22 inches high.

— Use hinges to attach the sections to each other.

— Paint or cover the background with adhesive paper, if you like.

POINTS TO PONDER ON YOUR NATURE WALK

1. Which trees and plants are sun-loving?
2. What animals did you see on your walk?
3. Which layers of the forest did they use?
4. What insects did you see on the forest floor? In the understory? In the canopy?
5. Which layer of trees or plants gets the most rain? Which layer gets the least?

Plan a family outing to a park or forest. Look at the types of resources that are provided for visitors and answer the following questions.

1. What evidence of timber harvesting do you see in the woods? Describe any hiking trails, snowmobile trails, docks on lakes, or other signs of recreation.
2. What things were done to keep the woods beautiful? Were trees left standing along the major roads?
3. What signs of wildlife did you see?
4. What information did you see posted about bears or other animals:
5. Did the air smell clean, and did the water look clear?

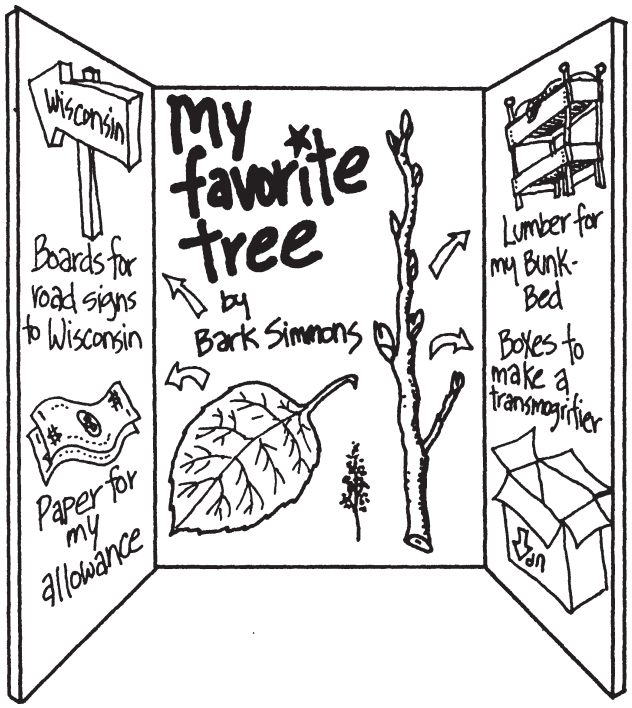
Take this chance to tell your family what you know about multiple-resource management.

ROUNDUP AND FAIR PROJECTS

Draw your favorite tree. Mount the drawing on poster board. Draw some products and benefits we enjoy from this tree (for example, furniture or a place to hang a swing). Do a little research (try an encyclopedia or a book on trees) to list the right products. Different kinds of trees give us different items.

Prepare a display of renewable and nonrenewable resources, using samples (a small piece of wood or a rock, for example) or drawings and photographs. Mount the items on a three-sided display board. Label which items are renewable and which are nonrenewable.

Prepare a display on a job related to the forest (for example, wildlife biologist or forester). Include photos or drawings of different job duties, such as checking survival in tree plantations or managing a timber sale. Mount these drawings on a three-sided display board.



ANSWERS

Re-Tree-Ve the Resource

Across
1. maple syrup
2. picnicking
3. fishing
4. bowling pins
5. toilet paper
6. paper cups

Down
1. camping
2. clean air
3. baseball bats
4. pencils
5. clean water
6. hiking
7. lumber

Renewable/Nonrenewable Quiz

Renewable resources
black cherry, raccoons, sunfish, white ash, and garter snakes.

Nonrenewable resources
natural gas, copper, zinc, diamonds, and coal

Job Match

A. soil scientist
B. truck driver
C. mill technician
D. forester
E. hydrologist
F. logger
G. wildlife manager
H. park ranger

Quiz for the Real Whizzes

1. canopy
2. forest ecology
3. conservation
4. forestry
5. multiple resource
6. renewable resource
7. understory
8. forest floor

Chapter 4

CHANGE IN THE FOREST
FOREST SUCCESSION
The Forces of Change

Centuries ago, Pennsylvania was covered with pine and hemlock forests. Then the settlers came, bringing saws and plows. One by one they cut the towering hemlock and white pine trees until only stumps and hardwoods remained. Fires started by passing trains or by the settlers burned through these areas. As farms grew, the number of pines and hemlocks decreased. Change came to the forest.

Various hardwoods, an important part of the original forest, now ruled the areas where pine and hemlock trees reigned. A new cycle of **succession,** the gradual change in the type and amount of plants in an area, had been started by the settlers.

Fire, logging, plowing, and other events sometimes disturb an area of land. When formerly dominant plants and trees are removed, succession begins. New plants take over the area where the old plants once lived.

Mark an "X" by the events that might start succession in a forest

_____ **tornado**

_____ **hurricane**

_____ **floods**

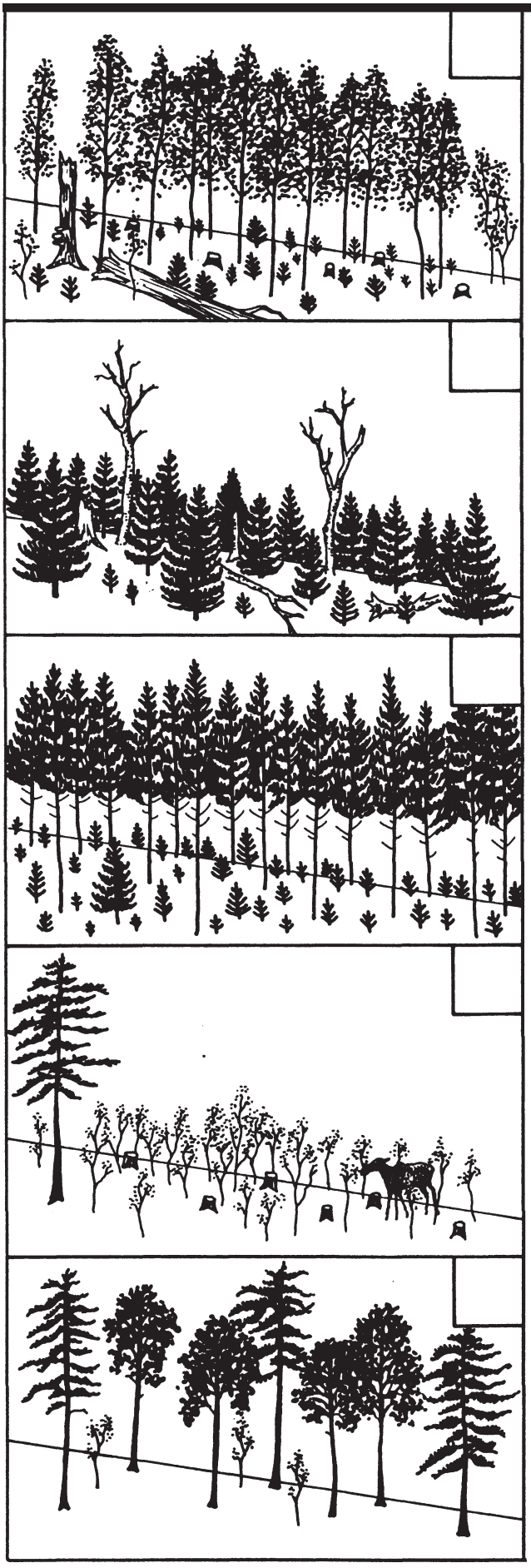
_____ **drought**

_____ **logging**

_____ **fire**

_____ **large numbers of insects**

_____ **plowing/land clearing**



MADE IN THE SHADE

When you remove trees, you take away the shade for new trees on the ground. The first new seedlings to grow in this area often like sunlight, but not shade. Aspen, paper birch, cherry, and ash are some common **shade intolerant** plants, also known as **pioneers**.

Once shade intolerant trees settle into an area, they make a bit of a problem for themselves. Younger pioneer trees can't grow up in the shade of their taller parents. The younger pioneer trees, remember, need lots of sunlight. This means that different tree species will start to take over beneath the parents.

These other tree species are shade tolerant—they can grow and reproduce in the shade. Shade tolerant tree species include sugar maple, American basswood, American beech, and hemlock. When the pioneers die out, the shade tolerant trees dominate the area.

A **climax** forest is a forest in which the overstory trees are the same species as the understory trees. Climax trees remain until fire, harvesting, or another force disturbs the area again.

In the drawings on the left, label the correct series of events in the succession. Use a "1" for the first stage, "2" for the second, and so on, until you reach a climax forest.

THERE'S NO PLACE LIKE HOME

Animals are very particular about their surroundings. Every animal has a specific environment, or habitat, that it likes the best. This preferred habitat meets that animal's special needs for food, water, shelter, and space.

When a forest changes, the animal species that live there also change. Different stages of succession are ideal habitat for different types of wildlife.

Some animals are **generalists** because they like many types of habitats. The black bear likes berries found in the early successional stages of a forest. Yet the bear also needs mature forests for shelter.

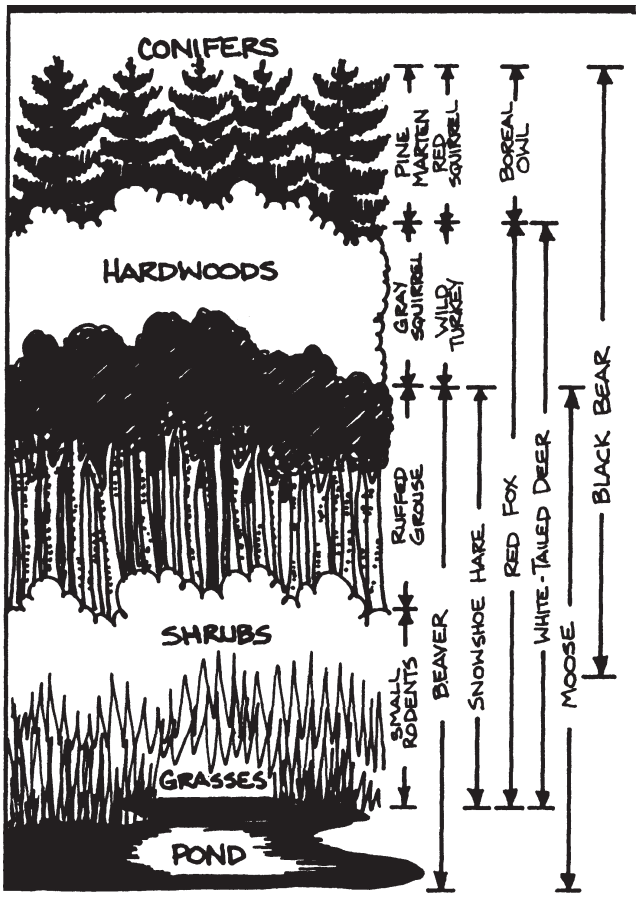
In the Pacific Northwest, the northern spotted owl needs old forests of Douglas-fir and western hemlock. The northern spotted owl is a specialist because it survives best in one type of habitat.

When a habitat is changed, either by people or by nature, it can't support the same animals.

SUCCESSION AND PRODUCTS

Forest succession also affects the types of products a forest produces. A forest in the early stages of succession has many shade intolerant trees. These trees—ash, cherry, and oak—make good wood products. Often foresters will try to slow or stop succession, so that these favored trees can grow.

Other products need a climax forest. Sugar maple is needed to make maple syrup. Woodland owners who want to produce syrup will often try to make this successional stage last.



In this picture, which animals would you call specialists. Why? Which animals would you call generalists? Why?

pine marten: _____

small rodents: _____

ruffed grouse: _____

gray squirrel: _____

beaver: _____

wild turkey: _____

red squirrel: _____

red fox: _____

boreal owl: _____

snowshoe hare: _____

moose: _____

black bear: _____

white-tailed deer: _____

SHADE TOLERANCE

Intolerant

red pine

black cherry

black walnut

paper birch

quaking aspen

black willow

white ash

Intermediate

eastern white pine

red maple

oaks

American elm

Tolerant

eastern hemlock

sugar maple

ironwood

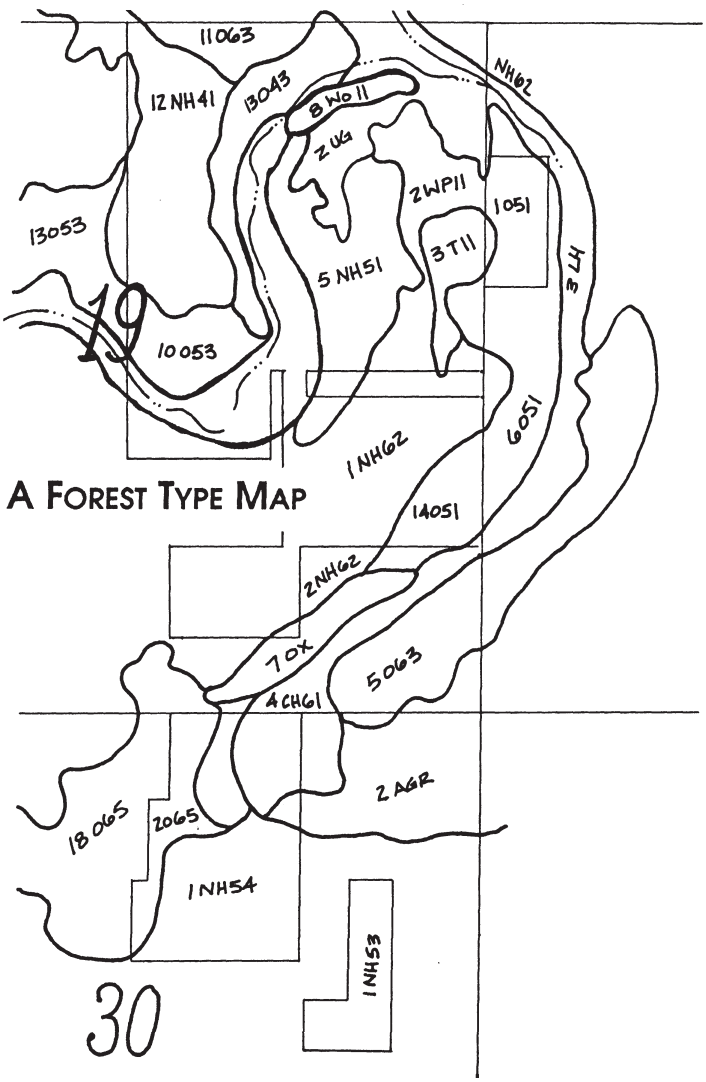
American basswood

American beech

FOREST TYPES

Each forest is a special blend of tree species growing together in one community. This collection of tree species is not random. Certain tree species occur together because they need similar soils, water, and light. We call a collection of species that occur together a **forest type**.

Forest types are named for their main tree species. Quaking aspen and paper birch rule an aspen-birch forest type, although other tree species also can be found there. Foresters often map the location of forest types. The map helps them decide how to manage certain areas.



A FOREST TYPE MAP

See if you can match each tree species below with the forest type where it would be found. More than one species can match each forest type.

SPECIES NAME	FOREST TYPE
bigtooth aspen	**maple-basswood**
white oak	
black cherry	**oak-hickory**
white birch	
eastern white pine	**black cherry-maple**
red oak	
sugar maple	
shagbark hickory	**pine-hemlock**
red pine	
American basswood	
eastern hemlock	**aspen-birch**

CAREER CONSIDERATIONS

Wildlife managers conduct habitat improvement programs, and monitor wildlife populations. They also teach the public about game (hunted animals, such as deer and moose) and nongame (animals that aren't hunted, such as songbirds) wildlife. You'll have to know a great deal about animals to be a wildlife manager. A good place to start is at a college or university.

QUIZ FOR THE REAL WHIZZES

Fill in the blanks below using the words at the end. Whiz through this!

1. A _____ is an animal that can use many different types of habitat.
2. A collection of tree species that occur together is a _____.
3. _____ plants and trees love shade.
4. A gradual change in the type and amount of trees over a long period of time is called _____.
5. An animal that requires a certain type of habitat is a _____.
6. Invading intolerant plants also are called _____.
7. Plants that do not like shade are called _____.
8. A _____ forest exists when the tree species in the overstory are the same species found in the understory.

Answers:	**forest type**	**pioneers**
	climax	**intolerant**
	tolerant	**succession**
	specialist	**generalist**

LEAVE THE ANSWER TO ME

Are you a specialist or a generalist? What type of habitat do you prefer the most?

TREE-VIAL PURSUIT

The male ruffed grouse claims a territory in the spring by jumping up on logs and making a loud drumming sound. He does this by beating his wings back and forth dozens of times every second. Can you move that fast?

YEARNING TO LEARN

Additional Activities

In the following activities, remember the basic rules of conservation. Do not damage or destroy the plants and animals you are studying. Leave the animal homes unchanged. Have a positive impact on the forest.

Choose one animal that lives in the forests around you. Find out what habitat it requires for food, shelter, and space. "Shelter" can include areas for nesting, sleeping, hibernation, and also escaping from predators or bad weather. Give a short presentation on which stages of forest succession your animal would need to meet these requirements.

Stake out and study an area of forest approximately as big as an average yard (40 feet by 40 feet). This forest can be a community forest within a city park or a forest you see while on a camping trip. Count trees that make up the overstory and identify each. Determine the forest type from the list of forest types on page 33.

Remember, forest types are named after the tree species that occur most often. If the species you find do not fit into a given type, name your own type using the two most common species in the plot you study.

Tree Species	Number of Trees in Plot

Forest Type: _____

ROUNDUP AND FAIR PROJECTS

Observe succession in your own yard as a long-term project. Isolate, with some type of temporary fencing, a 4-foot by 4-foot area in your yard. Clear all the plants from this square to expose bare soil. Spade the area and remove any roots you find. Do not water, mow, or fertilize. Observe this area once a month. At each visit,

note the plants that are growing. Are they weeds, grasses, shrubs, or trees? If tree seedlings appear, try to identify them to the genus level (for example, oak, pine, or aspen).

Photograph or sketch your plot each time you visit it, and record the date. Continue this activity for at least two years. Don't expect a climax forest; that usually takes a few hundred years!

After at least two years, prepare a display using photographs or sketches and the information you gathered to illustrate the different plants that invaded the area over time.

You also could build a model to illustrate the succession you observed—use forest materials, twigs, and other materials that resemble the plants you observed. (This activity is adapted from *Project Learning Tree, Activity Guide for Grades 7–12*, American Forest Institute, 1977.)

Prepare a display that illustrates wildlife found in at least two different forest types. For each forest type, do the following?

- Photograph or collect pictures of the forest type.
- Identify the common tree species in the forest type.
- Identify at least two wildlife species found in that forest type.
- Include a picture or photograph of the animals mentioned. Mount your photographs or pictures on a three-sided display board or in a box.

Expand on the forest typing activity **from page 34.** Gather tree species data for at least three distinct forest types in the area. Then map the area. Mount the map on a three-sided display or poster board along with your forest data sheets.

ANSWERS

Succession Disturbances

All of these events are capable of starting succession.

Succession Series

top to bottom: 3; 4; 5; 2; 1

Specialist/Generalist Quiz

Specialists	Generalists
small rodents	snowshoe hare
ruffed grouse	red fox
gray squirrel	white-tailed deer
wild turkey	black bear
red squirrel	beaver

F*orest/Species* Match

maple-basswood: sugar maple, American basswood

oak-hickory: white oak, red oak, shagbark hickory

black cherry-maple: black cherry, sugar maple

pine-hemlock: eastern white pine, eastern hemlock

aspen-birch: bigtooth aspen, white birch

Quiz for the Real Whizzes

1. generalist
5. specialist
2. forest type
6. pioneers
3. tolerant
7. intolerant
4. succession
8. climax

PENNSTATE

College of Agricultural Sciences
Cooperative Extension

Name _____

Address _____

_____

Name of club _____

Leader's name _____

4-H Club Motto
"To make the best better"

4-H Club Pledge
I pledge
my head to clearer thinking,
my heart to greater loyalty,
my hands to larger service, and
my health to better living, for
my club,
my community,
my country, and
my world.

4-H Club Colors
Green and White

18 U.S.C. 707

FOR STANDING TREES

To Read Diameters: Hold Stick 25 Inches From Eye Against Tree At Height of 4 1/2 Feet.
To Read Heights: Stand 100 Feet From Tree and Hold Stick Vertical 25 Inches From Eye.

Diameter of tree (inches)	6	7	8	9	10	11	12	13
Height (No. Foot Logs)	1	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2

13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5	5 1/2	6	6 1/2	7	7 1/2	8	8 1/2	9	9 1/2	10