

Activity 76: Tree Cookies

Overview

One of the best ways to learn about a tree is to look at its annual rings. Tree rings show a pattern of change in the tree's life as well as changes in the area where it grows. In this activity, students will trace environmental and historical changes using a cross section of a tree trunk, otherwise known as a "tree cookie."

How to Use This Information

This supplement enhances the information provided in the Background section of this activity. Use this material in addition to the information contained on page 327 of PLT's Pre K-8 Activity Guide.

Resources

Important historical information and local stories about New Hampshire are collected by many around the state. See page 32 of this publication for a list of community resources.

www.americanforests.org

Correlations to NH Frameworks

Literacy:

Reading Indicators:

Vocabulary: 1.1

Breadth of Reading: 3.1, 3.2, 3.3, 3.4

Written and Oral Communication:

SL: 1.1, 1.2

Expressive Writing: 5.3, 5.6

Oral Communications:

1.1, 1.2, 1.3, 1.4, 1.5

Science:

Life Science: LS2.1, LS3.1

Science Process Skills: SPS1.1

Correlations found at
www.nhplt.org/Correlations.htm

Tree Cookies: A Word About Rings

Why do tree rings differ among species? In temperate climates such as New Hampshire has, trees grow rapidly in diameter in the spring. The diameter growth slows as the season progresses. The growth in the spring is full of conductive tissue and is often porous. The cells are large and can often be seen with the naked eye. This part of the tree ring is called early wood or spring wood. Denser and frequently darker wood grows later in the season and is called late wood or summer wood. It is less able to carry sap, but helps support the tree.

Together, the early wood and the late wood create a distinct band called an annual ring. It corresponds to one season's growth. There is always an abrupt transition between one year's annual ring and the next. However, the transition between early wood and late wood can be abrupt or gradual. Certain softwoods, such as red pine, have an abrupt transition. By contrast, eastern white pine has a gradual transition between early wood and late wood.

The rings of hardwoods are classified as either "diffuse porous" or "ring porous." Diffuse porous hardwoods include maples, beech, and aspen. The early to late wood transition is gradual. Ring porous hardwoods (oaks, ashes, and hickories) exhibit a more abrupt transition. These transitions between the cell types within an annual ring, different densities and colors, and many other properties produce the differences in tree rings among species.



New Hampshire Forest History Timeline

When looking at the growth rings of a tree, one can imagine it as a time line of history. The shape and width of each ring portrays such local natural events as floods, droughts, and fire. Consider the oldest known tree in New Hampshire—a black gum tree—estimated to be over 700 years old. Many major natural and human-related events have occurred during its life time. This tree's first rings were grown during Christopher Columbus's historic voyages. The tree later survived every significant natural disaster recorded in our time.

Natural Events

The shape of a tree's growth rings can record many natural events. For example, wider than normal rings signify growth spurts that may have been caused by heavy rains or openings in the surrounding forest from tornadoes. Scars in a growth ring may indicate fire. Narrow rings—a sign of slow growth—may signal distress from drought or an insect attack. In some cases, the natural event may have been so serious that the trees involved have died and decomposed, leaving no clues behind to observe.

Human Events

While a tree's growth rings cannot record human events in history as they do for natural events, the rings do form something of a timeline. For older trees—like the black gum—you can relate significant events to the life of the tree.



Here's What's Cookin': Tree Cookies

1. Start with a species with well-defined growth rings. For hardwoods, use white ash, red oak, or shagbark hickory. For soft-woods, use hemlock, eastern white pine, red pine, or Scot's pine.
2. Cut a cross section of branch or trunk
3. Dry cookie slowly in an oven, microwave oven, or in the sun. If you dry the cookie too fast, it will crack or even burn.
4. Sand the cookie.
5. Wipe with water to remove dust particles and let dry.
6. Treatment options. Wipe with iodine to make rings more distinct or coat with polyurethane. Leave some cookies untreated to allow students to feel and smell the wood.

A Note of Caution

Only cross-sections cut from the base of a tree can accurately depict a tree's age. Cookies cut higher on the tree and from branches have fewer growth rings. Of course, to use a tree cookie as a timeline, you also need to know what year it was cut.

History Timeline

How many of the state's major human and natural events can you relate to the life of a single tree?

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| 1603 | First exploration of New Hampshire by Europeans. Large old growth forests of hardwoods and softwoods covered the state. | 1947 | Major forest fire. Over 20,000 acres burned in Strafford and Carroll Counties in October. |
| 1623 | First European settlement in what is now Rye. | 1960s | Butternut Canker appeared. |
| 1631 | Construction of first sawmill in the state. | 1965 | Severe drought. Only 31 inches of precipitation. |
| 1634 | First ship masts exported to England. | 1971 | Saddled prominent caterpillars defoliated 600,000 acres of trees |
| 1706 | Last mature forest in Piscataqua basin harvested. | 1974 | Eastern Wilderness Areas Act designated the Presidential-Dry River Wilderness in the White Mountain National Forest. |
| 1700s | (into the early 1800s) State's forests cleared for agriculture. | 1976 | Spruce budworm attack. Estimated 106,000 acres defoliated. |
| 1860 | Industrial revolution. More than 50% of state's forests harvested.. | 1980 | Major drought. Only 36 inches of precipitation. |
| 1867 | Invention of process for making paper from wood pulp. | 1981 | Gypsy moth attack. Nearly 2 million acres defoliated. |
| 1869 | Gypsy moth attack. | 1983 | (until 1984) Bruce spanworm attack in Northern Grafton and Coos Counties. 17,600 acres defoliated. |
| 1871 | Severe drought. | 1985 | Major drought. Approximately 36 inches of precipitation. |
| 1890 | Beech bark disease. | 1988 | Major drought. Only 37.5 inches of precipitation. |
| 1900 | (early 1900s) Extensive clearcutting at the turn of the century. Prompted the eastern conservation movement. | 1995 | Major drought. |
| 1903 | Major forest fire. Over 200,000 acres burned, including over 85,000 acres in Zealand valley of White Mountains. | 1997 | Major drought. |
| 1910 | White pine blister rust discovered in southern NH | 1998 | Major ice storm. Hundreds of acres throughout the state damaged. |
| 1911 | Passage of Week's Act authorizing federal land purchases for national forests in the east and leading to creation of White Mountain and Green Mountain National Forests. | 2003 | Old Man on the Mountain collapses |
| 1916 | (until 1920) Chestnut blight. Chestnut trees decimated within 15 years. | 2005 | Monadnock region experiences record amounts of flooding |
| 1920 | Spruce budworm attack. | 2006 | Record flooding experienced statewide. |
| 1930 | Dutch elm disease outbreak. | 2006 | State population reaches 1,300,000 (estimate) |
| 1935 | State park system established | 2006 | United States Senate passed the New England Wilderness Act of 2006 creating 82,000 acres of wilderness and 15,000 acre recreation area in the White Mountain and Green Mountain National Forests |
| 1938 | Major hurricane. Blowdown of trees estimated at 1.5 billion board feet. | 2008 | Tornadoes hit central New Hampshire. |
| 1941 | Worst drought on record since 1871. Only .42 inches of rainfall for April. | 2008 | Worst ice storm on record in New Hampshire. |
| 1941 | Major forest fire. Over 24,000 acres burned in Marlow, Stoddard, Washington, and Gilsum. | | |

Big Trees of New Hampshire

While our state's big trees are smaller than the redwoods of the west, some species reach over 130 feet. The New Hampshire Big Tree Program registers and monitors the most outstanding examples of various tree species in the state. In addition to locating the largest trees, the program works "to obtain the cooperation of the tree owners to protect and preserve these specimens as landmarks for future generations to enjoy." The program is sponsored by the Society for the Protection of New Hampshire Forests, New Hampshire Division of Forests and Lands, and UNH Cooperative Extension.

Trees with the largest circumference at breast height, vertical height, and average crown spread are listed in the New

Hampshire Big Tree Program. The program also reports to a national program sponsored by American Forests, an organization that, among other things, communicates the benefit of trees and forests. (www.americanforests.org)

Three trees in New Hampshire are currently national champions, the largest of their species in the United States. They are a common apple tree, a black birch, and a pitch pine.

Anyone can nominate a tree to be a big tree champion. For more information about the New Hampshire Big Tree Program and to enter a big tree candidate, contact UNH Cooperative Extension, UNH-Manchester, Univ. Center room 311, 400 Commercial St., Manchester, NH 03101, or call 629-4124. <http://extension.unh.edu/forestry/BigTree.htm>

Big Trees of New Hampshire			
Tree's Common Name	Circumference (inches)	Vertical Height (feet)	Town
••Common apple tree	117	44	Acworth
Balsam fir	76	94	Cambridge
American beech	163	105	Chester
Red maple	156	87	Brentwood
Northern red oak	267	82	Warner
Sugar maple	232	76	Gilmanston
Yellow birch	183	76	Coos
Balsam fir	73	95	Holderness
Eastern hemlock	110	145	Hollis
White oak	242	65	Laconia
Butternut	206	54	Loudon
Silver maple	249	101	Manchester
American elm	219	126	Milford
•• Black birch	165	82	New Boston
•• Pitch pine	170	99	Newbury
Black walnut	160	74	Peterborough
Paper birch	168	76	Haverhill
Butternut	175	86	Plainfield
American basswood	199	128	Hollis
Eastern cottonwood	241	122	Rollinsford
Eastern white pine	243	119	Keene
Black cherry	153	87	Walpole
Black locust	188	98	Walpole
Black locust	186	93	Barrington
Sycamore	202	113	Walpole
White ash	225	94	Portsmouth

•• National champion big trees, the largest known of their species in the country.