



Dendrochronology



Slideshow Script

*Slide 1 - Please use the **Click** prompts that are embedded in the slideshow script to coordinate the narration with corresponding images.*

This lesson will introduce you to the science of dendrochronology. During this slideshow, respond to the prompts in “Part 1” of your worksheet. **Click**

Slide 2 - Read the slide.

Many of you may already have a basic understanding of dendrochronology’s foundational assumptions. Let’s check your knowledge. **Click**

*Slide 3 - Using this generalized cross section, determine the tree’s age. What assumption/prior knowledge did you use in aging this tree? Give students time to record their determinations on their worksheets. Slide 5 will go over the age of the depicted tree. **Click** What were probably the wettest and driest years this tree experienced? Remember, according to the slide, that the outermost ring would represent the year 2000. What assumption/prior knowledge did you use to determine your responses? Give students time to record their responses. Slide 6 will go over the wettest and driest years. When it appears that all students have responded on their worksheets.... **Click***

*Slide 4 - Most of you are familiar with the concept of determining the age of a tree by counting its rings. This tree is six years old. **Click** The pith, the centermost tissues of a tree trunk, is considered to be part of the first ring. **Click***

Pith: *The centermost tissues of a tree trunk or branch produced by the upward or outward growth of the shoot tip which allows a tree to reach greater heights or a branch to become longer.*

Slide 5 - The ***principle of limiting factors*** states that the most limiting environmental factor controls the growth of the organism. [Click](#) Precipitation is the dominant limiting factor for trees in the Cross Timbers. In this cross section, it is apparent that the rings are of different widths. In this example, [Click](#) the narrow band corresponds to a drier year, [Click](#) and the wide band reflects a wetter year. [Click](#) If the outermost ring were produced in 2000, [Click](#) then the narrow/dry ring would be from 1999, and [Click](#) [Click](#) the wide/wet ring would have been produced in 1997. [Click](#)

Slide 6 - In temperate biomes, tree rings are usually easy to differentiate from each other due to “lighter” and “darker” concentric bands. Each annual ring is comprised of a “light” and, then, a “dark” band. Thus, the rings are relatively easy to count. [Click](#)

Slide 7 - *Read the slide.*

On the left, a slide from tree **xylem** tissue shows that earlywood appears lighter because the earlywood has larger “openings.” [Click](#)

Xylem: *The tissue through which most of the water and dissolved minerals utilized flows. In trees, xylem contains annual growth rings.*

Slide 8 - *Read the slide.*

The xylem tissue slide also shows the relative darkness of the latewood resulting from smaller “openings.” [Click](#)

Slide 9 - *Read the slide.* [Click](#)

Slide 10 - There are two basic data sources in dendrochronology. The first is comprised of cross sections with which most of you are familiar. Increment cores, the second source type, depicts annual rings in a “reduced” fashion. [Click](#)

Slide 11 - Complete cross sections can be collected from dead trees or from living trees. Since taking a complete cross section from a living tree will result in its death. This is only done when trees on a site are planned to be harvested or removed. [Click](#)

Slide 12 - Partial cross sections can be collected from living trees without causing the tree's death. Studies have shown that there is no significant difference in mortality between a control group of trees that were not sampled and a group with partial cross sections removed. [Click](#)

Slide 13 - An increment borer is a tool designed to remove a small core from a living tree without harming it. The small hole left in the tree after sampling is quickly sealed, and parasites or other forms of life can only enter the bore hole to cause damage under extreme conditions. The borer is turned until the depth of penetration is sufficient to include the pith. An extractor spoon is then used to remove the core by being inserted through the handle between the core and the metal tube of the increment borer. Cores can also be extracted from dead wood. Now let's take a look at how dendrochronology can be used to better understand the important ecological disturbance of fire. [Click](#)

Slide 14 - Stand-replacing fires kill most of the trees on a site, creating conditions that favor the establishment of a new forest where most of the trees are about the same age – a new **cohort**. [Click](#) Increment cores taken from the new or “replacement” stand of trees can provide some information about when a stand-replacing fire may have occurred. Further evidence is often required to support the occurrence of a stand-replacing fire because other conditions could result in widespread mortality, such as droughts, pest outbreaks, changes in community competition, and changes in climate. [Click](#)

Cohort: *Organisms that form a group of approximately the same age. As a result, such organisms are subject to an environment which may differ from that to which organisms from an earlier or later time are exposed. A group of individuals of the same age, recruited into a population at the same time.*

Slide 15 - Surface fires are those that burn over the ground surface consuming **duff** and **fine fuels**. Surface fires are typically of lower severity or intensity. However, some could be severe enough to be stand-replacing. Low-intensity fires kill some trees (especially younger and older ones of species with thin bark) and burn around others. Fire scars may be produced on some of the surviving trees. Once a tree is initially scarred, future fires are likely to scar the damaged area again. Repeated fire scars create a triangular scar, called a catface, at the base of the tree. By collecting partial cross sections from surviving trees and complete cross sections from dead trees, fire scars can be used to determine the historic frequency of low-intensity fires on a study site. [Click](#)

The fire scar video may be shown.

Duff: *Partially decomposed organic matter lying beneath the litter layer and above the mineral soil. Includes the fermentation and humus layers of the forest floor.*

Fine fuels: *Dead fuels comprised primarily of herbaceous plants but which could also include woody plants less than 0.25 inch (6.4 mm) in diameter and litter found on the ground surface.*

Slide 16 - The yellow layer or band in this diagram depicts **cambium** tissue. Cambium that is severely damaged can no longer produce other tissues necessary for tree survival and growth. [Click](#) A low-intensity surface fire passes by the tree, but enough heat and physical damage is produced to cause cambium death in one area. [Click](#) We will assume that there has not been enough cambium damage to kill the tree. [Click](#) As time passes, [Click](#) the surrounding cambium is able to continue with tree growth. [Click](#) The scarred area begins to be overgrown and could eventually close. [Click](#) [Click](#) This partial cross section is from a tree that has survived at least three fires. [Click](#) [Click](#) [Click](#) On cross sections with multiple fire scars, the number of annual rings between scars indicates how much time has elapsed between fires. [Click](#)

Cambium: *Tissue within the stems or roots of trees and plants which produces the secondary tissues xylem and phloem. Cambium is located in the interior of a tree a short distance beneath the bark.*

Slide 17 - When investigating the fire history of a study site, dendrochronologists survey for evidence of fire on living and dead trees. Complete cross sections could be collected from tree stumps or dead trees that are standing or that have fallen. Partial cross sections could be taken from living trees that have fire scars. Increment cores could also be taken from living or dead trees with or without fire scars. [Click](#)

Slide 18 - *Read the slide.*

You will use images of increment cores and cross sections from this study conducted in Oregon. [Click](#)

Fire Frequency: *Number of fires per unit time in a specified area*

Fire Intensity: *A general term relating to the heat energy released in a fire (e.g., high- or low-intensity)*

Slide 19 - The Deschutes National Forest is found in central Oregon [Click](#) to the east of the Cascade Mountains. [Click](#) The sampling site for this study was in the easternmost part of the forest. [Click](#) **Stands** of trees at the study site are composed of Lodgepole Pines and Ponderosa Pines. [Click](#)

Stand: *An aggregation of trees or other growth occupying a specific area and sufficiently uniform in species composition, size, age, arrangement, and condition as to be distinguished from the forest or other growth on adjoining areas.*

Slide 20 - We are now finished with this activity's background information; Part A on your worksheet should be complete. It is time to continue this investigation on your own.

End of slideshow

The End