

Life Over Time: Dendrochronology

Teacher's Guide

Subject: Integrated Science (Life; Earth-Space; Physical)

Topic: Tree Rings, Tree Cores, Life Cycle, Seasons, Environmental Conditions

Summary: Students will measure growth rings in tree cores, cross sections or stumps and examine the relationship of these rings to environmental conditions.

After completing the field lab, students will be able to:

Objective(s):

1. Obtain a tree core
2. Measure tree rings using the core
3. Identify possible stressors that affect tree ring growth

Ecosystem(s): Hammocks; Pinelands; Scrub, Upland

Equipment:

- Tree corer
- Rulers (mm)
- Data sheet & clipboard
- Prepared Tree Cores
- Tree Cookies
- Hand Lenses (5) Tree Caliper
- Micro-caliper
- GPS

Background:

- **Vocabulary:** diameter; radius; circumference; stressors, tree ring
- **Reference Material:** Review background information from Project Learning Tree activity on tree rings, “Investigate learning from tree rings”, pg 249-250 of Florida Lab Manual grade 7—teachers edition, chapter 13 on Views of Earth’s Past.
- **Equipment Training:** Use of tree corer

Procedure (Engage; Explore; Explain)

1. Ask students to reflect on the change in their height as they grow. Then ask them to consider the growth in their waistline as they grow. Have them compare these changes with the changes that a tree goes through. Explain that trees add new wood every year and that this wood can usually be differentiated from wood added in previous years.
2. Explain that trees add new wood every year in the form of a growth ring. These rings include light and dark sections (light section represents the growing season and the dark section the rest of the year). Together these represent one year of growth.
3. In years where water and nutrients are abundant, growth rings are thick. In years, where water is limited or other stressors exist, growth rings are thin.
4. Examine a tree cookie/cross section. Place a tree corer on top of the cookie and demonstrate how it could collect the same information without having to cut down the tree.
5. Demonstrate how to use the DBH tape and tree corer. Give each student a chance to use both pieces of equipment.
6. Return to the ISSP Education Center and hand out a previously prepared core(s). Transfer tree ring information from the sample core to the long edge of your data sheet by placing a tick mark on the edge of the paper corresponding with the end of the dark ring.
7. Complete the data sheet, and answer assessment questions

Sunshine State Standards:

Science: SC.D.1.3.2, 4, 5; SC.F.1.3.1; SC.G.1.3.2, 4, 5; SC.G.2.3.3; SC.H.1.3.4; SC.H.2.3.1

Language Arts: LA.A.1.3.3; LA.B.2.3.1; LA.C.1.3.1

Mathematics: MA.A.1.3.1; MA.B.2.3.1; MA.B.3.3.1 **Social Studies:** SS.A.6.3.2; SS.B.2.3.9

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Student Data Sheet

General Information

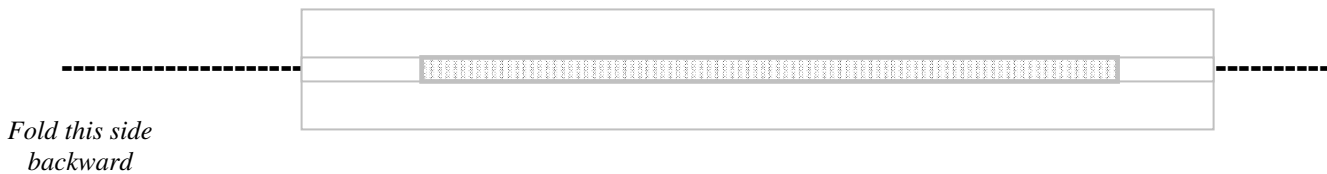
| | | | |
|-------------------|--|------------|--|
| Full Name: | | Date: | |
| School (teacher): | | Time: | |
| Latitude: | | Longitude: | |

Student Hypothesis and Rational If rainfall affects tree growth than I hypothesize that a tree will have a (choose one: higher/ lower or same rate of growth during periods of increased rainfall) because _____

Field Observations/Measurements/Data

| Item | Measurement |
|--|-------------|
| Diameter at Breast Height (DBH) (cm) [at time core was taken] | |
| Date of Core (month/year) [written on side of mount] | |
| Length of Core (cm) [measure from center mark to just inside bark] | |
| Age of tree (years) [Count number of growth rings] | |
| “Birth Year” of Tree [Subtract age of tree from date of core] | |
| Average Growth Rate (cm/year) [Length of core divided by the number of rings] | |
| At the bottom of this page, transfer your core data to the edge of this data sheet. Be careful not to write on the core itself. Mark the following on the data sheet: Center = “C”; Outside/bark = “B”; Each growth ring at the outside edge of the dark band; Label the band that corresponds to your birthday with the year; label the band for 1985; label the band for 1995. | |

Fold paper on dotted line and transfer your tree core rings to the edge of the paper below



Dendrochronology

Assessment

1. What year was the growth ring (band) the largest? What year was the growth ring (band) the smallest?

2. Based on the table below circle the two-year period had the lowest rainfall? Is there any correlation between this dry period and the growth rings/bands on your tree core?

Rainfall Data (in inches/year) from Ichetucknee Springs State Park

| Year | Rain | Year | Rain | Year | Rain |
|------|-------|------|-------|------|------|
| 2005 | n/a | 1995 | 57.82 | 1985 | |
| 2004 | 64.46 | 1994 | 61.30 | 1984 | |
| 2003 | 61.17 | 1993 | 59.03 | 1983 | |
| 2002 | 55.09 | 1992 | 56.72 | 1982 | |
| 2001 | 39.62 | 1991 | 77.78 | 1981 | |
| 2000 | 36.53 | 1990 | n/a | 1980 | |
| 1999 | 50.63 | 1989 | 29.34 | 1979 | |
| 1998 | 61.15 | 1988 | | 1978 | |
| 1997 | 57.13 | 1987 | | 1977 | |
| 1996 | 75.23 | 1986 | | 1976 | |

Average rainfall is 52 inches per year

3. Under what condition might two trees of the same type and age have different growth rates?

4. The park periodically gathers tree core samples to study. What might they learn about the Park by doing this?

5. All living things go through a cycle of growth. In trees we measure that growth by looking at tree rings. Think about your own growth (height/weight) over the years and explain how you might measure your own growth.

Dendrochronology post-activity

Complete the concept map below by choosing from the following words or phrases:

- Competition (from other trees)
- Disease
- Tree rings

