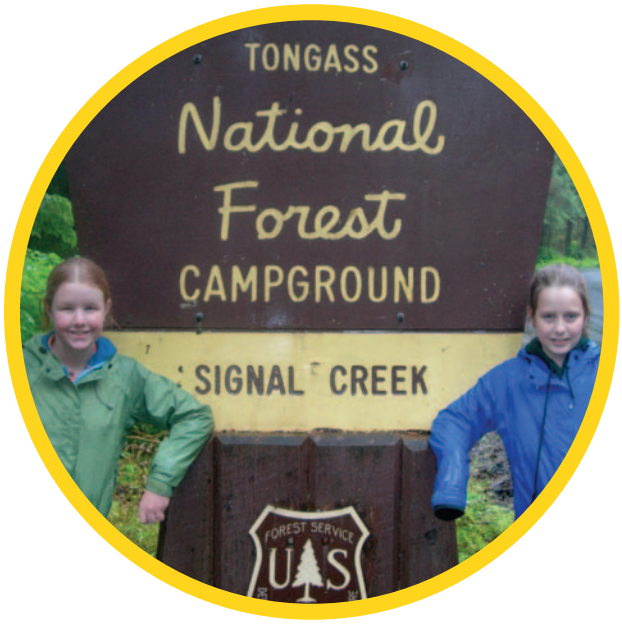
DragonflyTV: GPS Activity 2
Tree's a Crowd!

Southeast Alaska Discovery Center
Ketchikan, AK
http://www.fs.fed.us/r10/tongass/districts/discoverycenter/

Temperate Rain Forest

We're Emma and Gracie, and we live in Ketchikan, Alaska, where it rains 25 feet a year! All that water helps trees and other plants grow like crazy. That's why the Tongass National Forest grows so well here. Some days when it's raining, and we can't get out to enjoy nature, we go to the next best place—the Southeast Alaska Discovery Center. They have a cool exhibit that brings the forest inside. The exhibit got us thinking about tree growth. Our DFTV question: How long would it take for a new tree to grow as big as an old growth tree?

We visited three areas of the forest: thinned, non-thinned, and old growth. In each location, we collected data from 2 small and 2 large trees. We measured tree diameters and took tree ring samples from a total of 12 trees. Then we counted rings and estimated the trees' ages. We figured the growth rate of each tree by dividing diameter by age.



Icebreaker

Investigate how a tree's trunk diameter relates to the height of its lowest branch!

1 hour

DragonflyTV Skill: Observing

Guide your kids as they

1) Identify a group of deciduous trees to study. Ideally, there would be 20-25 trees.
2) Use the tree identification guide, if needed, to determine the species of trees under study. Record this information in their notebooks.
3) Measure the trunk circumference of each tree. Follow the standard procedure of wrapping the string around the trunk at a height of 1.3 meters (4 ft. 3 in.) above the base, then measure the amount of string required to reach that circumference. Alternatively, a flexible tape can be wrapped around the trunk, and the circumference measured directly. Record the circumference in centimeters.
4) Measure the height of the lowest branch above the ground, by measuring from where that branch joins the trunk. Record this height in meters.
5) Use a calculator to convert the circumference to an estimated diameter.

   diameter = circumference divided by pi (3.14)

6) Analyze the results to look for a relationship between tree diameter and height of the lowest branch. Sort the data by tree species.

You'll need per group of two:

- string, 3 meters long
- a tape measure, metric
- a calculator
- a tree identification guide

DFTV Science Helper

This activity exposes kids to techniques that foresters actually use to study and measure trees. This technique is also featured in the accompanying video for this story. Use the opportunity to discuss the challenges of measuring the height of tall trees, and brainstorm ways you might accomplish that.

For more simple activities like this one, surf to pbskidsgo.org/dragonflytv/superdoit/index.html

Investigation
Tree Growth

1 hour

Examine tree rounds (or "cookies") to study tree growth rates.

Guide your kids as they

1) Acquire a minimum of 5 tree rounds. Make sure they can identify the type of tree from which the round comes.
2) Begin by counting the number of rings. Have a teammate double-check the counting… it's easy to make a counting error.
3) Use a centimeter ruler to measure the diameter of the tree round. Since tree rounds aren't exactly round, measure 3 different diameters on each sample and determine an average.
4) Identify the ring that seems to be thickest. Use the millimeter markings on the ruler to measure the thickest ring. Similarly, identify the thinnest ring. Attempt to measure it with the millimeter ruler. If it is thinner than a millimeter, estimate the fraction of a millimeter it seems to represent.
5) Determine the ring number of the thickest and thinnest rings identified above. Be sure to count from the center outward.
6) Calculate the appropriate averages, and complete a table, as shown on the following page.
7) Answer these questions:
   - **a)** If 2 tree rounds have the same diameter, does that mean they are the same age? Give examples to support your answer.
   - **b)** For each tree round, in which year(s) of the tree's life did it grow the fastest?
   - **c)** For each tree round, in which year(s) of the tree's life did it grow the slowest?
   - **d)** Is an older tree always a larger tree? Use examples to support your answer.
   - **e)** Find an example of 2 tree rounds where the older tree is the smaller tree. Discuss what factors could have caused this.

You'll need:

- a minimum of 5 tree rounds per group (available from www.acornnaturalists.com if you do not have access to your own)
- a cloth measuring tape (metric if possible)
- a metric ruler, with millimeter divisions
- notebooks
- optional: string and meterstick

DFTV Science Helper

Younger children can participate in this exercise simply by counting rings and noting that some are thicker than others. Older children can be given the additional task of measuring rings with a ruler and calculating rates of growth.

DFTV Kids Synthesize
Data and Analysis

Calculate the following characteristic for each tree round:

1) Overall average growth rate (cm per year) = diameter (cm) divided by number of rings

2) Fastest growth rate (cm per year) = thickest ring thickness (mm) x 20

3) Slowest growth rate (cm per year) = thinnest ring thickness (mm) x 20

Tree round #	Tree type	Diameter, cm	# of rings	Thickest ring, mm	Thinnest ring, mm	Average rate
1	pine	8.5	18	3	0.5	0.5 cm/yr
2	oak	10.5	24	2	1	0.4 cm/yr
3	oak	8.5	26	1	0.5	0.3 cm/yr
4	basswood	12.0	14	5	2	0.9 cm/yr
etc.						

DFTV Adult Tip

Because the growth rate values are small numbers (typically, less than one centimeter per year), many kids will have difficulty putting these numbers onto a graph. Coach your kids on how to construct the vertical axis of a graph that is graduated in units between one and zero.

Keep Exploring!

What is a silviculturist? What is a forester? Contact your local Forest Service Ranger District to meet a silviculturist and/or a forester to learn more about what kind of work these scientists do in our national forests! Learn more at www.fs.fed.us.