


Another Virtual DAY *in the* WOODS

Measuring the Trees in Your Woods

7-10-2020

Dave Apsley
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Ohio State University Extension

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2020 EVENT SCHEDULE

A DAY *in the* WOODS

2nd Friday Series | May-December



VINTON FURNACE
STATE FOREST

located near McArthur, Ohio

Designed for
woodland owners
and enthusiasts

u.osu.edu/seohiowoods
 Email: apsley.1@osu.edu

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Due to COVID-19 our May 8 & June 12 programs will be offered virtually. Content & login information will be available prior to the event at: u.osu.edu/seohiowoods

Additional updates will be posted as needed.

Keeping yourself and your woodlands healthy

May 8 - Virtual Program Via Zoom

- Spring Migrating Birds (9 am)
- Health Benefits of Woodlands (11 am)
- Keeping woodlands healthy-Part 1 (1 pm)
- Keeping woodlands healthy-Part 2 (3 pm)

Tree and shrub identification

June 12 - Virtual Program Via Zoom

- Learn to use leaf characteristics to identify trees
- Explore a variety of trees virtually
- Get a downloadable free Leaf ID Key and learn to use it
- Become familiar with phone apps and web sites that can assist you with tree identification

From trees to lumber

July 10 - Zaleski State Forest

- Learn to measure standing trees and logs
- Understand how tree and log quality relate to the quality and value of lumber
- Learn how trends in lumber and log prices relate to the value of your trees
- Visit local log yards and sawmills to understand the process of turning logs into lumber

Mapping and legal Issues

August 14 - ODNR Complex Zal. SF (9:00 -noon) Mapping and GPS

- Learn about the wide array of tools that are available online to assist with your woodland management
- Understand the capabilities of GPS phone apps for navigating and mapping in your woods
- Explore My Land Plan and other software that you can use to map your woodland and document your activities

(Noon-4:00) Woodland legal Issues

- Protect yourself from timber theft
- Understand fence line & recreational user laws
- Become familiar with strategies available to ensure that your woodland legacy lasts into the future

For maps, directions and other information visit us at:

u.osu.edu/seohiowoods

Woodland wildlife: Implications of our changing times

Sept. 11 - Vinton Furnace State Forest

- Explore trends in land use and the influence on Ohio's forests and wildlife populations
- Explore changes in age, structure and composition of Ohio's forests
- Learn how wildlife populations impact forests
- Understand the challenges Ohio's forests and wildlife are facing, such as climate change, invasive species, and disease



Tools and equipment for managing your woodlands and wildlife habitat

October 9th - Hocking College

- Learn how to select, safely use and maintain a chainsaw
- Understand how to safely operate your small farm tractors and off-road vehicles
- Become familiar with hand tools commonly used in woodland and wildlife management

Building and maintaining woodland trails and roads

November 13 - Vinton Furnace State Forest

- Learn how to design, layout and build trails
- Practice building new and maintaining existing recreational trails
- Understand Best Management Practices (BMP's)

Winter tree identification

December 11 - Vinton Furnace State Forest

- Learn to use buds and twig characteristics to identify trees
- Recognize bark of common trees
- Identify trees using nuts, acorns and other clues that you can find on the forest floor

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Just for woodland owners and enthusiasts in SE Ohio



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JUNE 29, 2020

Measuring the Trees in Your Woods – Virtual "A DAY in the WOODS" offered on July 10

by [David Appleby](#) at 8:43pm

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Please join us for: **Measuring the Trees in Your Woods – Virtual "A DAY in the WOODS"** on July 10.

This program will consist of a homework assignment and a one hour live Zoom Webinar from 10 am to 11 am.

Ohio State University

Using the Tree Measuring Stick

This is a virtual program that will be held on July 10, 2020. The program will consist of a homework assignment and a one hour live Zoom Webinar from 10 am to 11 am.

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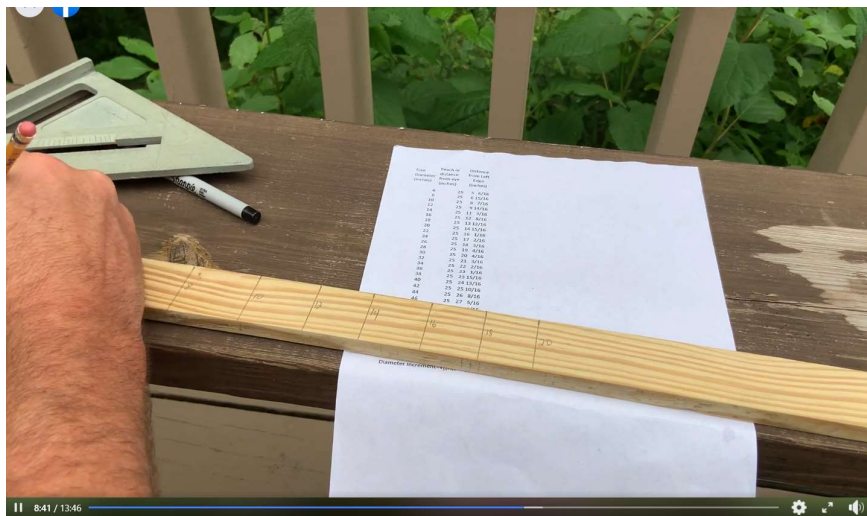
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CRUISER Stick 25 inch reach

Biltmore Stick			Merritt Hypsometer
Tree Diameter (inches)	Reach or distance from eye (inches)	D.B.H. Distance from Left Edge (inches)	16 Ft Log: 1 log increments (inches)
6	25	5 6/16	6 1/16
8	25	6 15/16	
10	25	8 7/16	
12	25	9 14/16	
14	25	11 3/16	
16	25	12 8/16	
18	25	13 12/16	
20	25	14 15/16	
22	25	16 1/16	
24	25	17 2/16	
26	25	18 3/16	
28	25	19 4/16	
30	25	20 4/16	
32	25	21 3/16	
34	25	22 2/16	
36	25	23 1/16	
38	25	23 15/16	
40	25	24 13/16	
42	25	25 10/16	
44	25	26 8/16	
46	25	27 5/16	
48	25	28 1/16	
50	25	28 14/16	
52	25	29 10/16	
54	25	30 6/16	
56	25	31 2/16	
58	25	31 13/16	
60	25	32 9/16	

Where R is reach or distance from the eye (25 inches), D is diameter
Diameter Increment = $\sqrt{[(R \times D)] / (R + D)}$

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Using the Tree Measuring Stick

Kathy L. Smith, Extension Program Director - Forestry
David K. Apsley, Natural Resources Specialist

The tree measuring stick is a useful tool for measuring trees and logs. Although not as precise as more specialized tools, it is inexpensive, easy to carry, and accurate enough for most of your tree and log measurement needs. This stick incorporates several tools that are commonly used by foresters and the forest industry, and can help woodland owners better understand and manage their forest resource. What can you measure with this stick? The stick is primarily used to measure the diameter of standing trees in inches, their height in 16-foot logs, and the volume they contain in board feet or cords. It can also be used to measure diameters of logs and estimate their volume. Additionally, the stick has an angle gauge that can be used to determine basal area—a measurement of tree density or crowding.

Even though the stick is a useful tool, it will not eliminate the woodland owner's need for the assistance of a professional forester. A woodland owner should utilize a professional forester to develop a management plan and to assist with forest management activities such as timber harvests and tree planting.

Measuring Tree Diameter

There are two important factors to keep in mind when measuring tree diameter: (1) the diameter of a tree should be measured at a point on the tree 4½ feet off of the ground (this is known as Diameter at Breast Height or d.b.h.) on the uphill side of the tree, and (2) trees are often not perfectly round; therefore, it is a good idea to take two measurements perpendicular to each other and average them.




Figure 1. A tree measuring stick showing the "Tree Scale Stick" side.

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Measuring Standing Trees

Determining Diameter, Merchantable Height, and Volume

Randall B. Heilmann, Extension Specialist, Forestry
Stephen M. Bratkovich, Former Extension Specialist, Forestry

Woodland owners often need to measure the merchantable board-foot content (termed "volume") of certain trees in their woodland. In order to sell timber, for example, an estimate is needed of the quantity to be sold. If trees are to be cut to provide lumber, an estimate of volume is needed to determine what size and how many trees to cut. Using the methods described in this article, a woodland owner can estimate the board-foot volume in one or several trees. If an estimate is needed for several acres, however, it is recommended that the woodland owner engage the services of an Ohio Department of Natural Resources Division of Forestry Service Forester, a consulting forester, or an industry forester. Methods needed to accurately and efficiently inventory timber volume on large areas are beyond the scope of this publication.

Tree Volume Estimation

In the United States, the most common measure of lumber volume is the board foot, defined as a piece of wood containing 144 cubic inches. It can most easily be visualized as a board 12 inches square and one inch thick (12" x 12" x 1" = 144 cubic inches). However, any piece of wood containing 144 cubic inches is a board foot (e.g., 3" x 4" x 12", 2" x 6" x 12", etc.). The board-foot content of any board may be determined by multiplying the length by the width by the thickness, all expressed in inches, and dividing by 144 cubic inches.

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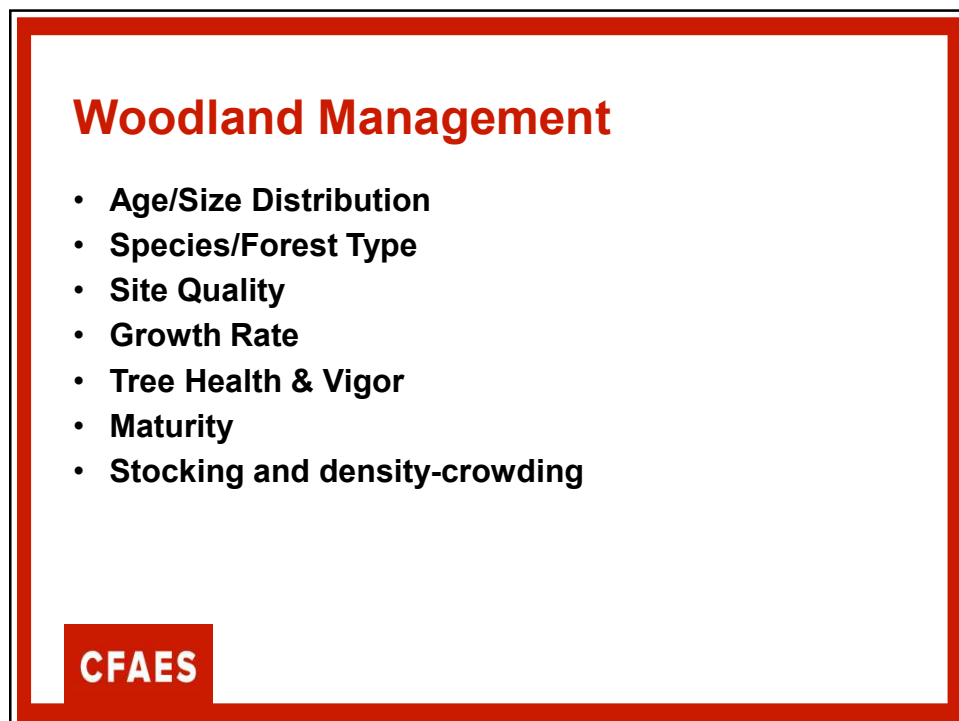
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Product Sale

- Volume of product
- Quality of product
- Estimated value of the product

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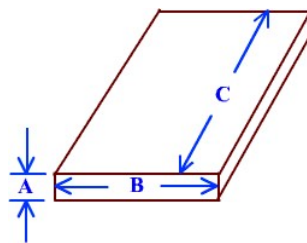
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Board Foot

"Board Foot" is a unit of volume used for forest products. A board foot is equal to 144 cubic inches of wood.

$(\text{Thickness} \times \text{Width} \times \text{Length}) / 144 = \text{Board Feet}$

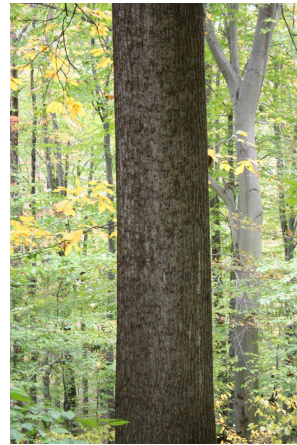
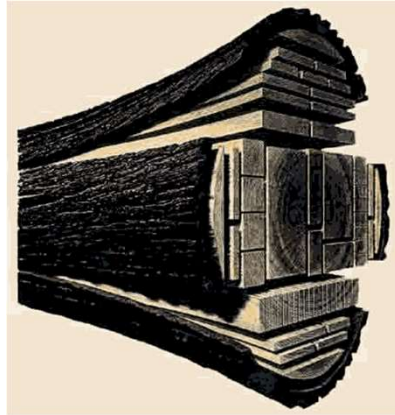
A board 12" long x 12" wide x 1" thick = 144 Cubic Inches



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How do we determine Volume in Board Feet of a tree?



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Trees Are Cylinders That Taper

- Measure length
- Measure diameter
- Estimate taper (tables adjust for this)
- Reduce for slab and kerf loss (tables adjust for this also)

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Measuring Diameter

- Diameter is measured at breast height (d.b.h.) which is 4.5 feet from the ground (from the up-hill side of the tree)
- Tools to use
 - Diameter tape
 - Biltmore stick
 - Caliper



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Measuring Diameter Diameter Tape



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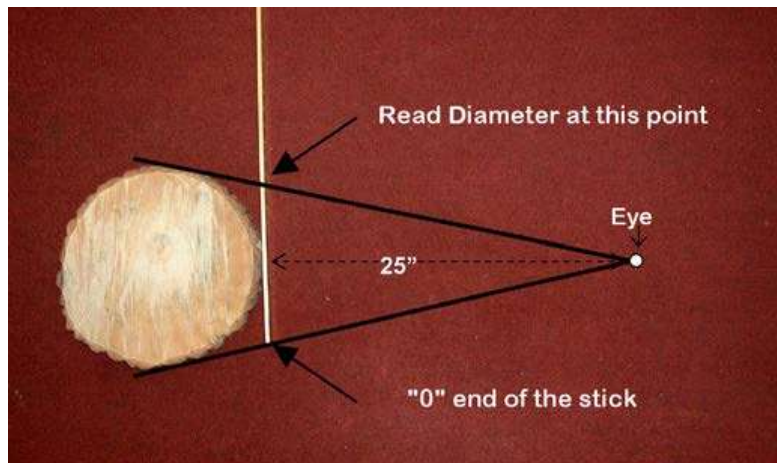
Measuring Diameter- Using a Biltmore Stick



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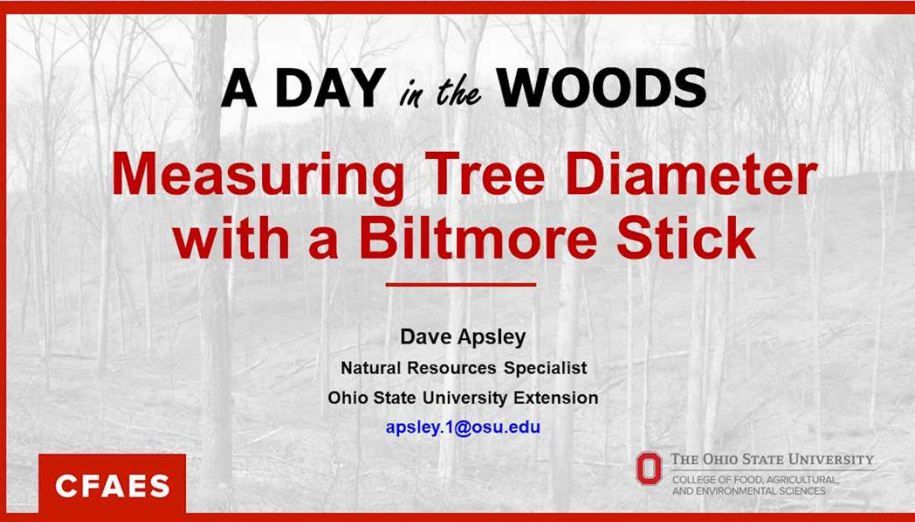
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Using a Biltmore Stick



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Measuring Tree Diameter with a Biltmore Stick


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**Where is
d.b.h.
measured?**

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Measuring Height

Merchantable Height

- 1 log = 16 feet
- Measure to nearest $\frac{1}{2}$ log
- 1 foot above the ground
- 10 inch diameter top

Tools

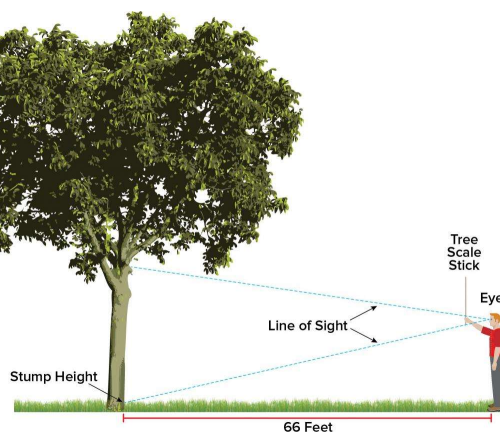
- Clinometer
 - **Within a couple of feet**
- Merritt Hypsometer – on tree measuring stick
 - **Nearest $\frac{1}{2}$ log**



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Measuring Merchantable Height (Merritt Hypsometer)



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Pacing to Estimate Distance

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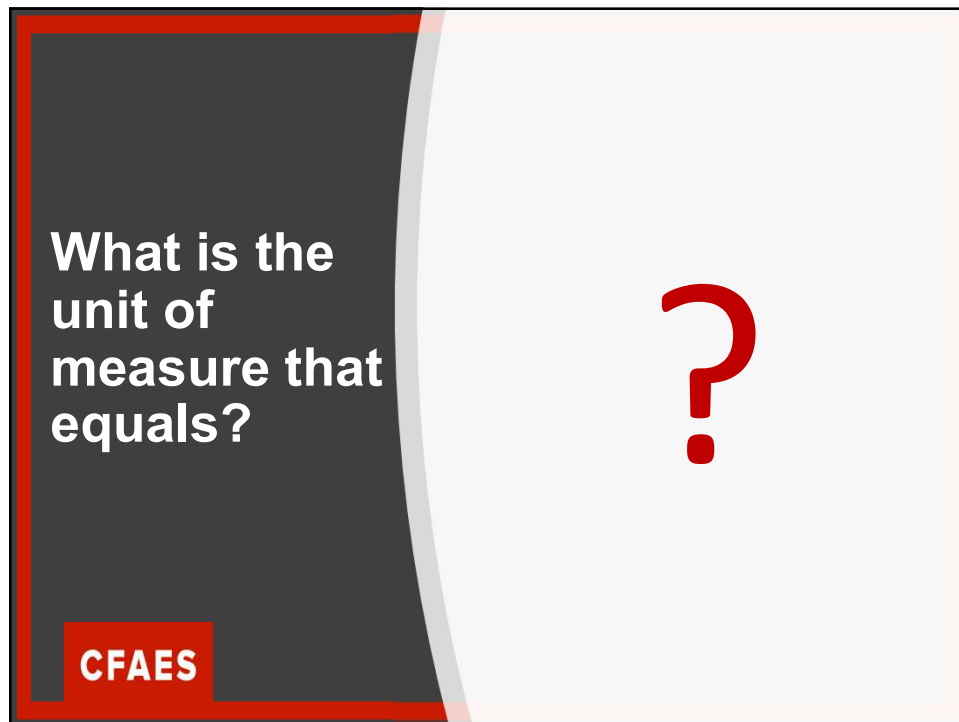
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**How many
steps are in a
pace?**

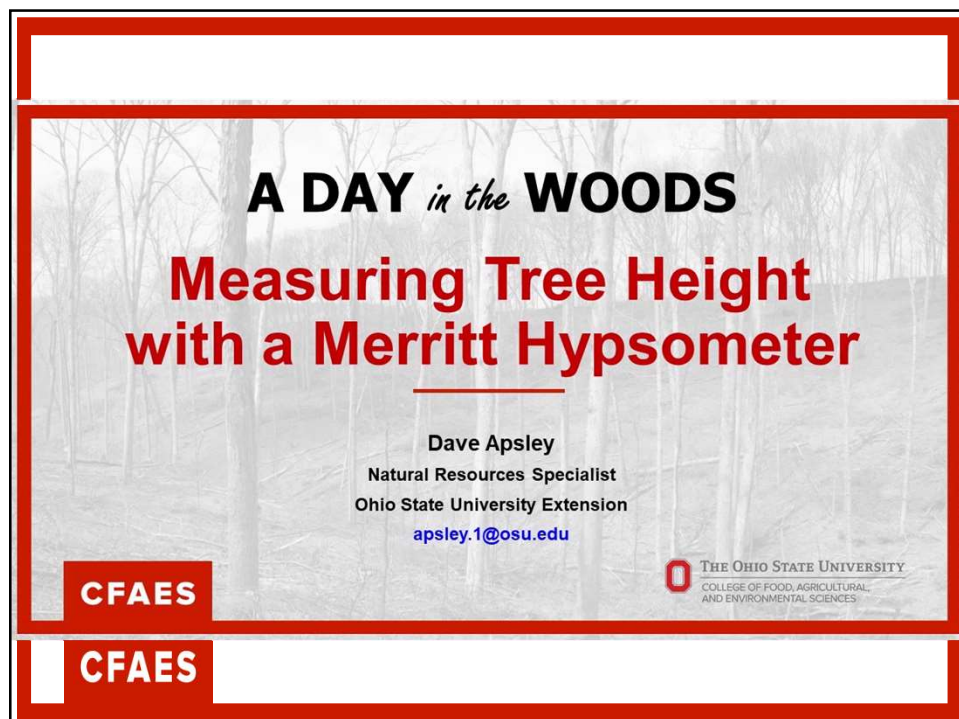
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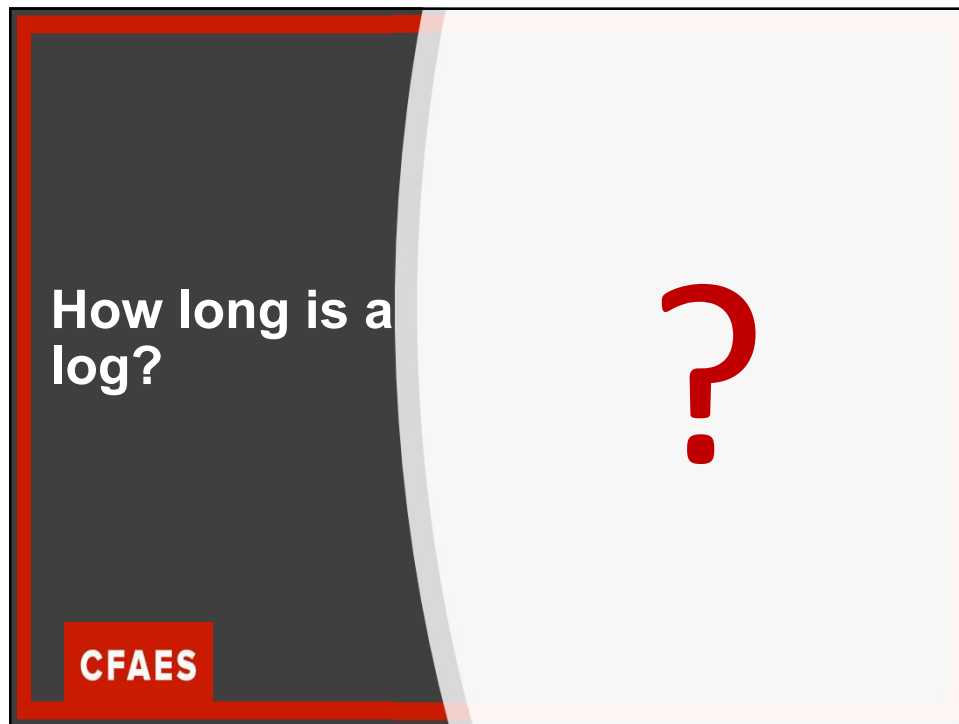
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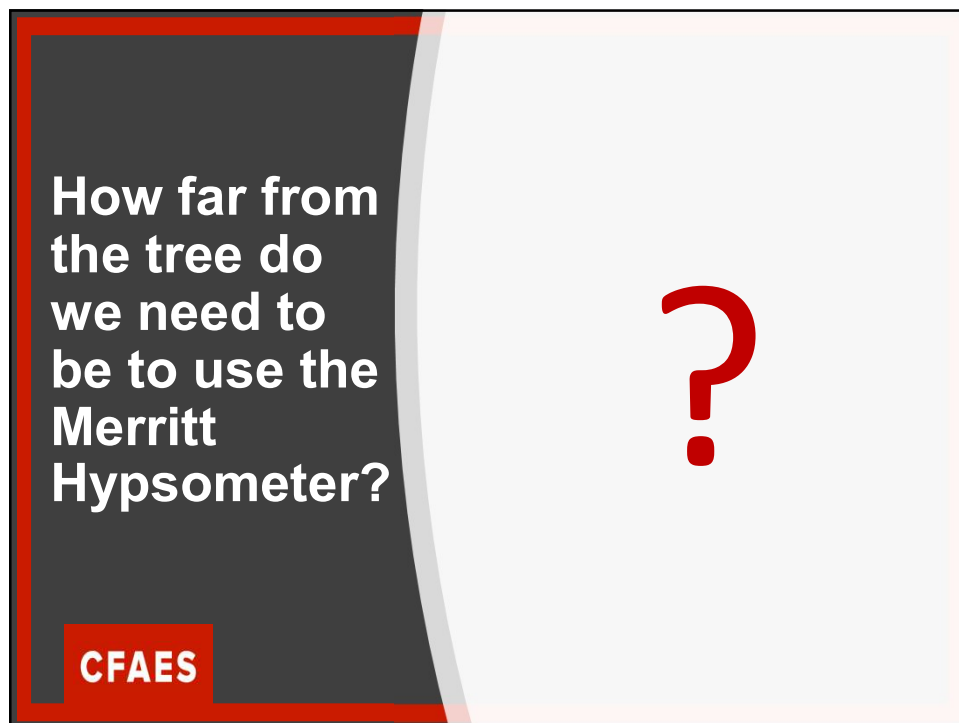
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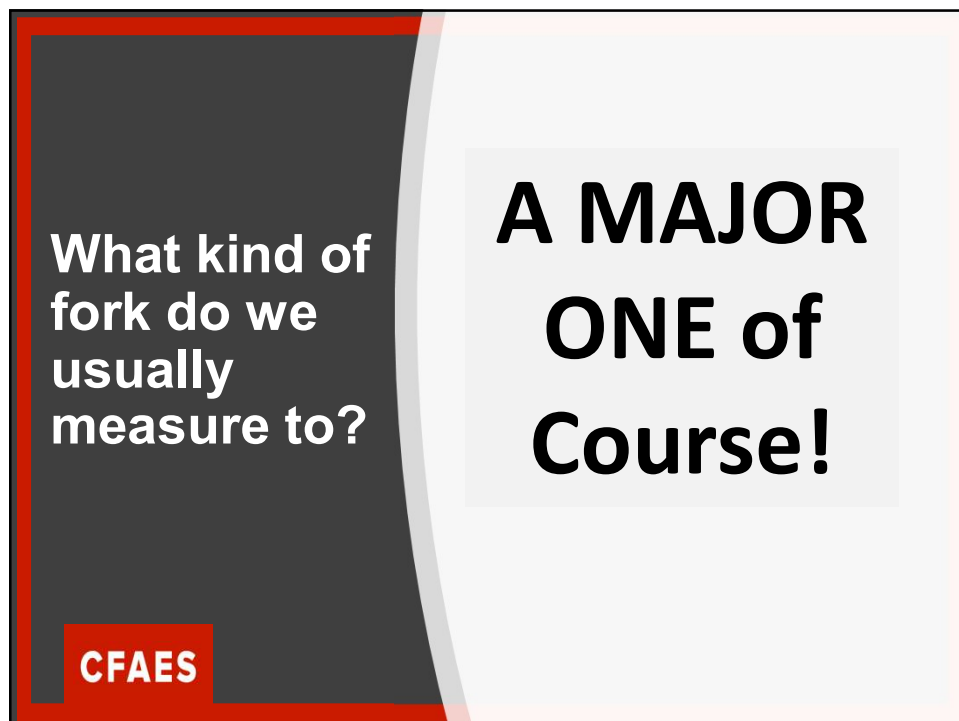
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Doyle Log Rule

Published by Edward Doyle in 1825

For logs between 26 and 36 inches in diameter results can be pretty accurate.

- Underestimates smaller logs (over run)
- Overestimates large logs (under run)

$$(D-4)^2 / 16) * L$$

if log is 16 feet simply $(D-4)^2$

Where:

D= Log diameter (inches) inside bark on small end of the log

L=Log length in feet

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Comparison of Doyle and International 1/4" log Rules for 16' logs

Log Diameter (Inches)	International 1/4"	Doyle	Doyle % of International
8	40	16	40
12	95	64	67
16	180	144	80
20	290	256	88
24	425	400	94
28	585	576	98
32	770	784	102
36	980	1024	104
40	1220	1296	106

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Form Class

Ratio of Diameter Breast Height (dbh, outside bark) to
Diameter Inside Bark (dib) at top of the first 16-ft log
(inside bark).

Form Class 78 used most often:

Examples 10-in dbh = 7.8 dib 17.3
 20-in dbh = 15.6
 30 in dbh = 23.4

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Volume Table

Table that provides an estimate of the average volume of a tree using one or more tree dimensions

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Volume Table

TREE
SCALE

DIA. 4'-6" ABOVE GROUND INCHES	DOYLE LOG RULE							
	NUMBER OF 16 FOOT LOGS IN TREE							
	1/2	1	1 1/2	2	2 1/2	3	3 1/2	4
CONTENTS IN BOARD FEET								
12	20	30	40	50	60			
14	30	50	70	80	90	100		
16	40	70	100	120	140	160	180	190
18	60	100	130	160	200	220	240	260
20	80	130	180	220	260	300	320	360
22	100	170	230	280	340	380	420	460
24	130	220	290	360	430	490	540	600
26	160	260	360	440	520	590	660	740
28	190	320	430	520	620	710	800	880
30	230	380	510	630	740	840	940	1040
32	270	440	590	730	860	990	1120	1220
34	300	510	680	850	1000	1140	1300	1440
36	350	580	780	970	1140	1310	1480	1640
38	390	660	880	1100	1290	1480	1680	1860
40	430	740	990	1230	1450	1660	1880	2080
42	470	830	1100	1370	1620	1860	2100	2320

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