NRCS	**Michigan Technical Note** **USDA-Natural Resources Conservation Service**

FORESTRY #9
Subject: How to Use the Woodland Information Stick
Date: April 2007

GENERAL INFORMATION

This Technical Note is a revision of Woodland Technical Note #9, dated February 3, 1976, for Woodland Information Sticks manufactured before 1969 ("Woodland Information Stick, USDA-Soil Conservation Service") and sticks manufactured in 1969. (These sticks will have a table entitled "Potential Average Annual Growth by Site:Species.") See Michigan Forestry Technical Note #9A for instructions for using sticks from Forestry Suppliers distributed to field offices in 2005 and later.

The Woodland Information Stick is a notebook on a stick. It will furnish you with readily available answers to many questions landowners may raise in the course of conservation planning.

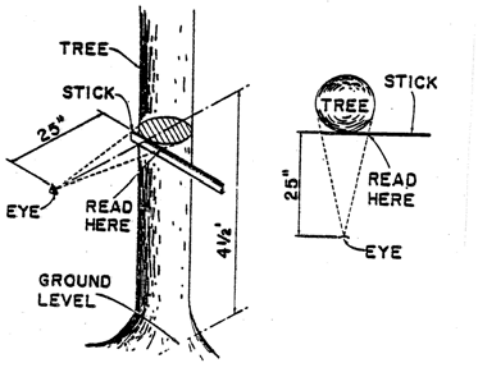
The Stick is also an instrument for measuring the heights and diameters of trees. Like any other tool, to be effective it must be used properly.

Learn to use it well and you will have information at your fingertips to help you do quality forest land conservation planning.

HOW TO USE IT

A. <u>To Measure Tree Diameter</u>:

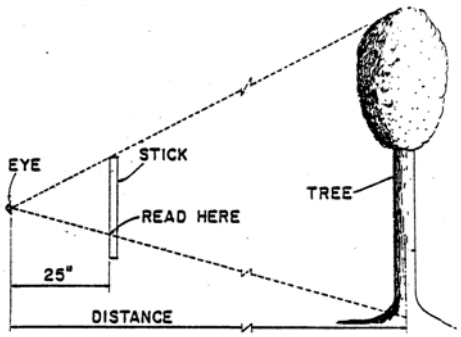
1. Use the "Tree Diameter Scale."
2. Hold the stick horizontally against the tree at 4 1/2 feet above the ground and 25 inches (stick length) from the eye.
3. Adjust the stick so the left end is even with the line of sight to the left side of the tree.
4. Turn your eye, not your head, and read on the <u>Tree Diameter Scale</u> the figure crossed by your line of sight to the right side of the tree. This is the diameter of the tree. Many tree boles are elliptical rather than round in cross-section. Measure such trees from two sides and use the average.
5. Be sure <u>not</u> to use "full inches" scale.



Source: Society of American Foresters, Forestry Handbook, Table 1, page 1.2.

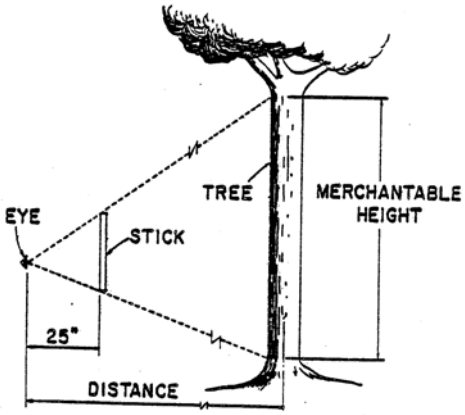
B. To Measure Tree Heights:

1. Stand where you can see the top and base of the tree. Use the Tree Height Scale.
2. Hold stick vertical, 25 inches (stick length) from eye. The right end of the stick should be at the top. It is labeled top.
3. Adjust the stick until the top is in the line of sight to the top of the tree. Then lower your eye – don't move your head – and pick the point along the stick edge where the line of sight to the tree base crosses.
4. The scale reading will be the height of the tree if you are 100 feet from the tree. At any other distance, multiple the scale reading by distance and the decimal point to the left two places.



C. To Estimate the Merchantable Height of a Tree:

1. Pick the point on the tree trunk which you believe to be the top limit of merchantability. For logs to be sawn into lumber, this is at an 8-inch diameter inside bark or at the point where the main trunk becomes unusable because of forking or some other defect. For cordwood, it is to a 4-inch top inside bark.
2. Walk away from the tree until the stick (when held as for measuring tree heights) intercepts just the distance between the stump and the top limit.
3. Measure (pace) the distance to the tree. This will be the same as the merchantable height. Do not try to estimate merchantable heights in units smaller than 1/2 log (8 feet).



D. To Estimate Board Feet Contents of a Tree:

Use the table labeled "Bd. Ft Per Tree." Determine diameter and merchantable height. Example: A 16-inch tree with 2 logs merchantable height (32 feet). The table shows 180 board feet. This table is based on the International 1/4-inch log rule, commonly used in the Northern Lower Peninsula. It gives a fairly close estimate to what a tree would saw out in lumber. The Scribner log scale is used in the Upper Peninsula and the Doyle log scale is used in the Southern Lower Peninsula. To convert to one of these, multiply by the appropriate percentage at the right of the table. For Scribner, the answer would be: 180 x 90% = 160 bd. ft. For Doyle: 180 x 65% =120 bd. ft. Round all figures to the nearest 10 feet. Interpolate for other tree diameters than shown.

E. To Estimate Cordwood Contents of a Tree:

1. Use the "cords per tree" table to right of the board foot table. Follow the same procedure as for board foot contents except merchantable height is estimated to a 4-inch top inside bark.
2. Example: A 10-inch tree with 24 feet of merchantable length contains 0.11 cords of wood. Nine such trees would make approximately 1 cord.

Source: The volume tables – both board feet and cords – are taken from "Composite Volume Tables for Timber and Their Application to the Lake States," Tech Bulletin 1104, USDA. These are composite tables – that is, they are intended to be used for all species. Some error is involved with certain species, but for our purposes it can be ignored. The figures are slightly high (7-10%) for oak, aspen, birch, hemlock, Jack pine, and white cedar and slightly low (7-15%) for cottonwood, sycamore, beech, black gum, and yellow poplar.

F. Using the Stocking Guides:

Stocking is a term used to indicate the number of trees in a stand as compared to the desirable number for best growth and management. In these tables, standards are given for three levels of stocking. "High" stocking is that degree of stocking at which there is essentially full production of wood. The upper limit of "high" stocking is the limit imposed by nature. The lower limit is that stocking where trees have ample room to grow with none to waste. When a stand is thinned to the widest spacing possible for good development of crop trees but with negligible loss of wood producing capacity, that is the lower limit of "high" stocking. Other terms synonymous for "high" stocking are well stocked, good stocking, and full stocking.

"Medium" stocking begins where "high" leaves off. The lower limit of "medium" stocking is that at which if trees grow normally, they will have grown enough in 10 years to increase the stocking to "high."

"Low" stocking extends from "medium" down to where there are only scattered trees. An area with less than 10% of crown canopy would be called "open."

Stocking may be described by spacing, by number of trees, or by basal area. These tables use D + spacing, which relates the size of the tree to the space available to it. In this formula, D = tree diameter. X is an added quantity. If trees average 8 inches in diameter and are spaced 19 feet apart, we say they are spaced D + 11 (8 + 11 = 19). Note that the table shows closer spacing for conifers than for hardwoods. Hardwood trees 12 inches in diameter growing at D + 11 would be "medium" stocking. Conifers of the same size and spacing would be shown as "low" stocking.

G. Potential Average Annual Growth by Site and Species: (1969 Information Stick)

This table makes productivity information available for key species. Example: Refer to Section II-A of the electronic Field Office Technical Guide (eFOTG) for the site index of a key species on a particular soil for a particular county. In "Soils Report," select "Forest Productivity." (Site index is an expression of site quality based on the height of the dominant trees of a particular species at an arbitrarily chosen age – generally 50 years. The taller the tree at a given age, the higher the productivity.) The eFOTG shows a site index of 60 for red

pine growing on Rubicon sand. Refer to the Information Stick table, "Potential Average Annual Growth by Site and Species." From the left hand side of the table, read the site index 60 and then move to the right until you find the table for red pine and read 410 board feet per acre per year and 0.90 cords growth per acre per year.

Warning: This table cannot be used to predict productivity for one species on the basis of a known site index for another species.

For Woodland Information Sticks made before 1969, disregard the upland Oak Site Index table. Volume and site index for key species are available from the Forest Productivity table described above.

Continue to use the stocking guide table even though it differs from the 1969 model.

H. Using the "Average Spacing and Number of Trees per Acre" Table:

This table is intended as a cross-reference with the stocking guides. Add D to X to get spacing. In the example earlier, 8-inch trees were spaced at D + 11, spacing is 19 feet. For a 19-foot spacing, the table shows 121 trees per acre. The table assumes trees to be evenly spaced on squares.

This table is very useful in giving a clue as to the amount of thinning which could be done. Example: you have a conifer stand 8 inches in diameter now spaced at D + 4. The stocking guide shows it could be thinned to D + 6.

Example:

D + 4 = 8 + 4 = 12 foot spacing for which the table shows 304 trees per acre.
D + 6 = 8 + 6 = 14 foot spacing for which the table shows 222 trees per acre.
Trees that could be removed: 82.

In actual use, we must recognize that precise measurements are not possible. This is only an indication or "clue" as to the amount of thinning which might be possible.

I. Using the Table "Tree Spacing Related to Basal Area":

This is also a cross-reference table. Basal area per acre is the sum of the areas of all tree stems at breast height expressed in square feet. The area includes the bark with the wood. For the example above, 8-inch trees at D + 11, the basal area would be about 42 (by interpolation from the table). If the table is not broad enough to give the answer you need, remember that you can reduce D + X to its lowest common denominator and the basal area will remain the same. The basal area for 2-inch trees spaced at D + 16 is the same as 10-inch trees at D + 8 or 5-inch trees at D + 4.

J. Miscellaneous:

At the right end of the stick, some information is given on the weight of green wood per cord. Green wood is variable in weight. These weights shown are only approximations.