



# STATE FOREST NOTES

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## MEASURING THE ADAM TREE, LARGEST SIERRA REDWOOD ON THE MOUNTAIN HOME STATE FOREST

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The Sierra redwood (*Sequoiadendron giganteum*), occurring naturally only in scattered groves along the west side of the Sierra Nevada, has been the object of wonderment as well as written and spoken exaggeration since its discovery was announced to the world in 1852. Many stories about the huge proportions of these largest of all living things have been propagated, but it is only in recent years that the task of accurately measuring the dimensions of the Sierra redwood has been undertaken. Foresters at the Mountain Home State Forest, in the interest of providing more complete visitor information, have completed measurements on the "Adam Tree." It is the largest of the many Sierra redwood on this 4,590 acre tract located in Tulare County about 20 miles northeast of Springville.

In order to obtain an accurate accounting of the size of the Adam Tree, a method of indirectly measuring the tree by triangulation from various points on a closed traverse was selected. This technique was published by Jourdan (1932) after a team of engineers completed their measurements on four of the largest living Sierra redwoods: the General Sherman Tree, the General Grant Tree, and the Hart Tree, all in the Sequoia Kings National Park; and the Boole Tree in the Sequoia National Forest. These trees, and a fifth Sierra redwood, the Grizzly Giant in Yosemite National Park, are today designated the five largest trees in the world (Hartsveldt, 1975).

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Figure 1. Measuring the Adam Tree



Using this method, foresters at Mountain Home established a closed traverse with a transit at some distance from the Adam Tree, selecting corners that would afford the best view of the tree's bole. The method then required horizontal and vertical angular measurements to be made from all corners with care being taken to sight on both tangents of the tree at the same relative elevation on the bole. Because of topography, other trees, and limbs, the entire bole of the tree was not visible from any one traverse point, although enough measurements were taken to give a fairly accurate diameter for each elevation selected. When measurements from every adjacent set of traverse points were compared, using the formulas shown in Figure 2, an average diameter was obtained for the tree at ten foot intervals. Each of these imaginary ten foot cross-sectional pieces was subjected to the prismoidal formula in order to obtain a cubic foot volume. Volume of the lower ten foot section was obtained using diameter tapes and by mapping the perimeter of the tree from a small interior traverse. The map made of the perimeter was useful in determining the amount of diameter lost in burned out portions of the tree.

As shown in Table I, the restored volume of the Adam Tree, exclusive of limbs, was computed to be 36,746 cubic feet. This volume places the tree in a favorable position among trees thought to be the largest of living things. It is not possible, however, to place the Adam Tree in a ranking order with any degree of certainty. Trees measured in 1931 have gained volume through the years and now must greatly exceed figures indicated in Table I. As an example, a recent measurement of the General Sherman reflects growth placing the tree's volume at 58,077 cubic feet (Beck, 1975). Nevertheless, the information gained through this study will be useful in providing interpretive data for visitors and will add to the body of knowledge regarding Sierra redwood.

Managers of Mountain Home State Forest have a unique opportunity to safeguard the future of the giant Adam Tree. Management techniques include harvesting competing trees through logging, which helps reduce the chances of injury to the tree from fire and improves vistas of the tree for the benefit of visitors. Steps will be taken during successive cutting cycles to keep the forest surrounding the Adam Tree at normal stocking levels and in a healthy condition, so that the sight of this magnificent tree may be enjoyed by many generations of forest visitors.

#### LITERATURE CITED

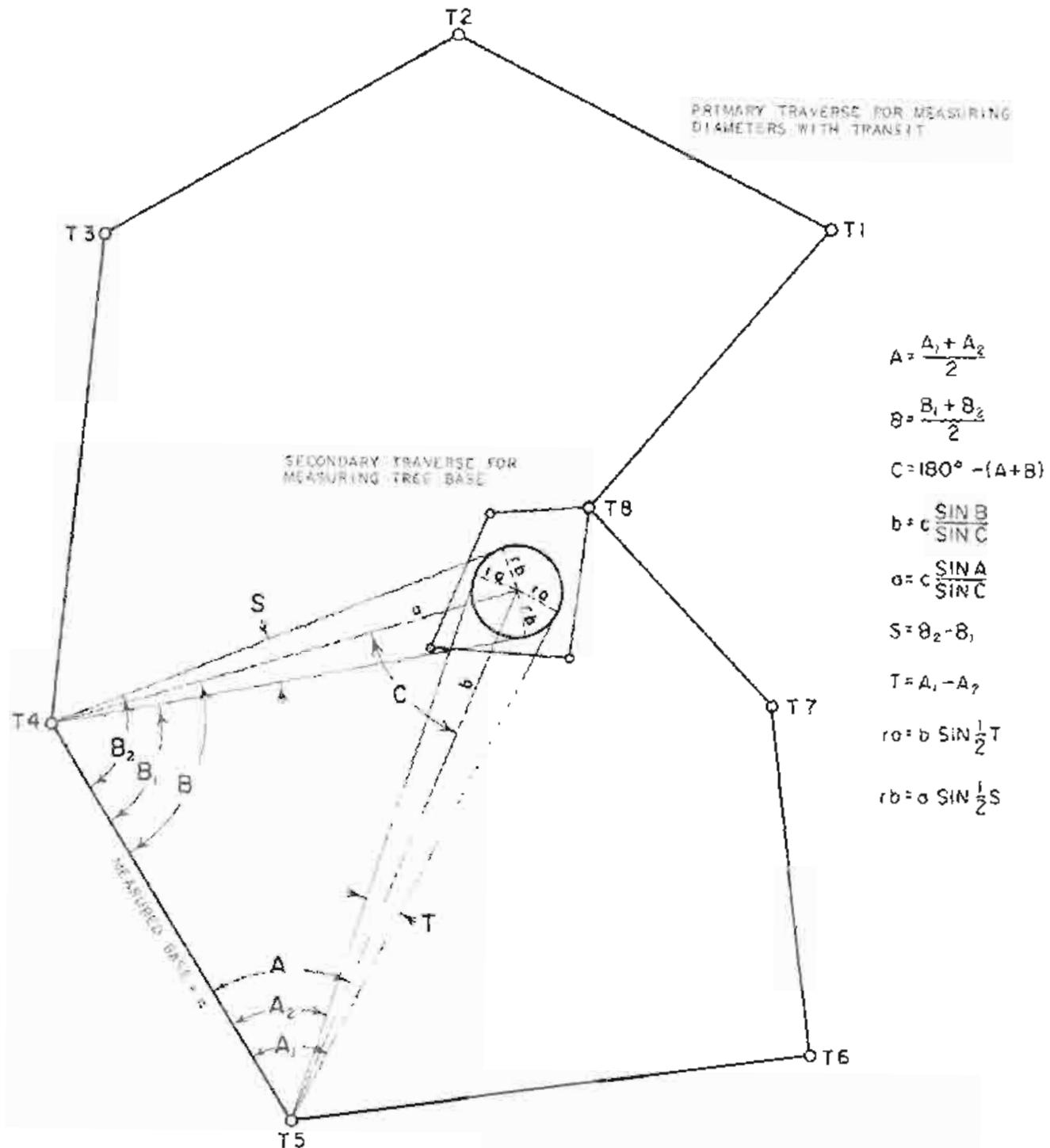
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TABLE 1. COMPARATIVE SIZES OF SIERRA REDWOOD TREES\*

(All measurements are in feet or cubic feet.)

	General Sherman	General Grant	Boyle	Hart	Grizzly Giant	Adam
Height	272.4	257.4	268.8	277.9	209.0	247.4
Volume (excluding limb)	49,660	43,058	39,974	32,607	50,300	35,957
Volume of Burns	550	2,194	1,425	1,650	-	789
Restored Volume	50,010	45,232	41,394	34,246	-	36,746
Perimeter at Base on Slope	101.6	107.6	112.0	77.7	96.5	94.2
Perimeter (highest ground)	88.0	92.9	90.3	68.7	-	85.5
Mean Diameter of Restored Base	30.7	33.3	33.7	26.5	27.6	31.4
Mean Diameter at 60 Feet	17.5	16.3	15.5	14.5	15.6	16.2
Mean Diameter at 120 Feet	17.0	15.0	13.9	12.9	13.1	13.6
Mean Diameter at 180 Feet	14.0	12.9	11.9	11.3	-	7.0

\* Measurements for Sherman, Grant, Boyle, and Hart trees are from Jourdan (1932); those for Grizzly Giant are from Cook (1953); and those for Adam Tree were made by the authors in 1976.



$$A = \frac{A_1 + A_2}{2}$$

$$B = \frac{B_1 + B_2}{2}$$

$$C = 180^\circ - (A + B)$$

$$b = c \frac{\sin B}{\sin C}$$

$$a = c \frac{\sin A}{\sin C}$$

$$S = \theta_2 - \theta_1$$

$$T = A_1 - A_2$$

$$r_0 = b \sin \frac{1}{2} T$$

$$r_b = a \sin \frac{1}{2} S$$

Figure 2. Scale diagram of traverse established around the Adam Tree showing the method used to determine diameters. Method from Jourdan (1932).

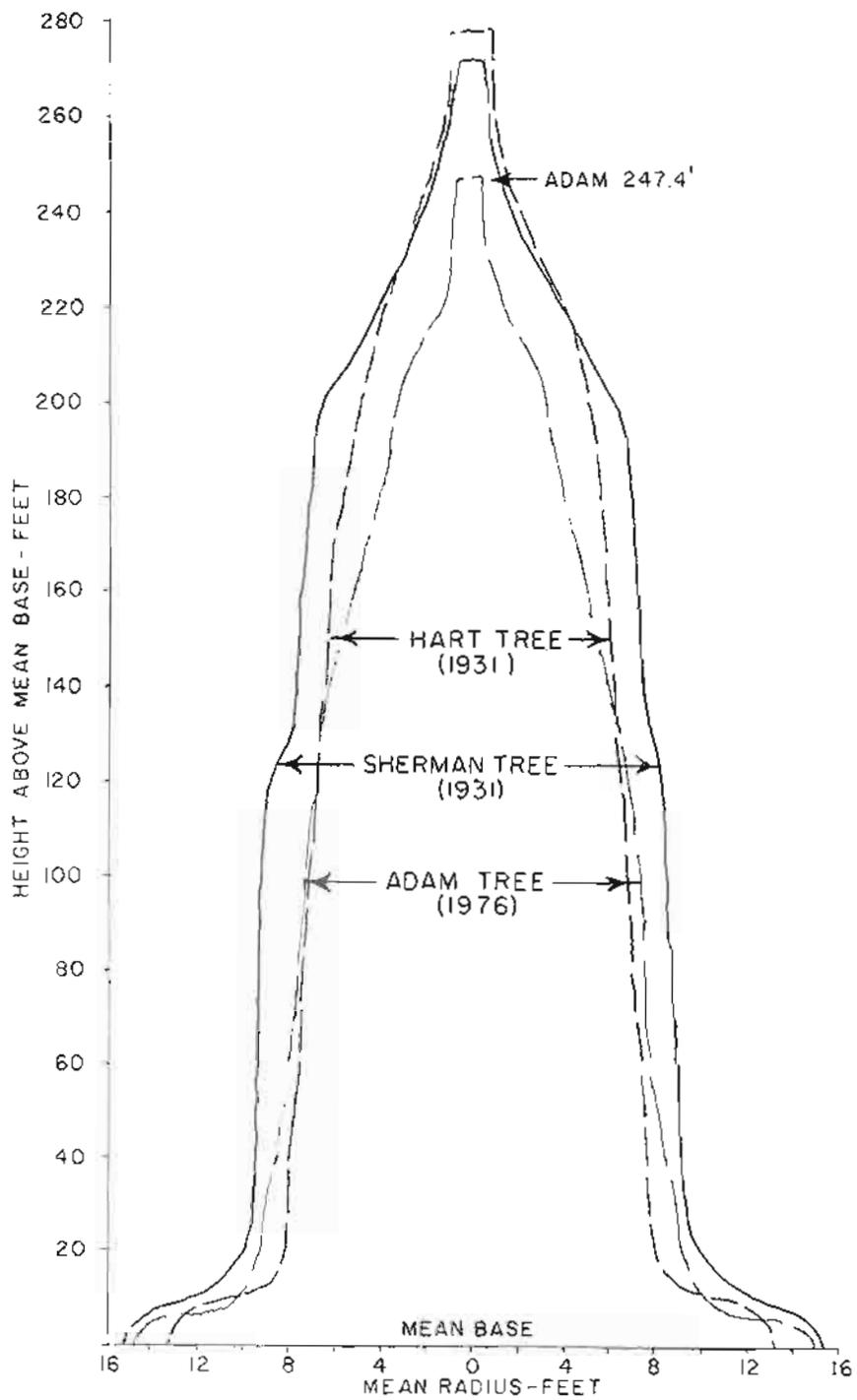


Figure 3. Profiles of several  
Large Sierra Redwood