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BLACK ROCK FOREST PAPERS

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A CHESTNUT OAK VOLUME TABLE FOR THE HUDSON HIGHLAND REGION

By

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CORNWALL-ON-THE-HUDSON, NEW YORK

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By H. H. Tryon and R. F. Finn

Chestnut Oak (Quercus montana Willd.) is a common tree on the Black Rock Forest. In both the Hudson Highlands and adjacent territory it is used chiefly for fuel. Its technical properties, when occurring in this area, seldom admit of its being classed as a timber species. Since, so far as was known, no cordwood volume table had ever been made for this species in this region, the project was initiated in 1927.

Eight separate cutting operations on the Forest, beginning in the autumn of 1927 and ending with the spring of 1934, offered ample opportunity to gather the needed measurements. Portions of seven different compartments, covering a wide range of altitude, type, and soil quality were operated. These cuttings included cleanings, thinnings, and one reproduction cutting. In all, 2228 trees were measured, the great majority whereof lay within the co-dominant, intermediate, and suppressed crown classes.

The following field measurements were taken. The d.b.h.; the total height (taken after each tree was felled); the stump height; age; condition of tree; and the middle diameter of each 4-foot cordwood stick. In conformity with local utilization, these last were taken down to 1.5 inches.

In addition, thirteen full cord ranks were taken down and measured for the middle diameter of each piece to determine the actual cubic foot content of the average full cord as ranked by an experienced chopper cutting by the cord. This gave an average figure of 79.185 cubic feet. Two full cords were ranked, using a wide range of diameters, and employing no more than the average chopper's care, into a timber frame built to hold an accurate cord of 128 cubic feet. These two cords tallied out 77.191 and 77.150 cubic feet respectively—a variation of 2.5% from the average volume of the ranks scaled in the woods.

The graphic method [1] was employed in the office. The total cubic foot volume of each tree was calculated and scatter diagrams plotted, using volume against d.b.h. by height classes. The number of trees measured was entered against each point, and each height-class series was harmonized by the method of least squares. The resultant curves furnished values from which a second scatter diagram of volume against total height by diameter classes was drafted. These curves were also harmonized, and from the final plottings thus obtained were derived the values of cubic feet per tree by d.b.h. and total height classes.

From these final values, using the converting factor of 79.185 cubic feet per cord, tables may be computed giving cords per tree and trees per cord.

A statistical analysis, based on the original data and the final, harmonized curves was made as a check on the accuracy of the graphic method employed. Two measures of accomplishment were calculated; correlation index (CI—measure of the degree of relationship between the two variables), and standard error (SE—measure of curve accuracy). These may be summarized as follows:

CI varied between $\pm$ 0.835 and + 0.989
SE varied between $\pm$ 0.032 and + 0.704

As is usually the case where a large amount of data is available, the graphic method of curve fitting gave entirely satisfactory results as is evidenced by favorable statistical indices for the majority of the curves. In one or two cases the statistical measures were relatively unfavorable, due largely to insufficient data; in these instances purely statistical procedures were employed to obtain curves of best fit.

The table given herewith was also checked in the field by laying off an area 0.9 acres in extent, in a pure chestnut oak stand which included a wide variation in tree form and crown class. A 100% cruise was made, after which the block was cut clean and the wood ranked. The cruise gave an estimate of 19.86 cords; the tally of the ranks totally 20.75 cords—an under-estimate of a shade over 4%.

The writers feel that the results of the two tests (field and statistical) indicate that this table may be held reliable for this locality.

[1] Chapman, H. H.: Forest Mensuration, J. Wiley and Sons, 1921, p. 163 et seq.

Chestnut Oak Volume Table—1933-1934. 2228 Trees

	Total Height in Feet										
	20	25	30	35	40	45	50	55	60	65	No. Trees
D.B.H.	Volume in Cubic Feet										
2	0.27	0.35	0.52	....	....	....	....	....	....	....	7
3	0.56	0.73	0.85	0.93	....	....	....	....	....	....	103
4	1.22	1.30	1.42	1.60	1.82	2.06	....	....	....	....	499
5	....	....	2.23	2.41	2.63	2.91	3.24	3.61	....	....	656
6	....	....	3.37	3.60	3.88	4.22	4.63	5.09	5.55	6.03	524
7	....	....	4.68	4.97	5.30	5.73	6.27	6.87	7.48	8.10	236
8	....	....	....	6.18	6.79	7.47	8.18	8.92	9.75	10.64	117
9	....	....	....	....	8.86	9.62	10.40	11.30	12.47	13.88	39
10	....	....	....	....	....	12.35	13.19	14.16	15.36	16.65	32
11	....	....	....	....	....	15.13	16.51	17.76	18.89	20.04	14
12	....	....	....	....	....	....	20.15	....	....	....	1