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by Everette D. Rast

Log and Tree Sawing Times for Hardwood Mills

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NORTHEASTERN FOREST EXPERIMENT STATION
FOREST SERVICE, U.S. DEPARTMENT OF AGRICULTURE
6816 MARKET STREET, UPPER DARBY, PA. 19082
F. BRYAN CLARK, STATION DIRECTOR

The Author

EVERETTE D. RAST received his bachelor of science degree in forestry from the University of Missouri in 1960 and his master of science degree in agricultural economics from Ohio State University in 1970. He joined the U.S. Forest Service in 1960 as a forester on the Mendocino National Forest and in 1966 transferred to the Northeastern Forest Experiment Station. He has served since that time as a research forest products technologist on the project studying quality and grade of hardwood timber at Columbus, Ohio.

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ERRATA SHEET

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Page 3, Table 2

Under Log sawing time (min.) the independent variable D should be D SQ. The regression coefficient is correct as well as Tables 5 and 6. The SQ term was omitted during printing.

Under Log sawing time per Mbf. (min), the regression coefficient for the last independent variable SD > 25% is wrong. It should be 15.87645 instead of 15.51666. Therefore, Tables 8 and 10 are slightly off (see Tables 8 and 10).

Examples: Table 8

dib	Log length					
	8 feet		12 feet		16 feet	
	old	new	old	new	old	new
8	74.77	74.40	57.66	57.30	50.21	49.84
40	37.32	36.95	29.60	29.24	26.84	26.47

Log and Tree Sawing Times for Hardwood Mills

ABSTRACT

Data on 6,850 logs and 1,181 trees were analyzed to predict sawing times. For both logs and trees, regression equations were derived that express (in minutes) sawing time per log or tree and per Mbf. For trees, merchantable height is expressed in number of logs as well as in feet. One of the major uses for the tables of average sawing times is as a bench mark against which individual mills can make comparisons.

This publication is based on a paper originally presented at the 27th Annual Meeting of the Forest Products Research Society, June 26, 1973, in Anaheim, California.

Introduction

Most sawmill operations are centered around the headsaw. The headsaw is the hub, for all other sawmill operations are geared to the speed with which logs are sawn. Yet many mill owners and foremen do not know how much time it takes to saw logs of different dimensions. Information on average log-sawing time allows mill owners to evaluate their production, to use available computer programs to determine the dollar worth of sawlogs, to evaluate the time saved by a resaw, and to determine the effect of a change in average log size. This information will also be useful in timber appraisal.

Profit is a major incentive for mill owners and it is directly related to cost (profit = revenue − cost); anything that reduces cost increases profits. Sawing is one of the cost items; therefore, reducing the average sawing time per log or per thousand board feet will increase profits.

Sample Data

The data on log-sawing times were collected during 47 studies conducted at 20 different mills, of which 7 used circular saws and 13 used bandsaws. Eight of the mills had resaws. The data cover 18 different species and 6,850 logs. The data on tree-sawing times came from 24 studies at 11 mills, of which 3 used circular saws and 8 bandsaws. Four of the bandsaw mills had resaws. The sample data covered 8 different species, 1,181 trees and 3,570 logs.

Procedure

Sawing time, as used in this study, commences when the log is rolled out onto the carriage and continues until the log is completely sawn, the dog board or cant is released, and the carriage returns and stops in front of the log deck ready for the next log. Any delay of 20 seconds or more during the sawing of a log is recorded and deducted from the sawing time. Sawing time is broken down into two categories and each is analyzed from two different standpoints. The two categories are log-sawing time and tree-sawing time, and each is expressed as sawing time (in minutes) per log or tree and per Mbf.

Before analysis, the sawing time data were split into three groups. The first group was used to develop the model, the second group to obtain the coefficients for the model, and the third group to test the final model.

Variables

The factors affecting sawing time can be grouped into three main categories:

1. Characteristics of the log or tree.
2. Type of sawmill equipment.
3. Method of sawing and thickness pattern used.

Log or tree characteristics include species, diameter or dbh., length or merchantable height (either in feet or in number of logs), grade, volume, form class, and scalable defects. Some of these variables are expressed as combinations of other variables; for example, volume is a function of diameter, length, and form.

Under type of sawmill equipment, the primary variable was type of headsaw, band or circular. Other variables considered were the presence or absence of a debarker, a resaw, and a chipper.

Under the last category, method of sawing and thickness pattern, only the latter was tested because all sawyers sawed for grade, turning the log when the grade dropped and also setting out taper.

Table 1.—Independent variables

Logs			Trees		
D	Diameter		DBH	Diameter breast height	
L	Length		FT	Merchantable height in feet	
D SQ	Diameter squared		NL	" " " no. of logs	
L SQ	Length squared		DBH SQ	Diameter breast height squared	
D SQ × L			FT SQ	Merchantable height in feet squared	
1/D			NL SQ	" " " no. of logs squared	
1/L			DBH SQ × FT		
1/D SQ			DBH SQ × NL		
1/L SQ			1/DBH		
1/D SQ × L			1/FT		
SP	Species	as dummy variable	1/NL		
GR	Grade	" " "	1/DBH SQ		
UD	Unsound defects	" " "	1/FT SQ		
SD	Soundness	" " "	1/NL SQ		
AD	All scalable defects	" " "	1/DBH SQ × FT		
B-C	Band or circular saw	" " "	1/DBH SQ × NL		
TP	Thickness pattern	" " "	FM	Form class	as dummy variable
R	Presence or absence of resaw	" " "	SP	Species	" " "
DB	" " " " debarker	" " "	GR	Grade	" " "
CH	" " " " chipper	" " "	UD	Unsound defects	" " "
			SD	Soundness	" " "
			AD	All scalable defects	" " "
			B-C	Band or circular saw	as dummy variable
			TP	Thickness pattern	" " "
			R	Presence or absence of resaw	" " "
			DB	Presence or absence of debarker	" " "
			CH	Presence or absence of chipper	" " "
(The interaction terms between the dummy variables and all other variables were also formed)			(The interaction terms between the dummy variables and all other variables were also formed)		

Table 2.—Regression coefficients and associated T-values
(Log sawing time)

Independent variable	Regression coefficient	T-value
Log sawing time (min.)		
Intercept	0.85969654	16.56**
D	0.00213389	5.55**
D SQ × L	0.00067173	21.98**
L SQ	0.00077287	2.46*
R × L	−0.02651734	2.97**
R × L SQ	−0.00030880	0.49[a]
R × D SQ × L	−0.00026255	22.27**
Log sawing time per Mbf. (min.)		
Intercept	14.87645	17.14**
1/D SQ	619.15918	2.93**
1/D SQ × L	23624.93360	10.11**
1/L SQ	844.20239	8.79**
R	−8.18146	13.82**
R × 1/D SQ × L	−8607.90625	8.60**
SD > 25%	15.51666	19.48**

** Significant at the 1 percent probability level.
* Significant at the 5 percent probability level.
[a] Although not significant, this term is retained in the equation because its presence prevents the values at the sawing times of the 8 to 10-inch diameter logs in the 13 to 16 foot range from decreasing in value.

Developing the Model

The data selected for developing the model were analyzed using the least-squares principle for fitting a multiple linear regression model. The initial selection of independent variables was made by compiling two simple correlation matrices, one for the log data and one for the tree data. These matrices were made up of the log, tree and mill characteristics (table 1). Some of the variables are transformations and combinations of other variables and others are dummy variables. Also all the interaction terms between the dummy variable and all other variables were used. With the correlation matrix as a guide, the variables to be used in the model searching were selected. A stepwise regression fitting procedure was used to select those independent variables that had a significant effect on the dependent variable, sawing time. In the tree sawing time models, equations were developed using merchantable height both in feet and in number of logs.

The variables found to be significant, their regression coefficients, and the associated T-values are given in tables 2 and 3.

Some of the more important factors that add variation that cannot be accounted for adequately are:

1. Differences among the 20 mills.

Table 3.—Regression coefficients and associated T-values
(Tree sawing time)

Independent variable	Merchantable height in no. of logs		Merchantable height in feet	
	Regression coefficient	T-values	Regression coefficient	T-values
Tree sawing time (min.)				
Intercept	3.92863000	11.52**	4.17154000	12.09**
DBH SQ	0.00722676	6.44**	0.00639411	5.64**
DBH SQ × NL (FT)	0.00463075	21.17**	0.00030065	21.66**
1/DBH SQ × NL (FT)	−277.30493000	4.38**	−5034.36719000	4.96**
R × DBH SQ	−0.00512604	6.97**	−0.00465374	6.31**
R × NL (FT)	−1.10542000	9.01**	−0.07443058	9.58**
Tree sawing time per Mbf. (min.)				
Intercept	33.79843	23.55**	34.11577000	23.73**
1/DBH SQ	3750.99023	16.47**	3722.54956000	16.35**
NL	−2.83026	7.79**	−0.18433136	8.04**
R	−10.35313	9.30**	−10.35213000	9.32**
R × 1/DBH SQ	−2351.58008	7.60**	−2355.91797000	7.63**
SD > 25%	10.66874	4.00**	10.65716000	4.00**

** Significant at the 1 percent probability level.

2. Differences among the one to three different sawyers per mill.
3. Different capacities of mills.
4. Vastly different power plants, some up to standard and others way below.
5. Differences in maintenance: some mills have good preventive maintenance and others wait until a breakdown occurs before making repairs.
6. Frequency of changing or sharpening saws.

Thickness pattern was found to be significant but was not used in the analysis. Using dummy variables and plots of the residuals showed a clear break when a mill was cutting 25 percent or more of 6/4 and thicker sawn lumber or timbers. Using this breakdown seemed logical, but the logs that fell in this category were all sawn at bandsaw mills with a resaw and, therefore, this dummy variable was highly correlated with the dummy variable for resaw. In the regression analysis, once the variable for resaw entered the equation, then the variable for 6/4 > 25 percent became nonsignificant. There were two problems with running these data separately: First, there were not enough data for a separate run, and second, they applied only to a bandsaw mill with a resaw. Therefore, this variable was dropped.

Sawing Time Results, Tests, and Discussion

The equations predict sawing time per log or tree better than sawing time per Mbf. In the log sawing time equations, the adjusted R^2s are .72 and .54, respectively, and for tree-sawing time, they are .82 and .69 (table 4). The variance ratio test was used to test for differences in the two sets of observations. The test is:

$$F = \frac{n_1 + n_2 - 2p}{p} \quad \frac{\mathcal{S}_c - (\mathcal{S}_1 + \mathcal{S}_2)}{\mathcal{S}_c}$$

where: n_1 = number of observations in first sample
n_2 = number of observations in test sample
p = number of parameters
$\mathcal{S}_c$ = sum of squared residuals for pooled first and second sample
$\mathcal{S}_1$ = sum of squared residuals for first sample
$\mathcal{S}_2$ = sum of squared residuals for test sample

The statistic F has an F distribution with $n_1 + n_2$ and p degrees of freedom if the observations are normally distributed.

If the F-value is nonsignificant, then the hypothesis that the parameters of the first and

Table 4.—Relevant statistics for the four sawing-time prediction models

Statistic		Log sawing time		Tree sawing time	
		Per log	Per Mbf.	Per tree	Per Mbf.
R^2		0.72	0.54	0.82	0.69
Standard error of estimate		.78	12.54	2.10	7.92
S.T.	Mean	2.76	32.30	8.90	28.36
	SD	1.48	18.63	4.90	14.34
Diam. or dbh	Mean	14.26	14.27	20.04	20.22
	SD	4.28	4.28	5.37	5.38
Length	Mean	12.54	12.55	40.32	40.70
	SD	2.64	2.64	12.29	12.30
No. of logs	Mean	—	—	2.55	2.57
	SD	—	—	.77	.77
No. of observations		6629	6608	1001	961

test data are the same is accepted, and the equation for the combined data is used.

The F-values for all equations are:

Tree-sawing time	1.36
Tree-sawing time per Mbf.	2.55
Log-sawing time	8.65**
Log-sawing time per Mbf.	0.013

** Significant at the 1 percent probability level.

The F-statistic for three of the tests is nonsignificant, but for log sawing time, the F-statistic is significant because the $\mathscr{S}_c$ is small (0.6105), so that the difference between coefficients of the first and test sample are large relative to $\mathscr{S}_c$. Therefore, tables of predicted values were developed using the coefficients of the three groups. The developing data table varied an average of 1 percent from the combined data table and the test data table varied an average of 7 percent. Therefore, even though the F-statistic was significant, the table is accepted because of the small differences among the three tables.

Tables 5 to 16 (Appendix) were produced using the models developed. The tables show in minutes the average time required to saw logs or trees grouped according to the following criteria: diameter inside bark, small end (dib), diameter breast height (dbh), length in feet, height by number of logs, presence or absence of a resaw, and scaling deduction greater than 25 percent in the tables showing sawing time per Mbf.

Tables 14 and 16, for tree-sawing time per Mbf with scaling deductions greater than 25 percent and with and without resaw, need more data before they can be used with confidence, even though the T-value of the scaling deduction coefficient is highly significant.

Use of the Study Results

There are many uses for the results of this study. First, the data on tree-sawing times can be used in making timber appraisals. One of the factors presently used is the average manufacturers cost in the appraisal zone. With the data for tree-sawing times, manufacturing costs can be adjusted for timber sales that are either above or below average size. Second, since the data is from many mills, an individual mill owner can compare sawing times at his mill to the average. Such an evaluation may suggest changes in sawing procedure. Third, a sawmill operator using one of several available computer programs[1] that require sawing times to provide mill analysis information, or to provide the dollar worth of sawlogs, could use the actual data developed here or could use the variables found to be significant and develop individual mill coefficients. Fourth, the mill owner could determine what type of change in production he could expect by adding or removing a resaw at his mill. Fifth, if the mill owner knows that the average diameter and length of the logs he receives at his mill will be changing, he can predict what effect this will have on his production and costs.

[1] For example see Adams, Edward L. "SOLVE: A Computer Program for Determining the Maximum Value of Hardwood Sawlogs" USDA Forest Service Research Paper NE-229, 1972.

Appendix

Table 5.—Log sawing time in minutes

(Mill has resaw)

dib	Log length								
	8 feet	9 feet	10 feet	11 feet	12 feet	13 feet	14 feet	15 feet	16 feet
8	1.02	1.03	1.04	1.05	1.06	1.07	1.08	1.10	1.11
9	1.12	1.13	1.15	1.16	1.18	1.20	1.22	1.24	1.26
10	1.22	1.24	1.26	1.29	1.31	1.34	1.37	1.39	1.42
11	1.33	1.36	1.39	1.43	1.46	1.50	1.53	1.57	1.60
12	1.46	1.50	1.54	1.58	1.62	1.67	1.71	1.76	1.80
13	1.59	1.64	1.69	1.75	1.80	1.85	1.91	1.96	2.02
14	1.74	1.80	1.86	1.92	1.99	2.05	2.12	2.19	2.26
15	1.89	1.97	2.04	2.12	2.19	2.27	2.35	2.43	2.51
16	2.06	2.15	2.23	2.32	2.41	2.50	2.59	2.68	2.78
17	2.24	2.34	2.44	2.54	2.64	2.75	2.85	2.96	3.06
18	2.43	2.54	2.66	2.77	2.89	3.01	3.13	3.25	3.37
19	2.63	2.76	2.89	3.02	3.15	3.28	3.42	3.55	3.69
20	2.84	2.99	3.13	3.28	3.43	3.57	3.72	3.87	4.03
21	3.06	3.22	3.39	3.55	3.71	3.88	4.05	4.21	4.38
22	3.29	3.47	3.65	3.84	4.02	4.20	4.38	4.57	4.76
23	3.54	3.74	3.93	4.13	4.33	4.54	4.74	4.94	5.15
24	3.79	4.01	4.23	4.45	4.67	4.89	5.11	5.33	5.55
25	4.06	4.29	4.53	4.77	5.01	5.25	5.49	5.74	5.98
26	4.33	4.59	4.85	5.11	5.37	5.63	5.89	6.16	6.42
27	4.62	4.90	5.18	5.46	5.74	6.03	6.31	6.60	6.88
28	4.92	5.22	5.52	5.83	6.13	6.44	6.74	7.05	7.36
29	5.22	5.55	5.88	6.20	6.53	6.86	7.19	7.52	7.85
30	5.54	5.89	6.24	6.60	6.95	7.30	7.66	8.01	8.37
31	5.87	6.25	6.62	7.00	7.38	7.76	8.14	8.52	8.90
32	6.21	6.61	7.02	7.42	7.82	8.23	8.63	9.04	9.44
33	6.57	6.99	7.42	7.85	8.28	8.71	9.14	9.57	10.01
34	6.93	7.38	7.84	8.29	8.75	9.21	9.67	10.13	10.59
35	7.30	7.78	8.27	8.75	9.24	9.72	10.21	10.70	11.19
36	7.69	8.20	8.71	9.22	9.74	10.25	10.77	11.29	11.80
37	8.08	8.62	9.16	9.71	10.25	10.80	11.34	11.89	12.44
38	8.49	9.06	9.63	10.20	10.78	11.36	11.93	12.51	13.09
39	8.90	9.51	10.11	10.72	11.32	11.93	12.54	13.15	13.76
40	9.33	9.97	10.60	11.24	11.88	12.52	13.16	13.80	14.44

Shaded area indicates limits of basic data.

Table 6.—Log sawing time in minutes

(no resaw)

dib	Log length								
	8 feet	9 feet	10 feet	11 feet	12 feet	13 feet	14 feet	15 feet	16 feet
8	1.39	1.45	1.50	1.56	1.62	1.69	1.75	1.82	1.88
9	1.52	1.58	1.65	1.72	1.80	1.87	1.95	2.02	2.10
10	1.66	1.74	1.82	1.91	1.99	2.08	2.16	2.25	2.35
11	1.82	1.91	2.01	2.11	2.20	2.31	2.41	2.51	2.62
12	1.99	2.10	2.21	2.32	2.44	2.56	2.67	2.79	2.91
13	2.18	2.30	2.43	2.56	2.69	2.83	2.96	3.10	3.23
14	2.38	2.53	2.67	2.82	2.97	3.12	3.27	3.43	3.58
15	2.60	2.76	2.93	3.10	3.26	3.44	3.61	3.78	3.96
16	2.83	3.02	3.20	3.39	3.58	3.77	3.96	4.16	4.36
17	3.08	3.29	3.49	3.71	3.92	4.13	4.35	4.56	4.78
18	3.34	3.57	3.80	4.04	4.27	4.51	4.75	4.99	5.23
19	3.62	3.88	4.13	4.39	4.65	4.91	5.18	5.44	5.71
20	3.91	4.19	4.48	4.76	5.05	5.34	5.63	5.92	6.21
21	4.22	4.53	4.84	5.15	5.47	5.78	6.10	6.42	6.74
22	4.54	4.88	5.22	5.56	5.91	6.25	6.60	6.94	7.29
23	4.88	5.25	5.62	5.99	6.36	6.74	7.11	7.49	7.87
24	5.23	5.63	6.04	6.44	6.84	7.25	7.66	8.07	8.48
25	5.60	6.03	6.47	6.91	7.34	7.78	8.22	8.66	9.11
26	5.98	6.45	6.92	7.39	7.86	8.34	8.81	9.29	9.77
27	6.38	6.89	7.39	7.90	8.40	8.91	9.42	9.93	10.45
28	6.80	7.33	7.88	8.42	8.96	9.51	10.06	10.61	11.16
29	7.22	7.80	8.38	8.96	9.54	10.13	10.71	11.30	11.89
30	7.67	8.28	8.90	9.52	10.15	10.77	11.40	12.02	12.65
31	8.12	8.78	9.44	10.10	10.77	11.43	12.10	12.77	13.44
32	8.60	9.30	10.00	10.70	11.41	12.12	12.83	13.54	14.25
33	9.09	9.83	10.58	11.32	12.07	12.82	13.58	14.33	15.09
34	9.59	10.38	11.17	11.96	12.76	13.55	14.35	15.15	15.95
35	10.11	10.94	11.78	12.62	13.46	14.30	15.15	15.99	16.84
36	10.64	11.52	12.41	13.29	14.18	15.07	15.96	16.86	17.75
37	11.19	12.12	13.05	13.99	14.93	15.87	16.81	17.75	18.69
38	11.75	12.73	13.72	14.70	15.69	16.68	17.67	18.66	19.66
39	12.33	13.36	14.40	15.44	16.48	17.52	18.56	19.60	20.65
40	12.92	14.01	15.10	16.19	17.28	18.38	19.47	20.57	21.67

Shaded area indicates limits of basic data.

Table 7.—Log sawing time in Minutes per Mbf.

(Mill has resaw; scaling defect < 25%)

dib	Log length								
	8 feet	9 feet	10 feet	11 feet	12 feet	13 feet	14 feet	15 feet	16 feet
8	58.89	52.86	48.28	44.68	41.79	39.41	37.44	35.76	34.33
9	50.70	45.36	41.32	38.17	35.65	33.60	31.89	30.45	29.22
10	44.85	39.99	36.35	33.52	31.26	29.43	27.92	26.65	25.57
11	40.52	36.02	32.66	30.07	28.02	26.35	24.98	23.84	22.87
12	37.22	33.00	29.87	27.45	25.55	24.01	22.75	21.70	20.81
13	34.66	30.65	27.69	25.41	23.63	22.19	21.01	20.03	19.21
14	32.62	28.79	25.96	23.80	22.10	20.74	19.63	18.71	17.94
15	30.98	27.28	24.56	22.49	20.87	19.58	18.52	17.65	16.92
16	29.64	26.05	23.42	21.42	19.86	18.62	17.61	16.78	16.08
17	28.52	25.03	22.48	20.54	19.03	17.83	16.86	16.05	15.38
18	27.59	24.18	21.68	19.80	18.33	17.17	16.22	15.45	14.80
19	26.80	23.45	21.01	19.17	17.74	16.61	15.69	14.94	14.31
20	26.13	22.84	20.44	18.63	17.23	16.13	15.23	14.50	13.89
21	25.55	22.30	19.95	18.17	16.80	15.71	14.84	14.12	13.52
22	25.04	21.84	19.52	17.77	16.42	15.36	14.50	13.79	13.21
23	24.60	21.44	19.15	17.42	16.09	15.04	14.20	13.51	12.94
24	24.22	21.09	18.82	17.12	15.81	14.77	13.94	13.26	12.70
25	23.88	20.78	18.53	16.85	15.55	14.53	13.71	13.04	12.49
26	23.58	20.50	18.27	16.61	15.32	14.31	13.50	12.84	12.30
27	23.31	20.26	18.05	16.39	15.12	14.12	13.32	12.67	12.13
28	23.07	20.04	17.84	16.20	14.94	13.95	13.16	12.51	11.98
29	22.85	19.84	17.66	16.03	14.78	13.80	13.01	12.37	11.84
30	22.66	19.66	17.49	15.88	14.64	13.66	12.88	12.25	11.72
31	22.48	19.50	17.34	15.74	14.50	13.54	12.76	12.13	11.61
32	22.32	19.35	17.21	15.61	14.38	13.42	12.65	12.03	11.51
33	22.18	19.22	17.08	15.49	14.28	13.32	12.56	11.93	11.42
34	22.05	19.10	16.97	15.39	14.18	13.23	12.47	11.85	11.34
35	21.92	18.98	16.87	15.29	14.08	13.14	12.38	11.77	11.26
36	21.81	18.88	16.77	15.20	14.00	13.06	12.31	11.70	11.19
37	21.71	18.79	16.69	15.12	13.92	12.99	12.24	11.63	11.13
38	21.61	18.70	16.61	15.05	13.85	12.92	12.17	11.57	11.07
39	21.53	18.62	16.53	14.98	13.79	12.86	12.11	11.51	11.02
40	21.45	18.55	16.46	14.91	13.73	12.80	12.06	11.46	10.97

Shaded area indicates limits of basic data.

Table 8.—Log sawing time in minutes per Mbf.

(mill has resaw; scaling defect > 25%)

dib	Log length								
	8 feet	9 feet	10 feet	11 feet	12 feet	13 feet	14 feet	15 feet	16 feet
8	74.77	68.74	64.15	60.55	57.66	55.29	53.31	51.64	50.21
9	66.58	61.24	57.20	54.05	51.53	49.47	47.77	46.33	45.10
10	60.72	55.87	52.22	49.39	47.14	45.31	43.80	42.53	41.45
11	56.39	51.90	48.54	45.95	43.89	42.23	40.86	39.71	38.74
12	53.10	48.88	45.74	43.33	41.42	39.89	38.63	37.58	36.69
13	50.53	46.53	43.56	41.29	39.50	38.07	36.89	35.91	35.09
14	48.50	44.67	41.83	39.67	37.98	36.62	35.51	34.59	33.82
15	46.86	43.16	40.44	38.37	36.75	35.45	34.40	33.52	32.79
16	45.51	41.93	39.30	37.30	35.74	34.50	33.49	32.65	31.95
17	44.40	40.91	38.35	36.41	34.91	33.71	32.73	31.93	31.26
18	43.47	40.05	37.56	35.67	34.21	33.04	32.10	31.32	30.68
19	42.68	39.33	36.89	35.05	33.62	32.48	31.57	30.81	30.18
20	42.00	38.71	36.32	34.51	33.11	32.00	31.11	30.37	29.76
21	41.42	38.18	35.82	34.05	32.68	31.59	30.71	30.00	29.40
22	40.92	37.72	35.40	33.65	32.30	31.23	30.37	29.67	29.09
23	40.48	37.32	35.02	33.30	31.97	30.92	30.08	29.39	28.81
24	40.10	36.97	34.70	32.99	31.68	30.65	29.82	29.14	28.57
25	39.76	36.65	34.41	32.72	31.43	30.41	29.59	28.92	28.36
26	39.45	36.38	34.15	32.48	31.20	30.19	29.38	28.72	28.17
27	39.19	36.13	33.92	32.27	31.00	30.00	29.20	28.55	28.01
28	38.95	35.91	33.72	32.08	30.82	29.83	29.04	28.39	27.86
29	38.73	35.71	33.54	31.91	30.66	29.68	28.89	28.25	27.72
30	38.54	35.54	33.37	31.75	30.51	29.54	28.76	28.12	27.60
31	38.36	35.37	33.22	31.61	30.38	29.41	28.64	28.01	27.49
32	38.20	35.23	33.08	31.49	30.26	29.30	28.53	27.91	27.39
33	38.05	35.09	32.96	31.37	30.15	29.20	28.43	27.81	27.30
34	37.92	34.97	32.85	31.26	30.05	29.10	28.34	27.73	27.22
35	37.80	34.86	32.74	31.17	29.96	29.02	28.26	27.65	27.14
36	37.69	34.76	32.65	31.08	29.88	28.94	28.18	27.57	27.07
37	37.59	34.66	32.56	31.00	29.80	28.86	28.11	27.51	27.01
38	37.49	34.58	32.48	30.92	29.73	28.80	28.05	27.45	26.95
39	37.40	34.50	32.41	30.85	29.66	28.73	27.99	27.39	26.89
40	37.32	34.42	32.34	30.79	29.60	28.68	27.94	27.34	26.84

Shaded area indicates limits of basic data.

Table 9.—Log sawing time in minutes per Mbf.

(no resaw; scaling defect < 25%)

dib	Log length								
	8 feet	9 feet	10 feet	11 feet	12 feet	13 feet	14 feet	15 feet	16 feet
8	83.88	75.99	69.91	65.09	61.17	57.94	55.23	52.91	50.92
9	72.17	65.35	60.13	56.01	52.69	49.95	47.66	45.72	44.05
10	63.79	57.74	53.13	49.52	46.62	44.24	42.25	40.57	39.13
11	57.59	52.11	47.96	44.72	42.13	40.01	38.25	36.76	35.49
12	52.87	47.83	44.02	41.07	38.71	36.79	35.20	33.87	32.73
13	49.20	44.49	40.96	38.23	36.05	34.29	32.83	31.61	30.57
14	46.29	41.85	38.53	35.97	33.94	32.30	30.95	29.82	28.87
15	43.94	39.72	36.57	34.15	32.24	30.70	29.44	28.38	27.49
16	42.02	37.97	34.97	32.66	30.85	29.39	28.19	27.20	26.36
17	40.43	36.52	33.64	31.43	29.69	28.30	27.17	26.22	25.43
18	39.09	35.31	32.52	30.39	28.73	27.39	26.30	25.40	24.64
19	37.96	34.29	31.58	29.52	27.91	26.62	25.57	24.71	23.98
20	37.00	33.41	30.77	28.77	27.21	25.96	24.95	24.11	23.41
21	36.17	32.66	30.08	28.13	26.61	25.40	24.41	23.60	22.93
22	35.45	32.00	29.48	27.57	26.09	24.91	23.95	23.16	22.50
23	34.82	31.43	28.95	27.08	25.63	24.48	23.54	22.78	22.14
24	34.27	30.93	28.49	26.66	25.23	24.10	23.19	22.44	21.81
25	33.78	30.49	28.09	26.28	24.88	23.77	22.87	22.14	21.53
26	33.35	30.10	27.73	25.95	24.57	23.48	22.60	21.87	21.27
27	32.97	29.75	27.41	25.65	24.29	23.21	22.35	21.64	21.05
28	32.62	29.44	27.12	25.38	24.04	22.98	22.13	21.43	20.85
29	32.31	29.16	26.86	25.14	23.82	22.77	21.93	21.24	20.67
30	32.04	28.90	26.63	24.93	23.61	22.58	21.75	21.07	20.50
31	31.78	28.67	26.42	24.73	23.43	22.41	21.58	20.91	20.35
32	31.56	28.47	26.23	24.56	23.27	22.25	21.44	20.77	20.22
33	31.35	28.28	26.06	24.39	23.12	22.11	21.30	20.64	20.10
34	31.16	28.11	25.90	24.25	22.98	21.98	21.18	20.53	19.99
35	30.98	27.95	25.75	24.11	22.85	21.86	21.07	20.42	19.88
36	30.82	27.80	25.62	23.99	22.74	21.75	20.96	20.32	19.79
37	30.68	27.67	25.50	23.87	22.63	21.65	20.87	20.23	19.70
38	30.54	27.55	25.38	23.77	22.53	21.56	20.78	20.15	19.63
39	30.42	27.43	25.28	23.67	22.44	21.47	20.70	20.07	19.55
40	30.30	27.33	25.18	23.58	22.36	21.39	20.63	20.00	19.48

Shaded area indicates limits of basic data.

Table 10.—Log sawing time in minutes per Mbf.

(no resaw; scaling defect > 25%)

dib	Log length								
	8 feet	9 feet	10 feet	11 feet	12 feet	13 feet	14 feet	15 feet	16 feet
8	99.76	91.87	85.78	80.96	77.05	73.82	71.10	68.79	66.80
9	88.05	81.23	76.01	71.89	68.56	65.83	63.54	61.59	59.92
10	79.67	73.62	69.01	65.40	62.49	60.11	58.13	56.45	55.01
11	73.47	67.99	63.84	60.60	58.00	55.88	54.12	52.64	51.37
12	68.75	63.70	59.90	56.94	54.59	52.67	51.08	49.74	48.60
13	65.08	60.37	56.84	54.10	51.93	50.17	48.71	47.49	46.45
14	62.17	57.73	54.41	51.85	49.82	48.18	46.83	45.70	44.74
15	59.82	55.59	52.45	50.03	48.12	46.58	45.31	44.26	43.36
16	57.90	53.85	50.84	48.54	46.72	45.27	44.07	43.08	42.24
17	56.30	52.40	49.51	47.30	45.57	44.18	43.04	42.10	41.30
18	54.97	51.19	48.40	46.27	44.60	43.27	42.18	41.28	40.52
19	53.84	50.16	47.45	45.39	43.78	42.50	41.45	40.58	39.86
20	52.87	49.29	46.65	44.65	43.09	41.84	40.83	39.99	39.29
21	52.04	48.53	45.96	44.00	42.48	41.27	40.29	39.48	38.80
22	51.32	47.88	45.36	43.45	41.96	40.78	39.83	39.04	38.38
23	50.70	47.31	44.83	42.96	41.51	40.35	39.42	38.65	38.01
24	50.15	46.81	44.37	42.53	41.11	39.98	39.06	38.31	37.69
25	49.66	46.37	43.97	42.16	40.76	39.65	38.75	38.02	37.40
26	49.23	45.97	43.61	41.82	40.44	39.35	38.47	37.75	37.15
27	48.84	45.63	43.28	41.53	40.17	39.09	38.22	37.51	36.93
28	48.50	45.31	43.00	41.26	39.92	38.86	38.00	37.30	36.72
29	48.19	45.03	42.74	41.02	39.69	38.65	37.80	37.11	36.54
30	47.91	44.78	42.51	40.80	39.49	38.46	37.62	36.94	36.38
31	47.66	44.55	42.30	40.61	39.31	38.28	37.46	36.79	36.23
32	47.43	44.34	42.11	40.43	39.14	38.13	37.31	36.65	36.10
33	47.22	44.15	41.93	40.27	38.99	37.99	37.18	36.52	35.98
34	47.03	43.98	41.77	40.12	38.85	37.86	37.06	36.40	35.86
35	46.86	43.82	41.63	39.99	38.73	37.74	36.94	36.30	35.76
36	46.70	43.68	41.50	39.86	38.61	37.63	36.84	36.20	35.67
37	46.55	43.54	41.37	39.75	38.51	37.53	36.74	36.11	35.58
38	46.42	43.42	41.26	39.65	38.41	37.44	36.66	36.02	35.50
39	46.29	43.31	41.16	39.55	38.32	37.35	36.58	35.95	35.43
40	46.18	43.20	41.06	39.46	38.23	37.27	36.50	35.88	35.36

Shaded area indicates limits of basic data.

Table 11.—Tree sawing time in minutes

(mill has resaw)

dbh	Merchantable height								
	1.0 log	1.5 log	2.0 log	2.5 log	3.0 log	3.5 log	4.0 log	4.5 log	5.0 log
10	0.72	1.33	1.47						
11	1.35	1.84	1.95						
12	1.87	2.29	2.39						
13	2.32	2.71	2.82						
14	2.73	3.10	3.24	3.28					
15	3.11	3.48	3.66	3.75	3.80	3.83			
16	3.46	3.86	4.08	4.23	4.35	4.44	4.52	4.59	4.65
17	3.81	4.25	4.52	4.73	4.91	5.08	5.23	5.37	5.51
18	4.15	4.63	4.97	5.25	5.51	5.75	5.98	6.20	6.41
19	4.49	5.02	5.44	5.80	6.13	6.45	6.76	7.06	7.36
20	4.82	5.43	5.92	6.36	6.78	7.18	7.58	7.98	8.36
21	5.16	5.84	6.41	6.95	7.46	7.95	8.44	8.93	9.41
22	5.51	6.27	6.93	7.56	8.16	8.76	9.35	9.93	10.51
23	5.86	6.71	7.47	8.19	8.90	9.60	10.29	10.97	11.66
24	6.22	7.16	8.02	8.85	9.66	10.47	11.27	12.06	12.85
25	6.59	7.63	8.60	9.54	10.46	11.38	12.29	13.19	14.10
26	6.96	8.11	9.19	10.25	11.29	12.32	13.35	14.37	15.39
27	7.35	8.61	9.81	10.98	12.14	13.30	14.45	15.59	16.74
28	7.75	9.13	10.45	11.75	13.03	14.31	15.59	16.86	18.13
29	8.15	9.66	11.11	12.54	13.95	15.36	16.77	18.17	19.57
30	8.57	10.21	11.79	13.35	14.90	16.45	17.99	19.53	21.07
31	9.00	10.77	12.49	14.19	15.89	17.57	19.25	20.93	22.61
32	9.45	11.35	13.22	15.06	16.90	18.73	20.56	22.38	24.21
33	9.90	11.95	13.96	15.96	17.94	19.92	21.90	23.88	25.85
34	10.36	12.57	14.73	16.88	19.02	21.16	23.29	25.42	27.55
35	10.84	13.20	15.52	17.83	20.13	22.42	24.71	27.00	29.29
36	11.33	13.85	16.34	18.81	21.27	23.73	26.18	28.64	31.09
37	11.84	14.52	17.17	19.81	22.44	25.07	27.69	30.31	32.93
38	12.35	15.21	18.03	20.84	23.64	26.44	29.24	32.04	34.83
39	12.88	15.91	18.91	21.90	24.88	27.85	30.83	33.80	36.78
40	13.42	16.63	19.81	22.98	26.14	29.30	32.46	35.62	38.77

Shaded area indicates limits of basic data.

Table 12.—Tree sawing time in minutes

(no resaw)

dbh	Merchantable height								
	1.0 log	1.5 log	2.0 log	2.5 log	3.0 log	3.5 log	4.0 log	4.5 log	5.0 log
10	2.34	3.50	4.19	4.70	5.12	5.48	5.81	6.12	6.41
11	3.07	4.12	4.78	5.29	5.72	6.11	6.47	6.82	7.15
12	3.71	4.69	5.34	5.87	6.33	6.75	7.16	7.54	7.92
13	4.29	5.23	5.89	6.45	6.95	7.42	7.87	8.31	8.73
14	4.84	5.76	6.45	7.05	7.60	8.12	8.62	9.11	9.60
15	5.36	6.30	7.02	7.67	8.27	8.85	9.41	9.97	10.52
16	5.88	6.83	7.61	8.31	8.97	9.62	10.25	10.87	11.49
17	6.40	7.38	8.21	8.98	9.71	10.43	11.13	11.83	12.52
18	6.91	7.95	8.84	9.68	10.49	11.28	12.06	12.83	13.60
19	7.44	8.53	9.50	10.41	11.30	12.17	13.03	13.89	14.74
20	7.98	9.14	10.18	11.17	12.15	13.10	14.06	15.00	15.94
21	8.53	9.76	10.89	11.97	13.03	14.08	15.13	16.17	17.20
22	9.09	10.41	11.62	12.80	13.96	15.11	16.25	17.38	18.52
23	9.68	11.08	12.39	13.67	14.93	16.18	17.42	18.66	19.90
24	10.28	11.77	13.19	14.57	15.93	17.29	18.64	19.99	21.33
25	10.90	12.49	14.01	15.50	16.98	18.45	19.91	21.37	22.83
26	11.53	13.24	14.87	16.48	18.07	19.65	21.23	22.81	24.38
27	12.19	14.01	15.76	17.48	19.20	20.90	22.61	24.30	26.00
28	12.87	14.80	16.68	18.53	20.37	22.20	24.03	25.85	27.68
29	13.57	15.63	17.63	19.61	21.58	23.54	25.50	27.46	29.41
30	14.29	16.48	18.61	20.73	22.83	24.93	27.03	29.12	31.21
31	15.04	17.36	19.63	21.88	24.13	26.37	28.60	30.84	33.07
32	15.80	18.26	20.68	23.08	25.46	27.85	30.23	32.61	34.98
33	16.59	19.19	21.76	24.30	26.84	29.38	31.91	34.43	36.96
34	17.40	20.15	22.87	25.57	28.26	30.95	33.64	36.32	39.00
35	18.23	21.14	24.01	26.87	29.72	32.57	35.42	38.26	41.10
36	19.08	22.15	25.19	28.21	31.23	34.24	37.25	40.25	43.26
37	19.96	23.20	26.40	29.59	32.77	35.95	39.13	42.30	45.48
38	20.86	24.27	27.64	31.00	34.36	37.71	41.06	44.41	47.76
39	21.78	25.36	28.92	32.46	35.99	39.52	43.05	46.58	50.10
40	22.73	26.49	30.22	33.95	37.66	41.37	45.08	48.79	52.50

Shaded area indicates limits of basic data.

Table 13.—Tree sawing time in minutes per Mbf.

(mill has resaw; scaling defect < 25%)

dbh	Merchantable height								
	1.0 log	1.5 log	2.0 log	2.5 log	3.0 log	3.5 log	4.0 log	4.5 log	5.0 log
10	34.61	33.19	31.78	30.36	28.95	27.53	26.12	24.70	23.29
11	32.18	30.77	29.35	27.94	26.52	25.10	23.69	22.27	20.86
12	30.33	28.92	27.50	26.09	24.67	23.26	21.84	20.43	19.01
13	28.90	27.48	26.07	24.65	23.24	21.82	20.40	18.99	17.57
14	27.75	26.34	24.92	23.51	22.09	20.68	19.26	17.85	16.43
15	26.83	25.42	24.00	22.59	21.17	19.76	18.34	16.93	15.51
16	26.08	24.67	23.25	21.84	20.42	19.01	17.59	16.18	14.76
17	25.46	24.04	22.63	21.21	19.80	18.38	16.97	15.55	14.14
18	24.93	23.52	22.10	20.69	19.27	17.86	16.44	15.03	13.61
19	24.49	23.08	21.66	20.25	18.83	17.42	16.00	14.59	13.17
20	24.11	22.70	21.28	19.87	18.45	17.04	15.62	14.21	12.79
21	23.79	22.37	20.96	19.54	18.13	16.71	15.30	13.88	12.47
22	23.51	22.09	20.68	19.26	17.85	16.43	15.02	13.60	12.19
23	23.26	21.85	20.43	19.02	17.60	16.18	14.77	13.35	11.94
24	23.04	21.63	20.21	18.80	17.38	15.97	14.55	13.14	11.72
25	22.85	21.44	20.02	18.61	17.19	15.78	14.36	12.95	11.53
26	22.69	21.27	19.85	18.44	17.02	15.61	14.19	12.78	11.36
27	22.53	21.12	19.70	18.29	16.87	15.46	14.04	12.63	11.21
28	22.40	20.98	19.57	18.15	16.74	15.32	13.91	12.49	11.08
29	22.28	20.86	19.45	18.03	16.62	15.20	13.79	12.37	10.96
30	22.17	20.75	19.34	17.92	16.51	15.09	13.68	12.26	10.85
31	22.07	20.66	19.24	17.83	16.41	15.00	13.58	12.17	10.75
32	21.98	20.57	19.15	17.74	16.32	14.91	13.49	12.08	10.66
33	21.90	20.48	19.07	17.65	16.24	14.82	13.41	11.99	10.58
34	21.83	20.41	19.00	17.58	16.17	14.75	13.33	11.92	10.50
35	21.76	20.34	18.93	17.51	16.10	14.68	13.27	11.85	10.44
36	21.69	20.28	18.86	17.45	16.03	14.62	13.20	11.79	10.37
37	21.64	20.22	18.81	17.39	15.98	14.56	13.15	11.73	10.32
38	21.58	20.17	18.75	17.34	15.92	14.51	13.09	11.68	10.26
39	21.54	20.12	18.70	17.29	15.87	14.46	13.04	11.63	10.21
40	21.49	20.07	18.66	17.24	15.83	14.41	13.00	11.58	10.17

Shaded area indicates limits of basic data.

Table 14.—Tree sawing time in minutes per Mbf.

(mill has resaw; scaling defect > 25%)

dbh	Merchantable height								
	1.0 log	1.5 log	2.0 log	2.5 log	3.0 log	3.5 log	4.0 log	4.5 log	5.0 log
10	45.28	43.86	42.45	41.03	39.62	38.20	36.79	35.37	33.96
11	42.85	41.43	40.02	38.60	37.19	35.77	34.36	32.94	31.53
12	41.00	39.59	38.17	36.76	35.34	33.93	32.51	31.10	29.68
13	39.56	38.15	36.73	35.32	33.90	32.49	31.07	29.66	28.24
14	38.42	37.01	35.59	34.18	32.76	31.35	29.93	28.52	27.10
15	37.50	36.09	34.67	33.26	31.84	30.43	29.01	27.60	26.18
16	36.75	35.34	33.92	32.50	31.09	29.67	28.26	26.84	25.43
17	36.13	34.71	33.30	31.88	30.47	29.05	27.64	26.22	24.80
18	35.60	34.19	32.77	31.36	29.94	28.53	27.11	25.70	24.28
19	35.16	33.75	32.33	30.91	29.50	28.08	26.67	25.25	23.84
20	34.78	33.37	31.95	30.54	29.12	27.71	26.29	24.88	23.46
21	34.46	33.04	31.63	30.21	28.80	27.38	25.97	24.55	23.14
22	34.18	32.76	31.34	29.93	28.51	27.10	25.68	24.27	22.85
23	33.93	32.51	31.10	29.68	28.27	26.85	25.44	24.02	22.61
24	33.71	32.30	30.88	29.47	28.05	26.64	25.22	23.81	22.39
25	33.52	32.11	30.69	29.28	27.86	26.45	25.03	23.62	22.20
26	33.35	31.94	30.52	29.11	27.69	26.28	24.86	23.45	22.03
27	33.20	31.79	30.37	28.96	27.54	26.13	24.71	23.30	21.88
28	33.07	31.65	30.24	28.82	27.41	25.99	24.58	23.16	21.75
29	32.95	31.53	30.12	28.70	27.29	25.87	24.46	23.04	21.63
30	32.84	31.42	30.01	28.59	27.18	25.76	24.35	22.93	21.52
31	32.74	31.32	29.91	28.49	27.08	25.66	24.25	22.83	21.42
32	32.65	31.24	29.82	28.40	26.99	25.57	24.16	22.74	21.33
33	32.57	31.15	29.74	28.32	26.91	25.49	24.08	22.66	21.25
34	32.49	31.08	29.66	28.25	26.83	25.42	24.00	22.59	21.17
35	32.43	31.01	29.60	28.18	26.77	25.35	23.94	22.52	21.11
36	32.36	30.95	29.53	28.12	26.70	25.29	23.87	22.46	21.04
37	32.31	30.89	29.48	28.06	26.65	25.23	23.82	22.40	20.98
38	32.25	30.84	29.42	28.01	26.59	25.18	23.76	22.35	20.93
39	32.20	30.79	29.37	27.96	26.54	25.13	23.71	22.30	20.88
40	32.16	30.74	29.33	27.91	26.50	25.08	23.67	22.25	20.84

Shaded area indicates limits of basic data.

Table 15.—Tree sawing time in minutes per Mbf.

(no resaw; scaling defect < 25%)

dbh	Merchantable height								
	1.0 log	1.5 log	2.0 log	2.5 log	3.0 log	3.5 log	4.0 log	4.5 log	5.0 log
10	68.48	67.06	65.65	64.23	62.82	61.40	59.99	58.57	57.16
11	61.97	60.55	59.14	57.72	56.31	54.89	53.48	52.06	50.65
12	57.02	55.60	54.19	52.77	51.36	49.94	48.53	47.11	45.70
13	53.16	51.75	50.33	48.92	47.50	46.09	44.67	43.26	41.84
14	50.11	48.69	47.28	45.86	44.45	43.03	41.62	40.20	38.78
15	47.64	46.22	44.81	43.39	41.98	40.56	39.15	37.73	36.32
16	45.62	44.21	42.79	41.38	39.96	38.54	37.13	35.71	34.30
17	43.95	42.53	41.12	39.70	38.29	36.87	35.46	34.04	32.63
18	42.55	41.13	39.72	38.30	36.88	35.47	34.05	32.64	31.22
19	41.36	39.94	38.53	37.11	35.70	34.28	32.87	31.45	30.04
20	40.35	38.93	37.52	36.10	34.69	33.27	31.85	30.44	29.02
21	39.47	38.06	36.64	35.23	33.81	32.40	30.98	29.57	28.15
22	38.72	37.30	35.89	34.47	33.06	31.64	30.23	28.81	27.40
23	38.06	36.64	35.23	33.81	32.40	30.98	29.57	28.15	26.74
24	37.48	36.07	34.65	33.23	31.82	30.40	28.99	27.57	26.16
25	36.97	35.55	34.14	32.72	31.31	29.89	28.48	27.06	25.65
26	36.52	35.10	33.69	32.27	30.86	29.44	28.03	26.61	25.20
27	36.11	34.70	33.28	31.87	30.45	29.04	27.62	26.21	24.79
28	35.75	34.34	32.92	31.51	30.09	28.68	27.26	25.85	24.43
29	35.43	34.01	32.60	31.18	29.77	28.35	26.94	25.52	24.11
30	35.14	33.72	32.31	30.89	29.48	28.06	26.65	25.23	23.81
31	34.87	33.46	32.04	30.63	29.21	27.80	26.38	24.97	23.55
32	34.63	33.22	31.80	30.39	28.97	27.56	26.14	24.73	23.31
33	34.41	33.00	31.58	30.17	28.75	27.34	25.92	24.51	23.09
34	34.21	32.80	31.38	29.97	28.55	27.14	25.72	24.31	22.89
35	34.03	32.62	31.20	29.78	28.37	26.95	25.54	24.12	22.71
36	33.86	32.45	31.03	29.62	28.20	26.79	25.37	23.96	22.54
37	33.71	32.29	30.88	29.46	28.05	26.63	25.22	23.80	22.39
38	33.57	32.15	30.74	29.32	27.91	26.49	25.08	23.66	22.24
39	33.43	32.02	30.60	29.19	27.77	26.36	24.94	23.53	22.11
40	33.31	31.90	30.48	29.07	27.65	26.24	24.82	23.41	21.99

Shaded area indicates limits of basic data.

Table 16.—Tree sawing time in minutes per Mbf.

(no resaw; scaling defect > 25%)

dbh	Merchantable height								
	1.0 log	1.5 log	2.0 log	2.5 log	3.0 log	3.5 log	4.0 log	4.5 log	5.0 log
10	79.15	77.73	76.32	74.90	73.49	72.07	70.66	69.24	67.83
11	72.64	71.22	69.81	68.39	66.98	65.56	64.15	62.73	61.32
12	67.69	66.27	64.86	63.44	62.02	60.61	59.19	57.78	56.36
13	63.83	62.42	61.00	59.59	58.17	56.76	55.34	53.93	52.51
14	60.77	59.36	57.94	56.53	55.11	53.70	52.28	50.87	49.45
15	58.31	56.89	55.48	54.06	52.65	51.23	49.82	48.40	46.99
16	56.29	54.87	53.46	52.04	50.63	49.21	47.80	46.38	44.97
17	54.62	53.20	51.79	50.37	48.96	47.54	46.13	44.71	43.30
18	53.21	51.80	50.38	48.97	47.55	46.14	44.72	43.31	41.89
19	52.03	50.61	49.20	47.78	46.37	44.95	43.54	42.12	40.71
20	51.01	49.60	48.18	46.77	45.35	43.94	42.52	41.11	39.69
21	50.14	48.73	47.31	45.90	44.48	43.07	41.65	40.24	38.82
22	49.39	47.97	46.56	45.14	43.73	42.31	40.90	39.48	38.07
23	48.73	47.31	45.90	44.48	43.07	41.65	40.24	38.82	37.41
24	48.15	46.73	45.32	43.90	42.49	41.07	39.66	38.24	36.83
25	47.64	46.22	44.81	43.39	41.98	40.56	39.15	37.73	36.32
26	47.19	45.77	44.36	42.94	41.53	40.11	38.69	37.28	35.86
27	46.78	45.37	43.95	42.54	41.12	39.71	38.29	36.88	35.46
28	46.42	45.01	43.59	42.18	40.76	39.35	37.93	36.52	35.10
29	46.10	44.68	43.27	41.85	40.44	39.02	37.61	36.19	34.78
30	45.80	44.39	42.97	41.56	40.14	38.73	37.31	35.90	34.48
31	45.54	44.12	42.71	41.29	39.88	38.46	37.05	35.63	34.22
32	45.30	43.88	42.47	41.05	39.64	38.22	36.81	35.39	33.98
33	45.08	43.67	42.25	40.84	39.42	38.01	36.59	35.18	33.76
34	44.88	43.47	42.05	40.64	39.22	37.81	36.39	34.98	33.56
35	44.70	43.28	41.87	40.45	39.04	37.62	36.21	34.79	33.38
36	44.53	43.12	41.70	40.29	38.87	37.46	36.04	34.63	33.21
37	44.38	42.96	41.55	40.13	38.72	37.30	35.89	34.47	33.06
38	44.23	42.82	41.40	39.99	38.57	37.16	35.74	34.33	32.91
39	44.10	42.69	41.27	39.86	38.44	37.03	35.61	34.20	32.78
40	43.98	42.57	41.15	39.74	38.32	36.91	35.49	34.08	32.66

Shaded area indicates limits of basic data.

Rast, Everette D.
1974. **Log and tree sawing times for hardwood mills.**
NE. Forest Exp. Sta., Upper Darby, Pa.
10 p. (USDA Forest Serv. Res. Pap. NE-304)

Data on 6,850 logs and 1,181 trees were analyzed to predict sawing times. For both logs and trees, regression equations were derived that express (in minutes) sawing time per log or tree and per Mbf. For trees, merchantable height is expressed in number of logs as well as in feet. One of the major uses for the tables of average sawing times is as a bench mark against which individual mills can make comparisons.

832.15 : 176.1

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