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# TEXAS FORESTRY PAPER



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STEPHEN F. AUSTIN STATE UNIVERSITY

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## MERCHANTABLE GREEN WEIGHTS FOR LOBLOLLY PINE TREES IN OLD-FIELD PLANTATIONS IN THE INTERIOR WEST GULF COASTAL PLAIN

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Many wood using industries within the Interior West Gulf Coastal Plain buy truckloads of loblolly pine (*Pinus taeda* L.) pulpwood on a green weight basis. This is an efficient and relatively error-free scaling procedure at the mill. However, most, if not all, scaling of loblolly pine trees in the forest is on a volumetric basis. To facilitate estimation of product weights directly from woods measurements, this paper presents equations and tables for estimating the green weight of the merchantable stems of loblolly pine trees to three top diameter limits on the basis of diameter at breast height and total tree height.

### PLANTATION MEASUREMENTS

During the summer of 1971, four randomly selected trees in each of 158 plantations throughout the Interior West Gulf Coastal Plain were felled and sectioned into 4-foot-long bolts (Hasness and Lenhart, 1972). Diameter at breast height (D) and total tree height including stump (H) were measured for each tree. Additional measurements were:

- (1) Green weight per bolt, including bark.
- (2) Green weight, including bark, of a 1- to 2-inch-thick disc sawn from the bottom of each bolt.
- (3) Green weight of the discs from each tree after bark removal.

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## TREE GREEN WEIGHT PREDICTION EQUATIONS

The green weight of wood, including bark, for each tree to top diameter limits of 2.0, 3.0, and 4.0 inches outside bark (d.o.b.) was calculated by summing the bolt weights of the tree. When a merchantability limit occurred within a bolt, the proportion of bolt cubic-foot volume below the limit was calculated and multiplied by the whole bolt green weight to obtain the green weight of the merchantable portion.

The green weight of wood, excluding bark, for each tree was determined using the collective disc weights. A ratio of collective disc weight excluding bark to collective disc weight including bark was calculated for each tree. Multiplication of each tree's green weight including bark by its respective ratio produces the tree's green weight excluding bark.

Using  $D^2H$  as the independent variable in regression analysis, the following equations for predicting green weights per tree were developed:

- (1) Green weight, including bark, to a 2.0-inch top (d.o.b.) =  $0.13820D^2H - 13.26294$
- (2) Green weight, excluding bark, to a 2.0-inch top (d.o.b.) =  $0.12814D^2H - 19.98421$
- (3) Green weight, including bark, to a 3.0-inch top (d.o.b.) =  $0.13885D^2H - 26.83057$
- (4) Green weight, excluding bark, to a 3.0-inch top (d.o.b.) =  $0.12867D^2H - 31.89977$
- (5) Green weight, including bark, to a 4.0-inch top (d.o.b.) =  $0.14080D^2H - 61.32799$
- (6) Green weight, excluding bark, to a 4.0-inch top (d.o.b.) =  $0.13031D^2H - 62.20827$

Each equation accounted for 98% or more of the total variation in green weight, and the standard deviations about regression varied from 39 to 44 pounds.

The values shown in Tables 1 through 6 were calculated from equations (1) through (6), respectively.

## LITERATURE CITED

- Hasness, J. R. and J. D. Lenhart. 1972. Cubic-foot volumes for loblolly pine trees in old-field loblolly pine plantations in the Interior West Gulf Coastal Plain. Texas Forestry Paper No. 12. 7 pp.

Table 1. Green weight, including bark, in pounds, to a 2.0-inch top d.o.b., for loblolly pine trees.

D. b. h. inches	Total height, feet											
	20	25	30	35	40	45	50	55	60	65	70	75
5	55.8	73.1	90.4	107.7	124.9	142.2	159.5	176.8	194.0			
6		111.1	136.0	160.9	185.7	210.6	235.5	260.4	285.2	310.1	335.0	
7			189.9	223.8	257.6	291.5	325.3	359.2	393.0	426.9	460.8	
8			252.1	296.3	340.5	384.8	429.0	473.2	517.4	561.6	605.9	
9			322.6	378.5	434.5	490.5	546.4	602.4	658.4	714.4	770.3	
10				470.4	539.5	608.6	677.7	746.8	815.9	885.0	954.1	1023.2
11						739.2	822.8	906.5	990.1	1073.7	1157.3	1240.9
12						882.3	981.8	1081.3	1180.8	1280.3	1379.8	1479.3
13						1037.7	1154.5	1271.3	1388.1	1504.9	1621.6	1738.4
14							1341.1	1476.5	1612.0	1747.4	1882.8	2018.3

Table 2. Green weight, excluding bark, in pounds, to a 2.0-inch top d.o.b., for loblolly pine trees.

D. b. h. inches	Total height, feet											
	20	25	30	35	40	45	50	55	60	65	70	75
5	44.1	60.1	76.1	92.1	108.2	124.2	140.2	156.2	172.2			
6		95.3	118.4	141.5	164.5	187.6	210.7	233.7	256.8	279.9	302.9	
7			168.4	199.8	231.2	262.6	294.0	325.4	356.7	388.1	419.5	
8			226.0	267.0	308.1	349.1	390.1	431.1	472.1	513.1	554.1	
9			291.4	343.3	395.2	447.1	499.0	550.9	602.8	654.7	706.6	
10				428.5	492.6	556.6	620.7	684.8	748.9	812.9	877.0	941.1
11						677.7	755.3	832.8	910.3	987.8	1065.4	1142.9
12						810.4	902.6	994.9	1087.1	1179.4	1271.7	1363.9
13						954.5	1062.8	1171.1	1279.4	1387.6	1495.9	1604.2
14							1235.8	1361.4	1486.9	1612.5	1738.1	1863.7

Table 3. Green weight, including bark, in pounds, to a 3.0-inch top d.o.b., for loblolly pine trees.

D. b. h. inches	Total height, feet											
	20	25	30	35	40	45	50	55	60	65	70	75
5	42.6	60.0	77.3	94.7	112.0	129.4	146.7	164.1	181.4			
6		98.1	123.1	148.1	173.1	198.1	223.1	248.1	273.1	298.1	323.1	
7			177.3	211.3	245.3	279.3	313.4	347.4	381.4	415.4	449.4	
8			239.8	284.2	328.6	373.1	417.5	461.9	506.4	550.8	595.2	
9			310.6	366.8	423.0	479.3	535.5	591.7	648.0	704.2	760.4	
10				459.1	528.6	598.0	667.4	736.8	806.3	875.7	945.1	1014.5
11						729.2	813.2	897.2	981.2	1065.2	1149.2	1233.2
12						872.9	972.9	1072.9	1172.8	1272.8	1372.8	1472.7
13						1029.1	1146.5	1263.8	1381.1	1498.4	1615.8	1733.1
14							1333.9	1470.0	1606.0	1742.1	1878.2	2014.3

Table 4. Green weight, excluding bark, in pounds, to a 3.0-inch top d.o.b., for loblolly pine trees.

D. b. h. inches	Total height, feet											
	20	25	30	35	40	45	50	55	60	65	70	75
5	32.4	48.5	64.6	80.7	96.8	112.9	128.9	145.0	161.1			
6		83.9	107.1	130.2	153.4	176.5	199.7	222.9	246.0	269.2	292.3	
7			157.2	188.8	220.3	251.8	283.3	314.9	346.4	377.9	409.4	
8			215.1	256.3	297.5	338.7	379.8	421.0	462.2	503.4	544.5	
9			280.8	332.9	385.0	437.1	489.2	541.3	593.4	645.5	697.7	
10				418.4	482.8	547.1	611.4	675.8	740.1	804.5	868.8	933.1
11						668.7	746.6	824.4	902.2	980.1	1057.9	1135.8
12						801.9	894.5	987.2	1079.8	1172.5	1265.1	1357.7
13						946.6	1055.4	1164.1	1272.8	1381.5	1490.3	1599.0
14							1229.1	1355.2	1481.3	1607.4	1733.5	1859.5

Table 5. Green weight, including bark, in pounds, to a 4.0-inch top d.o.b., for loblolly pine trees.

D. b. h. inches	Total height, feet												
	20	25	30	35	40	45	50	55	60	65	70	75	
5	9.1	26.7	44.3	61.9	79.5	97.1	114.7	132.3	149.9				
6		65.4	90.7	116.1	141.4	166.8	192.1	217.5	242.8	268.1	293.5		
7			145.6	180.1	214.6	249.1	283.6	318.1	352.6	387.1	421.6		
8			209.0	254.1	299.1	344.2	389.2	434.3	479.3	524.4	569.5		
9			280.8	337.8	394.9	451.9	508.9	565.9	623.0	680.0	737.0		
10				431.5	501.9	572.3	642.7	713.1	783.5	853.9	924.3	994.7	
11						705.3	790.5	875.7	960.9	1046.1	1131.2	1216.4	
12						851.1	952.4	1053.8	1155.2	1256.6	1357.9	1459.3	
13						1009.5	1128.4	1247.4	1366.4	1485.4	1604.3	1723.3	
14							1318.5	1456.5	1594.5	1732.5	1870.4	2008.4	

Table 6. Green weight, excluding bark, in pounds, to a 4.0-inch top d.o.b., for loblolly pine trees.

D. b. h. inches	Total height, feet												
	20	25	30	35	40	45	50	55	60	65	70	75	
5	2.9	19.2	35.5	51.8	68.1	84.4	100.7	117.0	133.3				
6		55.1	78.5	102.0	125.4	148.9	172.3	195.8	219.3	242.7	266.2		
7			129.3	161.3	193.2	225.1	257.1	289.0	320.9	352.8	384.8		
8			188.0	229.7	271.4	313.1	354.8	396.5	438.2	479.9	521.6		
9			254.4	307.2	360.0	412.8	465.5	518.3	571.1	623.9	676.6		
10				393.9	459.0	524.2	589.3	654.5	719.7	784.8	850.0	915.1	
11						647.3	726.2	805.0	883.8	962.7	1041.5	1120.4	
12						782.2	876.0	969.8	1063.7	1157.5	1251.3	1345.1	
13						928.8	1038.9	1149.0	1259.1	1369.2	1479.4	1589.5	
14							1214.8	1342.5	1470.2	1597.9	1725.6	1853.3	