United States
Department of
Agriculture

Forest
Service

North Central
Forest Experiment
Station

General Technical
Report **NC-95**

Green Weight Tables for Eight Tree Species in Northern Michigan

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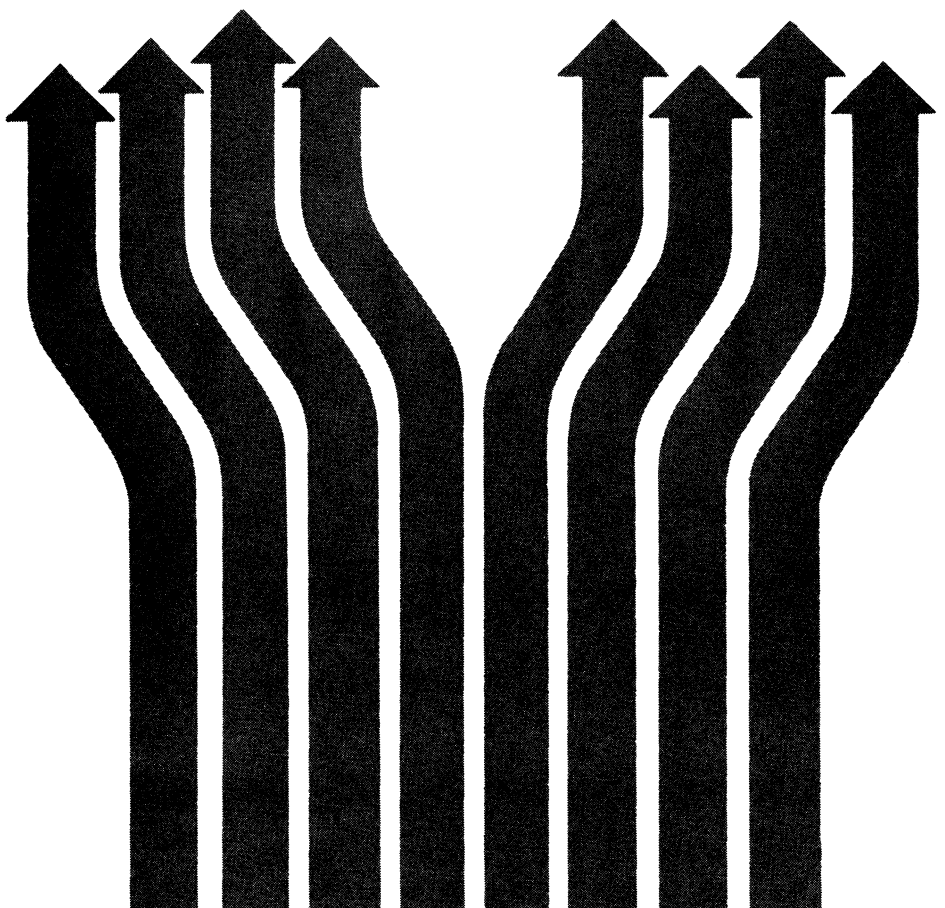
ASPEN
WHITE SPRUCE
RED PINE
BALSAM FIR
SUGAR MAPLE
RED OAK
RED MAPLE
WHITE BIRCH



North Central Forest Experiment Station
Forest Service—U.S. Department of Agriculture
1992 Folwell Avenue
St. Paul, MN 55108
Manuscript approved for publication February 15, 1984
September 1984

GREEN WEIGHT TABLES FOR EIGHT TREE SPECIES IN NORTHERN MICHIGAN

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During the last 10 to 15 years utilization of logging residue from merchantable trees and whole-tree chipping of pole-sized trees for fuel and fiber has increased. When logging residue and trees are harvested in chip form, they are usually sold on a green weight basis. Therefore, it has become necessary to develop green weight tables for trees, boles, and residues to enable preharvesting estimates to be made of the material to be removed from the forest.

Between 1966 and 1981, the USDA Forest Service's Forestry Sciences Laboratory, Houghton, Michigan, collected field data and prepared weight tables for eight tree species common to the Upper Peninsula of Michigan (Steinhilb and Erickson 1970, 1972; Steinhilb and Winsauer 1976; Winsauer and Steinhilb 1980; Steinhilb *et al.* in prep.). This publication summarizes these Michigan tables in a uniform and convenient form for use by foresters, loggers, and others concerned with estimating the green weights of trees and tree components. The tables and equations presented estimate the green weights of the tree, bole, and residue for the following species:

trembling aspen *(Populus tremuloides),*
sugar maple *(Acer saccharum),*
red maple *(Acer rubrum),*
white birch *(Betula papyrifera),*
red oak *(Quercus rubra),*
red pine *(Pinus resinosa),*
white spruce *(Picea glauca),*
balsam fir *(Abies balsamea).*

DEFINITIONS

The following terms and definitions are used in this publication:

Diameter breast height (d.b.h.)—The diameter of the tree (in inches outside the bark) measured at a point 4-½ feet above the ground.

Tree height—The height of the tree (in feet) from the cut stump to the tip.

Tree weight—The green weight (in pounds) of the entire tree—wood, bark, limbs, and foliage—above the cut stump.

Bole height—The height of the tree bole (in feet) from the cut stump to a point on the main stem at which the diameter outside the bark is 3.0 inches for aspen, red pine, white spruce, and balsam fir and 4.0 inches for sugar maple, red maple, white birch, and red oak. Sawtimber-sized sugar maple were also measured to a point on the main stem to a top diameter inside the bark determined by the uppermost merchantable saw log.

Bole weight—The green weight (in pounds) of the delimbed bole including wood and bark.

Residue weight—The green weight (in pounds) of wood, bark, and foliage of the total tree above the stump, minus the bole weight.

FIELD DATA COLLECTION

All the sample trees were from within 55 miles of Houghton, Michigan. Sample trees were selected to include an approximately equal number of trees in each diameter class. D.b.h. of each tree was measured to the nearest 0.1-inch. The tree was then felled, being careful to minimize breakage and loss of limbs. After felling, tree and bole height were measured to the nearest foot.

Within 24 hours after felling, the entire above-stump portion of each pulpwood tree was weighed by

suspending it from a weight transducer or load cell attached to a hydraulic knuckle boom loader, fork lift, or other lifting device. The tree was then lowered to the ground, the top and limbs were cut off, and the delimbed bole was suspended and weighed.

Sugar maple saw log trees were cut into saw logs to a top diameter of not less than 9.6 inches inside the bark according to commercial logging practice in the area. The length of each bole section, gross and net Scribner Decimal C scale, and butt and top diameter of each section were recorded. The length of the remaining top or crown beyond the last saw log was also recorded. Each bole section and the top of the tree were suspended from the transducer and weighed. The sum of the lengths of the components was used to determine tree height and merchantable bole height. The weights of the saw logs in a tree were added to determine bole weight, and the weights of the top and branches were added to obtain the above-stump green tree weight.

The range of the field data for the species studied is shown in table 1.

ANALYTIC PROCEDURE

The data for each species were analyzed separately, and regression equations were developed for the green weights of trees, boles, and residue. Sugar maple bole weight data were analyzed separately for pulpwood and saw log trees because bole height was defined differently for each group (4-inch top for pulpwood trees and a top diameter of not less than 9.6 inches inside the bark for saw log trees). However, because the measurements were "compatible" for both pulpwood and saw log trees for green tree weight, the data from both categories of trees were combined to obtain green tree weight tables.

The data in this publication for tree, bole, and residue weight are based on (1) d.b.h. and tree height and (2) d.b.h. and bole height to provide consistency and approximate additivity between the component weight equations. The weight equations were as follows:

green component weight in pounds = $A + B(D^2\ Th)$

and

green component weight in pounds = $A + B(D^2\ Bh)$

where:

A + B = regression coefficients,
D = d.b.h. in inches,
Th = tree height in feet, and
Bh = bole height in feet.

TABLES AND REGRESSION EQUATIONS

The regression equations for green tree, bole, and residue weights based on d.b.h. and tree height, together with standard errors of estimate and number of trees sampled for each species are given in table 2. Those based on d.b.h. and bole height are given in table 3.

Green weights for tree, bole, and residue weights as developed from the equations based on d.b.h. and tree height are given in tables 4 through 12; those based on d.b.h. and bole height are given in tables 13 through 21.

USE OF THE WEIGHT TABLES

The weight tables (tables 4 through 21) can be used to obtain preharvest weight inventories for forest stands in the same way that volume tables are used to obtain merchantable volume inventories.

Caution should be observed when using the weight tables for stands outside the study area because the tables were constructed from a limited sample of trees in a local area of Upper Michigan. The best estimates of biomass will result when the tables are used for stands similar in tree size, composition, age, and site index to those from which the sample trees were selected.

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TABLES

Table 1.--Data range of field tree measurements

Species	D.b.h.	Tree height	Tree weight	Bole height	Bole weight	Observations
	Inches	Feet	Pounds	Feet	Pounds	Number
Aspen	5.3-17.4	28-77	80-3,080	17-59	50-2,600	96
White spruce	6.2-16.2	31-72	255-3,292	22-64	135-2,526	60
Red pine	5.6-14.0	47-75	284-2,562	36-64	245-2,122	60
Balsam fir	5-0-13.2	31-62	225-2,255	17-54	135-1,700	69
Sugar maple						
All trees	5.0-24.0	38-89	164-9,016			130
Pulp trees	5.0-11.6	38-72	164-1,677	12-59	87-1,257	54
Saw log trees	11.6-24.0	56-89	1,494-9,016	13-56	582-5,371	76
Red oak	3.4-17.1	25-74	60-4,738	10-60	86-2,956	36
Red maple	2.0-16.8	22-81	30-4,352	7-67	53-3,163	48
White birch	1.6-15.6	22-85	5-3,190	3-58	25-2,258	33

Table 2.--Regression equations for determining green weight (in pounds) based on D^2 Th

Species	Regression equation	S.E.E.	Observations	Table number
			Number	
	Green tree weight			
Aspen	23.8 + 0.158 D^2 Th	1.29 D^2	96	4
White spruce	152.7 + 0.161 D^2 Th	2.35 D^2	60	5
Red pine	7.3 + 0.180 D^2 Th	0.76 D^2	60	6
Balsam fir	73.7 + 0.172 D^2 Th	1.81 D^2	69	7
Sugar maple	26.2 + 0.168 D^2 Th	1.56 D^2	130	8
Red oak	2.7 + 0.198 D^2 Th	1.18 D^2	36	10
Red maple	19.9 + 0.164 D^2 Th	1.45 D^2	48	11
White birch	8.7 + 0.173 D^2 Th	1.91 D^2	33	12
	Green bole weight			
Aspen	- 2.0 + 0.128 D^2 Th	0.98 D^2	96	4
White spruce	87.5 + 0.116 D^2 Th	1.51 D^2	60	5
Red pine	10.3 + 0.154 D^2 Th	0.67 D^2	60	6
Balsam fir	14.3 + 0.127 D^2 Th	1.22 D^2	69	7
Sugar maple (pulpwood)	- 78.0 + 0.146 D^2 Th	0.70 D^2	54	8
Sugar maple (saw log)	- 283.4 + 0.116 D^2 Th	1.07 D^2	76	9
Red oak	- 28.0 + 0.158 D^2 Th	0.85 D^2	34	10
Red maple	- 16.8 + 0.127 D^2 Th	0.87 D^2	30	11
White birch	- 35.9 + 0.137 D^2 Th	0.93 D^2	25	12
	Green residue weight			
Aspen	25.8 + 0.030 D^2 Th	0.94 D^2	96	4
White spruce	65.2 + 0.045 D^2 Th	1.64 D^2	60	5
Red pine	- 3.0 + 0.026 D^2 Th	0.40 D^2	60	6
Balsam fir	59.4 + 0.045 D^2 Th	1.32 D^2	69	7
Sugar maple (pulpwood)	65.8 + 0.036 D^2 Th	0.82 D^2	50	8
Sugar maple (saw log)	502.6 + 0.041 D^2 Th	1.60 D^2	76	9
Red oak	19.0 + 0.044 D^2 Th	1.22 D^2	33	10
Red maple	46.2 + 0.034 D^2 Th	1.16 D^2	30	11
White birch	36.2 + 0.038 D^2 Th	1.16 D^2	25	12

Table 3.--Regression equations for determining green weight (in pounds) based on D^2 Bh

Species	Regression equation	S.E.E.	Observations	Table number
			Number	
	Green tree weight			
Aspen	55.5 + 0.204 D^2 Bh	1.35 D^2	96	13
White spruce	215.2 + 0.180 D^2 Bh	2.39 D^2	60	14
Red pine	52.5 + 0.202 D^2 Bh	0.68 D^2	60	15
Balsam fir	155.2 + 0.194 D^2 Bh	1.85 D^2	69	16
Sugar maple (pulpwood)	158.3 + 0.219 D^2 Bh	1.59 D^2	54	17
Sugar maple (sawlog)	1,057.4 + 0.240 D^2 Bh	2.26 D^2	76	18
Red oak	99.0 + 0.256 D^2 Bh	1.51 D^2	33	19
Red maple	107.3 + 0.220 D^2 Bh	1.23 D^2	30	20
White birch	91.0 + 0.228 D^2 Bh	1.44 D^2	25	21
	Green bole weight			
Aspen	21.7 + 0.165 D^2 Bh	0.91 D^2	96	13
White spruce	131.2 + 0.130 D^2 Bh	1.52 D^2	60	14
Red pine	48.2 + 0.172 D^2 Bh	0.53 D^2	60	15
Balsam fir	72.7 + 0.144 D^2 Bh	1.21 D^2	69	16
Sugar maple (pulpwood)	44.8 + 0.184 D^2 Bh	0.51 D^2	54	17
Sugar maple (saw log)	239.2 + 0.189 D^2 Bh	0.72 D^2	76	18
Red oak	53.2 + 0.204 D^2 Bh	0.95 D^2	34	19
Red maple	44.3 + 0.174 D^2 Bh	0.66 D^2	30	20
White birch	34.4 + 0.179 D^2 Bh	0.71 D^2	25	21
	Green residue weight			
Aspen	33.8 + 0.038 D^2 Bh	0.97 D^2	96	13
White spruce	83.9 + 0.050 D^2 Bh	1.66 D^2	60	14
Red pine	4.25 + 0.029 D^2 Bh	0.42 D^2	60	15
Balsam fir	82.6 + 0.050 D^2 Bh	1.34 D^2	69	16
Sugar maple (pulpwood)	95.4 + 0.045 D^2 Bh	0.85 D^2	50	17
Sugar maple (saw log)	818.2 + 0.050 D^2 Bh	1.81 D^2	76	18
Red oak	42.9 + 0.055 D^2 Bh	1.27 D^2	33	19
Red maple	63.0 + 0.046 D^2 Bh	1.17 D^2	30	20
White birch	56.7 + 0.049 D^2 Bh	1.21 D^2	25	21

Table 4.--Trembling aspen green weights (values inside the lines show the range of the sample data)

(In pounds)

D.b.h. class (inches)	Tree height (feet)							
	20	30	40	50	60	70	80	90
Green tree weight								
4	74	100	125	150	175	201		
6	138	194	251	308	365	422	479	536
8	226	327	428	529	631	732	833	934
10	340	498	656	814	972	1,130	1,288	1,446
12	479	706	934	1,161	1,389	1,616	1,844	2,071
14		953	1,263	1,572	1,882	2,192	2,501	2,811
16			1,642	2,046	2,451	2,855	3,260	3,664
18				2,583	3,095	3,607	4,119	4,631
20				3,184	3,816	4,448	5,080	5,712
Green bole weight								
6	90	136	182	228	274	321	367	413
8	162	244	326	408	490	571	653	735
10	254	382	510	638	766	894	1,022	1,150
12	367	551	735	920	1,104	1,288	1,473	1,657
14		751	1,002	1,252	1,503	1,754	2,005	2,256
16			1,309	1,636	1,964	2,292	2,619	2,947
18				2,072	2,486	2,901	3,316	3,730
20				2,558	3,070	3,582	4,094	4,606
Green residue weight								
6	47	58	69	80	91	101	112	123
8	64	83	103	122	141	160	179	199
10	86	116	146	176	206	236	266	296
12	112	155	199	242	285	328	371	415
14		202	261	320	379	437	496	555
16			333	410	487	563	640	717
18				512	609	706	803	901
20				626	746	866	986	1,106

Table 5.--White spruce green weights (values inside the lines show the range of the sample data)

(In pounds)

D.b.h. class (inches)	Tree height (feet)						
	20	30	40	50	60	70	80
				Green tree weight			
4	204	230	256	282	307	333	
6	269	327	385	443	500	558	616
8	359	462	565	668	771	874	977
10	475	636	797	958	1,119	1,280	1,441
12		848	1,080	1,312	1,544	1,776	2,007
14		1,099	1,415	1,731	2,046	2,362	2,677
16			1,801	2,214	2,626	3,038	3,450
18				2,761	3,283	3,804	4,326
20					4,017	4,661	5,305
				Green bole weight			
6	171	213	255	296	338	380	422
8	236	310	384	459	533	607	681
10	320	436	552	668	784	900	1,016
12		589	756	923	1,090	1,257	1,424
14		770	997	1,224	1,452	1,679	1,906
16			1,275	1,572	1,869	2,166	2,463
18				1,967	2,343	2,718	3,094
20					2,872	3,336	3,800
				Green residue weight			
6	98	114	130	146	162	179	195
8	123	152	180	209	238	267	296
10	155	200	245	290	335	380	425
12		260	324	389	454	519	584
14		330	418	506	594	683	771
16			526	641	756	872	987
18				794	940	1,086	1,232
20					1,145	1,325	1,505

Table 6.--Red pine green weights (values inside the lines show the range of the sample data)

(In pounds)

D.b.h. class (inches)	Tree height (feet)						
	20	30	40	50	60	70	80
				Green tree weight			
4		94	123	151	180	209	238
6		202	267	331	396	461	526
8		353	468	583	699	814	929
10		547	727	907	1,087	1,267	1,447
12		785	1,044	1,303	1,563	1,822	2,081
14				1,771	2,124	2,477	2,830
16				2,311	2,772	3,233	3,694
18					3,507	4,090	4,673
20						5,057	5,767
				Green bole weight			
6		177	232	288	343	398	454
8		306	405	503	602	700	799
10		472	626	780	934	1,088	1,242
12		676	897	1,119	1,341	1,563	1,784
14		916	1,218	1,520	1,821	2,123	2,425
16				1,982	2,376	2,770	3,164
18					3,004	3,503	4,002
20						4,322	4,938
				Green residue weight			
6		25	34	44	53	63	72
8		47	64	80	97	113	130
10		75	101	127	153	179	205
12		109	147	184	222	259	297
14		150	201	252	303	354	405
16				330	396	463	529
18					502	587	671
20						725	829

Table 7.--Balsam fir green weights (values inside the lines show the range of the sample data)

(In pounds)

D.b.h. class (inches)	Tree height (feet)						
	20	30	40	50	60	70	80
				Green tree weight			
4	129	156	184	211	239		
6	198	259	321	383	445	507	
8	294	404	514	624	734	844	954
10	418	590	762	934	1,106	1,278	1,450
12	569	817	1,064	1,312	1,560	1,807	2,055
14	748	1,085	1,422	1,759	2,096	2,434	2,771
16		1,395	1,835	2,275	2,716	3,156	3,596
18				2,860	3,417	3,975	4,532
20					4,202	4,890	5,578
				Green bole weight			
6	106	151	197	243	289	334	380
8	177	258	339	421	502	583	665
10	268	395	522	649	776	903	1,030
12	380	563	746	929	1,112	1,294	1,477
14	512	761	1,010	1,259	1,508	1,757	2,006
16		990	1,315	1,640	1,965	2,290	2,615
18				2,072	2,483	2,895	3,306
20					3,062	3,570	4,078
				Green residue weight			
6	92	108	124	140	157	173	189
8	117	146	175	203	232	261	290
10	149	194	239	284	329	374	419
12	189	254	319	383	448	513	578
14	236	324	412	500	589	677	765
16		405	520	635	751	866	981
18				788	934	1,080	1,226
20					1,139	1,319	1,499

Table 8.--Sugar maple pulpwood green weights (values inside the lines show the range of the sample data)

(In pounds)

D.b.h. class (inches)	Tree height (all trees)							
	20	30	40	50	60	70	80	90
			Green tree weight (all trees)					
4		107	134	161	187	214	241	
6		208	268	329	389	450	510	571
8		349	456	564	671	779	886	994
10		530	698	866	1,034	1,202	1,370	1,538
12		752	994	1,236	1,478	1,720	1,962	2,203
14			1,343	1,673	2,002	2,331	2,660	2,990
16			1,747	2,177	2,607	3,037	3,467	3,997
18			2,203	2,748	3,292	3,836	4,381	4,925
20				3,386	4,058	4,730	5,402	6,074
22				4,092	4,905	5,718	6,531	7,344
24				4,865	5,832	6,800	7,768	8,735
26					6,840	7,976	9,112	10,247
			Green bole weight (pulpwood trees)					
6		80	132	185	237	290	342	
8		202	296	389	483	576	670	
10		360	506	652	798	944	1,090	
12		553	763	973	1,183	1,394	1,604	
14		780	1,067	1,353	1,639	1,925	2,211	
16			1,417	1,791	2,165	2,538	2,912	
18				2,287	2,760	3,233	3,706	
			Green residue weight (pulpwood trees)					
6		105	118	131	144	157	169	
8		135	158	181	204	227	250	
10		174	210	246	282	318	354	
12		221	273	325	377	429	481	
14		277	348	419	489	560	630	
16			434	527	619	711	803	
18				649	766	882	999	

Table 9.--Sugar maple saw log green weights (values inside the lines show the range of the sample data)

(In pounds)

D.b.h. class (inches)	Tree height (feet)					
	40	50	60	70	80	90
			Green bole weights (saw log trees)			
12	385	552	719	886	1,053	1,220
14	626	853	1,081	1,308	1,535	1,763
16	904	1,201	1,498	1,795	2,092	2,389
18	1,220	1,596	1,972	2,347	2,723	3,099
20	1,573	2,037	2,501	2,965	3,429	3,893
22	1,962	2,524	3,085	3,647	4,208	4,770
24		3,057	3,726	4,394	5,062	5,730
26			4,422	5,206	5,990	6,774
			Green residue weights (saw log trees)			
12	739	798	857	916	975	1,034
14	824	904	985	1,065	1,145	1,226
16	922	1,027	1,132	1,237	1,342	1,447
18	1,034	1,167	1,300	1,432	1,565	1,698
20	1,159	1,323	1,487	1,651	1,815	1,979
22	1,296	1,495	1,693	1,892	2,090	2,289
24		1,683	1,920	2,156	2,392	2,628
26			2,166	2,443	2,720	2,997

Table 10.--Red oak green weights (values inside the lines show the range of the sample data)

(In pounds)

D.b.h. class (inches)	Tree height (feet)						
	20	30	40	50	60	70	80
				Green tree weight			
2	19	26	34	42	50		
4	66	98	129	161	193	224	
6	145	217	288	359	430	502	573
8		383	510	636	763	890	1,016
10		597	795	993	1,191	1,389	1,587
12			1,143	1,428	1,713	1,999	2,284
14			1,555	1,943	2,331	2,719	3,107
16			2,030	2,537	3,044	3,551	4,058
18			2,569	3,210	3,852	4,493	5,135
20				3,963	4,755	5,547	6,339
				Green bole weight			
6		143	200	256	313	370	
8		275	376	478	579	680	781
10		446	604	762	920	1,078	1,236
12			882	1,110	1,337	1,565	1,792
14			1,211	1,520	1,830	2,140	2,449
16			1,590	1,994	2,399	2,803	3,208
18			2,020	2,532	3,044	3,555	4,067
20			2,500	3,132	3,764	4,396	5,028
				Green residue weight			
6		67	82	98	114	130	
8		103	132	160	188	216	244
10		151	195	239	283	327	371
12			272	336	399	463	526
14			364	450	536	623	709
16			470	582	695	807	920
18			589	732	874	1,017	1,159
20			723	899	1,075	1,251	1,427

Table 11.--Red maple green weights (values inside the lines show the range of the sample data)

(In pounds)

D.b.h. class (inches)	Tree height (feet)						
	20	30	40	50	60	70	80
Green tree weight							
2	33	40	46	53	59		
4	72	99	125	151	177		
6	138	197	256	315	374	433	492
8	230	335	440	545	650	755	860
10	348	512	676	840	1,004	1,168	1,332
12		728	965	1,201	1,437	1,673	1,909
14		984	1,306	1,627	1,949	2,270	2,591
16			1,699	2,119	2,539	2,959	3,379
18				2,677	3,208	3,739	4,271
20				3,300	3,956	4,612	5,268
Green bole weight							
6		120	166	212	258	303	
8		227	308	390	471	552	633
10		364	491	618	745	872	999
12		532	715	898	1,080	1,263	1,446
14			979	1,228	1,477	1,726	1,975
16			1,284	1,609	1,934	2,259	2,584
18				2,041	2,452	2,864	3,275
20				2,523	3,031	3,539	4,047
Green residue weight							
6		83	95	107	120	132	
8		111	133	155	177	199	220
10		148	182	216	250	284	318
12		193	242	291	340	389	438
14			313	379	446	513	579
16			394	481	568	655	743
18				597	707	817	927
20					862	998	1,134

Table 12.--White birch green weights (values inside the lines show the range of the sample data)

(In pounds)

D.b.h. class (inches)	Tree height (feet)						
	20	30	40	50	60	70	80
Green tree weight							
2	23	29	36	43	50		
4	64	92	119	147	175		
6	133	196	258	320	382	445	507
8	230	341	452	562	673	784	894
10	355	528	701	874	1,047	1,220	1,393
12		756	1,005	1,254	1,503	1,753	2,002
14		1,026	1,365	1,704	2,043	2,382	2,721
16		1,337	1,780	2,223	2,666	3,109	3,552
18			2,251	2,811	3,372	3,932	4,493
20				3,469	4,161	4,853	5,545
Green bole weight							
6		112	161	211	260	309	
8		227	315	403	490	578	
10		375	512	649	786	923	1,060
12		556	753	951	1,148	1,345	1,542
14		770	1,038	1,307	1,575	1,844	2,112
16			1,367	1,718	2,068	2,419	2,770
18			1,740	2,184	2,627	3,017	3,515
20			2,156	2,704	3,252	3,800	4,348
Green residue weight							
6		77	91	105	118	132	
8		109	133	158	182	206	231
10		150	188	226	264	302	340
12		200	255	310	365	419	474
14			334	409	483	558	632
16			425	523	620	717	814
18			529	652	775	898	1,021
20			644	796	948	1,100	1,252

Table 13.--Aspen green weights (values inside the lines show the range of the sample data)

(In pounds)

D.b.h. class (inches)	Bole height (number of 100-inch bolts) 1	2	3	4	5	6	7	8
Green tree weight								
4	83	110	137	164	192			
6	117	178	239	300	362	423		
8	164	273	382	491	600	708	817	926
10	225	396	566	735	906	1,076	1,245	1,416
12	330	545	790	1,035	1,280	1,524	1,769	2,014
14		722	1,055	1,388	1,722	2,055	2,388	2,721
16			1,361	1,796	2,232	2,667	3,102	3,537
18				2,558	2,810	3,360	3,911	4,462
20					3,456	4,136	4,815	5,496
Green bole weight								
6	71	121	170	220	269	319		
8	110	198	286	374	462	550	638	726
10	159	297	434	572	709	847	984	1,122
12	220	418	616	814	1,012	1,210	1,408	1,606
14		561	830	1,100	1,369	1,639	1,908	2,178
16			1,078	1,430	1,782	2,134	2,486	2,838
18				1,804	2,249	2,695	3,140	3,586
20					2,772	3,322	3,871	4,422
Green residue weight								
6	45	57	68	79	91	102		
8	54	74	95	115	135	155	176	196
10	65	97	129	160	192	224	255	287
12	79	125	171	216	262	307	353	399
14		158	220	282	344	406	469	530
16			277	358	439	520	601	682
18				444	547	649	752	855
20					667	794	920	1,047

Table 14.--White spruce green weights (values inside the lines show the range of the sample data)

(In pounds)

D.b.h. class (inches)	Bole height (number of 100-inch bolts)							
	1	2	3	4	5	6	7	8
Green tree weight								
4	239	263	287	311	335	359		
6	269	323	377	431	485	539	593	647
8	311	407	503	599	695	791	887	983
10	365	515	665	815	965	1,115	1,265	1,415
12		647	863	1,079	1,295	1,511	1,727	1,943
14		803	1,097	1,391	1,685	1,979	2,273	2,567
16			1,367	1,751	2,135	2,519	2,903	3,287
18				2,159	2,645	3,131	3,617	4,103
20					3,215	3,815	4,415	5,015
Green bole weight								
6	170	209	248	287	326	365	404	443
8	201	270	339	409	478	547	617	686
10	239	348	456	564	673	781	889	998
12	287	443	599	755	911	1,067	1,223	1,379
14		556	768	980	1,193	1,405	1,617	1,830
16			963	1,240	1,518	1,795	2,072	2,350
18				1,535	1,886	2,237	2,588	2,939
20					2,298	2,731	3,164	3,598
Green residue weight								
6	99	114	129	144	159	174	189	204
8	111	137	164	191	217	244	271	297
10	126	167	209	251	292	334	376	417
12	144	204	264	324	384	444	504	564
14		247	329	411	492	574	656	737
16			404	511	617	724	831	937
18				624	759	894	1,029	1,164
20					917	1,084	1,251	1,417

Table 15.--Red pine green weights (values inside the lines show the range of the sample data)

(In pounds)

D.b.h. class (inches)	Bole height (number of 100-inch bolts)							
	2	3	4	5	6	7	8	9
Green tree weight								
4	106	133	160	187	214	241		
6	174	234	295	356	416	477	537	
8	268	376	483	591	699	807	914	1,022
10	389	558	726	894	1,063	1,231	1,399	1,567
12	537	780	1,022	1,265	1,507	1,749	1,992	2,234
14			1,372	1,702	2,032	2,362	2,692	3,022
16				2,207	2,638	3,069	3,500	3,931
18					3,325	3,870	4,416	4,961
20					4,093	4,766	5,439	6,112
Green bole weight								
6	151	203	255	306	358	409	461	
8	232	323	415	507	599	690	782	874
10	335	478	621	765	908	1,051	1,195	1,339
12	461	667	874	1,080	1,287	1,493	1,699	1,906
14			1,172	1,453	1,734	2,015	2,296	2,577
16				1,883	2,250	2,617	2,984	3,351
18					2,835	3,299	3,764	4,228
20					3,488	4,061	4,635	5,208
Green residue weight								
6	22	30	39	48	56	65	74	
8	35	51	66	82	97	113	128	143
10	53	77	101	125	149	173	198	222
12	74	109	143	178	213	248	283	317
14			194	241	288	336	383	431
16				314	375	437	499	561
18					474	552	631	709
20					584	681	778	874

Table 16.--Balsam fir green weights (values inside the lines show the range of the sample data)

(In pounds)

D.b.h. class (inches)	Bole height (number of 100-inch bolts)							
	1	2	3	4	5	6	7	8
Green tree weight								
4	181	207	233	259	285			
6	213	272	330	388	446	504		
8	259	362	466	569	673	776	879	983
10	317	479	640	802	964	1,125	1,287	1,449
12	388	621	854	1,086	1,319	1,552	1,785	2,018
14		789	1,106	1,423	1,740	2,056	2,373	2,690
16			1,397	1,811	2,225	2,638	3,052	3,466
18				2,250	2,774	3,298	3,822	4,346
20					3,389	4,035	4,683	5,329
Green bole weight								
6	116	159	202	245	289	332		
8	149	226	303	380	457	534	610	687
10	193	313	433	553	673	793	913	1,033
12	245	418	591	764	937	1,110	1,282	1455
14		543	778	1,013	1,249	1,484	1,719	1,954
16			994	1,301	1,609	1,916	2,223	2,530
18				1,628	2,017	2,406	2,794	3,183
20					2,473	2,953	3,433	3,913
Green residue weight								
6	98	113	128	143	158	173		
8	109	136	163	189	216	243	269	296
10	124	166	208	249	291	333	374	416
12	143	203	263	323	383	443	503	563
14		246	328	409	491	573	654	736
16			403	509	616	723	829	936
18				623	758	893	1,028	1,163
20					916	1,083	1,249	1,416

Table 17.--Sugar maple pulpwood green weights (values inside the lines show the range of the sample data)

(In pounds)

D.b.h. class (inches)	Bole height (number of 100-inch bolts to 4-inch top)							
	1	2	3	4	5	6	7	8
Green tree weight								
4	187	217	246	275	304			
6	224	290	355	421	487	553		
8	275	392	509	625	742	859	976	
10	341	523	706	888	1,071	1,253	1,436	1,618
12	421	684	947	1,209	1,472	1,735	1,998	2,261
14		874	1,231	1,589	1,947	2,305	2,662	3,020
16			1,560	2,027	2,494	2,962	3,429	3,896
18				2,523	3,115	3,706	4,297	4,889
20					3,809	4,538	5,268	5,999
Green bole weight								
6	100	155	210	266	321	376		
8	143	241	339	437	536	634	732	
10	198	352	505	658	812	965	1,118	1,272
12	266	286	707	928	1,149	1,370	1,590	1,811
14		646	946	1,247	1,548	1,848	2,148	2,449
16			1,222	1,615	2,008	2,400	2,792	3,185
18				2,032	2,529	3,026	3,522	4,019
20					3,112	3,725	4,338	4,952
Green residue weight								
6	109	122	136	149	163	176		
8	119	143	167	191	215	239	263	
10	133	170	208	245	283	320	358	395
12	149	203	257	311	365	419	473	527
14		242	316	389	463	536	610	683
16			383	479	575	671	767	863
18				581	703	824	946	1,067
20					845	995	1,145	1,295

Table 18.--Sugar maple sawtimber green weights (values inside the lines show the range of the sample data)

(In pounds)

D.b.h. class (inches)	Bole height (number of 100-inch bolts to variable top)							
	1	2	3	4	5	6	7	8
Green tree weight								
12	1,345	1,634	1,921	2,209	2,498			
14	1,449	1,842	2,233	2,625	3,018	3,409	3,801	
16	1,569	2,082	2,593	3,105	3,618	4,129	4,641	5,154
18	1,705	2,354	3,001	3,649	4,298	4,945	5,593	6,242
20		2,658	3,457	4,257	5,058	5,857	6,657	7,458
22		2,994	3,961	4,929	5,898	6,865	7,833	8,802
24			4,513	5,665	6,818	7,969	9,121	10,274
26			5,113	6,465	7,818	9,169	10,521	11,874
Green bole weight								
12	466	693	920	1,146	1,373			
14	548	857	1,165	1,474	1,783	2,091	2,400	
16	642	1,046	1,449	1,852	2,255	2,658	3,061	3,465
18	749	1,260	1,770	2,280	2,791	3,301	3,811	4,322
20		1,499	2,129	2,759	3,389	4,019	4,649	5,279
22		1,764	2,526	3,288	4,051	4,813	5,575	6,338
24			2,961	3,868	4,776	5,682	6,589	7,497
26			3,433	4,498	5,563	6,627	7,692	8,757
Green residue weight								
12	878	938	998	1,058	1,118			
14	900	982	1,063	1,145	1,227	1,308	1,390	
16	925	1,032	1,138	1,245	1,352	1,458	1,565	1,672
18	953	1,088	1,223	1,358	1,493	1,628	1,763	1,899
20		1,152	1,318	1,485	1,652	1,818	1,985	2,152
22		1,222	1,423	1,625	1,827	2,028	2,230	2,432
24			1,538	1,778	2,018	2,258	2,498	2,738
26			1,663	1,945	2,227	2,508	2,790	3,072

Table 19.--Red oak green weights (values inside the lines show the range of the sample data)

(In pounds)

D.b.h. class (inches)	Bole height (number of 100-inch bolts)							
	1	2	3	4	5	6	7	8
Green tree weight								
4	133	167	201	236	270	304	338	
6	176	253	329	406	483	560	637	713
8	235	372	509	645	782	918	1,055	1,191
10	312	526	739	952	1,166	1,379	1,592	1,806
12	406	714	1,021	1,328	1,635	1,942	2,249	2,557
14		935	1,353	1,771	2,190	2,608	3,026	3,444
16			1,737	2,283	2,830	3,376	3,922	4,468
18				2,864	3,555	4,246	4,937	5,629
20					4,366	5,219	6,072	6,926
Green bole weight								
6	114	176	237	298	359	420	482	
8	162	271	380	488	597	706	815	924
10	223	393	563	733	903	1,073	1,243	1,413
12	298	543	788	1,032	1,277	1,522	1,767	2,012
14		720	1,053	1,386	1,719	2,052	2,385	2,719
16			1,359	1,794	2,229	2,664	3,099	3,535
18				2,256	2,807	3,358	3,909	4,460
20					3,453	4,133	4,813	5,493
Green residue weight								
6	59	76	92	109	125	142	158	
8	72	102	131	160	190	219	248	278
10	89	135	180	226	272	318	364	410
12	109	175	241	307	373	439	505	571
14		223	312	402	492	582	672	762
16			395	512	630	747	864	982
18				637	785	934	1,082	1,231
20					960	1,143	1,326	1,510

Table 20.--Red maple green weights (values inside the lines show the range of the sample data)

(In pounds)

D.b.h. class (inches)	Bole height (number of 100-inch bolts)							
	1	2	3	4	5	6	7	8
Green tree weight								
4	137	166	195	225	254	283	313	
6	173	239	305	371	437	503	569	635
8	225	342	459	577	694	811	929	1,046
10	291	474	657	841	1,024	1,207	1,391	1,574
12		635	899	1,163	1,427	1,691	1,955	2,219
14		826	1,185	1,544	1,904	2,263	2,622	2,982
16				1,984	2,454	2,923	3,392	3,862
18				2,483	3,078	3,671	4,265	4,860
20					3,774	4,507	5,240	5,974
Green bole weight								
6	96	149	201	253	305	358	410	
8	137	230	323	415	508	601	694	787
10	189	334	479	624	769	914	1,059	1,204
12		462	671	879	1,088	1,297	1,506	1,715
14		613	897	1,181	1,465	1,750	2,034	2,318
16				1,529	1,900	2,272	2,643	3,014
18				1,923	2,393	2,863	3,333	3,803
20					2,945	3,524	4,104	4,685
Green residue weight								
6	77	91	104	118	132	146	160	
8	88	112	137	161	186	210	235	259
10	101	140	178	216	255	293	331	370
12		173	229	284	339	394	449	505
14		213	288	364	439	514	589	664
16				455	554	652	750	848
18				560	684	808	932	1,057
20					830	983	1,136	1,290

Table 21.--White birch green weights (values inside the lines show the range of the sample data)

(In pounds)

D.b.h. class (inches)	Bole height (number of 100-inch bolts)							
	1	2	3	4	5	6	7	8
Green tree weight								
4	121	152	182	213	243	273		
6	159	228	296	365	433	501	570	
8	213	334	456	577	699	821	942	1,064
10	281	471	661	851	1,041	1,231	1,421	1,611
12	364	638	912	1,185	1,459	1,733	2,006	2,280
14			1,208	1,581	1,953	2,325	2,698	3,070
16				2,037	2,523	3,009	3,496	3,982
18					3,169	3,785	4,400	5,016
20					3,891	4,651	5,411	6,171
Green bole weight								
6	88	142	196	249	303	357	410	
8	130	225	321	416	512	607	703	798
10	184	333	482	631	780	929	1,079	1,228
12	249	464	679	894	1,108	1,323	1,538	1,753
14			912	1,204	1,496	1,789	2,081	2,373
16				1,562	1,944	2,326	2,707	3,089
18					2,451	2,934	3,417	3,901
20					3,018	3,614	4,211	4,808
Green residue weight								
6	71	86	101	115	130	145	160	
8	83	109	135	161	187	214	240	266
10	98	138	179	220	261	302	343	383
12	115	174	233	292	351	410	468	527
14			297	377	457	537	617	697
16				475	579	684	788	893
18					718	851	983	1,115
20					873	1,037	1,200	1,363

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Steinhilb, Helmuth M.; Arola, Rodger A.; Winsauer, Sharon A.
Green weight tables for eight tree species in northern Michigan. Gen. Tech. Rep. NC-95. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station; 1984. 23 p.

Presents the green weights of the above-stump portions of trees, boles, and residue for eight tree species in northern Michigan. Estimating equations and weight tables are presented for the tree components of each species.

KEY WORDS: Trembling aspen, sugar maple, red maple, white birch, red oak, red pine, white spruce, balsam fir.


40th BIRTHDAY
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PREVENT FOREST FIRES