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PACIFIC NORTHWEST FOREST AND RANGE EXPERIMENT STATION
R. W. COWLIN, DIRECTOR

Research Note



BUREAU OF
Entomology and Plant Quarantine

RECEIVED

Number 82★ NOV 26 1952★ Portland, Oregon

November 1952

FOREST INSECT LABORATORY,
PORTLAND, OREGON

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TOTAL HEIGHT VOLUME TABLES FOR
WESTERN HEMLOCK, SITKA SPRUCE AND YOUNG-GROWTH DOUGLAS-FIR

(Based on 32-foot logs and on an 8-inch top)

By

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In the Pacific Northwest logs are often scaled in lengths which average about 32 feet to facilitate logging. Although several excellent Western hemlock, Sitka spruce and Douglas-fir volume tables based on a 32-foot scaling length have been available for some time, they provide for a larger top diameter than is now used in actual practice. Other tables specify a satisfactory top diameter but are based on a 16-foot scaling length.

The tables presented here are based on 32-foot logs and an 8-inch top and are believed to correspond closely to the way trees are currently cut and scaled in many parts of the Douglas-fir region.

Specifications

Unit of measure	=	board feet in tens
Log rule	=	Scribner
Log length	=	32 feet
Top diameter	=	8 inches inside bark
Stump height	=	2 feet
Trim allowance	=	0.6 feet per 32-foot log

Method

All three tables were developed by adjusting tree volumes in previously published volume tables. Table 14 in U.S.D.A. Technical Bulletin 201¹ was used for Douglas-fir. Tables 48, 50, 55 and 57 in U.S.D.A. Technical Bulletin 544² were used for Western hemlock and Sitka spruce.

1/ McArdle, R. E., and Meyer, W. H. Yield of Douglas fir in the Pacific Northwest. U.S. Dept. Agric. Tech. Bul. 201, 64 p. 1930.

2/ Meyer, W. H. Yield of even-aged stands of Sitka spruce and Western hemlock. U.S. Dept. Agric. Tech. Bul. 544, 86 p. 1937.

A large sample of measured trees of each of the three species was analyzed to provide adjustment factors. The volume of each tree was calculated first according to the specifications of the base table and then again according to the new specifications. Differences between the two volume estimates were curved over d.b.h. and total height. The curved differences were then applied directly to the base tables.

Tree volumes in the table for Sitka spruce are listed by diameters inside bark at 18 feet instead of by diameters outside bark at breast height. This was also true of the base tables for Sitka spruce in Technical Bulletin 544 and was made necessary by the fact that butt taper in this species is extremely variable. Before using the table, therefore, diameters outside bark at breast height will have to be converted to diameters inside bark at 18 feet. This can be done either by developing a curve of d.i.b. at 18 feet over d.b.h. from measurements taken locally or by using the information in table 4 of this report. Since the converted d.i.b. measurements at 18 feet will only rarely be exactly an even number of inches, frequent interpolations will be required.

Table 1.--Board-foot volume table for young-growth Douglas-fir

D.b.h. inches	Total height in feet																		
	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240
	Board feet in tens																		
12	5	6	8	10	11	13	15	17	19	22									
14	7	9	11	13	16	18	20	23	26	29	33								
16	9	12	14	17	20	23	26	30	33	37	42								
18		15	18	21	25	29	32	36	40	45	51	58	65						
20		18	22	26	30	34	38	43	48	54	61	69	77	86	95				
22			26	30	35	40	45	51	56	63	71	80	90	100	111				
24				35	40	46	52	58	65	73	82	92	104	116	129	143	158		
26				40	46	52	59	66	74	83	93	105	119	133	148	163	178		
28					53	59	66	74	83	93	105	119	134	150	167	185	203		
30					59	65	73	82	92	104	117	132	150	168	187	207	227		
32						72	81	90	101	115	130	146	165	186	208	230	252	275	298
34						79	89	99	111	126	143	161	181	204	229	252	275	300	329
36							97	108	121	137	156	176	198	223	249	275	301	330	364
38							106	117	131	148	168	190	214	242	270	298	327	360	395
40										159	180	204	230	260	291	323	354	388	426
42										170	192	218	247	279	312	346	380	418	460
44										182	205	232	264	298	334	370	409	449	492
46										193	218	246	280	317	355	395	437	480	525
48										204	230	260	297	336	377	420	465	510	560
50										215	243	275	315	355	400	445	493	542	595
52										226	255	290	332	375	422	470	521	574	630
54										237	268	305	350	395	445	495	550	606	665

Based on

32-foot logs

8-inch top

2-foot stump

0.6-foot trim per log

Scribner Dec. C rule

Table 2.--Board-foot volume table for Western hemlock

D.b.h. inches	Total height in feet																				
	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260
	Board feet in tens																				
12	8	9	10	12	13	15	16	18	20	22	24	26									
14	12	14	16	18	20	22	24	27	30	32	35	38									
16	16	19	21	24	27	30	33	36	40	44	47	51	54	57	60						
18	21	24	28	31	34	39	43	48	52	56	61	66	70	74	78						
20	27	31	34	38	43	48	53	59	65	71	76	83	88	92	97	102	107				
22	35	38	42	47	52	58	64	71	79	86	93	100	107	113	118	124	130				
24	44	47	51	56	62	69	76	85	94	102	110	118	127	134	140	147	154				
26			62	67	74	81	89	99	109	119	128	137	147	155	164	172	180				
28				78	86	94	104	115	126	137	148	158	169	179	190	200	210				
30					99	108	119	131	144	157	169	180	193	204	216	228	240				
32					113	122	135	149	163	177	190	203	217	231	244	258	271	284	298		
34					126	137	152	167	183	198	213	228	243	258	273	288	303	318	333		
36							169	185	203	221	236	253	269	286	303	320	336	353	370		
38								205	225	244	260	280	298	317	335	353	370	389	407		
40									245	265	285	305	325	345	365	385	405	426	446	467	492
42									265	290	310	330	355	375	400	420	445	465	485	506	536
44									286	315	335	360	380	405	430	455	480	500	525	550	575
46									310	336	360	385	410	440	465	490	520	540	565	590	620
48									332	362	388	415	440	470	500	530	555	580	610	640	670
50									355	385	415	445	475	505	540	570	595	625	655	685	715
52											445	475	505	540	575	610	640	670	700	730	765
54											475	510	545	575	615	650	680	710	745	780	815
56											505	540	575	615	650	690	720	755	790	830	865
58											540	575	610	650	690	730	770	800	840	880	915
60											570	605	645	690	730	770	810	850	890	930	970

Based on

32-foot logs

8-inch top

2-foot stump

0.6-foot trim per log

Scribner Dec. C rule

Table 3.--Board-foot volume table for Sitka spruce

D.i.b. 18 ft.	Total height in feet																					
	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	
	Board feet in tens																					
10	5	6	7	9	10	11	13															
12	10	11	12	14	16	18	21	23	26													
14	14	16	18	21	24	27	31	34	38	41	45											
16	19	22	25	29	33	37	42	46	51	55	60											
18	24	28	33	38	43	48	54	60	66	71	77	83	88									
20	30	36	42	48	54	61	68	75	83	90	97	104	111	118	125							
22			51	58	66	74	83	91	100	109	117	125	134	143	152							
24			60	70	80	90	100	110	121	131	141	151	161	171	182	192	203					
26			73	84	95	107	119	131	143	155	167	178	190	202	215	228	241					
28			86	99	113	127	141	155	169	183	197	211	225	239	253	267	281	295	309			
30			100	115	131	147	163	179	196	212	228	244	260	276	292	308	324	340	356			
32			115	132	150	168	187	206	226	243	261	279	298	317	336	354	372	390	408	427	447	
34					170	191	213	234	255	275	295	315	336	358	380	401	422	442	462	482	502	
36					190	214	240	262	285	307	330	353	378	402	426	448	472	492	512	537	562	
38					212	238	265	291	315	341	367	393	420	445	471	498	526	550	576	603	631	
40					234	263	295	322	350	378	405	435	465	492	520	550	580	610	640	670	701	
42						288	322	356	390	420	450	480	510	545	580	610	645	675	705	743	781	
44							356	393	430	462	495	530	570	605	640	675	710	745	780	820	860	
46							390	430	470	505	540	580	620	660	700	740	780	820	860	900	940	
48							426	468	510	550	595	635	680	720	765	805	850	895	940	985	1030	
50							462	508	555	600	645	685	730	780	835	880	930	975	1030	1080	1130	
52								550	605	650	700	745	790	845	905	955	1010	1060	1120	1175	1230	
54								595	650	700	750	805	860	920	980	1040	1100	1150	1210	1265	1320	
56									700	750	810	865	930	990	1060	1120	1180	1240	1300	1360	1420	
58									745	800	865	925	1000	1070	1140	1200	1270	1330	1390	1450	1520	
60									795	855	920	990	1070	1140	1220	1280	1350	1410	1480	1550	1620	
62											980	1050	1130	1210	1290	1360	1430	1500	1570	1640	1720	
64												1050	1120	1200	1285	1370	1440	1510	1590	1660	1740	1820
66												1120	1190	1270	1360	1450	1520	1600	1680	1760	1840	1930
68												1180	1260	1340	1430	1530	1610	1700	1780	1860	1950	2050
70												1240	1320	1410	1510	1600	1700	1800	1880	1960	2060	2160
72														1490	1590	1700	1800	1900	1990	2080	2180	2280
74														1580	1690	1800	1900	2000	2100	2200	2300	2410
76														1670	1780	1900	2000	2110	2210	2320	2430	2540
78														1760	1880	2000	2110	2220	2330	2440	2560	2690
80														1850	1970	2100	2220	2340	2450	2570	2710	2850

Based on

32-foot logs

8-inch top

2-foot stump

0.6-foot trim per log

Scribner Dec. C rule

Table 4.--Relationship between diameter outside bark at breast height and diameter inside bark at 18 feet for Sitka spruce ^{1/}

D.b.h. inches	Diameter inside bark at 18 feet					
	Second growth less than 100 years old ^{2/}	120-year- old stand on fair site ^{3/}	170-year- old stand on good site ^{4/}	Old growth in British Columbia ^{5/}	Old growth with heavy butt swell ^{6/}	Old growth with light butt swell ^{7/}
<u>Inches</u>						
4	2.8					
6	4.6					
8	6.4					
10	8.2					
12	10.0	10.0		10.0		
14	11.7	11.5		11.8		
16	13.4	12.8	13.9	13.5		
18	15.1	14.4	15.2	15.3		
20	16.7	16.0	16.7	17.0		
22	18.3	17.5	18.4	18.7		
24	19.8	19.0	20.2	20.4		
26	21.3	20.6	22.0	22.1		
28	22.8	22.0	24.0	23.9		
30	24.3	23.5	26.0	25.6		
32	25.7	25.0	28.2	27.3	20.0	
34	27.1	26.3	30.4	29.0	21.2	
36	28.5	27.6	32.6	30.7	22.2	
38	29.9	28.9	34.8	32.3	23.3	
40	31.2	30.2	37.1	33.9	24.4	
44	33.9	32.6		36.9	26.6	
48	36.7	34.9		39.8	28.9	39.0
52	39.3	37.2		42.6	31.0	42.4
56	42.0	39.4		45.3	33.2	45.2
60	44.5	41.6		48.0	35.6	48.0
64				50.7	37.8	50.6
68					39.9	53.3
72					42.1	56.0
76					44.3	58.8
80					46.5	61.5

- ^{1/} Meyer, W. H. Yield of even-aged stands of Sitka spruce and Western hemlock. U.S. Dept. Agric. Tech. Bul. 544, 86 p. 1937.
- ^{2/} Basis, 344 tree measurements taken in Oregon and Washington and 264 taken in Alaska.
- ^{3/} Basis, 53 tree measurements taken on Young's River, Oreg.
- ^{4/} Basis, 25 tree measurements taken near Winchester Bay, Oreg.
- ^{5/} Basis, 279 tree measurements taken in British Columbia.
- ^{6/} Basis, 45 tree measurements taken near Humptulips, Wash.
- ^{7/} Basis, 51 tree measurements taken near Beaver, Wash.