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CUBIC VOLUME TABLES

FOR RED ALDER AND SITKA SPRUCE

by

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The three volume tables in this report were developed to cover omissions and discrepancies in a previously published set of volume tables for permanent sample plots in western Washington.[1/]

The first table is for cubic-foot volume in the entire stem (stump and tip included) of red alder trees. There has been no table with these specifications until now.

Table 2 is also for cubic volume in red alder trees, but for merchantable stem only (stump and tip excluded). This table was available previously, but it needed extension to cover the 20- and 30-foot height classes.

Table 3 is for cubic-foot volume in the entire stem of Sitka spruce trees. It also was available previously but was inconsistent in that volumes did not progress regularly with tree diameter and heights in certain areas of the table. These discrepancies have been removed for the present table.

[1/] Pacific Northwest Forest and Range Experiment Station. Volume tables for permanent sample plots as recommended by the Puget Sound Research Center Advisory Committee for use in western Washington. 28 tables. (Processed.) 1953.

Table 1.--Volume of red alder (Alnus rubra), stump and tip included[1/]

(In cubic feet)

D.b.h. (inches)	Total height (feet)											
	10	20	30	40	50	60	70	80	90	100	110	120
2	0.38	0.52	0.64	0.71	0.76	0.82	--	--	--	--	--	--
3	.63	.93	1.2	1.4	1.5	1.7	1.9	2.2	--	--	--	--
4	.88	1.4	1.9	2.2	2.6	2.9	3.3	3.7	--	--	--	--
5	--	1.9	2.7	3.3	3.8	4.3	4.9	5.5	6.1	--	--	--
6	--	2.5	3.5	4.4	5.2	6.0	6.8	7.7	8.5	--	--	--
7	--	3.1	4.5	5.7	6.8	7.9	9.1	10.2	11.3	--	--	--
8	--	3.8	5.5	7.1	8.7	10.0	11.6	13.0	14.4	16.0	17.4	18.5
9	--	4.5	6.6	8.6	10.7	12.4	14.3	16.2	17.9	19.6	21.5	23.1
10	--	5.2	7.8	10.3	12.8	15.0	17.4	19.6	21.8	23.7	26.0	28.0
11	--	--	--	12.0	15.2	17.9	20.7	23.4	25.9	28.0	30.5	33.4
12	--	--	--	13.9	17.7	20.9	24.3	27.4	30.4	33.1	36.2	39.2
13	--	--	--	15.9	20.3	24.1	28.1	31.7	35.2	38.4	41.9	45.5
14	--	--	--	--	23.2	27.6	32.2	36.3	40.4	44.1	48.4	52.2
15	--	--	--	--	26.1	31.3	36.5	41.2	45.8	50.0	55.0	59.3
16	--	--	--	--	29.3	35.1	41.1	46.4	51.6	56.3	62.0	66.9
17	--	--	--	--	32.6	39.2	45.9	51.8	57.6	62.8	69.3	74.8
18	--	--	--	--	36.1	43.5	50.9	57.5	64.0	70.5	76.9	83.2
19	--	--	--	--	--	48.0	56.2	63.5	70.7	77.1	84.8	91.9
20	--	--	--	--	--	52.6	61.8	69.7	77.7	85.1	93.3	101.1
21	--	--	--	--	--	57.4	67.5	76.2	85.0	93.7	102.3	110.7
22	--	--	--	--	--	--	73.5	83.0	92.5	103.3	111.7	120.6
23	--	--	--	--	--	--	79.7	90.0	100.4	112.2	122.6	131.0
24	--	--	--	--	--	--	86.2	97.3	108.6	120.9	132.2	141.8
25	--	--	--	--	--	--	92.9	104.9	117.0	131.1	143.0	152.9
26	--	--	--	--	--	--	99.8	112.7	125.8	140.4	153.3	164.4
27	--	--	--	--	--	--	106.9	120.7	134.8	151.0	164.9	176.3
28	--	--	--	--	--	--	114.2	129.5	144.1	161.0	175.8	188.6

1/ Volumes in this table are based on the volumes of red alder, stump and tip excluded, shown in table 9 of "Volume Tables for Permanent Sample Plots ... " (see footnote 1, page 1), with an estimated addition for volume in stump and tip. These estimated stump and tip volumes are based on the assumption that the volume in stump and tip of a red alder tree is the same as that of a Douglas-fir tree of the same d.b.h. and height. Thus, the differences between the volumes shown in tables 1 and 5 of "Volume Tables for Permanent Sample Plots ... " have been added to the volumes of red alder shown in table 9. Volumes resulting from this adjustment were smoothed by fitting a logarithmic curve for each 10-foot height class and extending them to include trees less than 6 inches in d.b.h. and less than 40 feet in height.

Table 2.--Volume of red alder (Alnus rubra), stump as cut and tip 4 inches d.i.b.[1/]

(In cubic feet)

D.b.h. (inches)	Total height (feet)										
	20	30	40	50	60	70	80	90	100	110	120
6	1.8	2.7	3.5	4.4	5.2	6.1	7.0	--	--	--	--
7	2.4	3.6	4.7	5.9	7.0	8.1	9.2	--	--	--	--
8	3.1	4.6	6.0	7.5	9.0	10.4	11.9	13.3	14.8	--	--
9	3.8	5.7	7.5	9.3	11.2	12.9	14.8	16.6	18.4	--	--
10	4.7	6.9	9.1	11.4	13.6	15.8	18.0	20.2	22.4	24.5	--
11	--	--	10.9	13.6	16.2	18.9	21.5	24.1	26.7	29.3	--
12	--	--	12.8	16.0	19.1	22.2	25.3	28.3	31.4	34.5	--
13	--	--	14.9	18.5	22.1	25.7	29.3	32.9	36.4	39.9	43.5
14	--	--	--	21.2	25.4	29.5	33.6	37.7	41.8	45.9	48.8
15	--	--	--	24.2	28.9	33.6	38.3	42.9	47.6	52.2	56.8
16	--	--	--	27.3	32.6	37.9	43.1	48.4	53.6	58.8	64.0
17	--	--	--	30.5	36.5	42.4	48.3	54.2	60.0	65.9	71.7
18	--	--	--	34.0	40.6	47.2	53.7	60.2	66.8	73.3	79.8
19	--	--	--	--	44.9	52.2	59.4	66.6	73.9	81.1	88.2
20	--	--	--	--	49.4	57.4	65.3	73.3	81.2	89.1	97.0
21	--	--	--	--	54.1	62.8	71.6	80.3	89.0	97.6	106.2
22	--	--	--	--	--	68.5	78.0	87.5	97.7	106.5	115.9
23	--	--	--	--	--	74.4	84.8	95.0	105.3	115.6	125.8
24	--	--	--	--	--	80.6	91.8	102.9	114.1	125.2	136.2
25	--	--	--	--	--	86.9	99.0	111.0	123.1	135.0	147.0
26	--	--	--	--	--	93.5	106.5	119.4	132.4	145.3	158.1
27	--	--	--	--	--	100.3	114.3	128.1	142.0	155.9	169.7
28	--	--	--	--	--	107.3	122.3	137.1	152.0	166.8	181.6

[1/] Volumes for trees of 20- and 30-foot height have been added to table 9 of "Volume Tables for Permanent Sample Plots ... " (see footnote 1, page 1) by use of the following equation:

$$\text{Log } V = 1.8618 \text{ Log } D + 0.9751 \text{ Log } H - 2.4628$$

Table 3.--Volume of Sitka spruce (Picea sitchensis), stump and tip included[1/]

(In cubic feet)

D.b.h. (inches)	Total height (feet)											
	10	20	30	40	50	60	70	80	90	100	110	120
2	0.12	0.22	0.35	0.45	0.54	0.69	--	--	--	--	--	--
3	.26	.51	.75	.98	1.2	1.45	1.6	--	--	--	--	--
4	--	.88	1.3	1.7	2.1	2.6	2.9	3.4	--	--	--	--
5	--	1.4	2.0	2.6	3.3	4.0	4.5	5.2	5.9	--	--	--
6	--	2.0	2.8	3.7	4.7	5.7	6.5	7.4	8.3	--	--	--
7	--	2.6	3.9	5.0	6.3	7.6	8.6	10	11	--	--	--
8	--	3.4	5.0	6.4	8.4	9.8	11	12	14	--	--	--
9	--	4.2	6.2	8.0	10	12	14	16	18	--	--	--
10	--	5.2	7.6	9.8	13	15	18	20	21	22	--	--
11	--	6.3	9.1	12	16	18	21	24	26	28	--	--
12	--	--	11	14	18	21	24	28	31	34	--	--
13	--	--	12	16	21	24	28	32	36	40	--	--
14	--	--	14	18	24	28	32	37	41	45	54	62
15	--	--	--	21	26	32	37	42	47	52	60	67
16	--	--	--	24	29	35	41	47	52	57	66	75
17	--	--	--	26	33	39	46	53	59	65	76	87
18	--	--	--	29	36	44	52	59	66	72	81	90
19	--	--	--	--	40	48	56	64	71	78	88	98
20	--	--	--	--	44	53	61	69	78	86	96	105
21	--	--	--	--	48	57	67	77	84	92	104	115
22	--	--	--	--	52	62	72	83	92	100	112	125
23	--	--	--	--	--	68	79	90	100	110	121	132
24	--	--	--	--	--	73	84	96	106	117	130	142
25	--	--	--	--	--	79	91	103	114	125	138	152
26	--	--	--	--	--	84	97	110	122	135	148	162
27	--	--	--	--	--	90	104	118	130	142	157	172
28	--	--	--	--	--	97	111	125	138	150	165	180
29	--	--	--	--	--	103	118	132	146	160	176	192
30	--	--	--	--	--	110	125	140	155	170	186	202

[1/] Volumes for trees that are both 8 inches or above in d.b.h. and 50 feet or above in height are the same as those in table 3 of "Volume Tables for Permanent Sample Plots ... " (see footnote 1, page 1). For heights 50 feet or above, volumes for trees less than 8 inches in d.b.h. were obtained by graphic extrapolation; for 20-, 30-, and 40-foot heights, entire-stem volumes of Douglas-fir (table 1 of "Volume Tables for Permanent Sample Plots ... ") were used, as volumes for these heights of Sitka spruce published previously do not progress regularly. Volumes for trees 10 feet in height were obtained by graphic extrapolation.