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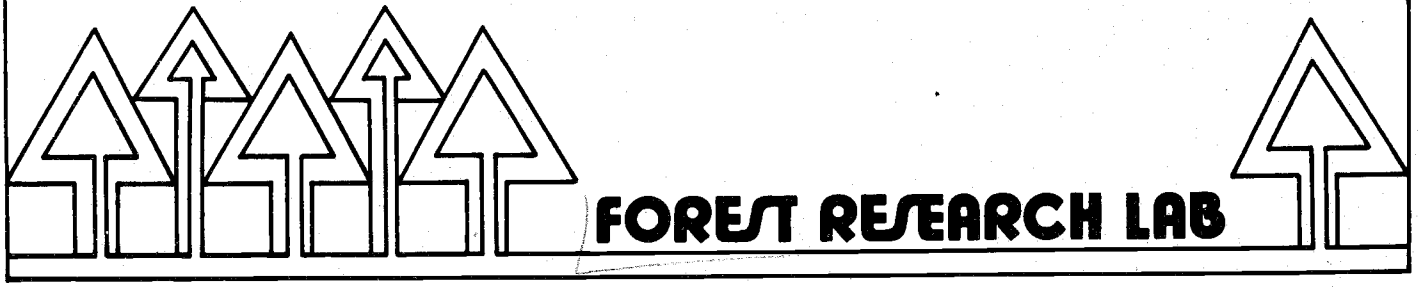

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David K. Walters
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Contents

Abstract

Equations and tables predicting gross total stem volumes in cubic feet are presented for Douglas-fir, grand fir, white fir, ponderosa pine, sugar pine, and incense-cedar. The data were gathered in second-growth, mixed-conifer stands of southwest Oregon. The basic equations use diameter outside bark at breast height and total tree height as independent variables. Tables and additional equations were developed that incorporate crown ratio for Douglas-fir, grand fir, and white fir. Equations that predict stump diameter, volume below breast height, and volume above breast height also are developed and presented for each species.

Introduction

The gross total stem volume (V) inside the bark is one of the most important single variables that a forester needs to estimate for a tree. V is directly proportional to a stem's biomass and, therefore, to its potential fiber and fuel yields. When combined with other variables, V can be used to predict the lumber recovery from a tree (Bruce 1970, Earnst and Hann 1984). Information about the tree's value can be influential in evaluating the financial worth of a stand of timber, determining the most appropriate thinning regime, or setting the allowable cut policy. Douglas-fir (Pseudotsuga menziesii [Mirb.] Franco), grand fir (Abies grandis [Gord. and Glend.] Lindl.), white fir (Abies concolor [Dougl.] Lindl.), ponderosa pine (Pinus ponderosa Laws.), sugar pine (Pinus lambertiana Dougl.), and incense-cedar (Calocedrus decurrens Torr.) are species of major economic importance in southwest Oregon. However, equations and tables for V have not been available for second-growth trees in mixed conifer stands of the region. The objective of this study was to develop equations and tables for V in cubic feet for the principal conifer species in southwest Oregon.

Data Collection

In the summers of 1981, 1982, and 1983, a total of 1236 trees, which had not received severe stem or top damage during the previous five years, were felled and sectioned in the mixed conifer zone of southwest Oregon. The trees were felled with a stump height of 1.0 feet. Total tree height in feet (H) and crown ratio (CR) were measured prior to felling as part of the Growth and Yield Project conducted by the FIR (Forestry Intensified Research) Cooperative. The CR measured prior to felling was used so that values would be close to those obtained through standard stand inventory procedures. Total tree height also was obtained for each tree after felling, as was the last 5-year increment in height growth. Logs were sectioned at 4.5 feet (breast height) and thereafter at approximate intervals of 8.4 feet. At each section, the diameters inside and outside the bark at breast height (DIB and DOB, respectively) were measured for the longest and shortest axes, and the geometric means were calculated. The geometric mean was used because it yields the correct cross-sectional area for both ellipses and circles (Brickell 1976). The sample covered a wide range of diameters and heights for each species and represented all crown classes except suppressed (Table 1 and Appendix A).

TABLE 1.

DATA SUMMARY BY SPECIES.

Species	Sample size	DOB (inches) Mean	DOB (inches) Range	Total height (feet) Mean	Total height (feet) Range
Douglas-fir	680	13.6	0.9-43.2	81.5	9.0-200.9
Grand fir	92	13.0	1.3-42.9	79.2	11.1-161.7
White fir	92	13.9	3.1-37.7	81.8	21.7-161.9
Ponderosa pine	139	14.5	1.3-35.6	81.4	15.3-192.8
Sugar pine	92	17.6	1.9-42.2	87.4	14.5-175.4
Incense-cedar	141	10.1	0.8-33.4	44.4	8.7-119.4

Preliminary calculations were performed. Using DIB and the stump diameter inside bark (DIB_S), the volume below breast height (V_{bbh}) was calculated as a neiloid frustrum:

$$V_{bbh} = \frac{\pi DIB_S^2}{175616}\left[729 + 81(DIB/DIB_S)^{2/3} + 297(DIB/DIB_S)^{4/3} + 265(DIB/DIB_S)^2\right] \quad [1]$$

Equation [1] is derived from an equation in Husch et al. (1982).

From breast height to the base of the last 5-year height growth increment, the stem of a tree

is typically parabolic to conic in shape. Both Smalian's and Newton's formulae accurately measure volumes in this section, although Newton's formula is considered more accurate (Husch et al.. 1982). Because Newton's formula requires three separate diameter measurements which are equidistant from each other, it was only possible to use Newton's method by combining two adjacent sections of equal length. On sections for which this was not possible, the lengths of the two adjacent sections were weighted, and the generalized prismoidal log volume formula was used (Wensel 1977). Smalian's formula was used for any odd-numbered sections that remained and for sections that were so different in length that the generalized prismoidal formula of log volume was inappropriate.

The volume of the tip section, considered to be the section between the base of the last 5-year height growth increment and the tree tip, was calculated as a cone.

Individual section volumes were then summed to obtain the calculated total stem volume for each tree.

Data Analysis

The approach used to predict tree volume is similar to the approach used in calculating actual tree volume. Equations which predict V_{bbh} and volume above breast height (V_{abh}) are developed, and these predictions are added together to give a prediction of total stem volume. This approach was thoroughly examined[1] for Douglas-fir in southwest Oregon and was found to be a better predictor than other, more traditional approaches that use only one equation for predicting total stem volume.

Estimated V_{bbh} can be calculated from estimated DIB and DIB_S using Equation [1]. Predicted V_{abh} can be estimated best as a form modifier multiplied by the volume for a cylinder with a diameter and height equal to, respectively, the tree's DOB and H minus 4.5 feet (H_{abh}). The estimated total stem volume can then be expressed as:

$$\hat{V} = \hat{V}_{bbh} + \hat{V}_{abh} \qquad [2]$$

Diameter Inside Bark at Breast Height and Stump Diameter

Equations predicting DIB for the six major conifer species in southwest Oregon have already been developed by Larsen and Hann (1985) using the following equation form and regression coefficients a_1, a_2:

$$\hat{DIB} = a_1 (DOB)^{a_2} \qquad [3]$$

These equations were developed with the data set used in this study as well as with additional data from felled but unsectioned trees. In the Larsen and Hann (1985) analysis, grand fir and white fir were combined into one data set.

In the current analysis, the following stump diameter equation was fitted to each species using weighted least squares nonlinear and linear regression techniques with a weight of DOB^{-2}:

$$\hat{DIB}_S = b_0 + b_1 (DOB)^{b_2} \qquad [4]$$

The regression coefficients b_0, b_1, and b_2 were then tested for significant departure from 0.0, 1.0, and 1.0, respectively, using separate t-tests. If the parameters were not significantly different from these values, they were set equal to these values. Analysis of covariance was then used to test for species differences between equations.

The following equation form was also fitted to each species to evaluate the effect of crown ratio (CR) upon stump diameter:

$$\hat{DIB}_S = c_0 + c_1 \cdot EXP(c_2 \cdot CR) \cdot DOB^{c_3} \qquad [5]$$

The regression coefficients c_0, c_1, c_2, and c_3 were also tested using t-tests to determine if they were significantly different from 0.0, 1.0, 0.0, and 1.0, respectively.

Volume Below Breast Height

Given estimated DIB_S and DIB, Equation [1] can be used to predict V_{bbh}. This approach was found to be unbiased for the Dougas-fir data set by Hann et al. (see footnote 1).

[1] Hann, D.W., D.K. Walters, and J.A. Scrivani. A comparison of total stem volume equations for Douglas-fir which incorporate crown length. Manuscript in preparation.

Volume Above Breast Height

Weighted least squares, nonlinear regression techniques were used to develop equations for estimated V_{abh}. The basic equation form first examined was:

$$\hat{V}_{abh} = e_1 \cdot (H_{abh}/DOB)^{e_2} \cdot (DOB^2 \cdot H_{abh}) \quad [6]$$

The weight used in this component was $(DOB^2 \cdot H_{abh})^{-2}$. Regression coefficients are e_1, e_2. Equation [6] is a modification of Spurr's (1951) constant form equation for predicting total stem volume. The modification is the addition of the H_{abh}/DOB term. Spurr's constant form equation assumes that the volume of a tree is directly proportional to the cylindrical volume predicted by $DOB \cdot H_{abh}$. Given the same cylindrical volume, the modified equation form assumes that a tall, thin stem will have more volume than a short, thick stem. The validity of this latter assumption was affirmed by testing the significance of e_2 from 0.0 using the t-test.

To test the effect of crown ratio upon estimated V_{abh}, Equation [6] was further modified to the following:

$$\hat{V}_{abh} = f_1 \cdot (H_{abh}/DOB)^{f_2} \cdot \mathrm{EXP}(f_3 \cdot CR_{abh}) \cdot (DOB^2 \cdot H_{abh}) \quad [7]$$

The term $\mathrm{EXP}(f_3 \cdot CR_{abh})$ implies that small-crowned trees have more volume than large-crowned trees, an assumption supported by the findings of Gray (1956). Regression coefficients are f_1, f_2, f_3. A t-test was used to examine the significance of f_3 from 0.0.

Total Stem Volume

Given the separate estimates of V_{bbh} and V_{abh}, Equation [2] can then be used to estimate total stem volume. Hann et al. (see footnote 1) examined this approach for Douglas-fir and found it to be unbiased. They also compared this approach to more traditional methods of predicting total stem volume and found that it compared very favorably.

Results and Discussion

Diameter Inside Bark at Breast Height and Stump Diameter

The two regression coefficients developed by Larsen and Hann (1985) for predicting DIB (Equation [3]) are presented in Table 2.

TABLE 2.

REGRESSION COEFFICIENTS FOR DIAMETER INSIDE BARK AT BREAST HEIGHT, EQUATION [3].

Species	Regression coefficients a_1	a_2
Douglas-fir	0.903563	0.989388
Grand/white fir	0.904973	1.000000
Ponderosa pine	0.809427	1.016866
Sugar pine	0.859045	1.000000
Incense-cedar	0.837291	1.000000

Source: Larsen and Hann (1985)

The regression coefficients for predicting DIB_S without crown ratio (Equation [4]) and the weighted mean squared error (MSE) for each species are given in Table 3. The analysis of covariance tests indicated that grand and white fir could be combined. A simple linear model through the origin proved to be best for Douglas-fir and sugar pine. DOB without any correction was found to be an unbiased estimator of DIB_S for ponderosa pine. The full nonlinear model was most appropriate for grand/white fir and incense-cedar.

TABLE 3.

REGRESSION COEFFICIENTS AND WEIGHTED MEAN SQUARED ERROR FOR STUMP DIAMETER INSIDE BARK, EQUATION [4].

Species	Regression coefficients b_0	b_1	b_2	Mean squared error
Douglas-fir	0.000000	0.989819	1.000000	0.346352E-02
Sugar pine	0.000000	1.039080	1.000000	0.381300E-02
Grand/white fir	0.287414	0.828652	1.082631	0.410658E-02
Incense-cedar	0.476734	0.819613	1.067437	0.607914E-02
Ponderosa pine	0.000000	1.000000	1.000000	0.285630E-02

The introduction of CR into the DIB_S prediction, via Equation [5], proved to be significant for only Douglas-fir and grand/white fir. The weighted MSE and the regression coefficients for Equation [5] are found in Table 4 for these two species groups. Equation [5] predicts that for a given DOB, a tree possessing a large CR will have a larger DIB_S than a tree with a small CR.

TABLE 4.

REGRESSION COEFFICIENTS AND WEIGHTED MEAN SQUARED ERROR FOR STUMP DIAMETER INSIDE BARK WITH CROWN RATIO, EQUATION [5].

Species	Regression coefficients				Mean squared error
	c_0	c_1	c_2	c_3	
Douglas-fir	0.000000	0.938343	0.101792	1.000000	0.314841E-02
Grand/white fir	0.341157	0.753147	0.101138	1.0952985	0.370594E-02

Consequently, trees with large CR will also have larger predicted V_{bbh} (Table 5). When CR is removed from Equation [5], the resulting form corresponds to the form of Equation [4] for that species.

TABLE 5.

AN EXAMPLE OF THE INFLUENCE OF CROWN RATIO ON DOUGLAS-FIR AND GRAND/WHITE FIR VOLUME DEPICTED AS A PERCENTAGE DIFFERENCE FROM A FULL-CROWNED TREE.[a]

Crown ratio[b]	Change in total volume below breast height		Change in total volume above breast height		Change in total stem volume	
	Douglas-fir (percent)	Grand/white fir (percent)	Douglas-fir (percent)	Grand/white fir (percent)	Douglas-fir (percent)	Grand/white fir (percent)
0.10	-11.11	-10.90	+16.80	+31.06	+12.51	+24.46
0.20	-9.85	-9.74	14.67	26.95	10.90	21.14
0.30	-8.84	-8.82	12.59	22.92	9.29	17.97
0.40	-7.58	-7.66	10.50	19.03	7.75	14.87
0.50	-6.31	-6.26	8.51	15.31	6.22	11.88
0.60	-5.05	-5.10	6.52	11.68	4.72	9.04
0.70	-3.79	-3.94	4.57	8.13	3.26	6.27
0.80	-2.53	-2.78	2.67	4.71	1.84	3.57
0.90	-1.26	-1.39	0.82	1.43	0.46	0.98
1.00	0.00	0.00	0.00	0.00	0.00	0.00

[a] If diameter outside bark at breast height equals 13 inches and total height equals 80 feet.
[b] Crown length divided by total height.

Volume Above Breast Height

The regression coefficients for estimated V_{abh} without CR (Equation [6]) and the weighted MSE for each species are found in Table 6. Grand fir and white fir could again be combined. The fact that e_2 was significantly different from 0.0 for all species supports the hypothesis that tall, thin trees contain more stem volume than short, fat trees of the same cylindrical volume.

TABLE 6.

REGRESSION COEFFICIENTS AND WEIGHTED MEAN SQUARED ERROR FOR VOLUME ABOVE BREAST HEIGHT, EQUATION [6].

Species	Regression coefficients		Mean squared error
	e_1	e_2	
Douglas-fir	0.001168	0.265430	0.362120E-07
Grand/white fir	0.001080	0.358300	0.588388E-07
Ponderosa pine	0.001265	0.172813	0.428554E-07
Sugar pine	0.000866	0.383940	0.262222E-07
Incense-cedar	0.000887	0.367622	0.823913E-07

The equation form incorporating CR (Equation [7]) was a significant improvement upon Equation [6] for both Douglas-fir and grand/white fir. Table 7 presents regression coefficients for Equation [7] and the weighted MSE for these two species groups. As shown in Table 5, trees having large CR will have less predicted volume, both V and V_{abh}, than trees with small CR. Gray (1956) concluded that the bole within the crown was often conic in shape, whereas the bole below the crown was parabolic. Because a cone contains less volume than a paraboloid of the same dimensions, long-crowned trees would be expected to contain less volume than short-crowned trees, which supports our findings.

TABLE 7.

REGRESSION COEFFICIENTS AND WEIGHTED MEAN SQUARED ERROR FOR VOLUME ABOVE BREAST HEIGHT WITH CROWN RATIO, EQUATION [7].

Species	Regression coefficients			Mean squared error
	f_1	f_2	f_3	
Douglas-fir	0.001420	-0.173824	0.211235	0.325530E-07
Grand/white fir	0.001625	-0.302363	0.233905	0.424011E-07

Total Stem Volume

Total stem volume inside the bark (V) is computed by Equation [2]. Appendix B contains tables of V for all species groups using equations requiring only DOB and H. Appendix C contains tables for total stem volumes of Douglas–fir and grand/white fir that are derived from equations requiring DOB, H, and CR.

Conclusion

The equation for total stem volume developed in this study compares very favorably (Hann et al., see footnote 1) with more traditional equations and has several advantages which we feel warrant its use. Each component and, therefore, the total stem volume equation form, is easily interpreted. The equation form is very flexible and can be altered to meet different management needs.

Different equations can be substituted for either of the two components with ease, or either component could be omitted, if so desired. Finally, each component model is quite simple but still possesses optimal statistical properties.

Crown ratio was a significant variable in all of the component equations for Douglas–fir and grand/white fir. Predicted volume changes significantly across CR classes for these two species; consequently, we suggest that the CR equations be used when possible. For these species, however, equations and tables are also presented which only require the measurement of DOB and H.

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Appendix A: Sample Distribution Across Diameter and Height Classes by Species

TABLE A-1
DOUGLAS-FIR SAMPLE DISTRIBUTION ACROSS DIAMETER AND HEIGHT CLASSES.

DBH	Height (ft.)																				
(in.)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	Total
1	4	1																			5
2	1	7	2																		10
3		3	11	4																	18
4		3	12	12	4																31
5			9	29	5	3	1														47
6			3	19	21	6	4	1													54
7				11	14	5	2	3													35
8				4	9	8	3		1												25
9				5	7	4	7	5		1											29
10					4	8	4	3	4	1	1	1									26
11					2	7	6	11	2	1											29
12					2	3	10	11	3	2	1	1									33
13					1	3	9	7	2	5	3										30
14							1	6	20	3	2										32
15							3	4	6	5	5	1									24
16							2	3	8	8	7										28
17								1	2	8	4	3									18
18							1	1	5	12	5	3	4								31
19									1	3	3	1	1	1							10
20										4	9	3	4	2							22
21								2	2	6	6	1	4								21
22									1	5	5	7	2	1		2					23
23									1	3	2	7	5								18
24											1	3	1	1							6
25										3	3	1	2	2	2						13
26									1		1	2	4	3		1	2				14
27											4	2	1	1							8
28											1		2	4		1					8
29												1	3	3	1						8
30												1			1	1					3
31													1	1							2
32													1		2	1			1		5
33														1		2					3
34														1			1			1	3
35																					
36																					
37													1		1				2		4
38																					
39																					
40																					
41																					
42															1					1	2
43																		1	1		2
44																					
45																					
Total	5	14	37	84	69	47	53	58	59	70	63	38	36	21	8	8	3	1	4	2	680

TABLE A-2
GRAND FIR SAMPLE DISTRIBUTION ACROSS DIAMETER AND HEIGHT CLASSES.

DBH	Height (ft.)																				
(in.)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	Total
1	1																				1
2		1																			1
3			2	1																	3
4			1	1																	2
5			3	4																	7
6			1	2	1																4
7					1																1
8				1		5		1													7
9				1	4	2	1														8
10					1	2															3
11					1	1	1														3
12						2	2	1	2	1											8
13							1	1	2												4
14						1		1		3	1										6
15							1	1	1	2	3										8
16							2		2	2		1	1								8
17											1	1									2
18																					
19													1	1							2
20													2								2
21																					
22																					
23									1				2								3
24												1	2	1	1						4
25														1	1						2
26														1							1
27																1					1
28																					
29																					
30																					
31																					
32																					
33																					
34																					
35																					
36																					
37																					
38																					
39																					
40																					
41																					
42																					
43																1					1
44																					
45																					
Total	1	1	7	10	8	13	8	5	8	8	5	3	8	4	1	2					92

TABLE A-3
WHITE FIR SAMPLE DISTRIBUTION ACROSS DIAMETER AND HEIGHT CLASSES.

DBH	Height (ft.)																			
(in.)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	Total
1																					
2																					
3		1																			1
4			5	1	1																7
5			2	4	1																7
6			2	1	4																7
7					2																2
8						2	1		1												4
9						2	1														3
10					1	4	1	1													7
11					1	2	1		1												5
12						2	2		1												5
13								1	2	1											4
14									2	1		1									4
15							2	1		2											5
16									1			1									2
17									1				1								2
18									1												1
19											1										1
20								1	1	1		1									4
21													1								1
22									1			2									3
23														1	1						2
24												1	2	1							4
25												1									1
26											1	1		1							3
27																					
28														2							2
29															2						2
30																					
31													1								1
32																					
33																1					1
34																					
35																					
36																					
37																					
38																1					1
39																					
40																					
41																					
42																					
43																					
44																					
45																					
Total		1	9	6	10	12	8	4	12	5	2	8	5	5	3	2					92

TABLE A-4
PONDEROSA PINE SAMPLE DISTRIBUTION ACROSS DIAMETER AND HEIGHT CLASSES.

DBH	Height (ft.)																				
(in.)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	Total
1		1																			1
2		1																			1
3			1																		1
4		1		2																	3
5			2	4	1	1															8
6		1	3	4	2	1															11
7		1		2	2	1	1														7
8				2	1	1															4
9				1	2			1													4
10						2	1		2												5
11					2	2	3	4	1												12
12						1	1	3													5
13								2	1	2											5
14					1	1		2	2												6
15						1	3		2	1		2									9
16							3	1	1												5
17								1	1	2	2	1									7
18								1		2		1									4
19									1	1	2										4
20									2		2	1	1								6
21								1	1			3									5
22									1		1	3									5
23									1		1		1	1							4
24													2								2
25											2	1									3
26													3		1						4
27													1								1
28												1		1							2
29													1								1
30																					
31													1			1					2
32																					
33																					
34													1								1
35																			1		1
36																					
37																					
38																					
39																					
40																					
41																					
42																					
43																					
44																					
45																					
Total		5	6	15	11	11	12	16	16	8	10	13	11	2	1	1			1		139

TABLE A-5
SUGAR PINE SAMPLE DISTRIBUTION ACROSS DIAMETER AND HEIGHT CLASSES.

DBH	Height (ft.)																				
(in.)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	Total
1																					
2	1																				1
3																					
4		1																			1
5		1	3	1																	5
6				2																	2
7			1																		1
8				1																	1
9				1	1		1														3
10				1	2	2	1														6
11				1		1		2													4
12					1	2	1	1	2												7
13								1	3												4
14							2		1	1											4
15						1	1	1	3	2											8
16									2												2
17										2	1										3
18								1	1												2
19								2		1											3
20										2			1								3
21									1				1								1
22									1	1											2
23									1	1		1									3
24										1	2	1									4
25												2									2
26													2	1							3
27											2	1	1	1							5
28														1							1
29											1				1						2
30												1	2								3
31												1									2
32											1	1	1								2
33																					1
34																					
35																		1			1
36												1									1
37																					
38																					
39																					
40																					
41																					
42															1						1
43																					
44																					
45																					
Total	1	2	4	7	4	6	6	8	14	11	7	8	8	3	2			1			92

TABLE A-6
INCENSE-CEDAR SAMPLE DISTRIBUTION ACROSS DIAMETER AND HEIGHT CLASSES.

DBH	Height (ft.)																				
(in.)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	Total
1	3																				3
2	2	1																			3
3	2	7																			9
4		8	3	1																	12
5		5	7																		12
6		4	7	1																	12
7		2	7	6	1																16
8			2	4	2		1														9
9			1	2	2																5
10				1	2	1		1													5
11				1	1	3	1														6
12			1		1	1	2														5
13				2		2															4
14					3	1	1														5
15					1		2	1													4
16				1		2	1														4
17					1	3	2		2												8
18					1		1	1		1											4
19							2	1													3
20																					
21							1	1	1												3
22																					
23								1	1												2
24																					
25									1												1
26							1			1											2
27									1												1
28								1	1												2
29																					
30																					
31																					
32																					
33												1									1
34																					
35																					
36																					
37																					
38																					
39																					
40																					
41																					
42																					
43																					
44																					
45																					
Total	7	27	28	19	15	13	15	7	7	2		1									141

Appendix B: Estimated V in Cubic Feet by Species, Using DOB and H

TABLE B-1
ESTIMATED TOTAL STEM CUBIC-FOOT VOLUME FOR DOUGLAS-FIR.

DBH	Total Height (ft.)																			
(in.)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
2	0.1	0.2	0.3	0.4	0.6	0.7														
3	.3	.5	.7	.9	1.2	1.5	1.8	2.1	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –
4	.5	.8	1.1	1.5	2.0	2.4	2.9	3.4	4.0	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –
5	.7	1.2	1.7	2.3	2.9	3.6	4.3	5.1	5.9	6.7	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –
6	1.0	1.6	2.4	3.2	4.1	5.0	6.0	7.0	8.1	9.2	10.3	– –	– –	– –	– –	– –	– –	– –	– –	– –
7	– –	2.2	3.1	4.2	5.4	6.6	7.9	9.2	10.6	12.0	13.5	15.0	– –	– –	– –	– –	– –	– –	– –	– –
8	– –	2.8	4.0	5.4	6.8	8.4	10.0	11.7	13.4	15.2	17.1	19.0	20.9	– –	– –	– –	– –	– –	– –	– –
9	– –	3.5	5.0	6.6	8.4	10.3	12.3	14.4	16.5	18.7	21.0	23.3	25.7	– –	– –	– –	– –	– –	– –	– –
10	– –	– –	6.0	8.0	10.2	12.4	14.8	17.3	19.9	22.5	25.3	28.1	30.9	33.8	– –	– –	– –	– –	– –	– –
11	– –	– –	7.2	9.5	12.1	14.7	17.6	20.5	23.5	26.6	29.9	33.2	36.5	40.0	– –	– –	– –	– –	– –	– –
12	– –	– –	8.4	11.2	14.1	17.2	20.5	23.9	27.4	31.1	34.8	38.6	42.6	46.6	– –	– –	– –	– –	– –	– –
13	– –	– –	– –	12.9	16.3	19.9	23.6	27.5	31.6	35.8	40.1	44.5	49.0	53.6	58.3	– –	– –	– –	– –	– –
14	– –	– –	– –	14.8	18.6	22.7	26.9	31.4	36.0	40.7	45.6	50.6	55.8	61.0	66.4	– –	– –	– –	– –	– –
15	– –	– –	– –	16.7	21.0	25.6	30.4	35.5	40.7	46.0	51.5	57.2	63.0	68.9	74.9	– –	– –	– –	– –	– –
16	– –	– –	– –	– –	23.6	28.8	34.1	39.8	45.6	51.6	57.7	64.0	70.5	77.1	83.8	90.7	– –	– –	– –	– –
17	– –	– –	– –	– –	26.3	32.1	38.0	44.3	50.7	57.4	64.2	71.2	78.4	85.8	93.2	100.9	– –	– –	– –	– –
18	– –	– –	– –	– –	29.2	35.5	42.1	49.0	56.1	63.5	71.0	78.8	86.7	94.8	103.1	111.5	– –	– –	– –	– –
19	– –	– –	– –	– –	– –	39.1	46.4	53.9	61.7	69.8	78.1	86.6	95.3	104.2	113.3	122.5	131.9	– –	– –	– –
20	– –	– –	– –	– –	– –	42.9	50.8	59.0	67.6	76.4	85.5	94.8	104.3	114.0	124.0	134.1	144.3	– –	– –	– –
21	– –	– –	– –	– –	– –	46.8	55.4	64.4	73.7	83.3	93.2	103.3	113.7	124.2	135.0	146.0	157.2	– –	– –	– –
22	– –	– –	– –	– –	– –	– –	60.2	69.9	80.0	90.4	101.1	112.1	123.3	134.8	146.5	158.4	170.6	182.9	– –	– –
23	– –	– –	– –	– –	– –	– –	65.1	75.7	86.6	97.8	109.4	121.2	133.4	145.8	158.4	171.3	184.4	197.7	– –	– –
24	– –	– –	– –	– –	– –	– –	70.3	81.6	93.3	105.4	117.9	130.6	143.7	157.1	170.7	184.5	198.6	212.9	– –	– –
25	– –	– –	– –	– –	– –	– –	75.6	87.7	100.3	113.3	126.7	140.4	154.4	168.7	183.3	198.2	213.3	228.7	244.3	– –
26	– –	– –	– –	– –	– –	– –	– –	94.0	107.5	121.4	135.7	150.4	165.4	180.8	196.4	212.3	228.5	245.0	261.7	– –
27	– –	– –	– –	– –	– –	– –	– –	100.6	115.0	129.8	145.1	160.7	176.8	193.1	209.8	226.8	244.1	261.7	279.5	– –
28	– –	– –	– –	– –	– –	– –	– –	107.3	122.6	138.4	154.7	171.4	188.4	205.9	223.7	241.8	260.2	278.9	297.9	317.2
29	– –	– –	– –	– –	– –	– –	– –	114.2	130.5	147.3	164.6	182.3	200.4	219.0	237.9	257.1	276.7	296.6	316.8	337.3
30	– –	– –	– –	– –	– –	– –	– –	– –	138.5	156.4	174.7	193.5	212.8	232.4	252.4	272.9	293.6	314.7	336.1	357.9
31	– –	– –	– –	– –	– –	– –	– –	– –	146.8	165.7	185.1	205.0	225.4	246.2	267.4	289.0	311.0	333.3	356.0	379.0
32	– –	– –	– –	– –	– –	– –	– –	– –	155.3	175.3	195.8	216.8	238.3	260.3	282.7	305.5	328.8	352.4	376.3	400.6
33	– –	– –	– –	– –	– –	– –	– –	– –	164.0	185.1	206.7	228.9	251.6	274.8	298.4	322.5	347.0	371.9	397.1	422.8
34	– –	– –	– –	– –	– –	– –	– –	– –	– –	195.1	217.9	241.2	265.2	289.6	314.5	339.8	365.6	391.8	418.4	445.4
35	– –	– –	– –	– –	– –	– –	– –	– –	– –	205.4	229.3	253.9	279.0	304.7	330.9	357.5	384.7	412.2	440.2	468.6
36	– –	– –	– –	– –	– –	– –	– –	– –	– –	215.9	241.0	266.8	293.2	320.2	347.7	375.7	404.1	433.1	462.5	492.3
37	– –	– –	– –	– –	– –	– –	– –	– –	– –	226.6	253.0	280.0	307.7	336.0	364.8	394.2	424.0	454.4	485.2	516.5
38	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	265.2	293.5	322.5	352.1	382.3	413.0	444.3	476.1	508.4	541.1
39	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	277.6	307.2	337.6	368.5	400.1	432.3	465.0	498.3	532.0	566.3
40	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	290.3	321.3	353.0	385.3	418.3	451.9	486.1	520.9	556.2	591.9

TABLE B-2
ESTIMATED TOTAL STEM CUBIC-FOOT VOLUME FOR GRAND/WHITE FIR.

DBH	Total Height (ft.)																			
(in.)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
2	0.1	0.2	0.4	0.5	0.7	0.9	--	--	--	--	--	--	--	--	--	--	--	--	--	--
3	.3	.5	.7	1.0	1.4	1.7	2.1	--	--	--	--	--	--	--	--	--	--	--	--	--
4	.5	.8	1.2	1.7	2.2	2.8	3.4	4.1	4.8	--	--	--	--	--	--	--	--	--	--	--
5	.7	1.2	1.8	2.5	3.3	4.1	5.0	6.0	7.0	--	--	--	--	--	--	--	--	--	--	--
6	1.0	1.7	2.5	3.4	4.5	5.6	6.8	8.1	9.4	10.8	--	--	--	--	--	--	--	--	--	--
7	--	2.2	3.3	4.5	5.9	7.3	8.9	10.5	12.2	14.0	--	--	--	--	--	--	--	--	--	--
8	--	2.9	4.2	5.7	7.4	9.2	11.1	13.2	15.3	17.6	19.9	--	--	--	--	--	--	--	--	--
9	--	3.6	5.2	7.0	9.0	11.2	13.6	16.1	18.7	21.4	24.2	27.1	--	--	--	--	--	--	--	--
10	--	--	6.2	8.4	10.8	13.5	16.3	19.2	22.3	25.5	28.9	32.4	35.9	--	--	--	--	--	--	--
11	--	--	7.4	10.0	12.8	15.9	19.1	22.6	26.2	30.0	33.9	38.0	42.1	46.5	--	--	--	--	--	--
12	--	--	8.7	11.6	14.9	18.4	22.2	26.2	30.4	34.7	39.2	43.9	48.7	53.7	--	--	--	--	--	--
13	--	--		13.4	17.1	21.2	25.5	30.0	34.8	39.7	44.9	50.2	55.7	61.4	67.2	--	--	--	--	--
14	--	--	--	15.3	19.5	24.1	28.9	34.0	39.4	45.0	50.9	56.9	63.1	69.5	76.1	--	--	--	--	--
15	--	--	--	17.3	22.0	27.1	32.5	38.3	44.3	50.6	57.1	63.9	70.8	78.0	85.4	--	--	--	--	--
16	--	--	--	--	24.7	30.3	36.4	42.8	49.5	56.4	63.7	71.2	78.9	86.9	95.1	103.5	--	--	--	--
17	--	--	--	--	27.4	33.7	40.4	47.4	54.8	62.5	70.6	78.8	87.4	96.2	105.2	114.5	--	--	--	--
18	--	--	--	--	30.3	37.2	44.5	52.3	60.4	68.9	77.7	86.8	96.2	105.9	115.8	126.0	--	--	--	--
19	--	--	--	--	--	40.9	48.9	57.4	66.2	75.5	85.1	95.1	105.3	115.9	126.8	137.9	149.2	--	--	--
20	--	--	--	--	--	44.7	53.4	62.6	72.3	82.4	92.8	103.7	114.8	126.3	138.1	150.2	162.6	--	--	--
21	--	--	--	--	--	48.7	58.1	68.1	78.6	89.5	100.8	112.6	124.7	137.1	149.9	163.0	176.4	--	--	--
22	--	--	--	--	--	--	63.0	73.8	85.1	96.9	109.1	121.8	134.8	148.2	162.0	176.2	190.7	205.4	--	--
23	--	--	--	--	--	--	68.0	79.6	91.8	104.5	117.6	131.2	145.3	159.7	174.6	189.8	205.4	221.3	--	--
24	--	--	--	--	--	--	73.3	85.7	98.7	112.3	126.4	141.0	156.1	171.6	187.5	203.8	220.5	237.6	--	--
25	--	--	--	--	--	--	78.6	91.9	105.9	120.4	135.5	151.1	167.2	183.8	200.8	218.2	236.1	254.3	272.9	--
26	--	--	--	--	--	--	--	98.3	113.2	128.7	144.8	161.5	178.6	196.3	214.5	233.1	252.1	271.6	291.4	--
27	--	--	--	--	--	--	--	105.0	120.8	137.3	154.4	172.1	190.4	209.2	228.5	248.3	268.5	289.2	310.4	--
28	--	--	--	--	--	--	--	111.8	128.5	146.1	164.2	183.0	202.4	222.4	242.9	263.9	285.4	307.4	329.8	352.7
29	--	--	--	--	--	--	--	118.7	136.5	155.1	174.3	194.2	214.8	235.9	257.7	279.9	302.7	326.0	349.7	373.9
30	--	--	--	--	--	--	--	--	144.7	164.3	184.7	205.7	227.5	249.8	272.8	296.3	320.4	345.0	370.1	395.7
31	--	--	--	--	--	--	--	--	153.1	173.8	195.3	217.5	240.4	264.0	288.2	313.1	338.5	364.5	391.0	418.0
32	--	--	--	--	--	--	--	--	161.7	183.5	206.1	229.5	253.7	278.5	304.1	330.2	357.0	384.3	412.3	440.7
33	--	--	--	--	--	--	--	--	170.5	193.4	217.2	241.8	267.2	293.4	320.2	347.7	375.9	404.7	434.0	464.0
34	--	--	--	--	--	--	--	--	--	203.5	228.5	254.4	281.1	308.5	336.7	365.6	395.2	425.4	456.3	487.7
35	--	--	--	--	--	--	--	--	--	213.9	240.1	267.2	295.2	324.0	353.6	383.9	414.9	446.6	478.9	511.9
36	--	--	--	--	--	--	--	--	--	224.5	251.9	280.4	309.7	339.8	370.8	402.5	435.0	468.2	502.1	536.6
37	--	--	--	--	--	--	--	--	--	235.3	264.0	293.7	324.4	355.9	388.3	421.5	455.5	490.2	525.6	561.8
38	--	--	--	--	--	--	--	--	--	--	276.3	307.3	339.4	372.3	406.2	440.9	476.4	512.6	549.6	587.4
39	--	--	--	--	--	--	--	--	--	--	288.8	321.2	354.7	389.0	424.4	460.6	497.6	535.5	574.1	613.5
40	--	--	--	--	--	--	--	--	--	--	301.6	335.4	370.2	406.1	442.9	480.6	519.2	558.7	599.0	640.0

TABLE B-3
ESTIMATED TOTAL STEM CUBIC-FOOT VOLUME FOR PONDEROSA PINE.

DBH	Total Height (ft.)																			
(in.)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
2	0.1	0.2	0.3	0.4																
3	.3	.4	.6	.8	1.0	1.2	1.5													
4	.5	.7	1.1	1.4	1.7	2.1	2.5	2.9	3.3											
5	.7	1.1	1.6	2.1	2.7	3.2	3.8	4.4	5.0											
6	1.0	1.6	2.3	3.0	3.7	4.5	5.3	6.1	6.9	7.8										
7		2.2	3.0	4.0	5.0	6.0	7.0	8.1	9.2	10.4										
8		2.8	3.9	5.1	6.4	7.7	9.0	10.4	11.8	13.3	14.7									
9		3.5	4.9	6.4	7.9	9.6	11.2	12.9	14.7	16.5	18.3	20.2								
10			6.0	7.8	9.7	11.6	13.7	15.7	17.9	20.0	22.2	24.5	26.8							
11			7.2	9.3	11.6	13.9	16.3	18.8	21.3	23.9	26.5	29.2	31.9	34.7						
12			8.5	11.0	13.6	16.3	19.2	22.1	25.0	28.1	31.1	34.3	37.5	40.7						
13				12.7	15.8	19.0	22.2	25.6	29.0	32.5	36.1	39.7	43.4	47.1	50.9					
14				14.6	18.1	21.8	25.5	29.4	33.3	37.3	41.4	45.5	49.8	54.0	58.4					
15				16.7	20.6	24.8	29.0	33.4	37.8	42.4	47.0	51.7	56.5	61.4	66.3					
16					23.3	27.9	32.7	37.6	42.6	47.7	53.0	58.3	63.7	69.1	74.6	80.2				
17					26.1	31.3	36.6	42.1	47.7	53.4	59.2	65.2	71.2	77.3	83.5	89.7				
18					29.0	34.8	40.7	46.8	53.0	59.4	65.8	72.4	79.1	85.9	92.7	99.7				
19						38.5	45.0	51.7	58.6	65.6	72.8	80.0	87.4	94.9	102.4	110.1	117.8			
20						42.3	49.5	56.9	64.4	72.1	80.0	88.0	96.0	104.3	112.6	121.0	129.5			
21						46.4	54.2	62.3	70.5	79.0	87.5	96.2	105.1	114.1	123.1	132.3	141.6			
22							59.1	67.9	76.9	86.0	95.4	104.9	114.5	124.3	134.2	144.2	154.3	164.5		
23							64.2	73.7	83.5	93.4	103.5	113.8	124.3	134.9	145.6	156.5	167.5	178.5		
24							69.5	79.8	90.3	101.1	112.0	123.1	134.4	145.9	157.5	169.2	181.1	193.1		
25							75.0	86.1	97.4	109.0	120.8	132.8	145.0	157.3	169.8	182.4	195.2	208.1	221.2	
26								92.6	104.8	117.2	129.9	142.8	155.8	169.1	182.5	196.1	209.8	223.7	237.7	
27								99.3	112.4	125.7	139.3	153.1	167.1	181.3	195.6	210.2	224.9	239.8	254.8	
28								106.2	120.2	134.4	148.9	163.7	178.7	193.8	209.2	224.8	240.5	256.4	272.4	288.6
29								113.4	128.3	143.5	158.9	174.7	190.6	206.8	223.2	239.8	256.5	273.5	290.6	307.9
30									136.6	152.8	169.2	185.9	202.9	220.1	237.6	255.2	273.0	291.1	309.3	327.7
31									145.2	162.3	179.8	197.5	215.6	233.8	252.4	271.1	290.0	309.2	328.5	348.0
32									154.0	172.1	190.7	209.5	228.6	247.9	267.6	287.4	307.5	327.8	348.3	368.9
33									163.0	182.2	201.8	221.7	241.9	262.4	283.2	304.2	325.4	346.9	368.5	390.4
34										192.6	213.3	234.3	255.6	277.3	299.2	321.4	343.8	366.5	389.3	412.4
35										203.2	225.0	247.2	269.7	292.5	315.6	339.0	362.6	386.5	410.7	435.0
36										214.1	237.0	260.4	284.1	308.1	332.4	357.0	381.9	407.1	432.5	458.1
37										225.2	249.4	273.9	298.8	324.1	349.6	375.5	401.7	428.1	454.9	481.8
38											262.0	287.7	313.9	340.4	367.3	394.4	421.9	449.7	477.7	506.0
39											274.9	301.9	329.3	357.1	385.3	413.8	442.6	471.7	501.1	530.8
40											288.1	316.3	345.1	374.2	403.7	433.5	463.7	494.2	525.0	556.1

TABLE B-4
ESTIMATED TOTAL STEM CUBIC-FOOT VOLUME FOR SUGAR PINE.

DBH	Total Height (ft.)																		
(in.)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
2	0.1	0.2	0.3	0.5																
3	.3	.4	.7	.9	1.2	1.5	1.9													
4	.5	.7	1.1	1.5	2.0	2.5	3.0	3.6	4.2											
5	.7	1.1	1.6	2.2	2.9	3.6	4.4	5.2	6.1											
6	1.0	1.5	2.2	3.0	3.9	4.9	6.0	7.1	8.2	9.5										
7	1.4	2.0	2.9	4.0	5.1	6.4	7.7	9.1	10.6	12.2										
8		2.6	3.7	5.0	6.4	8.0	9.6	11.4	13.3	15.2	17.2									
9		3.2	4.6	6.1	7.8	9.7	11.7	13.9	16.1	18.5	20.9	23.5								
10		3.9	5.5	7.3	9.4	11.6	14.0	16.5	19.2	22.0	24.9	27.9	31.0							
11			6.5	8.7	11.1	13.7	16.4	19.4	22.5	25.8	29.2	32.7	36.3	40.1						
12			7.6	10.1	12.8	15.8	19.0	22.4	26.0	29.8	33.7	37.7	41.9	46.2						
13			8.8	11.6	14.7	18.1	21.8	25.7	29.7	34.0	38.5	43.1	47.8	52.7	57.8					
14				13.2	16.7	20.6	24.7	29.1	33.7	38.5	43.5	48.7	54.0	59.6	65.3					
15				14.9	18.8	23.1	27.7	32.6	37.8	43.1	48.7	54.5	60.5	66.7	73.1					
16				16.7	21.1	25.8	30.9	36.4	42.1	48.0	54.2	60.7	67.3	74.2	81.3	88.5				
17					23.4	28.6	34.3	40.3	46.6	53.1	60.0	67.1	74.4	82.0	89.8	97.8				
18					25.8	31.6	37.8	44.3	51.2	58.4	66.0	73.7	81.8	90.1	98.7	107.4				
19					28.3	34.6	41.4	48.5	56.1	63.9	72.1	80.7	89.4	98.5	107.8	117.4	127.2			
20					31.0	37.8	45.1	52.9	61.1	69.7	78.6	87.8	97.4	107.2	117.3	127.7	138.4			
21					33.7	41.1	49.0	57.4	66.3	75.6	85.2	95.2	105.5	116.2	127.2	138.4	150.0			
22						44.5	53.1	62.1	71.7	81.7	92.1	102.8	114.0	125.5	137.3	149.4	161.9	174.6		
23						48.0	57.2	67.0	77.2	88.0	99.1	110.7	122.7	135.0	147.7	160.8	174.1	187.8		
24						51.7	61.5	72.0	82.9	94.4	106.4	118.8	131.6	144.9	158.5	172.4	186.7	201.4		
25							65.9	77.1	88.8	101.1	113.9	127.1	140.8	155.0	169.5	184.4	199.7	215.4	231.4	
26							70.5	82.4	94.9	108.0	121.6	135.7	150.3	165.3	180.8	196.7	213.0	229.7	246.7	
27							75.2	87.8	101.1	115.0	129.5	144.5	160.0	176.0	192.4	209.3	226.7	244.4	262.5	
28							80.0	93.4	107.5	122.2	137.6	153.5	169.9	186.9	204.3	222.3	240.6	259.4	278.6	298.3
29								99.1	114.0	129.6	145.8	162.7	180.1	198.1	216.5	235.5	254.9	274.8	295.2	315.9
30								104.9	120.7	137.2	154.3	172.1	190.5	209.5	229.0	249.0	269.6	290.6	312.1	334.0
31								110.9	127.5	144.9	163.0	181.8	201.2	221.2	241.7	262.9	284.5	306.7	329.3	352.5
32								117.1	134.5	152.8	171.9	191.6	212.0	233.1	254.8	277.0	299.8	323.1	347.0	371.3
33									141.7	160.9	180.9	201.7	223.2	245.3	268.0	291.4	315.4	339.9	364.9	390.5
34									149.0	169.2	190.2	212.0	234.5	257.7	281.6	306.1	331.3	357.0	383.3	410.1
35									156.5	177.6	199.6	222.5	246.1	270.4	295.4	321.1	347.5	374.4	402.0	430.1
36									164.1	186.2	209.3	233.1	257.8	283.3	309.5	336.4	364.0	392.2	421.0	450.5
37										195.0	219.1	244.0	269.9	296.5	323.9	352.0	380.8	410.3	440.4	471.2
38										203.9	229.1	255.1	282.1	309.9	338.5	367.8	397.9	428.7	460.2	492.3
39										213.0	239.2	266.4	294.5	323.5	353.3	383.9	415.3	447.4	480.3	513.8
40										222.3	249.6	277.9	307.2	337.4	368.4	400.3	433.0	466.5	500.7	535.6

TABLE B-5
ESTIMATED TOTAL STEM CUBIC-FOOT VOLUME FOR INCENSE-CEDAR.

DBH	Total Height (ft.)																			
(in.)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
2	0.1	0.2	0.3	0.5																
3	.3	.4	.7	.9	1.2	1.5	1.8													
4	.4	.7	1.1	1.5	1.9	2.4	3.0	3.5	4.1											
5	.7	1.1	1.6	2.2	2.8	3.5	4.3	5.1	5.9											
6	1.0	1.5	2.2	3.0	3.9	4.8	5.8	6.9	8.0	9.2										
7	1.3	2.0	2.9	3.9	5.0	6.2	7.6	8.9	10.4	11.9										
8	1.7	2.5	3.6	4.9	6.3	7.8	9.5	11.2	13.0	14.9	16.9									
9	2.1	3.1	4.5	6.0	7.7	9.6	11.5	13.6	15.8	18.1	20.5	23.0								
10	2.6	3.8	5.4	7.2	9.2	11.4	13.8	16.3	18.9	21.6	24.5	27.4	30.4							
11	3.1	4.6	6.4	8.5	10.9	13.5	16.2	19.1	22.2	25.4	28.7	32.1	35.6	39.3						
12		5.4	7.5	9.9	12.7	15.6	18.8	22.1	25.7	29.3	33.1	37.1	41.2	45.4						
13		6.2	8.6	11.4	14.6	17.9	21.5	25.4	29.4	33.5	37.9	42.4	47.0	51.8	56.7					
14		7.2	9.9	13.1	16.6	20.4	24.4	28.7	33.3	38.0	42.9	48.0	53.2	58.6	64.2					
15			11.2	14.7	18.7	22.9	27.5	32.3	37.4	42.7	48.2	53.8	59.7	65.8	72.0					
16			12.6	16.5	20.9	25.6	30.7	36.1	41.7	47.6	53.7	60.0	66.5	73.2	80.1	87.2				
17			14.1	18.4	23.2	28.5	34.1	40.0	46.2	52.7	59.4	66.4	73.6	81.0	88.6	96.4				
18			15.6	20.4	25.7	31.4	37.6	44.1	50.9	58.0	65.4	73.0	80.9	89.1	97.5	106.0				
19			17.3	22.5	28.2	34.5	41.2	48.3	55.8	63.5	71.6	80.0	88.6	97.5	106.6	116.0	125.6			
20				24.6	30.9	37.7	45.0	52.7	60.8	69.3	78.1	87.1	96.5	106.2	116.1	126.3	136.8			
21				26.9	33.7	41.1	49.0	57.3	66.1	75.2	84.7	94.6	104.7	115.2	126.0	137.0	148.3			
22				29.2	36.6	44.5	53.0	62.0	71.5	81.4	91.6	102.3	113.2	124.5	136.1	148.0	160.2	172.7		
23					39.5	48.1	57.3	66.9	77.1	87.7	98.8	110.2	122.0	134.1	146.6	159.4	172.5	185.9		
24					42.6	51.8	61.6	72.0	82.9	94.3	106.1	118.4	131.0	144.0	157.4	171.1	185.2	199.5		
25					45.8	55.6	66.1	77.2	88.9	101.0	113.7	126.8	140.3	154.2	168.5	183.2	198.2	213.5	229.2	
26					49.1	59.6	70.8	82.6	95.0	108.0	121.5	135.4	149.8	164.7	179.9	195.5	211.6	227.9	244.6	
27					52.5	63.6	75.5	88.1	101.3	115.1	129.4	144.3	159.6	175.4	191.6	208.2	225.3	242.7	260.5	
28						67.8	80.4	93.8	107.8	122.4	137.7	153.4	169.7	186.4	203.6	221.3	239.3	257.8	276.7	295.9
29						72.1	85.5	99.6	114.5	130.0	146.1	162.8	180.0	197.7	215.9	234.6	253.8	273.3	293.3	313.7
30						76.5	90.6	105.6	121.3	137.7	154.7	172.3	190.5	209.3	228.5	248.3	268.5	289.2	310.3	331.8
31							96.0	111.7	128.3	145.6	163.5	182.1	201.3	221.1	241.4	262.2	283.6	305.4	327.7	350.4
32							101.4	118.0	135.4	153.6	172.6	192.1	212.4	233.2	254.6	276.5	299.0	322.0	345.4	369.4
33							107.0	124.4	142.8	161.9	181.8	202.4	223.6	245.5	268.0	291.1	314.8	338.9	363.6	388.8
34							112.7	131.0	150.2	170.3	191.2	212.8	235.2	258.2	281.8	306.0	330.8	356.2	382.1	408.5
35								137.7	157.9	179.0	200.9	223.5	246.9	271.0	295.8	321.2	347.2	373.8	401.0	428.7
36								144.6	165.7	187.8	210.7	234.4	258.9	284.2	310.1	336.7	364.0	391.8	420.2	449.2
37								151.6	173.7	196.7	220.7	245.5	271.2	297.6	324.7	352.5	381.0	410.1	439.9	470.2
38									181.8	205.9	230.9	256.9	283.7	311.2	339.5	368.6	398.3	428.8	459.8	491.5
39									190.1	215.2	241.4	268.4	296.4	325.1	354.7	385.0	416.0	447.8	480.2	513.2
40									198.6	224.8	252.0	280.2	309.3	339.3	370.1	401.7	434.0	467.1	500.8	535.3

Appendix C: Estimated V in Cubic Feet by Species, Using DOB, H, and CR

TABLE C-1
ESTIMATED TOTAL STEM CUBIC-FOOT VOLUME FOR DOUGLAS-FIR WITH A TOTAL STEM CROWN RATIO OF 0.1.

DBH	Total Height (ft.)																			
(in.)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
2	0.1	0.2	0.3	0.4	0.6	0.7	--	--	--	--	--	--	--	--	--	--	--	--	--	--
3	.3	.5	.7	.9	1.2	1.5	1.8	2.1	--	--	--	--	--	--	--	--	--	--	--	--
4	.5	.8	1.2	1.6	2.0	2.5	3.0	3.5	4.0	--	--	--	--	--	--	--	--	--	--	--
5	.7	1.2	1.8	2.4	3.1	3.7	4.5	5.2	6.0	6.7	--	--	--	--	--	--	--	--	--	--
6	1.0	1.7	2.5	3.3	4.3	5.2	6.2	7.2	8.3	9.4	10.5	--	--	--	--	--	--	--	--	--
7	--	2.3	3.3	4.4	5.6	6.9	8.2	9.6	10.9	12.4	13.8	15.3	--	--	--	--	--	--	--	--
8	--	2.9	4.2	5.7	7.2	8.8	10.5	12.2	13.9	15.7	17.6	19.5	21.4	--	--	--	--	--	--	--
9	--	3.7	5.3	7.1	8.9	10.9	12.9	15.1	17.2	19.5	21.7	24.1	26.4	--	--	--	--	--	--	--
10	--	--	6.4	8.6	10.8	13.2	15.7	18.2	20.9	23.5	26.3	29.1	32.0	34.9	--	--	--	--	--	--
11	--	--	7.7	10.2	12.9	15.7	18.6	21.7	24.8	28.0	31.2	34.6	38.0	41.4	--	--	--	--	--	--
12	--	--	9.0	12.0	15.1	18.4	21.8	25.4	29.0	32.7	36.5	40.4	44.4	48.4	--	--	--	--	--	--
13	--	--	--	13.9	17.5	21.3	25.3	29.3	33.5	37.8	42.2	46.7	51.3	55.9	60.7	--	--	--	--	--
14	--	--	--	15.9	20.0	24.4	28.9	33.6	38.3	43.3	48.3	53.4	58.6	63.9	69.3	--	--	--	--	--
15	--	--	--	18.0	22.7	27.6	32.8	38.0	43.4	49.0	54.7	60.5	66.4	72.4	78.5	--	--	--	--	--
16	--	--	--	--	25.6	31.1	36.8	42.7	48.8	55.1	61.5	68.0	74.6	81.3	88.2	95.1	--	--	--	--
17	--	--	--	--	28.6	34.7	41.1	47.7	54.5	61.5	68.6	75.8	83.2	90.7	98.3	106.1	--	--	--	--
18	--	--	--	--	31.8	38.6	45.6	52.9	60.4	68.1	76.0	84.1	92.2	100.6	109.0	117.6	--	--	--	--
19	--	--	--	--	--	42.6	50.3	58.4	66.7	75.2	83.8	92.7	101.7	110.9	120.2	129.6	139.2	--	--	--
20	--	--	--	--	--	46.7	55.3	64.1	73.2	82.5	92.0	101.7	111.5	121.6	131.8	142.2	152.6	--	--	--
21	--	--	--	--	--	51.1	60.4	70.0	79.9	90.1	100.4	111.0	121.8	132.8	143.9	155.2	166.7	--	--	--
22	--	--	--	--	--	--	65.7	76.2	87.0	98.0	109.3	120.8	132.5	144.4	156.5	168.8	181.2	193.8	--	--
23	--	--	--	--	--	--	71.3	82.6	94.3	106.2	118.4	130.9	143.5	156.4	169.5	182.8	196.3	210.0	--	--
24	--	--	--	--	--	--	77.0	89.2	101.8	114.7	127.9	141.3	155.0	168.9	183.1	197.4	211.9	226.7	--	--
25	--	--	--	--	--	--	83.0	96.1	109.6	123.5	137.7	152.1	166.8	181.8	197.0	212.5	228.1	244.0	260.0	--
26	--	--	--	--	--	--	--	103.2	117.7	132.6	147.8	163.3	179.1	195.1	211.5	228.0	244.8	261.8	279.0	--
27	--	--	--	--	--	--	--	110.5	126.0	142.0	158.2	174.8	191.7	208.9	226.3	244.1	262.0	280.2	298.6	--
28	--	--	--	--	--	--	--	118.1	134.6	151.6	169.0	186.7	204.7	223.1	241.7	260.6	279.7	299.2	318.8	338.7
29	--	--	--	--	--	--	--	125.9	143.5	161.6	180.0	198.9	218.1	237.6	257.5	277.6	298.0	318.7	339.6	360.7
30	--	--	--	--	--	--	--	--	152.6	171.8	191.4	211.5	231.9	252.6	273.7	295.1	316.8	338.7	360.9	383.4
31	--	--	--	--	--	--	--	--	161.9	182.3	203.1	224.4	246.0	268.0	290.4	313.0	336.0	359.3	382.9	406.7
32	--	--	--	--	--	--	--	--	171.5	193.1	215.1	237.6	260.5	283.8	307.5	331.5	355.8	380.4	405.4	430.6
33	--	--	--	--	--	--	--	--	181.4	204.2	227.4	251.2	275.4	300.0	325.0	350.4	376.1	402.1	428.5	455.1
34	--	--	--	--	--	--	--	--	--	215.5	240.1	265.1	290.7	316.6	343.0	369.7	396.8	424.3	452.1	480.2
35	--	--	--	--	--	--	--	--	--	227.1	253.0	279.4	306.3	333.6	361.4	389.6	418.1	447.0	476.3	505.9
36	--	--	--	--	--	--	--	--	--	239.0	266.2	294.0	322.3	351.0	380.2	409.8	439.9	470.3	501.1	532.2
37	--	--	--	--	--	--	--	--	--	251.2	279.8	308.9	338.6	368.8	399.5	430.6	462.1	494.1	526.4	559.1
38	--	--	--	--	--	--	--	--	--	--	293.6	324.2	355.3	387.0	419.1	451.8	484.9	518.4	552.3	586.6
39	--	--	--	--	--	--	--	--	--	--	307.7	339.8	372.4	405.6	439.3	473.4	508.1	543.2	578.7	614.7
40	--	--	--	--	--	--	--	--	--	--	322.2	355.7	389.8	424.5	459.8	495.5	531.8	568.5	605.7	643.3

TABLE C-2
ESTIMATED TOTAL STEM CUBIC-FOOT VOLUME FOR DOUGLAS-FIR WITH A TOTAL STEM CROWN RATIO OF 0.2.

DBH	Total Height (ft.)																			
(in.)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
2	0.1	0.2	0.3	0.4	0.6	0.7	--	--	--	--	--	--	--	--	--	--	--	--	--	--
3	.3	.5	.7	.9	1.2	1.5	1.7	2.0	--	--	--	--	--	--	--	--	--	--	--	--
4	.5	.8	1.2	1.6	2.0	2.5	2.9	3.4	3.9	--	--	--	--	--	--	--	--	--	--	--
5	.7	1.2	1.8	2.4	3.0	3.7	4.4	5.1	5.9	6.6	--	--	--	--	--	--	--	--	--	--
6	1.0	1.7	2.5	3.3	4.2	5.1	6.1	7.1	8.2	9.2	10.3	--	--	--	--	--	--	--	--	--
7	--	2.3	3.3	4.4	5.6	6.8	8.1	9.4	10.8	12.2	13.6	15.1	--	--	--	--	--	--	--	--
8	--	2.9	4.2	5.6	7.1	8.7	10.3	12.0	13.7	15.5	17.3	19.2	21.0	--	--	--	--	--	--	--
9	--	3.6	5.2	7.0	8.8	10.8	12.8	14.8	17.0	19.2	21.4	23.7	26.0	--	--	--	--	--	--	--
10	--	--	6.4	8.5	10.7	13.0	15.5	18.0	20.5	23.2	25.9	28.7	31.5	34.3	--	--	--	--	--	--
11	--	--	7.6	10.1	12.7	15.5	18.4	21.4	24.4	27.5	30.8	34.0	37.4	40.7	--	--	--	--	--	--
12	--	--	8.9	11.8	14.9	18.2	21.5	25.0	28.6	32.2	36.0	39.8	43.7	47.7	--	--	--	--	--	--
13	--	--	--	13.7	17.3	21.0	24.1	28.9	33.0	37.3	41.6	46.0	50.5	55.1	59.7	--	--	--	--	--
14	--	--	--	15.7	19.8	24.1	28.5	33.1	37.8	42.6	47.5	52.6	57.7	62.9	68.2	--	--	--	--	--
15	--	--	--	17.9	22.5	27.3	32.3	37.5	42.8	48.3	53.9	59.6	65.4	71.3	77.3	--	--	--	--	--
16	--	--	--	--	25.3	30.7	36.3	42.1	48.1	54.2	60.5	66.9	73.4	80.0	86.8	93.6	--	--	--	--
17	--	--	--	--	28.3	34.3	40.6	47.0	53.7	60.5	67.5	74.6	81.9	89.3	96.8	104.4	--	--	--	--
18	--	--	--	--	31.4	38.1	45.0	52.2	59.6	67.1	74.9	82.8	90.8	99.0	107.3	115.7	--	--	--	--
19	--	--	--	--	--	42.0	49.7	57.6	65.7	74.0	82.6	91.3	100.1	109.1	118.3	127.6	137.0	--	--	--
20	--	--	--	--	--	46.1	54.5	63.2	72.1	81.2	90.6	100.1	109.8	119.7	129.7	139.9	150.2	--	--	--
21	--	--	--	--	--	50.4	59.6	69.0	78.8	88.7	98.9	109.3	119.9	130.7	141.6	152.7	164.0	--	--	--
22	--	--	--	--	--	--	64.9	75.1	85.7	96.5	107.6	118.9	130.4	142.1	154.0	166.1	178.3	190.7	--	--
23	--	--	--	--	--	--	70.3	81.5	92.9	104.6	116.6	128.9	141.3	154.0	166.9	179.9	193.2	206.6	--	--
24	--	--	--	--	--	--	76.0	88.0	100.3	113.0	126.0	139.2	152.6	166.3	180.2	194.3	208.6	223.0	--	--
25	--	--	--	--	--	--	81.9	94.8	108.1	121.7	135.6	149.8	164.3	179.0	193.9	209.1	224.5	240.1	255.8	--
26	--	--	--	--	--	--	--	101.8	116.0	130.6	145.6	160.8	176.3	192.1	208.2	224.4	240.9	257.6	274.5	--
27	--	--	--	--	--	--	--	109.0	124.2	139.9	155.9	172.2	188.8	205.7	222.8	240.2	257.9	275.7	293.8	--
28	--	--	--	--	--	--	--	116.5	132.7	149.4	166.5	183.9	201.6	219.6	237.9	256.5	275.3	294.4	313.7	333.2
29	--	--	--	--	--	--	--	124.1	141.4	159.2	177.4	195.9	214.8	234.0	253.4	273.2	293.3	313.6	334.1	354.9
30	--	--	--	--	--	--	--	--	150.4	169.3	188.6	208.3	228.3	248.7	269.4	290.4	311.7	333.3	355.2	377.2
31	--	--	--	--	--	--	--	--	159.6	179.7	200.1	221.0	242.2	263.9	285.8	308.1	330.7	353.6	376.7	400.2
32	--	--	--	--	--	--	--	--	169.1	190.3	211.9	234.0	256.5	279.4	302.7	326.3	350.2	374.4	398.9	423.7
33	--	--	--	--	--	--	--	--	178.8	201.2	224.1	247.4	271.2	295.4	319.9	344.9	370.1	395.7	421.6	447.8
34	--	--	--	--	--	--	--	--	--	212.4	236.5	261.1	286.2	311.7	337.6	363.9	390.6	417.6	444.9	472.5
35	--	--	--	--	--	--	--	--	--	223.8	249.3	275.2	301.6	328.5	355.8	383.5	411.5	439.9	468.7	497.8
36	--	--	--	--	--	--	--	--	--	235.6	262.3	289.6	317.4	345.6	374.3	403.4	432.9	462.8	493.1	523.7
37	--	--	--	--	--	--	--	--	--	247.6	275.6	304.3	333.5	363.1	393.3	423.9	454.9	486.2	518.0	550.2
38	--	--	--	--	--	--	--	--	--	--	289.3	319.3	349.9	381.0	412.7	444.7	477.2	510.2	543.5	577.2
39	--	--	--	--	--	--	--	--	--	--	303.2	334.7	366.7	399.3	432.4	466.0	500.1	534.6	569.5	604.8
40	--	--	--	--	--	--	--	--	--	--	317.4	350.4	383.9	418.0	452.7	487.8	523.5	559.5	596.1	633.0

TABLE C-3
ESTIMATED TOTAL STEM CUBIC-FOOT VOLUME FOR DOUGLAS-FIR WITH A TOTAL STEM CROWN RATIO OF 0.3.

DBH	Total Height (ft.)																			
(in.)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
2	0.1	0.2	0.3	0.4	0.6	0.7														
3	.3	.5	.7	.9	1.2	1.4	1.7	2.0												
4	.5	.8	1.2	1.6	2.0	2.4	2.9	3.4	3.9											
5	.7	1.2	1.7	2.3	3.0	3.6	4.3	5.0	5.8	6.5										
6	1.0	1.7	2.4	3.3	4.1	5.1	6.0	7.0	8.0	9.1	10.1									
7		2.3	3.3	4.3	5.5	6.7	8.0	9.3	10.6	12.0	13.4	14.8								
8		2.9	4.2	5.5	7.0	8.6	10.2	11.8	13.5	15.3	17.0	18.9	20.7							
9		3.6	5.2	6.9	8.7	10.6	12.6	14.6	16.7	18.9	21.1	23.3	25.6							
10			6.3	8.4	10.6	12.9	15.2	17.7	20.2	22.8	25.5	28.2	31.0	33.8						
11			7.5	10.0	12.6	15.3	18.1	21.0	24.1	27.1	30.3	33.5	36.8	40.1						
12			8.9	11.7	14.7	17.9	21.2	24.6	28.2	31.8	35.4	39.2	43.0	46.9						
13				13.6	17.1	20.7	24.6	28.5	32.6	36.7	41.0	45.3	49.7	54.2	58.8					
14				15.6	19.6	23.7	28.1	32.6	37.2	42.0	46.8	51.8	56.8	61.9	67.1					
15				17.7	22.2	26.9	31.9	37.0	42.2	47.6	53.0	58.6	64.3	70.1	76.0					
16					25.0	30.3	35.8	41.5	47.4	53.4	59.6	65.9	72.3	78.8	85.4	92.1				
17					27.9	33.8	40.0	46.4	52.9	59.6	66.5	73.5	80.6	87.9	95.3	102.7				
18					31.0	37.6	44.4	51.5	58.7	66.1	73.7	81.5	89.4	97.4	105.6	113.9				
19						41.5	49.0	56.8	64.8	72.9	81.3	89.9	98.6	107.4	116.4	125.5	134.8			
20						45.5	53.8	62.3	71.1	80.0	89.2	98.6	108.1	117.8	127.7	137.7	147.8			
21						49.8	58.8	68.1	77.6	87.4	97.5	107.7	118.1	128.7	139.4	150.3	161.4			
22							64.0	74.1	84.5	95.1	106.0	117.1	128.4	139.9	151.6	163.5	175.5	187.7		
23							69.4	80.3	91.6	103.1	114.9	126.9	139.2	151.6	164.3	177.1	190.1	203.3		
24							75.0	86.8	98.9	111.4	124.1	137.1	150.3	163.7	177.4	191.2	205.3	219.5		
25							80.8	93.5	106.5	119.9	133.6	147.5	161.8	176.2	190.9	205.8	220.9	236.2	251.7	
26								100.4	114.4	128.7	143.4	158.4	173.6	189.2	204.9	220.9	237.1	253.5	270.1	
27								107.5	122.5	137.8	153.5	169.6	185.9	202.5	219.3	236.4	253.8	271.3	289.1	
28								114.9	130.8	147.2	164.0	181.1	198.5	216.2	234.2	252.5	271.0	289.7	308.7	327.9
29								122.4	139.5	156.9	174.7	193.0	211.5	230.4	249.5	268.9	288.6	308.6	328.8	349.2
30									148.3	166.8	185.8	205.1	224.8	244.9	265.2	285.9	306.8	328.0	349.5	371.2
31									157.4	177.1	197.2	217.7	238.6	259.8	281.4	303.3	325.5	348.0	370.7	393.8
32									166.7	187.5	208.8	230.5	252.7	275.1	298.0	321.2	344.7	368.5	392.5	416.9
33									176.3	198.3	220.8	243.7	267.1	290.9	315.0	339.5	364.3	389.4	414.9	440.6
34										209.3	233.1	257.2	281.9	307.0	332.4	358.3	384.4	411.0	437.8	465.0
35										220.6	245.6	271.1	297.1	323.4	350.3	377.5	405.1	433.0	461.3	489.9
36										232.2	258.5	285.3	312.6	340.3	368.5	397.1	426.1	455.5	485.3	515.3
37										244.0	271.6	299.8	328.4	357.6	387.2	417.3	447.7	478.6	509.8	541.4
38											285.0	314.6	344.6	375.2	406.3	437.8	469.8	502.1	534.9	568.0
39											298.8	329.7	361.2	393.2	425.8	458.8	492.3	526.2	560.5	595.2
40											312.8	345.2	378.1	411.6	445.7	480.2	515.3	550.7	586.6	622.9

TABLE C-4
ESTIMATED TOTAL STEM CUBIC-FOOT VOLUME FOR DOUGLAS-FIR WITH A TOTAL STEM CROWN RATIO OF 0.4.

DBH	Total Height (ft.)																			
(in.)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
2	0.1	0.2	0.3	0.4	0.6	0.7														
3	.3	.5	.7	.9	1.2	1.4	1.7	2.0												
4	.5	.8	1.1	1.5	2.0	2.4	2.8	3.3	3.8											
5	.7	1.2	1.7	2.3	2.9	3.6	4.3	5.0	5.7	6.4										
6	1.0	1.7	2.4	3.2	4.1	5.0	5.9	6.9	7.9	8.9	10.0									
7		2.2	3.2	4.3	5.4	6.6	7.9	9.1	10.5	11.8	13.2	14.6								
8		2.9	4.1	5.5	6.9	8.4	10.0	11.6	13.3	15.0	16.8	18.6	20.4							
9		3.6	5.1	6.8	8.6	10.5	12.4	14.4	16.5	18.6	20.8	23.0	25.2							
10			6.3	8.3	10.4	12.7	15.0	17.5	19.9	22.5	25.1	27.8	30.5	33.2						
11			7.5	9.9	12.4	15.1	17.9	20.7	23.7	26.7	29.8	33.0	36.2	39.5						
12			8.8	11.6	14.6	17.7	20.9	24.3	27.7	31.3	34.9	38.6	42.4	46.2						
13				13.4	16.9	20.5	24.2	28.1	32.1	36.2	40.3	44.6	48.9	53.3	57.8					
14				15.4	19.3	23.4	27.7	32.1	36.7	41.3	46.1	51.0	55.9	61.0	66.1					
15				17.5	21.9	26.6	31.4	36.4	41.6	46.8	52.2	57.7	63.3	69.0	74.8					
16					24.7	29.9	35.3	41.0	46.7	52.7	58.7	64.9	71.2	77.6	84.1	90.7				
17					27.6	33.4	39.5	45.7	52.2	58.8	65.5	72.4	79.4	86.5	93.8	101.1				
18					30.6	37.1	43.8	50.7	57.9	65.2	72.6	80.3	88.0	95.9	103.9	112.1				
19						41.0	48.3	56.0	63.8	71.9	80.1	88.5	97.1	105.8	114.6	123.5	132.6			
20						45.0	53.1	61.4	70.1	78.9	87.9	97.1	106.5	116.0	125.7	135.5	145.5			
21						49.2	58.0	67.1	76.5	86.2	96.0	106.0	116.3	126.7	137.2	148.0	158.8			
22							63.1	73.1	83.3	93.7	104.4	115.3	126.5	137.8	149.3	160.9	172.7	184.7		
23							68.5	79.2	90.3	101.6	113.2	125.0	137.0	149.3	161.7	174.3	187.1	200.1		
24							74.0	85.6	97.5	109.7	122.2	135.0	148.0	161.2	174.6	188.2	202.0	216.0		
25							79.7	92.2	105.0	118.2	131.6	145.3	159.3	173.5	187.9	202.6	217.4	232.5	247.7	
26								99.0	112.8	126.9	141.3	156.0	171.0	186.2	201.7	217.4	233.4	249.5	265.8	
27								106.0	120.8	135.9	151.3	167.0	183.1	199.4	215.9	232.7	249.8	267.0	284.5	
28								113.3	129.0	145.1	161.6	178.4	195.5	212.9	230.6	248.5	266.7	285.1	303.8	322.6
29								120.8	137.5	154.6	172.2	190.1	208.3	226.8	245.6	264.7	284.1	303.7	323.6	343.6
30									146.2	164.5	183.1	202.1	221.4	241.1	261.1	281.4	302.0	322.8	343.9	365.3
31									155.2	174.5	194.3	214.4	235.0	255.8	277.1	298.6	320.4	342.5	364.8	387.5
32									164.4	184.9	205.8	227.1	248.8	270.9	293.4	316.2	339.2	362.6	386.3	410.2
33									173.9	195.5	217.6	240.1	263.1	286.4	310.1	334.2	358.6	383.3	408.3	433.6
34										206.3	229.7	253.4	277.6	302.3	327.3	352.7	378.4	404.5	430.9	457.5
35										217.5	242.0	267.1	292.6	318.5	344.9	371.6	398.7	426.2	453.9	482.1
36										228.9	254.7	281.0	307.9	335.1	362.9	391.0	419.5	448.3	477.6	507.1
37										240.6	267.7	295.3	323.5	352.1	381.3	410.8	440.7	471.0	501.7	532.8
38											280.9	309.9	339.5	369.5	400.0	431.0	462.4	494.2	526.4	559.0
39											294.4	324.8	355.8	387.3	419.2	451.7	484.6	517.9	551.6	585.7
40											308.3	340.1	372.5	405.4	438.9	472.8	507.2	542.1	577.4	613.0

TABLE C-5
ESTIMATED TOTAL STEM CUBIC-FOOT VOLUME FOR DOUGLAS-FIR WITH A TOTAL STEM CROWN RATIO OF 0.5.

DBH	Total Height (ft.)																			
(in.)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
2	0.1	0.2	0.3	0.4	0.5	0.7														
3	.3	.5	.7	.9	1.1	1.4	1.7	1.9												
4	.5	.8	1.1	1.5	1.9	2.4	2.8	3.3	3.7											
5	.7	1.2	1.7	2.3	2.9	3.5	4.2	4.9	5.6	6.3										
6	1.0	1.7	2.4	3.2	4.0	4.9	5.9	6.8	7.8	8.8	9.8									
7		2.2	3.2	4.2	5.4	6.5	7.7	9.0	10.3	11.6	13.0	14.4								
8		2.9	4.1	5.4	6.8	8.3	9.9	11.5	13.1	14.8	16.5	18.3	20.1							
9		3.6	5.1	6.7	8.5	10.3	12.2	14.2	16.2	18.3	20.4	22.6	24.8							
10			6.2	8.2	10.3	12.5	14.8	17.2	19.6	22.2	24.7	27.3	30.0	32.7						
11			7.4	9.8	12.3	14.9	17.6	20.5	23.4	26.3	29.4	32.5	35.6	38.9						
12			8.7	11.5	14.4	17.5	20.7	24.0	27.3	30.8	34.4	38.0	41.7	45.5						
13				13.3	16.7	20.2	23.9	27.7	31.6	35.6	39.7	43.9	48.2	52.5	56.9					
14				15.2	19.1	23.1	27.3	31.7	36.2	40.7	45.4	50.2	55.1	60.0	65.0					
15				17.3	21.7	26.3	31.0	35.9	41.0	46.2	51.5	56.9	62.4	68.0	73.7					
16					24.4	29.5	34.9	40.4	46.1	51.9	57.8	63.9	70.1	76.4	82.7	89.2				
17					27.3	33.0	39.0	45.1	51.4	57.9	64.5	71.3	78.2	85.2	92.3	99.5				
18					30.3	36.6	43.2	50.0	57.0	64.2	71.6	79.1	86.7	94.4	102.3	110.3				
19						40.4	47.7	55.2	62.9	70.8	78.9	87.2	95.6	104.1	112.8	121.6	130.5			
20						44.4	52.4	60.6	69.1	77.7	86.6	95.6	104.8	114.2	123.7	133.4	143.2			
21						48.6	57.3	66.2	75.5	84.9	94.6	104.5	114.5	124.7	135.1	145.6	156.3			
22							62.3	72.1	82.1	92.4	102.9	113.6	124.5	135.7	146.9	158.4	170.0	181.8		
23							67.6	78.1	89.0	100.1	111.5	123.1	135.0	147.0	159.2	171.6	184.2	196.9		
24							73.0	84.4	96.2	108.2	120.4	133.0	145.7	158.7	171.9	185.3	198.8	212.6		
25							78.7	90.9	103.6	116.5	129.7	143.2	156.9	170.9	185.0	199.4	214.0	228.8	243.8	
26								97.7	111.2	125.1	139.2	153.7	168.4	183.4	198.6	214.0	229.7	245.5	261.6	
27								104.6	119.1	133.9	149.1	164.5	180.3	196.3	212.6	229.1	245.9	262.8	280.0	
28								111.8	127.2	143.0	159.2	175.7	192.5	209.7	227.0	244.6	262.5	280.6	298.9	317.5
29								119.2	135.6	152.4	169.7	187.3	205.2	223.4	241.9	260.6	279.7	298.9	318.4	338.2
30									144.2	162.1	180.4	199.1	218.1	237.5	257.1	277.1	297.3	317.8	338.5	359.4
31									153.1	172.0	191.5	211.3	231.4	252.0	272.8	293.9	315.4	337.1	359.1	381.3
32									162.1	182.2	202.8	223.8	245.1	266.8	288.9	311.3	333.9	356.9	380.2	403.7
33									171.5	192.7	214.4	236.6	259.1	282.1	305.4	329.0	353.0	377.3	401.9	426.7
34										203.4	226.3	249.7	273.5	297.7	322.3	347.2	372.5	398.1	424.0	450.3
35										214.4	238.5	263.1	288.2	313.7	339.6	365.9	392.5	419.5	446.8	474.4
36										225.7	251.0	276.9	303.3	330.1	357.3	384.9	412.9	441.3	470.0	499.1
37										237.2	263.8	291.0	318.7	346.8	375.4	404.4	433.9	463.7	493.8	524.3
38											276.9	305.4	334.4	363.9	393.9	424.4	455.2	486.5	518.1	550.1
39											290.2	320.1	350.5	381.4	412.8	444.7	477.1	509.8	542.9	576.4
40											303.8	335.1	366.9	399.3	432.2	465.5	499.3	533.6	568.3	603.3

TABLE C-6
ESTIMATED TOTAL STEM CUBIC-FOOT VOLUME FOR DOUGLAS-FIR WITH A TOTAL STEM CROWN RATIO OF 0.6.

DBH	Total Height (ft.)																			
(in.)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
2	0.1	0.2	0.3	0.4	0.5	0.7														
3	.3	.4	.7	.9	1.1	1.4	1.6	1.9	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –
4	.5	.8	1.1	1.5	1.9	2.3	2.8	3.2	3.7	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –
5	.7	1.2	1.7	2.3	2.9	3.5	4.1	4.8	5.5	6.2	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –
6	1.0	1.7	2.4	3.2	4.0	4.9	5.8	6.7	7.7	8.7	9.7	– –	– –	– –	– –	– –	– –	– –	– –	– –
7	– –	2.2	3.2	4.2	5.3	6.4	7.6	8.9	10.1	11.5	12.8	14.1	– –	– –	– –	– –	– –	– –	– –	– –
8	– –	2.9	4.1	5.4	6.8	8.2	9.7	11.3	12.9	14.6	16.3	18.0	19.8	– –	– –	– –	– –	– –	– –	– –
9	– –	3.6	5.1	6.7	8.4	10.2	12.1	14.0	16.0	18.0	20.1	22.3	24.4	– –	– –	– –	– –	– –	– –	– –
10	– –	– –	6.2	8.1	10.2	12.4	14.6	17.0	19.4	21.8	24.4	26.9	29.5	32.2	– –	– –	– –	– –	– –	– –
11	– –	– –	7.3	9.7	12.1	14.7	17.4	20.2	23.0	25.9	28.9	32.0	35.1	38.2	– –	– –	– –	– –	– –	– –
12	– –	– –	8.6	11.3	14.2	17.2	20.4	23.6	27.0	30.4	33.9	37.4	41.1	44.7	– –	– –	– –	– –	– –	– –
13	– –	– –	– –	13.2	16.5	20.0	23.6	27.3	31.2	35.1	39.1	43.2	47.4	51.7	56.0	– –	– –	– –	– –	– –
14	– –	– –	– –	15.1	18.9	22.9	27.0	31.3	35.6	40.1	44.7	49.4	54.2	59.1	64.0	– –	– –	– –	– –	– –
15	– –	– –	– –	17.1	21.4	25.9	30.6	35.4	40.4	45.5	50.7	56.0	61.4	66.9	72.5	– –	– –	– –	– –	– –
16	– –	– –	– –	– –	24.1	29.2	34.4	39.8	45.4	51.1	57.0	62.9	69.0	75.2	81.5	87.8	– –	– –	– –	– –
17	– –	– –	– –	– –	27.0	32.6	38.4	44.5	50.7	57.1	63.6	70.2	77.0	83.9	90.9	98.0	– –	– –	– –	– –
18	– –	– –	– –	– –	30.0	36.2	42.7	49.4	56.2	63.3	70.5	77.9	85.4	93.0	100.7	108.6	– –	– –	– –	– –
19	– –	– –	– –	– –	– –	40.0	47.1	54.5	62.0	69.8	77.8	85.9	94.1	102.5	111.0	119.7	128.5	– –	– –	– –
20	– –	– –	– –	– –	– –	43.9	51.7	59.8	68.1	76.6	85.3	94.2	103.3	112.5	121.8	131.3	140.9	– –	– –	– –
21	– –	– –	– –	– –	– –	48.0	56.5	65.3	74.4	83.7	93.2	102.9	112.8	122.8	133.0	143.4	153.9	– –	– –	– –
22	– –	– –	– –	– –	– –	– –	61.5	71.1	81.0	91.1	101.4	111.9	122.7	133.6	144.7	155.9	167.3	178.9	– –	– –
23	– –	– –	– –	– –	– –	– –	66.7	77.1	87.8	98.7	109.9	121.3	132.9	144.7	156.7	168.9	181.3	193.8	– –	– –
24	– –	– –	– –	– –	– –	– –	72.1	83.3	94.8	106.6	118.7	131.0	143.5	156.3	169.3	182.4	195.7	209.2	– –	– –
25	– –	– –	– –	– –	– –	– –	77.7	89.7	102.1	114.8	127.8	141.0	154.5	168.3	182.2	196.3	210.7	225.2	239.9	– –
26	– –	– –	– –	– –	– –	– –	– –	96.4	109.7	123.3	137.2	151.4	165.9	180.6	195.6	210.7	226.1	241.7	257.4	– –
27	– –	– –	– –	– –	– –	– –	– –	103.2	117.4	132.0	146.9	162.1	177.6	193.3	209.3	225.6	242.0	258.7	275.6	– –
28	– –	– –	– –	– –	– –	– –	– –	110.3	125.5	141.0	156.9	173.1	189.7	206.5	223.5	240.9	258.4	276.2	294.2	312.4
29	– –	– –	– –	– –	– –	– –	– –	117.6	133.7	150.3	167.2	184.5	202.1	220.0	238.2	256.6	275.3	294.2	313.4	332.8
30	– –	– –	– –	– –	– –	– –	– –	– –	142.2	159.8	177.8	196.2	214.9	233.9	253.2	272.8	292.6	312.8	333.1	353.7
31	– –	– –	– –	– –	– –	– –	– –	– –	151.0	169.6	188.7	208.2	228.0	248.1	268.6	289.4	310.5	331.8	353.4	375.2
32	– –	– –	– –	– –	– –	– –	– –	– –	159.9	179.7	199.9	220.5	241.4	262.8	284.5	306.5	328.8	351.3	374.2	397.3
33	– –	– –	– –	– –	– –	– –	– –	– –	169.1	190.0	211.3	233.1	255.3	277.8	300.7	324.0	347.5	371.4	395.5	419.9
34	– –	– –	– –	– –	– –	– –	– –	– –	– –	200.6	223.1	246.0	269.4	293.2	317.4	341.9	366.7	391.9	417.4	443.1
35	– –	– –	– –	– –	– –	– –	– –	– –	– –	211.4	235.1	259.3	283.9	309.0	334.4	360.2	386.4	412.9	439.7	466.9
36	– –	– –	– –	– –	– –	– –	– –	– –	– –	222.5	247.4	272.9	298.8	325.1	351.9	379.0	406.5	434.4	462.6	491.2
37	– –	– –	– –	– –	– –	– –	– –	– –	– –	233.9	260.0	286.7	313.9	341.6	369.7	398.2	427.1	456.4	486.0	516.0
38	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	272.9	300.9	329.5	358.5	387.9	417.9	448.2	478.9	510.0	541.4
39	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	286.1	315.4	345.3	375.7	406.6	437.9	469.7	501.8	534.4	567.3
40	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	299.5	330.2	361.5	393.3	425.6	458.4	491.6	525.3	559.3	593.8

TABLE C-7
ESTIMATED TOTAL STEM CUBIC-FOOT VOLUME FOR DOUGLAS-FIR WITH A TOTAL STEM CROWN RATIO OF 0.7.

DBH	Total Height (ft.)																			
(in.)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
2	0.1	0.2	0.3	0.4	0.5	0.6														
3	.3	.4	.7	.9	1.1	1.4	1.6	1.9												
4	.5	.8	1.1	1.5	1.9	2.3	2.7	3.2	3.6											
5	.7	1.2	1.7	2.2	2.8	3.4	4.1	4.8	5.4	6.1										
6	1.1	1.7	2.4	3.1	3.9	4.8	5.7	6.6	7.6	8.5	9.5									
7		2.2	3.1	4.2	5.2	6.4	7.5	8.8	10.0	11.3	12.6	13.9								
8		2.8	4.0	5.3	6.7	8.1	9.6	11.2	12.7	14.4	16.0	17.7	19.4							
9		3.6	5.0	6.6	8.3	10.1	11.9	13.8	15.8	17.8	19.8	21.9	24.1							
10			6.1	8.0	10.1	12.2	14.4	16.7	19.1	21.5	24.0	26.5	29.1	31.7						
11			7.3	9.6	12.0	14.5	17.2	19.9	22.7	25.6	28.5	31.5	34.5	37.7						
12			8.6	11.2	14.1	17.0	20.1	23.3	26.6	29.9	33.4	36.9	40.4	44.1						
13				13.0	16.3	19.7	23.3	26.9	30.7	34.6	38.6	42.6	46.7	50.9	55.1					
14				14.9	18.7	22.6	26.6	30.8	35.1	39.6	44.1	48.7	53.4	58.2	63.0					
15				17.0	21.2	25.6	30.2	34.9	39.8	44.8	49.9	55.2	60.5	65.9	71.4					
16					23.9	28.8	34.0	39.3	44.8	50.4	56.1	62.0	68.0	74.0	80.2	86.4				
17					26.7	32.2	37.9	43.9	50.0	56.2	62.6	69.2	75.8	82.6	89.5	96.4				
18					29.6	35.8	42.1	48.7	55.5	62.4	69.5	76.7	84.1	91.6	99.2	106.9				
19						39.5	46.5	53.7	61.2	68.8	76.6	84.6	92.7	101.0	109.3	117.8	126.5			
20						43.4	51.0	59.0	67.1	75.5	84.1	92.8	101.7	110.7	119.9	129.3	138.7			
21						47.4	55.8	64.5	73.4	82.5	91.8	101.4	111.1	120.9	131.0	141.1	151.5			
22							60.7	70.2	79.8	89.8	99.9	110.3	120.8	131.5	142.4	153.5	164.7	176.1		
23							65.9	76.1	86.6	97.3	108.3	119.5	130.9	142.5	154.3	166.3	178.4	190.7		
24							71.2	82.2	93.5	105.1	117.0	129.1	141.4	153.9	166.7	179.6	192.7	205.9		
25							76.7	88.5	100.7	113.2	125.9	139.0	152.2	165.7	179.4	193.3	207.4	221.7	236.1	
26								95.1	108.2	121.5	135.2	149.2	163.4	177.9	192.6	207.5	222.6	237.9	253.4	
27								101.9	115.8	130.2	144.8	159.7	174.9	190.4	206.1	222.1	238.3	254.6	271.2	
28								108.9	123.8	139.0	154.7	170.6	186.8	203.4	220.1	237.1	254.4	271.9	289.6	307.5
29								116.0	131.9	148.2	164.8	181.8	199.1	216.7	234.5	252.6	271.0	289.6	308.5	327.5
30									140.3	157.6	175.3	193.3	211.7	230.3	249.3	268.6	288.1	307.9	327.9	348.1
31									148.9	167.2	186.0	205.1	224.6	244.4	264.5	285.0	305.7	326.6	347.8	369.3
32									157.8	177.2	197.0	217.3	237.9	258.8	280.1	301.8	323.7	345.9	368.3	391.0
33									166.9	187.4	208.3	229.7	251.5	273.6	296.1	319.0	342.1	365.6	389.3	413.3
34										197.8	219.9	242.5	265.4	288.8	312.5	336.6	361.1	385.8	410.8	436.1
35										208.5	231.8	255.5	279.7	304.3	329.3	354.7	380.4	406.5	432.9	459.5
36										219.4	243.9	268.9	294.4	320.2	346.5	373.2	400.3	427.7	455.4	483.4
37										230.6	256.3	282.6	309.3	336.5	364.1	392.1	420.5	449.3	478.4	507.9
38											269.0	296.6	324.6	353.1	382.1	411.5	441.3	471.4	502.0	532.9
39											282.0	310.9	340.2	370.1	400.4	431.2	462.4	494.1	526.1	558.4
40											295.3	325.4	356.2	387.4	419.2	451.4	484.1	517.1	550.6	584.5

TABLE C-8
ESTIMATED TOTAL STEM CUBIC-FOOT VOLUME FOR DOUGLAS-FIR WITH A TOTAL STEM CROWN RATIO OF 0.8.

DBH	Total Height (ft.)																			
(in.)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
2	0.1	0.2	0.3	0.4	0.5	0.6														
3	.3	.4	.6	.9	1.1	1.3	1.6	1.9												
4	.5	.8	1.1	1.5	1.9	2.3	2.7	3.1	3.6											
5	.7	1.2	1.7	2.2	2.8	3.4	4.0	4.7	5.4	6.0										
6	1.1	1.6	2.3	3.1	3.9	4.7	5.6	6.5	7.5	8.4	9.4									
7		2.2	3.1	4.1	5.2	6.3	7.4	8.6	9.9	11.1	12.4	13.7								
8		2.8	4.0	5.3	6.6	8.0	9.5	11.0	12.6	14.1	15.8	17.4	19.1							
9		3.6	5.0	6.5	8.2	9.9	11.7	13.6	15.5	17.5	19.5	21.6	23.7							
10			6.1	7.9	9.9	12.0	14.2	16.5	18.8	21.2	23.6	26.1	28.6	31.2						
11			7.2	9.5	11.9	14.3	16.9	19.6	22.4	25.2	28.1	31.0	34.0	37.1						
12			8.5	11.1	13.9	16.8	19.8	23.0	26.2	29.5	32.9	36.3	39.8	43.4						
13				12.9	16.1	19.5	23.0	26.6	30.3	34.1	38.0	42.0	46.0	50.1	54.3					
14				14.8	18.5	22.3	26.3	30.4	34.6	39.0	43.4	48.0	52.6	57.3	62.1					
15				16.8	21.0	25.3	29.8	34.5	39.3	44.2	49.2	54.3	59.6	64.9	70.3					
16					23.6	28.5	33.5	38.8	44.2	49.7	55.3	61.1	66.9	72.9	79.0	85.1				
17					26.4	31.8	37.5	43.3	49.3	55.4	61.7	68.1	74.7	81.3	88.1	94.9				
18					29.3	35.3	41.6	48.0	54.7	61.5	68.5	75.6	82.8	90.2	97.6	105.2				
19						39.0	45.9	53.0	60.3	67.8	75.5	83.3	91.3	99.4	107.7	116.0	124.5			
20						42.9	50.4	58.2	66.2	74.4	82.9	91.4	100.2	109.1	118.1	127.3	136.5			
21						46.9	55.1	63.6	72.4	81.3	90.5	99.9	109.4	119.1	129.0	139.0	149.1			
22							60.0	69.2	78.7	88.5	98.5	108.6	119.0	129.6	140.3	151.1	162.1	173.3		
23							65.1	75.1	85.4	95.9	106.7	117.7	129.0	140.4	152.0	163.7	175.7	187.8		
24							70.3	81.1	92.2	103.6	115.3	127.2	139.3	151.6	164.1	176.8	189.7	202.7		
25							75.8	87.4	99.3	111.6	124.1	136.9	150.0	163.2	176.7	190.3	204.2	218.2	232.4	
26								93.9	106.7	119.8	133.3	147.0	161.0	175.2	189.6	204.3	219.1	234.2	249.4	
27								100.5	114.3	128.3	142.7	157.4	172.4	187.6	203.0	218.7	234.6	250.7	266.9	
28								107.4	122.1	137.1	152.5	168.1	184.1	200.3	216.8	233.5	250.5	267.6	285.0	302.6
29								114.5	130.1	146.1	162.5	179.1	196.1	213.4	231.0	248.8	266.8	285.1	303.6	322.3
30									138.4	155.4	172.8	190.5	208.5	226.9	245.5	264.5	283.7	303.1	322.7	342.6
31									146.9	164.9	183.4	202.1	221.3	240.8	260.5	280.6	300.9	321.5	342.4	363.5
32									155.7	174.7	194.2	214.1	234.4	255.0	275.9	297.1	318.7	340.5	362.6	384.9
33									164.6	184.8	205.4	226.4	247.8	269.6	291.7	314.1	336.9	359.9	383.2	406.8
34										195.1	216.8	239.0	261.5	284.5	307.8	331.5	355.5	379.8	404.4	429.3
35										205.6	228.5	251.8	275.6	299.8	324.4	349.3	374.6	400.2	426.1	452.3
36										216.4	240.5	265.0	290.0	315.5	341.3	367.5	394.1	421.0	448.3	475.9
37										227.5	252.7	278.5	304.8	331.5	358.6	386.2	414.1	442.4	471.0	499.9
38											265.3	292.3	319.9	347.9	376.3	405.2	434.5	464.2	494.2	524.5
39											278.1	306.4	335.3	364.6	394.4	424.7	455.4	486.4	517.9	549.7
40											291.1	320.8	351.0	381.7	412.9	444.5	476.6	509.1	542.0	575.3

TABLE C-9
ESTIMATED TOTAL STEM CUBIC-FOOT VOLUME FOR DOUGLAS-FIR WITH A TOTAL STEM CROWN RATIO OF 0.9.

DBH	Total Height (ft.)																			
(in.)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
2	0.1	0.2	0.3	0.4	0.5	0.6														
3	.3	.4	.6	.9	1.1	1.3	1.6	1.8												
4	.5	.8	1.1	1.5	1.8	2.2	2.6	3.1	3.5											
5	.8	1.2	1.7	2.2	2.8	3.4	4.0	4.6	5.3	6.0										
6	1.1	1.7	2.3	3.1	3.9	4.7	5.5	6.4	7.3	8.3	9.2									
7		2.2	3.1	4.1	5.1	6.2	7.3	8.5	9.7	10.9	12.2	13.5								
8		2.9	4.0	5.2	6.5	7.9	9.4	10.8	12.4	13.9	15.5	17.2	18.9							
9		3.6	5.0	6.5	8.1	9.8	11.6	13.4	15.3	17.3	19.2	21.3	23.3							
10			6.1	7.9	9.8	11.9	14.0	16.3	18.5	20.9	23.3	25.7	28.2	30.7						
11			7.2	9.4	11.7	14.2	16.7	19.3	22.0	24.8	27.7	30.6	33.5	36.5						
12			8.5	11.0	13.8	16.6	19.6	22.7	25.8	29.1	32.4	35.8	39.2	42.7						
13				12.8	15.9	19.2	22.7	26.2	29.9	33.6	37.4	41.3	45.3	49.3	53.4					
14				14.7	18.3	22.0	25.9	30.0	34.2	38.4	42.8	47.3	51.8	56.4	61.1					
15				16.7	20.7	25.0	29.4	34.0	38.7	43.6	48.5	53.5	58.7	63.9	69.2					
16					23.3	28.1	33.1	38.3	43.5	49.0	54.5	60.2	65.9	71.8	77.7	83.8				
17					26.1	31.4	37.0	42.7	48.6	54.7	60.8	67.1	73.6	80.1	86.7	93.5				
18					29.0	34.9	41.1	47.4	53.9	60.6	67.5	74.5	81.6	88.8	96.2	103.6				
19						38.6	45.3	52.3	59.5	66.9	74.4	82.1	89.9	97.9	106.0	114.2	122.5			
20						42.4	49.8	57.4	65.3	73.4	81.7	90.1	98.7	107.4	116.3	125.3	134.4			
21						46.3	54.4	62.8	71.4	80.2	89.2	98.4	107.8	117.3	127.0	136.8	146.8			
22							59.2	68.3	77.7	87.3	97.1	107.1	117.2	127.6	138.1	148.8	159.6	170.6		
23							64.3	74.1	84.2	94.6	105.2	116.0	127.1	138.3	149.7	161.2	173.0	184.8		
24							69.5	80.1	91.0	102.2	113.6	125.3	137.2	149.3	161.6	174.1	186.7	199.6		
25							74.8	86.3	98.0	110.1	122.4	134.9	147.7	160.8	174.0	187.4	201.0	214.8	228.7	
26								92.7	105.3	118.2	131.4	144.9	158.6	172.6	186.8	201.2	215.8	230.5	245.5	
27								99.3	112.7	126.6	140.7	155.1	169.8	184.8	199.9	215.3	230.9	246.8	262.8	
28								106.1	120.5	135.2	150.3	165.7	181.4	197.3	213.5	229.9	246.6	263.5	280.6	297.8
29								113.1	128.4	144.1	160.2	176.6	193.3	210.2	227.5	245.0	262.7	280.7	298.9	317.3
30									136.6	153.3	170.3	187.7	205.5	223.5	241.8	260.4	279.3	298.4	317.7	337.3
31									145.0	162.7	180.8	199.2	218.0	237.2	256.6	276.3	296.3	316.6	337.1	357.8
32									153.6	172.3	191.5	211.0	230.9	251.2	271.8	292.6	313.8	335.2	356.9	378.8
33									162.4	182.2	202.5	223.1	244.2	265.6	287.3	309.3	331.7	354.3	377.3	400.4
34										192.4	213.7	235.5	257.7	280.3	303.2	326.5	350.1	373.9	398.1	422.6
35										202.8	225.3	248.2	271.6	295.4	319.5	344.0	368.9	394.0	419.5	445.2
36										213.5	237.1	261.2	285.8	310.8	336.2	362.0	388.1	414.5	441.3	468.4
37										224.4	249.2	274.5	300.4	326.6	353.3	380.3	407.8	435.5	463.7	492.1
38											261.6	288.1	315.2	342.7	370.7	399.1	427.9	457.0	486.5	516.3
39											274.2	302.0	330.4	359.2	388.5	418.3	448.4	478.9	509.8	541.1
40											287.1	316.2	345.9	376.1	406.7	437.8	469.4	501.3	533.6	566.4

TABLE C-10
ESTIMATED TOTAL STEM CUBIC-FOOT VOLUME FOR DOUGLAS-FIR WITH A TOTAL STEM CROWN RATIO OF 1.0.

DBH	Total Height (ft.)																			
(in.)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
2	0.1	0.2	0.3	0.4	0.5	0.6														
3	.3	.5	.6	.9	1.1	1.3	1.6	1.8	—	—	—	—	—	—	—	—	—	—	—	—
4	.5	.8	1.1	1.5	1.8	2.2	2.6	3.1	3.5	—	—	—	—	—	—	—	—	—	—	—
5	.8	1.2	1.7	2.2	2.8	3.4	4.0	4.6	5.2	5.9	—	—	—	—	—	—	—	—	—	—
6	1.1	1.7	2.3	3.1	3.9	4.7	5.5	6.4	7.3	8.2	9.2	—	—	—	—	—	—	—	—	—
7	—	2.2	3.1	4.1	5.1	6.2	7.3	8.5	9.7	10.9	12.1	13.4	—	—	—	—	—	—	—	—
8	—	2.9	4.0	5.2	6.5	7.9	9.3	10.8	12.3	13.8	15.4	17.0	18.7	—	—	—	—	—	—	—
9	—	3.6	5.0	6.5	8.1	9.8	11.6	13.4	15.2	17.1	19.1	21.1	23.1	—	—	—	—	—	—	—
10	—	—	6.1	7.9	9.9	11.9	14.0	16.2	18.4	20.7	23.1	25.5	27.9	30.4	—	—	—	—	—	—
11	—	—	7.3	9.4	11.7	14.2	16.7	19.3	21.9	24.6	27.4	30.3	33.2	36.1	—	—	—	—	—	—
12	—	—	8.6	11.1	13.8	16.6	19.5	22.6	25.7	28.9	32.1	35.4	38.8	42.3	—	—	—	—	—	—
13	—	—	—	12.9	16.0	19.2	22.6	26.1	29.7	33.4	37.1	41.0	44.9	48.8	52.9	—	—	—	—	—
14	—	—	—	14.8	18.3	22.0	25.9	29.9	34.0	38.2	42.5	46.8	51.3	55.8	60.5	—	—	—	—	—
15	—	—	—	16.8	20.8	25.0	29.3	33.9	38.5	43.2	48.1	53.1	58.1	63.3	68.5	—	—	—	—	—
16	—	—	—	—	23.4	28.1	33.0	38.1	43.3	48.6	54.1	59.6	65.3	71.1	76.9	82.9	—	—	—	—
17	—	—	—	—	26.2	31.4	36.9	42.5	48.3	54.3	60.4	66.6	72.9	79.3	85.8	92.4	—	—	—	—
18	—	—	—	—	29.1	34.9	40.9	47.2	53.6	60.2	66.9	73.8	80.8	87.9	95.2	102.5	—	—	—	—
19	—	—	—	—	—	38.5	45.2	52.1	59.2	66.4	73.8	81.4	89.1	96.9	104.9	113.0	121.2	—	—	—
20	—	—	—	—	—	42.3	49.6	57.2	64.9	72.9	81.0	89.3	97.8	106.4	115.1	123.9	132.9	—	—	—
21	—	—	—	—	—	46.3	54.3	62.5	71.0	79.6	88.5	97.6	106.8	116.2	125.7	135.4	145.2	—	—	—
22	—	—	—	—	—	—	59.1	68.0	77.2	86.7	96.3	106.1	116.2	126.4	136.7	147.2	157.9	168.6	—	—
23	—	—	—	—	—	—	64.1	73.8	83.7	94.0	104.4	115.0	125.9	136.9	148.1	159.5	171.0	182.7	—	—
24	—	—	—	—	—	—	69.3	79.7	90.5	101.5	112.8	124.3	136.0	147.9	160.0	172.2	184.7	197.3	—	—
25	—	—	—	—	—	—	74.6	85.9	97.5	109.3	121.4	133.8	146.4	159.2	172.2	185.4	198.8	212.3	226.1	—
26	—	—	—	—	—	—	—	92.3	104.7	117.4	130.4	143.7	157.2	170.9	184.9	199.0	213.4	227.9	242.6	—
27	—	—	—	—	—	—	—	98.8	112.1	125.7	139.6	153.8	168.3	183.0	197.9	213.0	228.4	244.0	259.7	—
28	—	—	—	—	—	—	—	105.6	119.8	134.3	149.1	164.3	179.7	195.4	211.3	227.5	243.9	260.5	277.3	294.3
29	—	—	—	—	—	—	—	112.6	127.7	143.1	159.0	175.1	191.5	208.2	225.2	242.4	259.8	277.5	295.4	313.5
30	—	—	—	—	—	—	—	—	135.8	152.2	169.0	186.2	203.6	221.4	239.4	257.7	276.2	295.0	314.0	333.2
31	—	—	—	—	—	—	—	—	144.2	161.6	179.4	197.6	216.1	234.9	254.0	273.4	293.1	313.0	333.1	353.5
32	—	—	—	—	—	—	—	—	152.8	171.2	190.0	209.3	228.9	248.8	269.0	289.5	310.3	331.4	352.8	374.3
33	—	—	—	—	—	—	—	—	161.6	181.0	201.0	221.3	242.0	263.0	284.4	306.1	328.1	350.3	372.9	395.7
34	—	—	—	—	—	—	—	—	—	191.1	212.1	233.6	255.4	277.6	300.2	323.0	346.2	369.7	393.5	417.5
35	—	—	—	—	—	—	—	—	—	201.5	223.6	246.2	269.2	292.6	316.3	340.4	364.8	389.6	414.6	439.9
36	—	—	—	—	—	—	—	—	—	212.1	235.3	259.1	283.3	307.8	332.8	358.2	383.9	409.9	436.2	462.8
37	—	—	—	—	—	—	—	—	—	222.9	247.3	272.3	297.7	323.5	349.7	376.3	403.3	430.6	458.3	486.3
38	—	—	—	—	—	—	—	—	—	—	259.6	285.8	312.4	339.5	367.0	394.9	423.2	451.9	480.9	510.2
39	—	—	—	—	—	—	—	—	—	—	272.1	299.5	327.4	355.8	384.6	413.9	443.5	473.6	503.9	534.7
40	—	—	—	—	—	—	—	—	—	—	284.9	313.6	342.8	372.5	402.7	433.3	464.3	495.7	527.5	559.6

TABLE C-11
ESTIMATED TOTAL STEM CUBIC-FOOT VOLUME FOR GRAND/WHITE FIR WITH TOTAL STEM CROWN RATIO OF 0.1.

DBH	Total Height (ft.)																			
(in.)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
2	0.1	0.2	0.4	0.5	0.7															
3	.3	.5	.8	1.1	1.4	1.7	2.1													
4	.5	.9	1.3	1.8	2.4	2.9	3.5	4.1	4.8											
5	.8	1.3	2.0	2.7	3.5	4.4	5.2	6.1	7.1											
6	1.1	1.9	2.8	3.8	4.9	6.1	7.3	8.5	9.8	11.1										
7		2.5	3.7	5.1	6.5	8.0	9.6	11.2	12.9	14.6										
8		3.2	4.8	6.5	8.3	10.2	12.2	14.3	16.4	18.6	20.8									
9		4.0	5.9	8.0	10.3	12.6	15.1	17.6	20.3	23.0	25.7	28.6								
10			7.2	9.7	12.4	15.3	18.2	21.3	24.5	27.7	31.1	34.5	38.0							
11			8.6	11.6	14.8	18.1	21.7	25.3	29.0	32.9	36.8	40.9	45.0	49.2						
12			10.1	13.6	17.3	21.3	25.3	29.6	33.9	38.4	43.0	47.7	52.6	57.4						
13				15.8	20.1	24.6	29.3	34.2	39.2	44.4	49.7	55.1	60.6	66.3	72.0					
14				18.1	23.0	28.1	33.5	39.0	44.8	50.7	56.7	62.9	69.2	75.6	82.2					
15				20.6	26.1	31.9	37.9	44.2	50.7	57.4	64.2	71.2	78.3	85.6	92.9					
16					29.3	35.9	42.7	49.7	57.0	64.4	72.1	79.9	87.9	96.0	104.3	112.7				
17					32.8	40.0	47.6	55.4	63.5	71.8	80.4	89.1	97.9	107.0	116.2	125.6				
18					36.4	44.4	52.8	61.5	70.4	79.6	89.0	98.7	108.5	118.5	128.7	139.1				
19						49.1	58.3	67.8	77.6	87.7	98.1	108.7	119.5	130.5	141.7	153.1	164.7			
20						53.9	63.9	74.4	85.2	96.2	107.6	119.2	131.0	143.1	155.4	167.8	180.5			
21						58.9	69.9	81.3	93.0	105.1	117.4	130.1	143.0	156.1	169.5	183.1	196.9			
22							76.0	88.4	101.1	114.2	127.7	141.4	155.4	169.7	184.2	199.0	213.9	229.1		
23							82.4	95.8	109.6	123.8	138.3	153.1	168.3	183.7	199.4	215.4	231.6	248.1		
24							89.1	103.5	118.4	133.6	149.3	165.3	181.6	198.3	215.2	232.4	249.9	267.6		
25							96.0	111.4	127.4	143.8	160.7	177.9	195.4	213.3	231.5	250.0	268.8	287.8	307.1	
26								119.7	136.8	154.4	172.4	190.9	209.7	228.8	248.4	268.2	288.3	308.7	329.4	
27								128.1	146.4	165.2	184.5	204.2	224.4	244.9	265.7	286.9	308.4	330.2	352.3	
28								136.9	156.4	176.5	197.0	218.0	239.5	261.3	283.6	306.2	329.1	352.4	376.0	399.8
29								145.9	166.7	188.0	209.9	232.2	255.0	278.3	302.0	326.0	350.4	375.2	400.2	425.6
30									177.2	199.9	223.1	246.8	271.1	295.7	320.9	346.4	372.3	398.6	425.2	452.2
31									188.0	212.0	236.7	261.8	287.5	313.6	340.3	367.3	394.8	422.6	450.8	479.4
32									199.2	224.6	250.6	277.2	304.4	332.0	360.2	388.8	417.8	447.3	477.1	507.3
33									210.6	237.4	264.9	293.0	321.6	350.9	380.6	410.8	441.4	472.5	504.1	536.0
34										250.6	279.5	309.1	339.4	370.2	401.5	433.3	465.7	498.4	531.7	565.3
35										264.0	294.5	325.7	357.5	389.9	422.9	456.4	490.4	524.9	559.9	595.3
36										277.8	309.9	342.6	376.1	410.1	444.8	480.0	515.8	552.0	588.8	626.0
37										291.9	325.6	360.0	395.1	430.8	467.2	504.2	541.7	579.7	618.3	657.4
38											341.6	377.7	414.5	451.9	490.1	528.8	568.2	608.1	648.5	689.4
39											358.0	395.8	434.3	473.5	513.4	554.0	595.2	637.0	679.3	722.2
40											374.8	414.2	454.5	495.5	537.3	579.7	622.8	666.5	710.7	755.6

TABLE C-12
ESTIMATED TOTAL STEM CUBIC-FOOT VOLUME FOR GRAND/WHITE FIR WITH A TOTAL STEM CROWN RATIO OF 0.2.

DBH	Total Height (ft.)																			
(in.)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
2	0.1	0.2	0.4	0.5	0.7															
3	.3	.5	.8	1.1	1.4	1.7	2.0													
4	.5	.9	1.3	1.8	2.3	2.8	3.4	4.0	4.6											
5	.8	1.3	2.0	2.7	3.4	4.3	5.1	6.0	6.9											
6	1.1	1.8	2.7	3.7	4.8	5.9	7.1	8.3	9.5	10.8										
7		2.5	3.6	4.9	6.3	7.8	9.3	10.9	12.6	14.2										
8		3.2	4.7	6.3	8.1	9.9	11.9	13.9	15.9	18.1	20.3									
9		4.0	5.8	7.8	10.0	12.3	14.7	17.1	19.7	22.3	25.0									
10			7.1	9.5	12.1	14.9	17.8	20.7	23.8	27.0	30.2	33.5								
11			8.4	11.3	14.4	17.7	21.1	24.6	28.2	32.0	35.8	39.7	43.7							
12			9.9	13.3	16.9	20.7	24.7	28.8	33.0	37.4	41.8	46.4	51.1	55.8						
13				15.4	19.6	24.0	28.5	33.3	38.1	43.2	48.3	53.6	58.9	64.4						
14				17.7	22.4	27.4	32.6	38.0	43.6	49.3	55.2	61.2	67.3	73.5	79.9					
15				20.1	25.5	31.1	37.0	43.1	49.4	55.8	62.4	69.2	76.1	83.2	90.3					
16					28.7	35.0	41.6	48.4	55.4	62.7	70.1	77.7	85.4	93.3	101.4					
17					32.0	39.1	46.4	54.0	61.8	69.9	78.2	86.6	95.2	104.0	112.9	122.0				
18					35.6	43.4	51.5	59.9	68.6	77.5	86.6	96.0	105.5	115.2	125.1	135.1				
19						47.9	56.8	66.0	75.6	85.4	95.4	105.7	116.2	126.9	137.8	148.8				
20						52.6	62.3	72.5	82.9	93.7	104.7	115.9	127.4	139.1	151.0	163.1	175.4			
21						57.5	68.1	79.2	90.6	102.3	114.3	126.5	139.0	151.8	164.8	178.0	191.4			
22							74.2	86.1	98.5	111.2	124.2	137.5	151.1	165.0	179.1	193.4	207.9			
23							80.4	93.4	106.7	120.5	134.6	149.0	163.7	178.7	193.9	209.4	225.1	241.0		
24							86.9	100.9	115.3	130.1	145.3	160.8	176.7	192.8	209.2	225.9	242.9	260.1		
25							93.6	108.6	124.1	140.0	156.4	173.1	190.1	207.4	225.1	243.0	261.3	279.7		
26								116.6	133.2	150.3	167.8	185.7	203.9	222.5	241.5	260.7	280.2	300.0	320.1	
27								124.9	142.7	160.9	179.6	198.7	218.2	238.1	258.3	278.9	299.8	320.9	342.4	
28								133.4	152.4	171.8	191.8	212.2	233.0	254.2	275.7	297.7	319.9	342.5	365.4	
29								142.2	162.4	183.1	204.3	226.0	248.1	270.7	293.6	316.9	340.6	364.6	389.0	413.6
30									172.7	194.6	217.2	240.2	263.7	287.6	312.0	336.8	361.9	387.4	413.2	439.4
31									183.2	206.5	230.4	254.8	279.7	305.1	330.9	357.1	383.8	410.8	438.2	465.9
32									194.1	218.7	244.0	269.8	296.1	323.0	350.3	378.0	406.2	434.8	463.7	493.0
33									205.2	231.2	257.9	285.1	313.0	341.3	370.1	399.4	429.2	459.3	489.9	520.9
34										244.1	272.2	300.9	330.2	360.1	390.5	421.4	452.7	484.5	516.7	549.4
35										257.2	286.8	317.0	347.9	379.3	411.3	443.8	476.8	510.3	544.2	578.6
36										270.7	301.8	333.5	366.0	399.0	432.6	466.8	501.5	536.7	572.3	608.4
37										284.4	317.1	350.4	384.5	419.1	454.4	490.3	526.7	563.6	601.0	638.9
38											332.7	367.7	403.3	439.7	476.7	514.3	552.4	591.1	630.4	670.1
39											348.7	385.3	422.6	460.7	499.4	538.8	578.7	619.3	660.3	701.9
40											365.0	403.3	442.3	482.1	522.6	563.8	605.6	648.0	690.9	734.4

TABLE C-13
ESTIMATED TOTAL STEM CUBIC-FOOT VOLUME FOR GRAND/WHITE FIR WITH A TOTAL STEM CROWN RATIO OF 0.3.

DBH	Total Height (ft.)																		
(in.)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
2	0.1	0.2	0.4	0.5	0.6															
3	.3	.5	.8	1.0	1.3	1.7	2.0													
4	.5	.8	1.3	1.7	2.2	2.8	3.3	3.9	4.5											
5	.7	1.3	1.9	2.6	3.4	4.1	5.0	5.8	6.7											
6	1.1	1.8	2.7	3.6	4.7	5.8	6.9	8.1	9.3	10.5										
7		2.4	3.6	4.8	6.2	7.6	9.1	10.6	12.2	13.8										
8		3.1	4.6	6.2	7.9	9.7	11.6	13.5	15.5	17.6	19.7									
9		3.9	5.7	7.7	9.8	12.0	14.3	16.7	19.2	21.7	24.3	27.0								
10			6.9	9.3	11.8	14.5	17.3	20.2	23.2	26.2	29.4	32.6	35.8							
11			8.3	11.1	14.1	17.2	20.5	24.0	27.5	31.1	34.8	38.6	42.5	46.4						
12			9.8	13.0	16.5	20.2	24.0	28.0	32.1	36.4	40.7	45.1	49.6	54.3						
13				15.1	19.1	23.4	27.8	32.4	37.1	42.0	47.0	52.1	57.3	62.6	68.0					
14				17.3	21.9	26.7	31.8	37.0	42.4	48.0	53.7	59.5	65.4	71.5	77.6					
15				19.7	24.9	30.3	36.0	41.9	48.0	54.3	60.7	67.3	74.0	80.8	87.8					
16					28.0	34.1	40.5	47.1	54.0	61.0	68.2	75.6	83.1	90.7	98.5	106.4				
17					31.3	38.1	45.2	52.6	60.2	68.0	76.0	84.2	92.6	101.1	109.8	118.6				
18					34.8	42.3	50.2	58.3	66.8	75.4	84.3	93.3	102.6	112.0	121.6	131.3				
19						46.7	55.4	64.4	73.6	83.1	92.9	102.8	113.0	123.4	133.9	144.7	155.5			
20						51.3	60.8	70.6	80.8	91.2	101.8	112.8	123.9	135.3	146.8	158.5	170.5			
21						56.1	66.5	77.2	88.2	99.6	111.2	123.1	135.2	147.6	160.2	173.0	186.0			
22							72.3	84.0	95.9	108.3	120.9	133.8	147.0	160.4	174.1	188.0	202.1	216.4		
23							78.4	91.0	104.0	117.3	131.0	145.0	159.2	173.7	188.5	203.5	218.8	234.3		
24							84.8	98.3	112.3	126.7	141.4	156.5	171.9	187.5	203.4	219.6	236.1	252.8		
25							91.3	105.9	120.9	136.4	152.2	168.4	184.9	201.8	218.9	236.3	254.0	271.9	290.0	
26								113.7	129.8	146.4	163.4	180.7	198.4	216.5	234.8	253.5	272.4	291.6	311.1	
27								121.8	139.0	156.7	174.9	193.4	212.3	231.6	251.2	271.2	291.4	312.0	332.8	
28								130.1	148.5	167.4	186.7	206.5	226.7	247.2	268.2	289.4	311.0	332.9	355.1	377.6
29								138.7	158.3	178.3	198.9	219.9	241.4	263.3	285.6	308.2	331.1	354.4	378.1	402.0
30									168.3	189.6	211.5	233.8	256.6	279.8	303.5	327.5	351.9	376.6	401.7	427.0
31									178.6	201.2	224.3	248.0	272.2	296.8	321.8	347.3	373.1	399.3	425.9	452.8
32									189.2	213.1	237.6	262.6	288.2	314.2	340.7	367.6	394.9	422.6	450.7	479.2
33									200.1	225.3	251.2	277.6	304.6	332.1	360.0	388.4	417.3	446.6	476.2	506.3
34										237.8	265.1	292.9	321.4	350.3	379.8	409.8	440.2	471.1	502.3	534.0
35										250.6	279.3	308.6	338.6	369.1	400.1	431.6	463.7	496.1	529.0	562.4
36										263.8	293.9	324.7	356.2	388.2	420.9	454.0	487.6	521.8	556.4	591.4
37										277.2	308.8	341.2	374.2	407.8	442.1	476.9	512.2	548.0	584.3	621.0
38											324.1	358.0	392.6	427.9	463.7	500.2	537.2	574.8	612.8	651.4
39											339.7	375.2	411.4	448.3	485.9	524.1	562.8	602.1	642.0	682.3
40											355.6	392.7	430.6	469.2	508.5	548.4	588.9	630.0	671.7	713.9

TABLE C-14
ESTIMATED TOTAL STEM CUBIC-FOOT VOLUME FOR GRAND/WHITE FIR WITH A TOTAL STEM CROWN RATIO OF 0.4.

DBH	Total Height (ft.)																			
(in.)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
2	0.1	0.2	0.4	0.5	0.6															
3	.3	.5	.7	1.0	1.3	1.6	1.9	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –
4	.5	.8	1.2	1.7	2.2	2.7	3.2	3.8	4.4	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –
5	.7	1.3	1.9	2.6	3.3	4.0	4.8	5.7	6.5	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –
6	1.1	1.8	2.6	3.6	4.6	5.6	6.7	7.8	9.0	10.2	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –
7	– –	2.4	3.5	4.7	6.0	7.4	8.8	10.3	11.9	13.5		– –	– –	– –	– –	– –	– –	– –	– –	– –
8	– –	3.1	4.5	6.0	7.7	9.4	11.3	13.1	15.1	17.1	19.1		– –	– –	– –	– –	– –	– –	– –	– –
9	– –	3.9	5.6	7.5	9.5	11.7	13.9	16.2	18.6	21.1	23.6	26.2		– –	– –	– –	– –	– –	– –	– –
10	– –	– –	6.8	9.1	11.6	14.1	16.8	19.6	22.5	25.5	28.5	31.7	34.8	– –	– –	– –	– –	– –	– –	– –
11	– –	– –	8.1	10.8	13.8	16.8	20.0	23.3	26.7	30.3	33.9	37.5	41.3	45.1	– –	– –	– –	– –	– –	– –
12	– –	– –	9.6	12.7	16.1	19.7	23.4	27.3	31.3	35.4	39.6	43.9	48.3	52.7		– –	– –	– –	– –	– –
13	– –	– –	– –	14.8	18.7	22.8	27.1	31.5	36.1	40.9	45.7	50.6	55.7	60.8	66.1	– –	– –	– –	– –	– –
14	– –	– –	– –	17.0	21.4	26.1	31.0	36.1	41.3	46.7	52.2	57.8	63.6	69.5	75.4		– –	– –	– –	– –
15	– –	– –	– –	19.3	24.3	29.6	35.1	40.9	46.8	52.9	59.1	65.5	72.0	78.6	85.3	– –	– –	– –	– –	– –
16	– –	– –	– –	– –	27.4	33.3	39.5	45.9	52.6	59.4	66.4	73.5	80.8	88.2	95.8	103.4	– –	– –	– –	– –
17	– –	– –	– –	– –	30.6	37.2	44.1	51.3	58.6	66.2	74.0	81.9	90.1	98.3	106.7	115.3	– –	– –	– –	– –
18	– –	– –	– –	– –	34.0	41.3	49.0	56.9	65.0	73.4	82.0	90.8	99.8	108.9	118.2	127.7	– –	– –	– –	– –
19	– –	– –	– –	– –	– –	45.6	54.0	62.7	71.7	80.9	90.4	100.1	109.9	120.0	130.2	140.6	151.2	– –	– –	– –
20	– –	– –	– –	– –	– –	50.1	59.3	68.8	78.7	88.8	99.1	109.7	120.5	131.5	142.7	154.1	165.7	– –	– –	– –
21	– –	– –	– –	– –	– –	54.8	64.8	75.2	85.9	96.9	108.2	119.8	131.6	143.6	155.8	168.2	180.8	– –	– –	– –
22	– –	– –	– –	– –	– –	– –	70.6	81.9	93.5	105.4	117.7	130.2	143.0	156.0	169.3	182.8	196.4	210.3	– –	– –
23	– –	– –	– –	– –	– –	– –	76.5	88.7	101.3	114.3	127.5	141.1	154.9	169.0	183.3	197.9	212.7	227.7	– –	– –
24	– –	– –	– –	– –	– –	– –	82.7	95.9	109.4	123.4	137.7	152.3	167.2	182.4	197.8	213.6	229.5	245.7	– –	– –
25	– –	– –	– –	– –	– –	– –	89.1	103.3	117.9	132.8	148.2	163.9	179.9	196.2	212.9	229.7	246.9	264.3	281.9	– –
26	– –	– –	– –	– –	– –	– –	– –	110.9	126.5	142.6	159.1	175.9	193.1	210.6	228.4	246.5	264.8	283.5	302.3	– –
27	– –	– –	– –	– –	– –	– –	– –	118.8	135.5	152.7	170.3	188.3	206.6	225.3	244.4	263.7	283.3	303.2	323.4	– –
28	– –	– –	– –	– –	– –	– –	– –	126.9	144.8	163.1	181.8	201.0	220.6	240.5	260.8	281.4	302.4	323.6	345.1	366.9
29	– –	– –	– –	– –	– –	– –	– –	135.3	154.3	173.7	193.7	214.1	234.9	256.2	277.8	299.7	322.0	344.6	367.5	390.7
30	– –	– –	– –	– –	– –	– –	– –	– –	164.1	184.7	205.9	227.6	249.7	272.3	295.2	318.5	342.1	366.1	390.4	415.1
31	– –	– –	– –	– –	– –	– –	– –	– –	174.1	196.0	218.5	241.5	264.9	288.8	313.1	337.8	362.8	388.2	414.0	440.1
32	– –	– –	– –	– –	– –	– –	– –	– –	184.5	207.7	231.4	255.7	280.5	305.7	331.4	357.5	384.0	410.9	438.2	465.8
33	– –	– –	– –	– –	– –	– –	– –	– –	195.1	219.6	244.6	270.3	296.4	323.1	350.2	377.8	405.8	434.2	463.0	492.1
34	– –	– –	– –	– –	– –	– –	– –	– –	– –	231.8	258.2	285.2	312.8	340.9	369.5	398.6	428.1	458.0	488.3	519.1
35	– –	– –	– –	– –	– –	– –	– –	– –	– –	244.3	272.1	300.5	329.6	359.2	389.3	419.9	450.9	482.4	514.3	546.7
36	– –	– –	– –	– –	– –	– –	– –	– –	– –	257.1	286.3	316.2	346.7	377.8	409.5	441.6	474.3	507.4	540.9	574.9
37	– –	– –	– –	– –	– –	– –	– –	– –	– –	270.2	300.9	332.3	364.3	396.9	430.1	463.9	498.1	532.9	568.1	603.7
38	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	315.7	348.6	382.2	416.4	451.2	486.6	522.5	558.9	595.8	633.2
39	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	330.9	365.4	400.5	436.3	472.8	509.8	547.4	585.5	624.2	663.3
40	– –	– –	– –	– –	– –	– –	– –	– –	– –	– –	346.5	382.5	419.2	456.7	494.8	533.5	572.8	612.7	653.1	694.1

TABLE C-15
ESTIMATED TOTAL STEM CUBIC-FOOT VOLUME FOR GRAND/WHITE FIR WITH A TOTAL STEM CROWN RATIO OF 0.5.

DBH	Total Height (ft.)																			
(in.)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
2	0.1	0.2	0.3	0.5	0.6															
3	.3	.5	.7	1.0	1.3	1.6	1.9													
4	.5	.8	1.2	1.7	2.1	2.6	3.1	3.7	4.2											
5	.7	1.2	1.8	2.5	3.2	3.9	4.7	5.5	6.3											
6	1.1	1.8	2.6	3.5	4.4	5.5	6.5	7.6	8.8	9.9										
7		2.4	3.4	4.6	5.9	7.2	8.6	10.1	11.6	13.1										
8		3.0	4.4	5.9	7.5	9.2	11.0	12.8	14.7	16.6	18.6									
9		3.8	5.5	7.3	9.3	11.4	13.6	15.8	18.1	20.5	23.0	25.5								
10			6.7	8.9	11.3	13.8	16.4	19.1	21.9	24.8	27.8	30.8	33.9							
11			8.0	10.6	13.4	16.4	19.5	22.7	26.0	29.4	32.9	36.5	40.2	43.9						
12			9.4	12.5	15.8	19.2	22.8	26.6	30.5	34.4	38.5	42.7	46.9	51.3						
13				14.5	18.3	22.3	26.4	30.7	35.2	39.8	44.5	49.3	54.2	59.1	64.2					
14				16.6	20.9	25.5	30.2	35.1	40.2	45.4	50.8	56.3	61.8	67.5	73.3					
15				18.9	23.8	28.9	34.3	39.8	45.6	51.5	57.5	63.7	70.0	76.4	82.9					
16					26.8	32.5	38.5	44.8	51.2	57.8	64.6	71.5	78.6	85.8	93.1	100.5				
17					29.9	36.3	43.0	50.0	57.1	64.5	72.0	79.7	87.6	95.6	103.8	112.0				
18					33.3	40.4	47.8	55.4	63.3	71.5	79.8	88.3	97.0	105.9	114.9	124.1				
19						44.6	52.7	61.1	69.9	78.8	88.0	97.4	106.9	116.7	126.6	136.7	146.9			
20						49.0	57.9	67.1	76.7	86.5	96.5	106.8	117.3	127.9	138.8	149.8	161.1			
21						53.6	63.3	73.3	83.7	94.4	105.4	116.6	128.0	139.6	151.5	163.5	175.7			
22							68.9	79.8	91.1	102.7	114.6	126.7	139.1	151.8	164.6	177.7	191.0	204.4		
23							74.7	86.6	98.8	111.3	124.2	137.3	150.7	164.4	178.3	192.4	206.8	221.3		
24							80.8	93.5	106.7	120.2	134.1	148.2	162.7	177.4	192.4	207.7	223.1	238.8		
25							87.0	100.7	114.9	129.4	144.3	159.5	175.1	190.9	207.0	223.4	240.1	256.9	274.0	
26								108.2	123.4	138.9	154.9	171.2	187.9	204.9	222.1	239.7	257.5	275.6	293.9	
27								115.9	132.1	148.8	165.8	183.3	201.1	219.2	237.7	256.5	275.5	294.8	314.4	
28								123.9	141.1	158.9	177.1	195.7	214.7	234.0	253.7	273.7	294.0	314.6	335.5	356.7
29								132.1	150.4	169.3	188.7	208.5	228.7	249.3	270.2	291.5	313.1	335.0	357.2	379.7
30									160.0	180.0	200.6	221.6	243.1	264.9	287.2	309.8	332.7	356.0	379.6	403.5
31									169.8	191.1	212.9	235.1	257.9	281.0	304.6	328.5	352.8	377.5	402.5	427.8
32									179.9	202.4	225.4	249.0	273.0	297.5	322.5	347.8	373.5	399.6	426.0	452.8
33									190.3	214.0	238.3	263.2	288.6	314.5	340.8	367.5	394.7	422.2	450.1	478.4
34										225.9	251.6	277.8	304.5	331.8	359.6	387.7	416.4	445.4	474.8	504.6
35										238.1	265.1	292.7	320.9	349.6	378.8	408.5	438.6	469.1	500.1	531.5
36										250.6	279.0	308.0	337.6	367.8	398.4	429.6	461.3	493.4	526.0	558.9
37										263.4	293.2	323.6	354.7	386.4	418.6	451.3	484.5	518.2	552.4	587.0
38											307.7	339.6	372.2	405.4	439.1	473.4	508.3	543.6	579.4	615.7
39											322.5	355.9	390.0	424.8	460.1	496.0	532.5	569.5	607.0	645.0
40											337.7	372.6	408.3	444.6	481.6	519.1	557.3	595.9	635.1	674.8

TABLE C-16
ESTIMATED TOTAL STEM CUBIC-FOOT VOLUME FOR GRAND/WHITE FIR WITH A TOTAL STEM CROWN RATIO OF 0.6.

DBH	Total Height (ft.)																			
(in.)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
2	0.1	0.2	0.3	0.5	0.6															
3	.3	.5	.7	1.0	1.2	1.5	1.8													
4	.5	.8	1.2	1.6	2.1	2.6	3.1	3.6	4.1											
5	.7	1.2	1.8	2.4	3.1	3.8	4.6	5.3	6.1											
6	1.1	1.7	2.5	3.4	4.3	5.3	6.4	7.4	8.5	9.7										
7		2.3	3.4	4.5	5.7	7.0	8.4	9.8	11.2	12.7										
8		3.0	4.3	5.8	7.3	9.0	10.7	12.5	14.3	16.2	18.1									
9		3.8	5.4	7.2	9.1	11.1	13.2	15.4	17.7	20.0	22.4	24.8								
10			6.6	8.7	11.0	13.5	16.0	18.6	21.3	24.1	27.0	29.9	32.9							
11			7.8	10.4	13.1	16.0	19.0	22.1	25.4	28.7	32.0	35.5	39.0	42.7						
12			9.2	12.2	15.4	18.8	22.3	25.9	29.7	33.5	37.5	41.5	45.6	49.8						
13				14.2	17.9	21.7	25.8	29.9	34.3	38.7	43.3	47.9	52.7	57.5	62.4					
14				16.3	20.5	24.9	29.5	34.3	39.2	44.2	49.4	54.7	60.1	65.7	71.3					
15				18.5	23.2	28.2	33.4	38.8	44.4	50.1	56.0	62.0	68.1	74.3	80.6					
16					26.2	31.8	37.6	43.6	49.9	56.3	62.9	69.6	76.4	83.4	90.5	97.7				
17					29.3	35.5	42.0	48.7	55.7	62.8	70.1	77.6	85.2	93.0	100.9	108.9				
18					32.6	39.4	46.6	54.0	61.7	69.6	77.7	86.0	94.4	103.0	111.8	120.7				
19						43.6	51.4	59.6	68.1	76.8	85.7	94.8	104.0	113.5	123.1	132.9	142.9			
20						47.9	56.5	65.5	74.7	84.2	94.0	103.9	114.1	124.4	135.0	145.7	156.6			
21						52.4	61.8	71.5	81.6	92.0	102.6	113.5	124.5	135.8	147.3	159.0	170.9			
22							67.3	77.9	88.8	100.1	111.6	123.4	135.4	147.7	160.1	172.8	185.7	198.7		
23							73.0	84.4	96.3	108.4	120.9	133.7	146.7	159.9	173.4	187.1	201.1	215.2		
24							78.9	91.3	104.0	117.1	130.6	144.3	158.3	172.6	187.2	202.0	217.0	232.2		
25							85.0	98.3	112.0	126.1	140.6	155.3	170.4	185.8	201.4	217.3	233.4	249.8	266.4	
26								105.6	120.3	135.4	150.9	166.7	182.9	199.3	216.1	233.1	250.4	268.0	285.7	
27								113.1	128.8	145.0	161.5	178.5	195.7	213.3	231.3	249.5	267.9	286.7	305.7	
28								120.9	137.7	154.9	172.5	190.6	209.0	227.8	246.9	266.3	286.0	306.0	326.2	346.7
29								128.9	146.7	165.0	183.8	203.0	222.6	242.6	262.9	283.6	304.5	325.8	347.3	369.2
30									156.1	175.5	195.5	215.8	236.6	257.9	279.4	301.3	323.6	346.2	369.1	392.2
31									165.7	186.3	207.4	229.0	251.1	273.5	296.4	319.6	343.2	367.1	391.4	415.9
32									175.5	197.3	219.7	242.5	265.8	289.6	313.8	338.4	363.3	388.6	414.2	440.2
33									185.7	208.7	232.3	256.4	281.0	306.1	331.6	357.6	383.9	410.6	437.7	465.1
34										220.3	245.2	270.6	296.6	323.0	349.9	377.3	405.0	433.2	461.7	490.6
35										232.2	258.4	285.2	312.5	340.3	368.6	397.4	426.6	456.3	486.3	516.7
36										244.4	271.9	300.1	328.8	358.0	387.8	418.1	448.8	479.9	511.5	543.5
37										256.9	285.8	315.3	345.4	376.1	407.4	439.1	471.4	504.1	537.2	570.8
38											299.9	330.9	362.5	394.7	427.4	460.7	494.5	528.8	563.5	598.7
39											314.4	346.8	379.9	413.6	447.9	482.7	518.1	554.0	590.3	627.2
40											329.2	363.1	397.7	432.9	468.8	505.2	542.2	579.7	617.7	656.3

TABLE C-17
ESTIMATED TOTAL STEM CUBIC-FOOT VOLUME FOR GRAND/WHITE FIR WITH A TOTAL STEM CROWN RATIO OF 0.7.

DBH	Total Height (ft.)																			
(in.)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
2	0.1	0.2	0.3	0.5	0.6															
3	.3	.5	.7	.9	1.2	1.5	1.8													
4	.5	.8	1.2	1.6	2.0	2.5	3.0	3.5	4.0											
5	.8	1.2	1.8	2.4	3.0	3.7	4.5	5.2	6.0											
6	1.1	1.7	2.5	3.3	4.2	5.2	6.2	7.2	8.3	9.4										
7		2.3	3.3	4.4	5.6	6.9	8.2	9.5	10.9	12.4										
8		3.0	4.2	5.6	7.2	8.7	10.4	12.1	13.9	15.7	17.6									
9		3.7	5.3	7.0	8.9	10.8	12.9	15.0	17.2	19.4	21.7	24.1								
10			6.4	8.5	10.8	13.1	15.6	18.2	20.8	23.5	26.3	29.1	32.0							
11			7.7	10.2	12.8	15.6	18.5	21.6	24.7	27.9	31.2	34.5	38.0	41.5						
12			9.1	12.0	15.1	18.3	21.7	25.2	28.9	32.6	36.5	40.4	44.4	48.5						
13				13.9	17.5	21.2	25.1	29.2	33.4	37.7	42.1	46.6	51.2	55.9	60.7					
14				16.0	20.0	24.3	28.8	33.4	38.2	43.1	48.1	53.3	58.5	63.9	69.3					
15				18.2	22.7	27.6	32.6	37.8	43.2	48.8	54.5	60.3	66.2	72.3	78.4					
16					25.6	31.0	36.7	42.6	48.6	54.8	61.2	67.7	74.4	81.1	88.0	95.0				
17					28.7	34.7	41.0	47.5	54.2	61.2	68.3	75.5	82.9	90.4	98.1	105.9				
18					31.9	38.5	45.5	52.7	60.2	67.8	75.7	83.7	91.9	100.2	108.7	117.3				
19						42.6	50.2	58.2	66.4	74.8	83.4	92.2	101.2	110.4	119.8	129.3	138.9			
20						46.8	55.2	63.9	72.8	82.1	91.5	101.2	111.0	121.1	131.3	141.7	152.2			
21						51.2	60.3	69.8	79.6	89.6	99.9	110.5	121.2	132.2	143.3	154.6	166.1			
22							65.7	76.0	86.6	97.5	108.7	120.1	131.8	143.7	155.8	168.1	180.6	193.2		
23							71.3	82.4	93.9	105.7	117.8	130.1	142.8	155.6	168.7	182.0	195.5	209.2		
24							77.1	89.1	101.4	114.2	127.2	140.5	154.1	168.0	182.1	196.5	211.0	225.8		
25							83.1	96.0	109.3	122.9	136.9	151.3	165.9	180.8	196.0	211.4	227.0	242.9	259.0	
26								103.1	117.3	132.0	147.0	162.4	178.0	194.0	210.3	226.8	243.6	260.6	277.8	
27								110.4	125.7	141.3	157.4	173.8	190.6	207.6	225.0	242.7	260.6	278.8	297.2	
28								118.0	134.3	151.0	168.1	185.6	203.5	221.7	240.2	259.0	278.2	297.5	317.2	337.1
29								125.9	143.2	160.9	179.1	197.8	216.8	236.1	255.9	275.9	296.2	316.8	337.8	358.9
30									152.3	171.1	190.5	210.3	230.4	251.0	271.9	293.2	314.8	336.7	358.9	381.4
31									161.7	181.6	202.1	223.1	244.5	266.3	288.4	311.0	333.9	357.1	380.6	404.4
32									171.3	192.4	214.1	236.3	258.9	281.9	305.4	329.2	353.4	378.0	402.9	428.0
33									181.2	203.5	226.4	249.8	273.7	298.0	322.8	347.9	373.5	399.4	425.7	452.3
34										214.9	239.0	263.7	288.8	314.5	340.6	367.1	394.1	421.4	449.1	477.1
35										226.5	251.9	277.9	304.4	331.4	358.8	386.8	415.1	443.9	473.0	502.5
36										238.4	265.1	292.4	320.2	348.6	377.5	406.8	436.6	466.9	497.5	528.5
37										250.6	278.6	307.3	336.5	366.3	396.6	427.4	458.7	490.4	522.5	555.1
38											292.4	322.5	353.1	384.3	416.1	448.4	481.2	514.4	548.1	582.2
39											306.6	338.0	370.1	402.8	436.0	469.8	504.1	539.0	574.2	610.0
40											321.0	353.9	387.4	421.6	456.4	491.7	527.6	564.0	600.9	638.3

TABLE C-18
ESTIMATED TOTAL STEM CUBIC-FOOT VOLUME FOR GRAND/WHITE FIR WITH A TOTAL STEM CROWN RATIO OF 0.8.

DBH	Total Height (ft.)																			
(in.)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
2	0.1	0.2	0.3	0.4	0.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
3	.3	.5	.7	.9	1.2	1.4	1.7	--	--	--	--	--	--	--	--	--	--	--	--	--
4	.5	.8	1.1	1.5	2.0	2.4	2.9	3.4	3.9	--	--	--	--	--	--	--	--	--	--	--
5	.8	1.2	1.7	2.3	3.0	3.6	4.3	5.1	5.8	--	--	--	--	--	--	--	--	--	--	--
6	1.1	1.7	2.4	3.3	4.1	5.1	6.0	7.0	8.1	9.1	--	--	--	--	--	--	--	--	--	--
7	--	2.3	3.2	4.3	5.5	6.7	8.0	9.3	10.6	12.0	--	--	--	--	--	--	--	--	--	--
8	--	2.9	4.2	5.5	7.0	8.5	10.1	11.8	13.5	15.3	17.1	--	--	--	--	--	--	--	--	--
9	--	3.7	5.2	6.9	8.7	10.6	12.6	14.6	16.7	18.9	21.2	23.4	--	--	--	--	--	--	--	--
10	--	--	6.3	8.4	10.5	12.8	15.2	17.7	20.2	22.9	25.6	28.3	31.1	--	--	--	--	--	--	--
11	--	--	7.6	10.0	12.6	15.3	18.1	21.0	24.0	27.2	30.3	33.6	36.9	40.3	--	--	--	--	--	--
12	--	--	8.9	11.7	14.7	17.9	21.2	24.6	28.1	31.8	35.5	39.3	43.2	47.1	--	--	--	--	--	--
13	--	--	--	13.6	17.1	20.7	24.5	28.5	32.5	36.7	41.0	45.4	49.8	54.4	59.0	--	--	--	--	--
14	--	--	--	15.7	19.6	23.7	28.1	32.6	37.2	42.0	46.8	51.8	56.9	62.1	67.4	--	--	--	--	--
15	--	--	--	17.8	22.3	26.9	31.8	36.9	42.1	47.5	53.0	58.7	64.4	70.3	76.3	--	--	--	--	--
16	--	--	--	--	25.1	30.3	35.8	41.5	47.4	53.4	59.6	65.9	72.4	78.9	85.6	92.4	--	--	--	--
17	--	--	--	--	28.1	33.9	40.0	46.3	52.9	59.6	66.5	73.5	80.7	88.0	95.4	103.0	--	--	--	--
18	--	--	--	--	31.2	37.7	44.4	51.4	58.7	66.1	73.7	81.5	89.4	97.5	105.7	114.1	--	--	--	--
19	--	--	--	--	--	41.6	49.1	56.8	64.7	72.9	81.2	89.8	98.5	107.4	116.5	125.7	135.1	--	--	--
20	--	--	--	--	--	45.8	53.9	62.3	71.0	80.0	89.1	98.5	108.1	117.8	127.7	137.8	148.1	--	--	--
21	--	--	--	--	--	50.1	58.9	68.1	77.6	87.4	97.3	107.6	118.0	128.6	139.4	150.4	161.6	--	--	--
22	--	--	--	--	--	--	64.2	74.2	84.5	95.0	105.9	117.0	128.3	139.8	151.6	163.5	175.6	187.9	--	--
23	--	--	--	--	--	--	69.7	80.4	91.6	103.0	114.8	126.8	139.0	151.5	164.2	177.1	190.2	203.5	--	--
24	--	--	--	--	--	--	75.3	87.0	99.0	111.3	123.9	136.9	150.1	163.5	177.2	191.1	205.2	219.6	--	--
25	--	--	--	--	--	--	81.2	93.7	106.6	119.8	133.4	147.3	161.5	176.0	190.7	205.7	220.8	236.2	251.8	--
26	--	--	--	--	--	--	--	100.7	114.5	128.7	143.3	158.2	173.4	188.9	204.6	220.7	236.9	253.4	270.1	--
27	--	--	--	--	--	--	--	107.9	122.6	137.8	153.4	169.3	185.6	202.1	219.0	236.1	253.5	271.1	289.0	--
28	--	--	--	--	--	--	--	115.3	131.0	147.2	163.9	180.8	198.2	215.8	233.8	252.1	270.6	289.4	308.5	327.8
29	--	--	--	--	--	--	--	122.9	139.7	156.9	174.6	192.7	211.1	229.9	249.0	268.5	288.2	308.2	328.5	349.0
30	--	--	--	--	--	--	--	--	148.6	166.9	185.7	204.9	224.4	244.4	264.7	285.3	306.3	327.5	349.0	370.8
31	--	--	--	--	--	--	--	--	157.8	177.2	197.1	217.4	238.1	259.3	280.8	302.6	324.8	347.3	370.2	393.3
32	--	--	--	--	--	--	--	--	167.2	187.7	208.7	230.2	252.2	274.5	297.3	320.4	343.9	367.7	391.8	416.3
33	--	--	--	--	--	--	--	--	176.9	198.5	220.7	243.4	266.6	290.2	314.2	338.6	363.4	388.6	414.0	439.8
34	--	--	--	--	--	--	--	--	--	209.6	233.0	257.0	281.4	306.3	331.6	357.3	383.4	409.9	436.8	464.0
35	--	--	--	--	--	--	--	--	--	221.0	245.6	270.8	296.5	322.7	349.4	376.4	403.9	431.8	460.1	488.7
36	--	--	--	--	--	--	--	--	--	232.6	258.5	285.0	312.0	339.5	367.5	396.0	424.9	454.2	483.9	514.0
37	--	--	--	--	--	--	--	--	--	244.5	271.7	299.5	327.8	356.7	386.1	416.0	446.4	477.1	508.3	539.9
38	--	--	--	--	--	--	--	--	--	--	285.2	314.3	344.0	374.3	405.2	436.5	468.3	500.5	533.2	566.3
39	--	--	--	--	--	--	--	--	--	--	299.0	329.5	360.6	392.3	424.6	457.4	490.7	524.4	558.6	593.3
40	--	--	--	--	--	--	--	--	--	--	313.1	345.0	377.5	410.7	444.4	478.7	513.5	548.8	584.6	620.8

TABLE C-19
ESTIMATED TOTAL STEM CUBIC-FOOT VOLUME FOR GRAND/WHITE FIR WITH A TOTAL STEM CROWN RATIO OF 0.9.

DBH	Total Height (ft.)																			
(in.)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
2	0.1	0.2	0.3	0.4	0.6															
3	.3	.5	.7	.9	1.1	1.4	1.7													
4	.5	.8	1.1	1.5	1.9	2.4	2.8	3.3	3.8											
5	.8	1.2	1.7	2.3	2.9	3.5	4.2	4.9	5.7											
6	1.1	1.7	2.4	3.2	4.0	4.9	5.9	6.9	7.9	8.9										
7		2.3	3.2	4.2	5.4	6.5	7.8	9.0	10.4	11.7										
8		3.0	4.1	5.4	6.8	8.3	9.9	11.5	13.2	14.9	16.7									
9		3.7	5.2	6.8	8.5	10.3	12.3	14.2	16.3	18.4	20.6	22.8								
10			6.3	8.2	10.3	12.5	14.8	17.2	19.7	22.3	24.9	27.6	30.3							
11			7.5	9.8	12.3	14.9	17.7	20.5	23.4	26.4	29.5	32.7	35.9	39.2						
12			8.9	11.6	14.4	17.5	20.7	24.0	27.4	30.9	34.5	38.2	42.0	45.8						
13				13.4	16.7	20.3	23.9	27.8	31.7	35.7	39.9	44.2	48.5	52.9	57.4					
14				15.4	19.2	23.2	27.4	31.8	36.3	40.9	45.6	50.4	55.4	60.4	65.6					
15				17.5	21.8	26.3	31.1	36.0	41.1	46.3	51.6	57.1	62.7	68.4	74.2					
16					24.6	29.7	35.0	40.5	46.2	52.0	58.0	64.2	70.4	76.8	83.3	89.9				
17					27.5	33.2	39.1	45.2	51.6	58.1	64.7	71.6	78.5	85.6	92.8	100.2				
18					30.6	36.9	43.4	50.2	57.2	64.4	71.8	79.3	87.0	94.9	102.9	111.0				
19						40.7	47.9	55.4	63.1	71.0	79.1	87.5	95.9	104.6	113.4	122.3	131.4			
20						44.8	52.7	60.8	69.3	77.9	86.8	95.9	105.2	114.7	124.3	134.1	144.0			
21						49.0	57.6	66.5	75.7	85.2	94.9	104.8	114.9	125.2	135.7	146.3	157.2			
22							62.7	72.4	82.4	92.7	103.2	113.9	124.9	136.1	147.5	159.1	170.8	182.7		
23							68.1	78.6	89.4	100.5	111.8	123.5	135.3	147.4	159.8	172.3	185.0	197.9		
24							73.6	84.9	96.6	108.5	120.8	133.3	146.1	159.2	172.5	186.0	199.7	213.6		
25							79.4	91.5	104.0	116.9	130.1	143.5	157.3	171.3	185.6	200.1	214.8	229.8	244.9	
26								98.3	111.7	125.5	139.6	154.1	168.8	183.9	199.2	214.7	230.5	246.5	262.7	
27								105.4	119.7	134.4	149.5	165.0	180.8	196.8	213.2	229.8	246.6	263.8	281.1	
28								112.6	127.9	143.6	159.7	176.2	193.0	210.2	227.6	245.3	263.3	281.5	300.0	318.8
29								120.1	136.4	153.1	170.2	187.8	205.7	223.9	242.4	261.3	280.4	299.8	319.5	339.4
30									145.1	162.9	181.0	199.7	218.6	238.0	257.7	277.7	298.0	318.6	339.5	360.7
31									154.1	172.9	192.2	211.9	232.0	252.5	273.4	294.6	316.1	337.9	360.1	382.5
32									163.3	183.2	203.6	224.4	245.7	267.4	289.5	311.9	334.6	357.7	381.2	404.9
33									172.7	193.7	215.3	237.3	259.8	282.7	306.0	329.6	353.7	378.1	402.8	427.8
34										204.6	227.3	250.5	274.2	298.3	322.9	347.8	373.2	398.9	424.9	451.3
35										215.7	239.6	264.0	288.9	314.3	340.2	366.5	393.1	420.2	447.6	475.4
36										227.1	252.2	277.8	304.0	330.7	357.9	385.5	413.6	442.0	470.8	500.0
37										238.7	265.0	292.0	319.5	347.5	376.0	405.0	434.5	464.3	494.5	525.2
38											278.2	306.5	335.3	364.7	394.6	425.0	455.8	487.1	518.8	550.9
39											291.7	321.3	351.5	382.2	413.5	445.3	477.6	510.4	543.6	577.2
40											305.5	336.4	367.9	400.1	432.8	466.1	499.9	534.1	568.8	604.0

TABLE C-20
ESTIMATED TOTAL STEM CUBIC-FOOT VOLUME FOR GRAND/WHITE FIR WITH A TOTAL STEM CROWN RATIO OF 1.0.

DBH	Total Height (ft.)																			
(in.)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
2	0.1	0.2	0.3	0.4	0.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
3	.3	.5	.7	.9	1.1	1.4	1.7	--	--	--	--	--	--	--	--	--	--	--	--	--
4	.5	.8	1.1	1.5	1.9	2.4	2.8	3.3	3.7	--	--	--	--	--	--	--	--	--	--	--
5	.8	1.2	1.7	2.3	2.9	3.5	4.2	4.9	5.6	--	--	--	--	--	--	--	--	--	--	--
6	1.1	1.7	2.4	3.2	4.0	4.9	5.8	6.8	7.8	8.8	--	--	--	--	--	--	--	--	--	--
7	--	2.3	3.2	4.3	5.4	6.5	7.7	9.0	10.2	11.6	--	--	--	--	--	--	--	--	--	--
8	--	3.0	4.2	5.5	6.8	8.3	9.8	11.4	13.0	14.7	16.4	--	--	--	--	--	--	--	--	--
9	--	3.7	5.2	6.8	8.5	10.3	12.2	14.1	16.1	18.2	20.3	22.4	--	--	--	--	--	--	--	--
10	--	--	6.3	8.3	10.3	12.5	14.7	17.1	19.5	22.0	24.5	27.1	29.8	--	--	--	--	--	--	--
11	--	--	7.6	9.9	12.3	14.9	17.5	20.3	23.1	26.1	29.1	32.2	35.3	38.5	--	--	--	--	--	--
12	--	--	9.0	11.6	14.4	17.4	20.5	23.8	27.1	30.5	34.0	37.6	41.3	45.0	--	--	--	--	--	--
13	--	--	--	13.5	16.7	20.2	23.8	27.5	31.3	35.3	39.3	43.4	47.7	51.9	56.3	--	--	--	--	--
14	--	--	--	15.5	19.2	23.1	27.2	31.5	35.8	40.3	44.9	49.6	54.4	59.3	64.3	--	--	--	--	--
15	--	--	--	17.6	21.8	26.3	30.9	35.7	40.6	45.7	50.9	56.2	61.6	67.2	72.8	--	--	--	--	--
16	--	--	--	--	24.6	29.6	34.8	40.1	45.7	51.3	57.2	63.1	69.2	75.4	81.7	88.1	--	--	--	--
17	--	--	--	--	27.6	33.1	38.8	44.8	51.0	57.3	63.8	70.4	77.2	84.1	91.1	98.2	--	--	--	--
18	--	--	--	--	30.6	36.8	43.1	49.7	56.6	63.6	70.7	78.1	85.6	93.2	101.0	108.8	--	--	--	--
19	--	--	--	--	--	40.6	47.6	54.9	62.4	70.1	78.0	86.1	94.3	102.7	111.3	119.9	128.7	--	--	--
20	--	--	--	--	--	44.7	52.3	60.3	68.5	76.9	85.6	94.4	103.4	112.6	122.0	131.5	141.1	--	--	--
21	--	--	--	--	--	48.9	57.2	65.9	74.9	84.1	93.5	103.1	113.0	123.0	133.2	143.5	154.0	--	--	--
22	--	--	--	--	--	--	62.4	71.8	81.5	91.5	101.7	112.2	122.8	133.7	144.8	156.0	167.4	179.0	--	--
23	--	--	--	--	--	--	67.7	77.9	88.4	99.2	110.2	121.6	133.1	144.9	156.8	169.0	181.3	193.9	--	--
24	--	--	--	--	--	--	73.2	84.2	95.5	107.1	119.1	131.3	143.7	156.4	169.3	182.4	195.7	209.2	--	--
25	--	--	--	--	--	--	78.9	90.7	102.9	115.4	128.2	141.3	154.7	168.3	182.2	196.3	210.6	225.1	239.8	--
26	--	--	--	--	--	--	--	97.5	110.5	123.9	137.7	151.7	166.1	180.7	195.5	210.6	226.0	241.5	257.3	--
27	--	--	--	--	--	--	--	104.5	118.4	132.8	147.4	162.5	177.8	193.4	209.3	225.4	241.8	258.4	275.3	--
28	--	--	--	--	--	--	--	111.7	126.6	141.8	157.5	173.5	189.9	206.5	223.5	240.7	258.1	275.9	293.8	312.0
29	--	--	--	--	--	--	--	119.1	134.9	151.2	167.9	184.9	202.3	220.0	238.0	256.4	274.9	293.8	312.9	332.3
30	--	--	--	--	--	--	--	--	143.6	160.8	178.5	196.6	215.1	233.9	253.0	272.5	292.2	312.2	332.5	353.1
31	--	--	--	--	--	--	--	--	152.5	170.7	189.5	208.7	228.2	248.2	268.4	289.0	310.0	331.2	352.7	374.5
32	--	--	--	--	--	--	--	--	161.6	180.9	200.8	221.0	241.7	262.8	284.2	306.0	328.2	350.6	373.3	396.4
33	--	--	--	--	--	--	--	--	170.9	191.4	212.3	233.7	255.6	277.8	300.5	323.5	346.8	370.5	394.5	418.9
34	--	--	--	--	--	--	--	--	--	202.1	224.2	246.7	269.8	293.2	317.1	341.3	366.0	390.9	416.3	441.9
35	--	--	--	--	--	--	--	--	--	213.1	236.3	260.1	284.3	309.0	334.1	359.6	385.6	411.8	438.5	465.5
36	--	--	--	--	--	--	--	--	--	224.3	248.7	273.7	299.2	325.1	351.5	378.4	405.6	433.2	461.2	489.6
37	--	--	--	--	--	--	--	--	--	235.8	261.5	287.7	314.4	341.6	369.3	397.5	426.1	455.1	484.5	514.3
38	--	--	--	--	--	--	--	--	--	--	274.5	301.9	330.0	358.5	387.6	417.1	447.1	477.5	508.3	539.5
39	--	--	--	--	--	--	--	--	--	--	287.8	316.5	345.9	375.8	406.2	437.1	468.5	500.3	532.5	565.2
40	--	--	--	--	--	--	--	--	--	--	301.4	331.4	362.1	393.4	425.2	457.5	490.3	523.6	557.3	591.5

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