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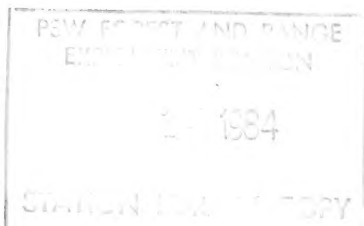
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Equations for Total, Wood, and Saw-Log Volume for Thirteen California Hardwoods

Norman H. Pillsbury and Michael L. Kirkley



Abstract

Volume equations for thirteen species of California hardwoods were developed from measurements of 766 sample trees from all parts of the state. The species included: bigleaf maple (*Acer macrophyllum* Pursh), Pacific madrone (*Arbutus menziesii* Pursh), giant chinkapin (*Castanopsis chrysophylla* (Dougl.) A. DC.), tanoak (*Lithocarpus densiflorus* (Hook. & Arn.) Rehd.), coast live oak (*Quercus agrifolia* Née), canyon live oak (*Quercus chrysolepis* Liebm.), blue oak (*Quercus douglasii* Hook. & Arn.), Engelmann oak (*Quercus engelmannii* Greene), Oregon white oak (*Quercus garryana* Dougl. ex Hook), California black oak (*Quercus kelloggii* Newb.), California white oak or valley Oak (*Quercus lobata* Née), interior live oak (*Quercus wislizeni* A. DC.), and California-laurel (*Umbellularia californica* (Hook. & Arn.) Nutt.).

Measurements were taken of standing trees using a Spiegel Relaskop. English and metric equations for three utilization standards were developed for each species: (1) total tree volume (all stem and branch wood plus stump and bark); (2) wood volume (all wood inside bark from stump to 10 cm (4 in) top outside bark); and (3) saw-log volume for trees 28 cm (11 in) diameter at breast height and larger (straight sections from stump to 23 cm (9 in) top outside bark). Diameter and height were found to be good predictors of total volume and wood volume. An indicator variable representing whether or not the first segment was merchantable, in addition to diameter and height, was found to be a good predictor of saw-log volume for eight of the species.

Keywords: Volume equations, volume measurement, hardwoods, California.

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Introduction

There is a vast hardwood resource in California. It is estimated¹ that together all hardwood species occupy 5-6 million hectares (12-15 million acres). Hardwood forest types cover 1.1 million hectares (2.8 million acres) of the 6.6 million hectares (16.3 million acres) of commercial forest lands (excluding parks and wilderness areas) in California. In addition, hardwood trees account for 10 percent or more of the stocking on 1.1 million hectares (2.7 million acres) of commercial conifer types (Bolsinger 1979). In a recent study the gross volume of hardwoods in the hardwood forests and woodlands in four central coast counties alone was estimated at 24.7 million cords or 56 million cubic meters of wood (two billion cubic feet at 80 cubic feet of wood per standard cord) (Pillsbury and Brockhaus 1981). We have estimated that hardwoods amount to about 26 percent of the total wood volume in California's forests (approximately 18 billion cubic feet).

In the past, little has been done to manage native California hardwoods because of the limited market for most hardwood products. The selective cutting of conifers in mixed stands has led to a 34-percent increase in cubic-foot volume of oaks and a 29-percent decrease in conifers since 1953 (Bolsinger 1979).

With the increasing demand for hardwood for fuel, energy, wood fiber, lumber, and nonconsumptive uses such as wildlife, watershed protection, and aesthetics (Asher,² Barrett, 1979, Bolsinger 1979, Crail,³ Smith 1981, Tillman 1978, Verner 1979), information on the distribution and volume of California's hardwoods is needed to manage the resource. Estimates of standing tree volumes are needed to inventory forests for management purposes, forest valuation, and taxation.

Background

Only a few volume equations have been published for native California hardwoods and all have been developed for local or regional use. Existing equations have been reported by several authors: Wiant and Berry (1965)—tanoak; Hornibrook and others (1950)—California black oak, Oregon white oak, Pacific madrone, and tanoak; Pillsbury and Stephens (1978)—coast live oak, blue oak, and tanoak; Harrington and others (1979)—California white oak. Local volume equations have been developed by McDonald (1983) for Pacific madrone, tanoak, and California black oak. Pillsbury and Stephens (1978) developed a methodology to estimate volume in standing trees with multiple stems and irregular forms.

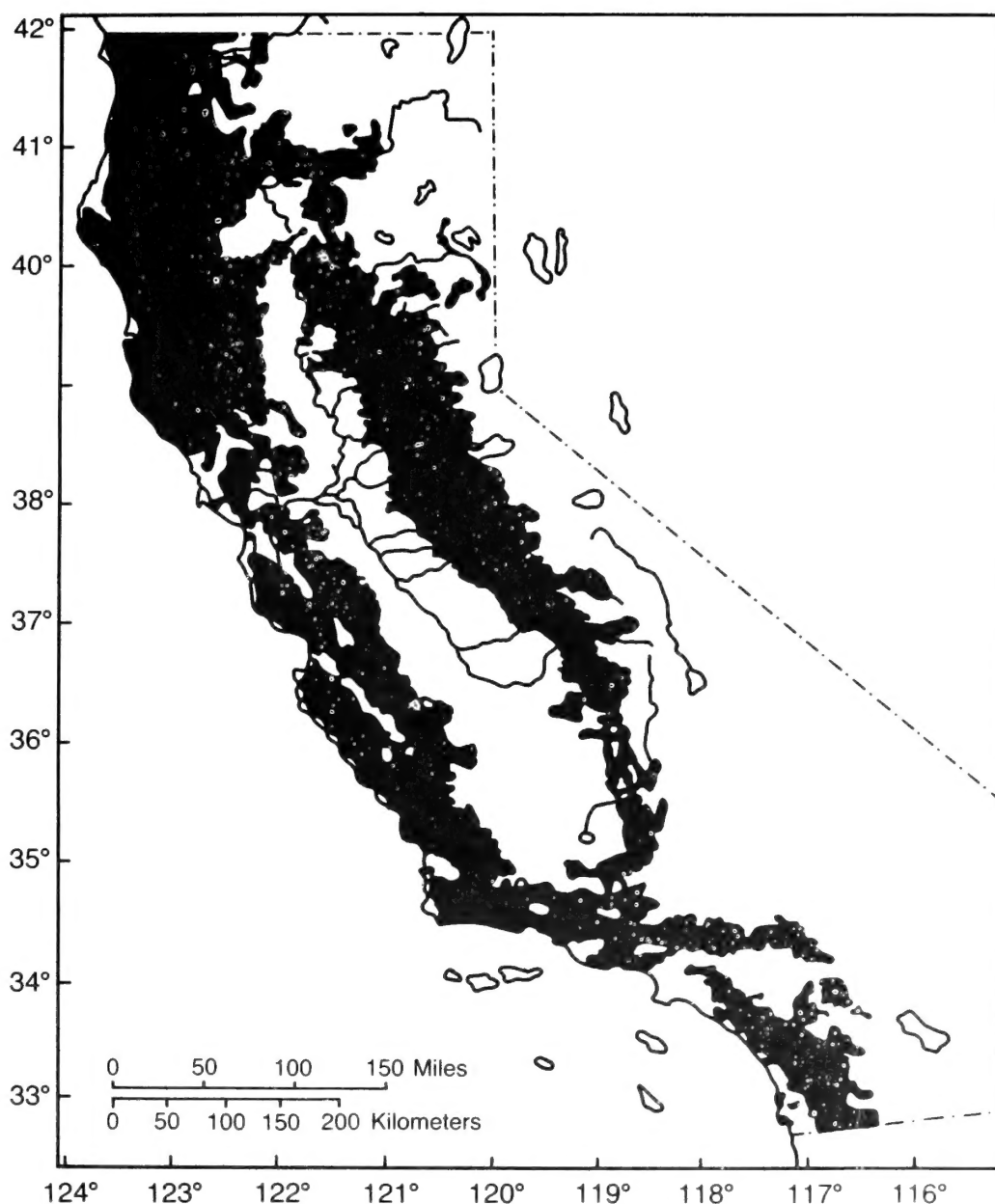
Reliable volume equations already exist for red alder (*Alnus rubra* Bong.), a commercial hardwood in California and the Pacific Northwest (Browne 1962, Curtis and others 1968, Johnson and others 1949, Skinner 1959, Turnbull and others 1963). Volume equations for bigleaf maple also exist, but were developed for use in British Columbia (Browne 1962).

¹ Personal communication, 1982, Charles L. Bolsinger, Pacific Northwest Forest and Range Experiment Station, Portland, Oregon.

² Presentation at the Hardwood Inventory and Utilization workshop, 1982, "Hardwood utilization and marketing in southern California," by James E. Asher, Natural Resources Management Department, California Polytechnic State University, San Luis Obispo.

³ Presentation at the Hardwood Inventory and Utilization workshop, 1982. "Demand for hardwoods as a raw material for pulping processes," by Miles Crail, Natural Resources Management Department, California Polytechnic State University, San Luis Obispo.

Figure 1.—Geographic range of the thirteen hardwood species in California (after Plumb 1979 and Griffin and Critchfield 1972).



None of the equations, except those for red alder, are considered suitable for a statewide forest inventory because of the inconsistency in measurement standards and the possibility that they may be unreliable outside of the area for which they were developed. In this study, volume equations for thirteen major hardwood species were developed (fig. 1) from data collected on sample trees distributed throughout their natural ranges in California. Equations were developed for: (1) total tree volume (all stem and branch wood plus stump and bark); (2) wood volume (wood inside bark from stump to 10 cm (4 in) top outside bark); and (3) saw-log volume for trees 28 cm (11 in) diameter at breast height (d.b.h.) and larger.⁴

⁴ All measurements were taken in metric units. English units shown in the text are rounded to the nearest unit.

The species included in this study are:

<u>Scientific name/author</u>	<u>Common name</u>
<i>Acer macrophyllum</i> Pursh	Bigleaf maple
<i>Arbutus menziesii</i> Pursh	Pacific madrone
<i>Castanopsis chrysophylla</i> (Dougl.) A. DC.	Giant chinkapin
<i>Lithocarpus densiflorus</i> (Hook. & Arn.) Rehd.	Tanoak
<i>Quercus agrifolia</i> Née	Coast live oak
<i>Quercus chrysolepis</i> Liebm.	Canyon live oak
<i>Quercus douglasii</i> Hook. & Arn.	Blue oak
<i>Quercus engelmannii</i> Greene	Engelmann oak
<i>Quercus garryana</i> Dougl. ex Hook.	Oregon white oak
<i>Quercus kelloggii</i> Newb.	California black oak
<i>Quercus lobata</i> Née	California white oak (valley oak)
<i>Quercus wislizeni</i> A. DC.	Interior live oak
<i>Umbellularia californica</i> (Hook. & Arn.) Nutt.	California-laurel

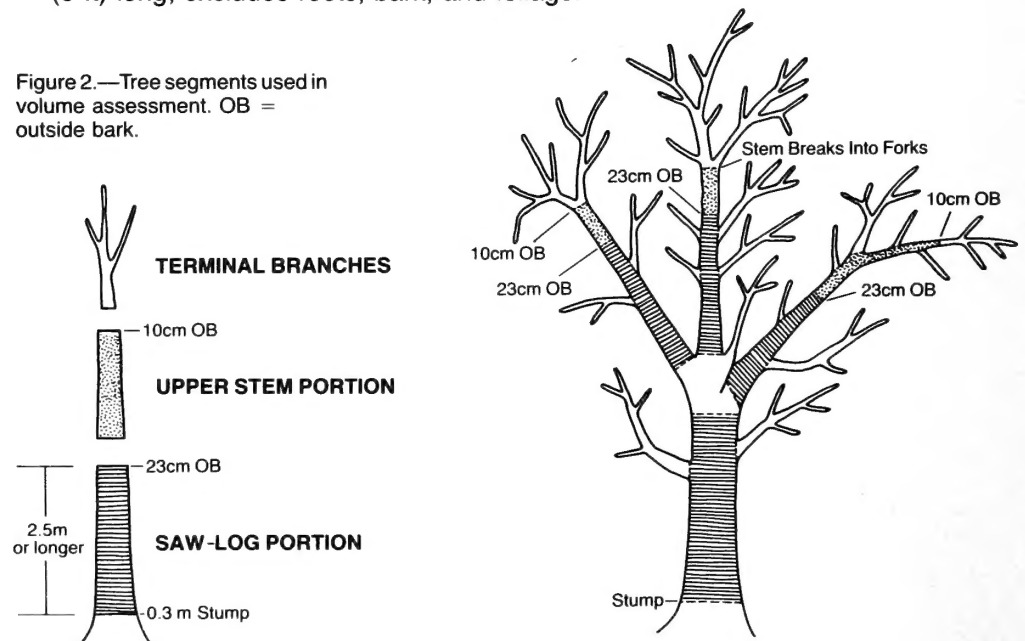
Methodology

Utilization Standards and Measured Variables

The volume equations developed for each species are expressed in cubic feet and cubic meters for three utilization standards (fig. 2).

1. Total volume: includes all stem and branch wood plus stump and bark; excludes roots and foliage.
2. Wood volume: computed from stump height (0.3 m (1 ft)) to a 10-cm (4-in) top outside bark; excludes roots, bark, and foliage.
3. Saw-log volume: computed for trees 28 cm (11 in) d.b.h. and larger; volume computed from stump height to a 23-cm (9-in) top outside bark for straight sections 2.5 m (8 ft) long; excludes roots, bark, and foliage.

Figure 2.—Tree segments used in volume assessment. OB = outside bark.



Sample Design

Each species was sampled throughout its natural range in California based on maps developed by Griffin and Critchfield (1972). The state was divided into six geographic regions: northern coast, northern interior, central coast, central interior, southern coast, and southern interior.⁵ The percentage of trees sampled in each region was proportional to the approximate area each species occupies in the region.

Trees were sampled in areas of varying site qualities, stand densities, and topography. Trees were not sampled east of the Sierra Nevada and Cascade Range because few hardwoods occur there.

A desirable sample size for each species was 60 trees, for a total of approximately 780 trees to be measured statewide for the 13 species studied. Experience has shown that a sample of this size is normally satisfactory for estimating regression coefficients and testing for adequacy of the model for the three utilization standards.

Sample Tree Selection

In sample areas, trees were selected to represent a range of diameters, heights, growth forms, stand structures, and topography. Sound trees 12.7 cm (5 in) in diameter, or larger, at breast height were selected. Decadent trees and trees with major defects were avoided.

Tree and Site Measurements

Sample tree variables measured in the field are summarized in table 1. Total height was measured from ground level to the tip of the tree. Habit class ratings developed by Pillsbury and Stephens (1978) were assigned to each tree sampled (fig. 3). A numerical

⁵ Unpublished Master's Thesis, 1982, Michael L. Kirkley, California Polytechnic State University, San Luis Obispo.

Table 1—Summary and measurement description of sample tree variables

Variable	Units	Measurement description
Diameter at breast height	cm	Diameter of main stem at 1.37 meters (4.5 ft) measured to the nearest tenth with a D-tape.
Stump diameter	cm	Diameter of main stem at 0.3 meters (1 ft) measured to the nearest tenth with a D-tape.
Height	m	To the terminal-most leader determined by Relaskop on the uphill side to the nearest tenth.
Single bark thickness	cm	Measured to the nearest tenth at breast height (1.37 m) (4.5 ft) with a ruler.
Habit class	class 1-5	Defined by branching pattern. 1 = conifer-like form; 5 = multi-branching form with many forks (fig. 3).
Stand density	m ² /ha	Cross-sectional area of trees at d b h measured using a Relaskop (basal area factor of 4).
Site quality	class	H = high; M = medium; L = low

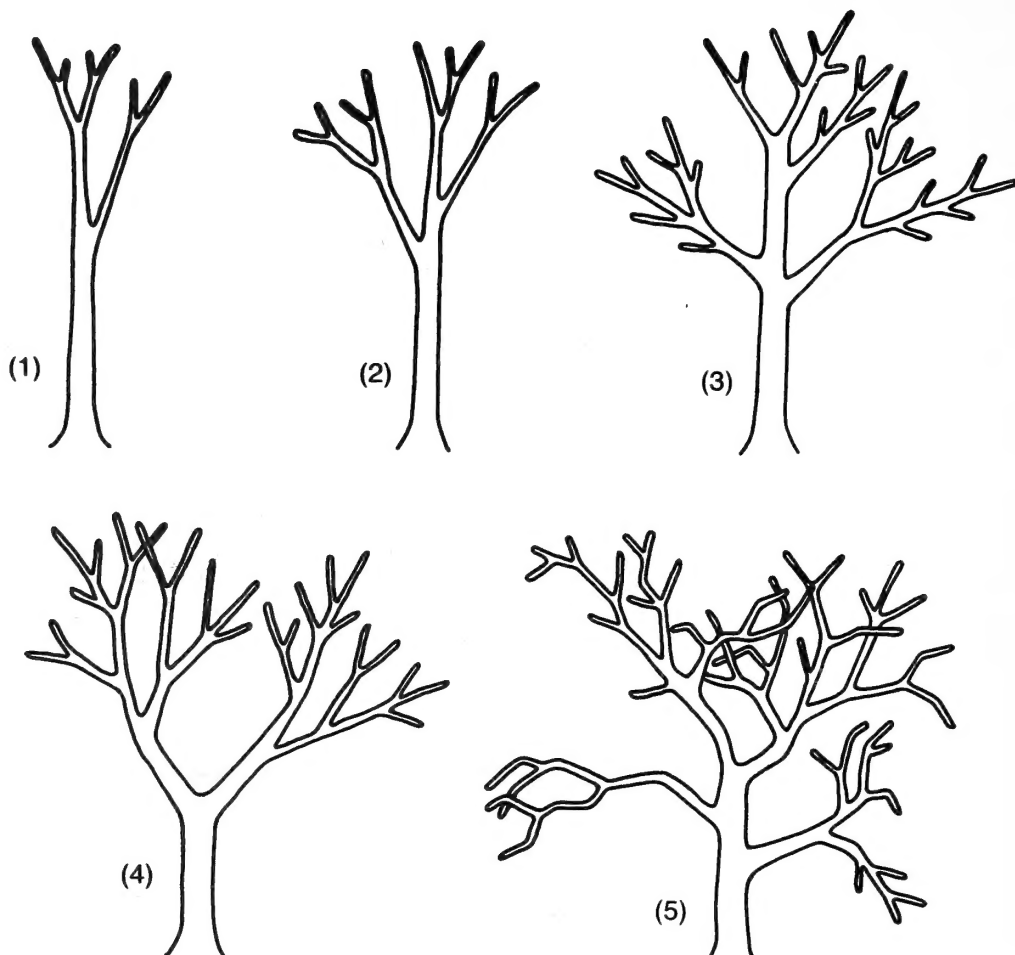


Figure 3.—Five habit classes were used for evaluating tree form and branching complexity (from Pillsbury and Stephens 1978).

rating of one to five was recorded to indicate the complexity of branching: a rating of one indicated an excurrent growth form with one main bole and one or two lateral branches, and a rating of five indicated a deliquescent growth form with complex branching (fig. 3). Stump diameters were measured to compute the volume of the first segment; bark thickness was measured to develop relationships between diameter at inside bark (d.i.b.) and diameter at outside bark (d.o.b.) for computing underbark volume and developing wood and saw-log volume equations.

Basal area per hectare and site quality data were recorded to describe the range of stand densities and sites of the sample trees. In areas with recent logging activity basal area was computed by counting both standing trees and stumps to estimate basal area prior to timber harvesting. Site quality was a subjective rating of high, medium, and low. Stand density, associated vegetation, soil depth, and tree form were used as guides to estimate site quality.

Tree Volume Measurement

For volume measurement, the branching pattern was defined on a segment basis. Segment length and the diameters at each end were measured using a Spiegel Relaskop (Dilworth 1981). Segment length was determined from coordinates measured at both ends of each segment. Each tree was divided into segments based on four criteria:

1. Segments were defined as the distance from fork to fork in trees with very complex branching pattern such as segment 11, figure 4.
2. If a branch had sweep or crook, segments were measured to obtain a straight log length such as in segments 3 and 5.
3. Segments were defined if abrupt changes in taper were apparent such as in segments 16 and 17.
4. If a tree had an excurrent growth form the maximum segment length was approximately 3 m (10 ft).

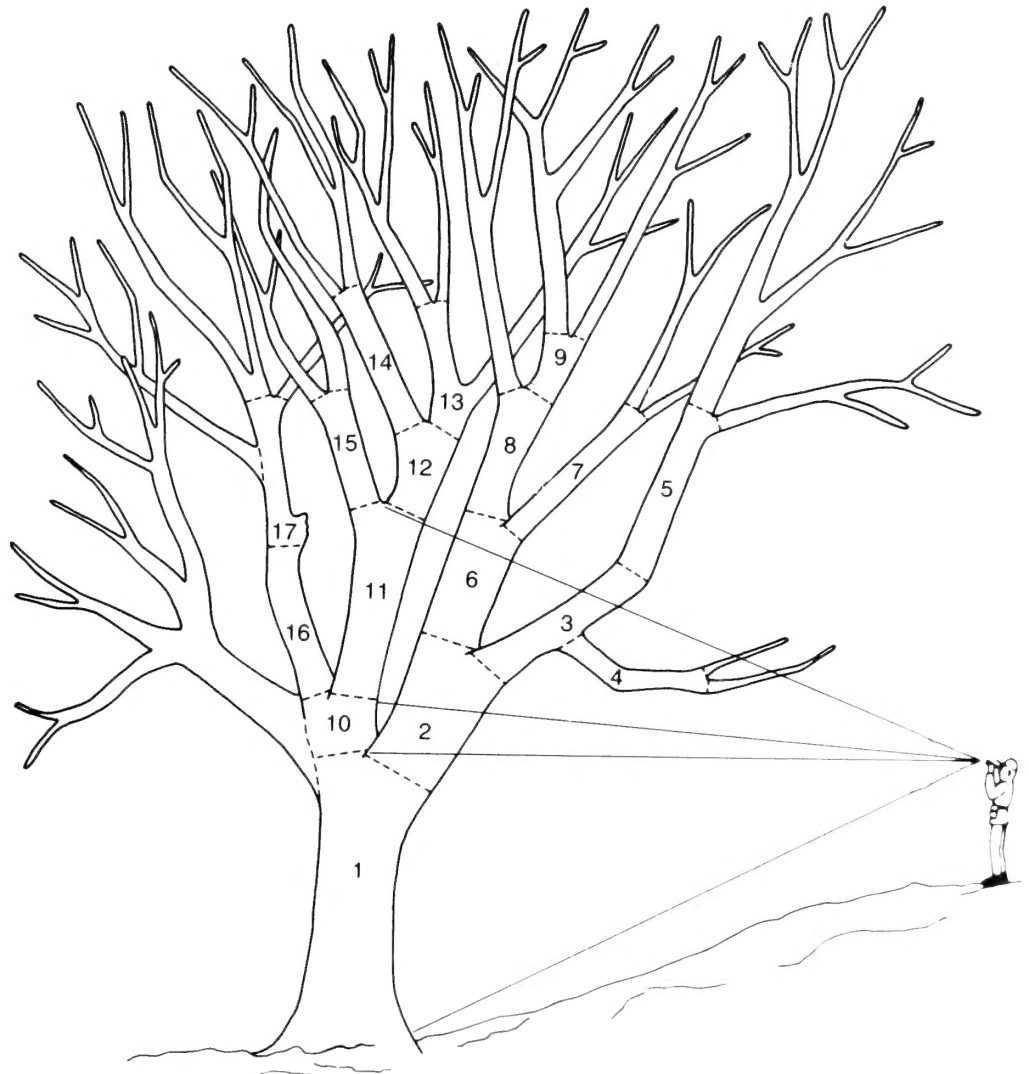


Figure 4.—Tree volumes were calculated from segment lengths and diameters.

Saw-log tree segments had to be at least 2.5 m (8 ft) long, with a small end diameter of 23 cm (9 in). If swelling was present on the stem, diameter measurements were taken slightly above or below the abnormality. Branches not growing vertically were assigned an angle (estimated to the nearest 5 degrees from horizontal) and segment length was calculated. Segments growing less than 30 degrees from horizontal were measured by projecting their length to the ground and measuring with a cloth tape held parallel to the branch angle. Terminal branches were measured from a 10-cm (4-in) diameter to the tip. All terminal branches were tallied and an average length to the nearest 0.5 m (20 in) was recorded.

Computation of Sample Tree Data

Segment volumes were computed from Relaskop coordinate and diameter measurements in cubic meters using Smalian's formula. Segment volumes were summed to obtain gross volume for each tree up to a 10-cm (4-in) top. Terminal branch volume was computed as a paraboloid.

Regression equations estimating d.i.b. from d.o.b. were developed for each species using bark thickness sample data (table 2). With the exception of tanoak, it was assumed that the d.i.b.: d.o.b. ratio remained constant at all heights in upper stem diameters. Previous work by Pillsbury and Stephens (1978) showed that this relationship did not hold with tanoak. A separate study was done to examine how the d.i.b.: d.o.b. ratio changed at increasing heights in tanoak. A sample of 50 trees was measured in Santa Cruz and Monterey Counties. Bark thickness and d.o.b. measurements were made at 0.3 m (1 ft), 1.37 m (4.5 ft), 2.74 m (9 ft), and 5.18 m (17 ft) on standing trees. The results of the study show that the wood tapers more with height than the bark does. A multiple regression equation was developed for tanoak to estimate d.i.b. at any height (DIB_h) using DOB_h and its height above ground (H):

$$DIB_h = -4.36852 + 0.95354 (DOB_h) + 0.18307 (H)$$

$N = 201$ height points on 50 trees; $R^2 = 0.962$; $SE = 1.16$.

Error and Outlier Analysis

A simple linear regression model using tree basal area times height (volume of a cylinder) to estimate volume was computed and plotted to analyze the data for linearity and detect any outliers. Also, d.b.h. was plotted against both volume and total height, and total height was plotted against volume to detect possible errors in the data sets. This was necessary to guard against compensation errors (for example, a case where basal area is too small and height too large, but basal area times height appears normal).

Extreme values were analyzed using a t-test. Lund's (1975) standardized residuals were computed and compared to tables for an approximate test for outliers. A total of 13 trees out of 779 trees sampled (1.7 percent) was determined to be outliers and were dropped from the analyses.

Table 2—Equations for estimating diameter inside bark based on measured diameter outside bark for 13 California hardwoods

	N	R ²	SE
BIGLEAF MAPLE DIB = 0.21235 + 0.94782 (DOB)	61	0.995	0.94
CALIFORNIA BLACK OAK DIB = -0.68133 + 0.95767 (DOB)	60	.997	1.20
BLUE OAK DIB = -0.44003 + 0.94403 (DOB)	60	.995	.99
CANYON LIVE OAK DIB = -0.48584 + 0.96147 (DOB)	57	.996	.81
GIANT CHINKAPIN DIB = 0.39534 + 0.90182 (DOB)	60	.986	1.53
COAST LIVE OAK DIB = -1.92379 + 0.93475 (DOB)	60	.992	1.47
ENGLEMANN OAK DIB = -1.99573 + 0.92472 (DOB)	61	.992	1.23
INTERIOR LIVE OAK DIB = 0.12237 + 0.92953 (DOB)	58	.995	1.27
CALIFORNIA-LAUREL DIB = -0.32491 + 0.96579 (DOB)	60	.998	.67
PACIFIC MADRONE DIB = -0.03425 + 0.98155 (DOB)	60	.999	.46
OREGON WHITE OAK DIB = -0.78034 + 0.95956 (DOB)	60	.995	1.19
CALIFORNIA WHITE OAK DIB = -0.97254 + 0.93545 (DOB)	60	.995	1.35
TANOAK DIB _h = -4.36852 + 0.95354 (DOB _h) + 0.18307 (H)			
N = 201 height points on 50 trees; R ² = 0.962; SE = 1.16			

SE = Standard error of estimate in cm.

DIB = diameter inside bark (cm).

DOB = diameter outside bark (cm).

DIB_h = diameter inside bark at any height.

DOB_h = diameter outside bark at any height.

H = ^hheight above ground.

**Analysis
Development
of Volume Equations**

Multiple regression equations were developed for total, wood, and saw-log volume from sample tree variables. Volume equations were developed for the 13 species in units of cubic feet and cubic meters. A \log_{10} transformation of volume and tree variables was used in developing the regression model to linearize the data and equalize the variation about the regression line.

Total and wood volume equations.—Tree volume was tested as a function of diameter at breast height, total height, stand density, and habit class. Diameter at breast height and total tree height were found to be the best predictors of total volume and wood volume. Stand density and habit class contributed little to the prediction of total and wood volume and were dropped from the model.

Multiple coefficient of determination (R^2) values exceeded 0.92 in all total and wood volume equations, indicating a strong relationship (tables 3 and 4).

Table 3—English equations for total, wood, and saw-log volumes for California hardwoods

Species	Equation	R^2	N	SE
BIGLEAF	TVOL = .0101786350 (DBH ^{2.22462}) (HT ^{0.57561})	0.944	61	45.4
MAPLE	WVOL = .0034214162 (DBH ^{2.35347}) (HT ^{0.69586})	.924	61	48.4
	SVOL = .0004236332 (DBH ^{2.10316}) (HT ^{1.08584}) (IV ^{0.40017})	.767	26	53.7
CALIFORNIA	TVOL = .0070538108 (DBH ^{1.97437}) (HT ^{0.85034})	.971	59	43.1
BLACK OAK	WVOL = .0036795695 (DBH ^{2.12635}) (HT ^{0.83339})	.962	60	45.2
	SVOL = .0012478663 (DBH ^{2.68099}) (HT ^{0.42441}) (IV ^{0.28385})	.929	38	47.7
BLUE	TVOL = .0125103008 (DBH ^{2.33089}) (HT ^{0.46100})	.971	60	43.0
OAK	WVOL = .0042324071 (DBH ^{2.53987}) (HT ^{0.50591})	.970	60	44.1
	SVOL = .0036912408 (DBH ^{1.79732}) (HT ^{0.83884}) (IV ^{0.15958})	.826	32	46.0
CANYON	TVOL = .0097438611 (DBH ^{2.20527}) (HT ^{0.61190})	.978	58	41.8
LIVE OAK	WVOL = .0031670596 (DBH ^{2.32519}) (HT ^{0.74348})	.980	58	42.0
	* SVOL = .0006540144 (DBH ^{2.24437}) (HT ^{0.81358}) (IV ^{0.43381})	.884	68	48.4
GIANT	TVOL = .0120372263 (DBH ^{2.02232}) (HT ^{0.68638})	.960	60	44.4
CHINKAPIN	WVOL = .0055212937 (DBH ^{2.07202}) (HT ^{0.77467})	.958	60	45.0
	SVOL = .0018985111 (DBH ^{2.38285}) (HT ^{0.77105})	.880	40	46.2
COAST	TVOL = .0065261029 (DBH ^{2.31958}) (HT ^{0.62528})	.968	60	44.1
LIVE OAK	WVOL = .0024574847 (DBH ^{2.53284}) (HT ^{0.60764})	.971	59	44.1
	* SVOL = .0006540144 (DBH ^{2.24437}) (HT ^{0.81358}) (IV ^{0.43381})	.884	68	48.4
ENGELMANN	TVOL = .0191453191 (DBH ^{2.40248}) (HT ^{0.28060})	.965	61	43.4
OAK	WVOL = .0053866353 (DBH ^{2.61268}) (HT ^{0.31103})	.966	61	43.9

Table 3—English equations for total, wood, and saw-log volumes for California hardwoods, continued

Species	Equation	R ²	N	SE
INTERIOR	TVOL = .0136818837 (DBH ^{2.02989}) (HT ^{0.63257})	0.971	58	42.7
LIVE OAK	WVOL = .0041192264 (DBH ^{2.14915}) (HT ^{0.77843})	.967	58	44.0
	* SVOL = .0006540144 (DBH ^{2.24437}) (HT ^{0.81358}) (IV ^{0.43381})	.884	68	48.4
CALIFORNIA	TVOL = .0057821322 (DBH ^{1.94553}) (HT ^{0.88389})	.967	60	43.8
LAUREL	WVOL = .0016380753 (DBH ^{2.05910}) (HT ^{1.05293})	.959	60	46.0
	SVOL = .0007741517 (DBH ^{2.23009}) (HT ^{1.03700})	.913	30	45.1
PACIFIC	TVOL = .0067322665 (DBH ^{1.96628}) (HT ^{0.83458})	.967	60	43.4
MADRONE	WVOL = .0025616425 (DBH ^{1.99295}) (HT ^{1.01532})	.959	58	44.8
	SVOL = .0006181530 (DBH ^{1.72635}) (HT ^{1.26462}) (IV ^{0.37867})	.905	32	45.9
OREGON	TVOL = .0072695058 (DBH ^{2.14321}) (HT ^{0.74220})	.961	60	44.6
WHITE OAK	WVOL = .0024277027 (DBH ^{2.25575}) (HT ^{0.87108})	.958	60	44.6
	SVOL = .0008281647 (DBH ^{2.10651}) (HT ^{0.91215}) (IV ^{0.32652})	.838	32	49.6
TANOAK	TVOL = .0058870024 (DBH ^{1.94165}) (HT ^{0.86562})	.973	60	42.9
	WVOL = .0005774970 (DBH ^{2.19576}) (HT ^{1.14078})	.961	59	46.3
	SVOL = .0002526443 (DBH ^{2.30949}) (HT ^{1.21069})	.906	37	48.0
CALIFORNIA	TVOL = .0042870077 (DBH ^{2.33631}) (HT ^{0.74872})	.990	59	40.6
WHITE OAK	WVOL = .0009684363 (DBH ^{2.39565}) (HT ^{0.98878})	.990	59	41.0
	SVOL = .0001880044 (DBH ^{1.87346}) (HT ^{1.62443})	.929	37	47.0

SE = the standard error of the estimate in cubic feet.

TVOL = total tree volume in cubic feet.

WVOL = wood volume in cubic feet.

SVOL = saw-log volume in cubic feet.

DBH = diameter at breast height in inches.

HT = total height in feet.

IV = an indicator variable (1 = non-merchantable first segment;
10 = merchantable first segment).

* Combined equation for sawlog volumes for canyon live oak, interior live oak,
and coast live oak.

Table 4—Metric equations for total, wood, and saw-log volumes for California hardwoods

Species	Equation	R ²	N	SE
BIGLEAF	TVOL = .0000718042 (DBH ^{2.22462}) (HT ^{0.57561})	.944	61	1.29
MAPLE	WVOL = .0000246916 (DBH ^{2.35347}) (HT ^{0.69586})	.924	61	1.37
	SVOL = .0000061361 (DBH ^{2.10316}) (HT ^{1.08584}) (IV ^{0.40017})	.767	26	1.52
CALIFORNIA	TVOL = .0000870843 (DBH ^{1.97437}) (HT ^{0.85034})	.971	59	1.22
BLACK OAK	WVOL = .0000386403 (DBH ^{2.12635}) (HT ^{0.83339})	.962	60	1.28
	SVOL = .0000048067 (DBH ^{2.68099}) (HT ^{0.42441}) (IV ^{0.28385})	.929	38	1.35
BLUE	TVOL = .0000697541 (DBH ^{2.33089}) (HT ^{0.46100})	.971	60	1.22
OAK	WVOL = .0000204861 (DBH ^{2.53987}) (HT ^{0.50591})	.970	60	1.25
	SVOL = .0000530200 (DBH ^{1.79732}) (HT ^{0.83884}) (IV ^{0.15958})	.826	32	1.31
CANYON	TVOL = .0000730718 (DBH ^{2.20527}) (HT ^{0.61190})	.978	58	1.18
LIVE OAK	WVOL = .0000248325 (DBH ^{2.32519}) (HT ^{0.74348})	.980	58	1.19
	* SVOL = .0000060095 (DBH ^{2.24437}) (HT ^{0.81358}) (IV ^{0.43381})	.884	68	1.37
GIANT	TVOL = .0001169607 (DBH ^{2.02232}) (HT ^{0.68638})	.960	60	1.26
CHINKAPIN	WVOL = .0000568840 (DBH ^{2.07202}) (HT ^{0.77467})	.958	60	1.27
	SVOL = .0000145764 (DBH ^{2.38285}) (HT ^{0.77105})	.880	40	1.31
COAST	TVOL = .0000446992 (DBH ^{2.31958}) (HT ^{0.62528})	.968	60	1.25
LIVE OAK	WVOL = .0000135114 (DBH ^{2.53284}) (HT ^{0.60764})	.971	59	1.25
	* SVOL = .0000060095 (DBH ^{2.24437}) (HT ^{0.81358}) (IV ^{0.43381})	.884	68	1.37
ENGELMANN	TVOL = .0000805935 (DBH ^{2.40248}) (HT ^{0.28060})	.965	61	1.23
OAK	WVOL = .0000193268 (DBH ^{2.61268}) (HT ^{0.31103})	.966	61	1.24

Table 4—Metric equations for total, wood, and saw-log volumes for California hardwoods, continued

Species	Equation	R ²	N	SE
INTERIOR	TVOL = .0001238312 (DBH ^{2.02989}) (HT ^{0.63257})	0.971	58	1.21
LIVE OAK	WVOL = .0000396716 (DBH ^{2.14915}) (HT ^{0.77843})	.967	58	1.24
	* SVOL = .0000060095 (DBH ^{2.24437}) (HT ^{0.81358}) (IV ^{0.43381})	.884	68	1.37
CALIFORNIA	TVOL = .0000763133 (DBH ^{1.94553}) (HT ^{0.88389})	.967	60	1.24
LAUREL	WVOL = .0000237733 (DBH ^{2.05910}) (HT ^{1.05293})	.959	60	1.30
	SVOL = .0000094003 (DBH ^{2.23009}) (HT ^{1.03700})	.913	30	1.28
PACIFIC	TVOL = .0000821921 (DBH ^{1.96628}) (HT ^{0.83458})	.967	60	1.23
MADRONE	WVOL = .0000378129 (DBH ^{1.99295}) (HT ^{1.01532})	.959	58	1.27
	SVOL = .0000157319 (DBH ^{1.72635}) (HT ^{1.26462}) (IV ^{0.37867})	.905	32	1.30
OREGON	TVOL = .0000674342 (DBH ^{2.14321}) (HT ^{0.74220})	.961	60	1.26
WHITE OAK	WVOL = .0000236325 (DBH ^{2.25575}) (HT ^{0.87108})	.958	60	1.30
	SVOL = .0000097284 (DBH ^{2.10651}) (HT ^{0.91215}) (IV ^{0.32652})	.838	32	1.41
TANOAK	TVOL = .0000763045 (DBH ^{1.94165}) (HT ^{0.86562})	.973	60	1.22
	WVOL = .0000081905 (DBH ^{2.19576}) (HT ^{1.14078})	.961	59	1.31
	SVOL = .0000035019 (DBH ^{2.30949}) (HT ^{1.21069})	.906	37	1.36
CALIFORNIA	TVOL = .0000334750 (DBH ^{2.33631}) (HT ^{0.74872})	.990	59	1.15
WHITE OAK	WVOL = .0000095166 (DBH ^{2.39565}) (HT ^{0.98878})	.990	59	1.16
	SVOL = .0000063968 (DBH ^{1.87346}) (HT ^{1.62443})	.929	37	1.33

SE = the standard error of the estimate in cubic meters.

TVOL = total tree volume in cubic meters.

WVOL = wood volume in cubic meters.

SVOL = saw-log volume in cubic meters.

DBH = diameter at breast height in centimeters.

HT = total height in meters.

IV = an indicator variable (1 = non-merchantable first segment;
10 = merchantable first segment).

* Combined equation for sawlog volumes for canyon live oak, interior live oak,
and coast live oak.

Saw-log volume equations.—A qualitative indicator variable was used to break the saw-log data into two subsets: trees with a merchantable (straight, at least 2.5 m (8 ft) long, and free of defect) first segment, and trees without a merchantable first segment. A code of “1” means the first segment is nonmerchantable and a code of “10” means it is merchantable. The addition of the indicator variable helped reduce the variation in saw-log equations for 8 of the 13 species (tables 3 and 4). This improved the precision of the saw-log volume equation. Species that forked below 2.5 m (8 ft) commonly had sweep, crook, and a multiple branching pattern, resulting in segment lengths shorter than 2.5 m (8 ft) and an overall lower proportion of saw-log volume.

Of the eight species where an indicator variable was included in the model, trees with a merchantable first segment had an average of 2.3 times more volume than trees without a merchantable first segment. The regression model incorporating the indicator variable was not used for tanoak, chinkapin, and California-laurel because these species usually have merchantable first logs. Also it was not used for California white oak because the indicator variable added little to reduce variation in predicting saw-log volume.

Saw-log equations were not developed for Engelmann oak, which has a very complex growth form with few straight sections. Little or no saw-log volume can be expected in unmanaged native stands of this species.

Test To Combine Regression Lines

Because of the size and irregular form of the live oak species (canyon, coast, and interior), many trees measured did not have any saw-log volume. As a result the sample size for developing saw-log equations for the live oak species was small. These species were observed to have similar growth forms and an F-test supported combining the data sets. The three live oak data sets were therefore combined to produce one equation for saw-log volume (tables 3 and 4).

Verification of Tree Volume

Most of the sample trees were on private property and were not felled at the time of Relaskop measurement. Pillsbury and Stephens' (1978) method was used to check tree volumes. They cut and measured 61 trees to check the accuracy of the volumes based on Relaskop measurements of standing trees. They developed a simple linear regression equation (\log_{10} transformation) relating standing tree volume to cut tree volume and obtained a multiple coefficient of determination of 0.990 (SE = 1.17). To validate their equation for use in this study, 10 additional sample trees spanning the range of diameters at breast height were measured. Standing tree measurements were made by the techniques previously discussed in this report. Then each tree was felled and measured with tape and caliper. A simple linear regression (\log_{10} transformation) was developed relating standing tree volume to cut tree volume and compared to the Pillsbury and Stephens (1978) equation. An F-test supported combining the two data sets as one population at the 0.99 probability level. All standing volumes were corrected using the Pillsbury and Stephens (1978) equation:

$$\text{Corrected Volume (M}^3\text{)} = 1.166 (\text{Standing Volume (M}^3\text{)})^{0.9947}$$

The standing tree volumes are increased by approximately 15 percent using this equation, indicating that the technique used to measure standing tree volume tends to underestimate tree volume.

Reliability of the Equations

The average aggregate difference in percent is -2.1 for total volume, -2.8 for wood volume, and -5.8 for saw-log volume. An independent test was made using total volumes of 76 felled trees in three central coast counties. The average aggregate difference for the 76 trees is 17.0 percent.

The reliability of the equations can be measured by the relative deviation of individual tree volumes from the regression surface (MacLean and Berger 1976). A measure of this residual variation is the root mean squared error; that is, the root of the mean squared difference between the predicted and actual values. This comparison, expressed as a percent of the mean volume, is shown in table 5. The root mean squared error difference for 76 trees of known volume in three central coast counties is shown in table 6. The root mean squared errors range from about 20 to 55 for the various utilization standards shown in tables 5 and 6. These values are higher than those reported for conifers (MacLean and Berger 1976) and illustrate the greater variability in volume that occurs for a given diameter and height for many hardwoods.

Table 5—Root mean squared errors of standard volume equations for total, wood, and saw-log utilization standards

Species	Root mean squared error					
	Total volume		Wood volume		Sawlog volume	
	<i>N</i>	<i>Percent</i>	<i>N</i>	<i>Percent</i>	<i>N</i>	<i>Percent</i>
Bigleaf maple	61	36	61	46	24	31
California black oak	59	50	60	56	38	21
Blue oak	60	27	60	30	32	36
Canyon live oak	58	52	58	53	—	n/a—
Giant chinkapin	60	45	60	46	40	20
Coast live oak	60	36	59	39	—	n/a—
Engelmann oak	61	30	61	34	—	n/a—
Interior live oak	58	28	58	38	—	n/a—
California-laurel	60	24	60	26	30	20
Pacific madrone	60	38	58	39	32	24
Oregon white oak	60	41	60	47	32	36
Tanoak	60	38	59	54	37	27
California white oak	59	20	59	22	37	22
Combined: Canyon, interior and coast live oaks	—	n/a—	—	n/a—	85	64

n/a = not applicable.

Table 6—Results of a test of equations for 76 trees of known total volume from Monterey, San Luis Obispo, and Santa Cruz Counties

Species	Root mean squared error	
	<i>Number of trees</i>	<i>Percent</i>
Blue oak	26	42
Coast live oak	35	50
Tanoak	15	24

Use of the Equations

Following is an example showing calculations in English units of total, wood, and saw-log volumes for a blue oak tree with these dimensions: d.b.h. = 25.5 inches; and total height = 47 feet. It has a merchantable first segment:

$$\text{TVOL} = .0125103008 (25.5^{2.33089}) \times (47^{0.46100}) = 140 \text{ cubic feet;}$$

$$\text{WVOL} = .0042324071 (25.5^{2.53987}) \times (47^{0.50591}) = 110 \text{ cubic feet; and}$$

$$\text{SVOL} = .0036912408 (25.5^{1.79732}) \times (47^{0.83884}) \times (10^{0.15958}) = 45 \text{ cubic feet.}$$

Although other hardwood volume equations are available, most have been developed for regional or local use and incorporate various utilization standards. Volume equations developed for local areas may provide better estimates of tree volumes in those areas than the equations for the entire state. Field checking may be necessary to compare the accuracy of the statewide equations to local or regional sites if this use is desired.

Volume Tables and Range of Data

In the appendix are tables showing calculated volumes for selected diameters and heights for each of the 13 hardwood species studied. The range of measurements used to develop the equations is shown on each table.

Literature Cited

Barrett, Reginald A. Mammals of California oak habitats—management implications. In: Proc., Symp. on Ecology, management and utilization of California oaks; 1979 June 26-28; Claremont, CA. Gen. Tech. Rep. PSW-44. Berkeley, CA: U.S. Department of Agriculture, Forest Service; **1979**: 275-291.

Bolsinger, Charles L. Oaks in California's commercial forests—volume, stand structure, and defect characteristics. In: Proc., Symp. on Ecology, management and utilization of California oaks; 1979 June 26-28; Claremont, CA. Gen. Tech. Rep. PSW-44. Berkeley, CA: U.S. Department of Agriculture, Forest Service; **1979**: 101-106.

Browne, J. Standard cubic foot volume tables for the commercial tree species of British Columbia. Vancouver, B.C: British Columbia Forest Service Forest Surveys and Inventory Division; **1962**: 107 p.

Curtis, R.; Bruce, D.; Van Coevering, C. Volume and taper tables for red alder. Res. Pap. PNW-56. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station; **1968**. 35 p.

Dilworth, J. Log scaling and timber cruising. Corvallis, OR: O.S.U. Book Stores, Inc.; **1981**. 466 p.

Griffin, J. R.; Critchfield, W. B. The distribution of forest trees in California. Res. Note PSW-82. Berkeley, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Forest and Range Experiment Station; **1972**. 114 p.

Harrington, Thomas J.; Pillsbury, Norman H; Barrette, Brian. A gross volume table for California white oak in Monterey and San Luis Obispo Counties. State Forest Note No. 77. Sacramento, CA: California Department of Forestry; **1979**. 4 p.

Hornibrook, E. M.; Larson, R. W.; Van Akkeren, J. J.; Hasel, A. A. Boardfoot and cubic-foot volume tables for some California hardwoods. Res. Note PSW-67. Berkeley, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Forest and Range Experiment Station; **1950**. 31 p.

Johnson, F. A.; Kallander, R. M.; Lauterback, P. G. Volume tables for red alder. Res. Note PNW-55. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station; **1949**. 10 p.

- Lund, Richard E.** Tables for an approximate test for outliers in linear models. *Technometrics*. 17(4): November **1975**.
- MacLean, C.; Berger, J.** Softwood tree volume equations for major California species. Res. Note PNW-266. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station; **1976**. 33 p.
- McDonald, Phillip M.** Local volume tables for Pacific madrone, tanoak, and California black oak in north-central California. Res. Note PSW-362. Berkeley, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Forest and Range Experiment Station; **1983**. 6 p.
- Pillsbury, Norman H.; Brockhaus, John A.** Hardwood biomass inventory maps for California's central coast. Salinas, CA: Central Coastal Resource Conservation and Development Project and USDA Soil Conservation Service; **1981**. 5 maps.
- Pillsbury, Norman H.; Stephens, Jeffrey A.** Hardwood volume and weight tables for California's central coast. Sacramento, CA: California Department of Forestry; **1978**. 54 p.
- Plumb, Timothy R.** Response of oaks to fire. In: Proc., Symp. of Ecology, management and utilization of California oaks, 1979 June 26-28, Claremont, CA. Gen. Tech. Rep. PSW-44. Berkeley, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Forest and Range Experiment Station; **1979**: 202-215.
- Skinner, E. C.** Cubic volume tables for red alder and sitka spruce. Res. Note PNW-170. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station; **1959**. 4 p.
- Smith, Nigel.** Wood: An ancient fuel with a new future. Worldwatch Pap. No. 42. Washington, DC: Worldwatch Institute; **1981**. 48 p.
- Tillman, David A.** Wood as an energy resource. Academic Press: **1978**. 252 p.
- Turnbull, K. J.; Little, G. R.; Hoyer, G. E.** Comprehensive tree volume tariff tables. Olympia, WA: State Washington Department of Natural Resources. **1963**. 23 p. and tables.
- Verner, Jared.** Birds of California oak habitats—management implications. In: Proc., Symp. on Ecology, management and utilization of California oaks, 1979 June 26-28, Claremont, CA. Gen. Tech. Rep. PSW-44. Berkeley, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Forest and Range Experiment Station; **1979**: 246-264.
- Wiant, Harry V. Jr.; Berry, William S.** Cubic-foot volume and tariff access tables for tanoak in Humboldt County, California. For. Rep. 2. Arcata, CA: Division of Natural Resources. Humboldt State College. **1965**. 10 p.

Appendix

Tables 7 through 19 are in English measurement; tables 20 through 32 are in metric measurement.

Table 7--Total tree, wood, and saw-log volume for giant chinkapin

DIAMETER AT BREAST HEIGHT OUTSIDE BARK 1/	TOTAL HEIGHT (FEET)													
	20	30	40	50	60	70	80	90	100	110	120	130	140	150
----- CUBIC FEET -----														
5:														
TVOL	2	3	4	5										
WVOL	2	2	3	3										
SVOL	1	1	2	2										
7:														
TVOL	5	6	8	9	10	11								
WVOL	3	4	5	6	7	8								
SVOL	2	3	3	4	5	5								
9:														
TVOL	8	11	13	15	17	19	21	22						
WVOL	5	7	9	11	12	14	16	17						
SVOL	4	5	6	7	8	9	10	11						
11:														
TVOL	12	16	19	23	26	28	31	34	36	39	41			
WVOL	8	11	14	16	19	21	24	26	28	30	32			
SVOL	6	8	10	12	14	15	17	18	20	22	23			
13:														
TVOL	17	22	27	32	36	40	44	47	51	54	58			
WVOL	11	16	20	23	27	30	33	37	40	43	46			
SVOL	9	12	15	17	20	23	25	28	30	32	34			
15:														
TVOL		30	36	42	48	53	58	63	68	72	77	81	86	90
WVOL		21	26	31	36	41	45	49	53	58	62	66	69	73
SVOL		17	21	25	28	32	35	39	42	45	48	51	54	57
17:														
TVOL		38	47	54	62	68	75	81	87	93	99	105	110	115
WVOL		27	34	41	47	53	58	64	69	75	80	85	90	95
SVOL		22	28	33	38	43	48	52	57	61	65	69	73	77
19:														
TVOL			58	68	77	86	94	102	109	117	124	131	138	145
WVOL			43	51	59	66	73	80	87	94	101	107	113	120
SVOL			36	43	50	56	62	68	74	79	85	90	96	101
21:														
TVOL			71	83	94	105	115	125	134	143	152	160	169	177
WVOL			53	63	72	81	90	99	107	116	124	132	139	147
SVOL			46	55	63	71	79	86	94	101	108	115	121	128
23:														
TVOL			86	100	113	126	138	150	161	172	183	193	203	213
WVOL			64	76	87	98	109	120	130	140	149	159	168	178
SVOL			57	68	78	88	98	107	116	125	134	142	151	159
25:														
TVOL			102	119	134	149	164	177	191	204	216	228	240	252
WVOL			76	90	104	117	130	142	154	166	178	189	200	211
SVOL			70	83	96	108	119	131	142	153	163	174	184	194
27:														
TVOL				138	157	174	191	207	223	238	253	267	281	294
WVOL				106	122	137	152	167	181	195	208	222	235	248
SVOL				100	115	129	143	157	170	183	196	208	221	233
29:														
TVOL				160	181	202	221	240	257	275	292	308	324	340
WVOL				123	141	159	176	193	210	226	241	257	272	287
SVOL				118	136	153	170	186	202	217	232	247	262	276
31:														
TVOL				183	208	231	253	274	295	315	334	353	371	389
WVOL				141	162	183	203	222	241	259	277	295	312	330
SVOL				139	160	180	199	218	237	255	272	290	307	324

NOTE: BLOCK INDICATES RANGE OF DATA.

1/ TVOL = TOTAL ABOVEGROUND VOLUME OF WOOD AND BARK; EXCLUDES FOLIAGE.

WVOL = VOLUME OF WOOD FROM A 1-FOOT STUMP TO A 4-INCH TOP OUTSIDE BARK; EXCLUDES BARK AND FOLIAGE.

SVOL = SAW-LOG VOLUME IN STRAIGHT MERCHANTABLE SECTIONS AT LEAST 8 FEET LONG TO A 9-INCH TOP OUTSIDE BARK ABOVE A 1-FOOT STUMP.

Table 8--Total tree, wood, and saw-log volume for California-laurel

DIAMETER AT BREAST HEIGHT OUTSIDE BARK 1/	TOTAL HEIGHT (FEET)												
	20	30	40	50	60	70	80	90	100	110	120	130	140
----- CUBIC FEET -----													
INCHES													
5:													
TVOL	2	3	3	4	5	6	6						
WVOL	1	2	2	3	3	4	5						
SVOL	1	1	1	2	2	2	3						
7:													
TVOL	4	5	7	8	10	11	12	14	15				
WVOL	2	3	4	6	7	8	9	10	11				
SVOL	1	2	3	3	4	5	6	6	7				
9:													
TVOL	6	8	11	13	15	18	20	22	24				
WVOL	4	5	7	9	11	13	15	17	19				
SVOL	2	4	5	6	7	9	10	11	12				
11:													
TVOL	9	12	16	19	23	26	30	33	36	39	42	45	48
WVOL	5	8	11	14	17	20	23	26	29	32	35	38	42
SVOL	4	6	7	9	11	13	15	17	19	21	23	25	27
13:													
TVOL	12	17	22	27	32	36	41	45	50	54	58	63	67
WVOL	8	12	16	20	24	28	32	37	41	45	50	54	59
SVOL	5	8	11	14	16	19	22	25	28	31	34	37	40
15:													
TVOL		23	29	36	42	48	54	60	66	72	77	83	89
WVOL		16	21	27	32	38	44	49	55	61	67	73	79
SVOL		11	15	19	23	27	31	35	39	43	47	51	55
TVOL		29	37	45	53	61	69	76	84	91	99	106	113
WVOL		20	27	34	42	49	56	64	71	79	87	94	102
SVOL		15	20	25	30	35	40	46	51	56	62	67	72
19:													
TVOL		36	46	56	66	76	86	95	104	113	122	131	140
WVOL		25	34	43	52	62	71	80	90	99	109	118	128
SVOL		19	25	32	38	45	52	58	65	72	79	86	92
21:													
TVOL		44	56	69	81	92	104	115	127	138	149	160	170
WVOL		31	42	53	64	76	87	99	110	122	134	145	157
SVOL		23	32	40	48	56	65	73	82	90	99	107	116
23:													
TVOL		52	67	82	96	110	124	138	151	164	177	190	203
WVOL		37	51	64	78	91	105	119	133	147	161	175	190
SVOL		29	39	49	59	69	79	90	100	110	121	131	142
25:													
TVOL		61	79	96	113	130	146	162	178	193	209	224	239
WVOL		44	60	76	92	109	125	141	158	175	191	208	225
SVOL		35	47	59	71	83	95	108	120	133	145	158	171
27:													
TVOL			92	112	131	151	169	188	206	224	242	260	278
WVOL			71	89	108	127	146	166	185	205	224	244	264
SVOL			55	70	84	99	113	128	143	158	173	188	203
29:													
TVOL			106	129	151	173	195	216	237	258	279	299	319
WVOL			82	103	125	147	170	192	214	237	260	283	306
SVOL			65	82	99	116	133	150	168	185	202	220	237
31:													
TVOL				146	172	197	222	246	270	294	317	340	364
WVOL				119	144	169	195	220	246	272	298	324	351
SVOL				95	114	134	154	174	194	215	235	255	276
33:													
TVOL				165	194	222	250	278	305	332	358	384	411
WVOL				135	163	192	221	250	280	309	339	369	399
SVOL				109	132	154	177	200	223	247	270	293	317
35:													
TVOL				185	218	249	281	311	342	372	402	431	460
WVOL				152	184	217	250	283	316	349	383	416	450
SVOL				124	150	176	202	228	255	281	308	334	361
37:													
TVOL				206	243	278	313	347	381	414	448	480	513
WVOL				171	207	243	280	317	354	392	429	467	505
SVOL				141	170	199	229	259	288	318	348	379	409
39:													
TVOL				229	269	308	346	384	422	459	496	532	568
WVOL				190	231	271	312	353	395	436	478	520	563
SVOL				158	191	224	257	291	324	358	392	426	460
41:													
TVOL				252	296	339	382	424	465	506	546	587	626
WVOL				211	256	301	346	392	438	484	530	577	624
SVOL				177	214	251	288	325	363	400	438	476	514

NOTE: BLOCK INDICATES RANGE OF DATA.

1/TVOL = TOTAL ABOVEGROUND VOLUME OF WOOD AND BARK; EXCLUDES FOLIAGE.

WVOL = VOLUME OF WOOD FROM A 1-FOOT STUMP TO A 4-INCH TOP OUTSIDE BARK; EXCLUDES BARK AND FOLIAGE.

SVOL = SAW-LOG VOLUME IN STRAIGHT MERCHANTABLE SECTIONS AT LEAST 8 FEET LONG TO A 9-INCH TOP OUTSIDE BARK ABOVE A 1-FOOT STUMP.

Table 9--Total tree, wood, and saw-log volume for tanoak

DIAMETER AT BREAST HEIGHT OUTSIDE BARK 1/	TOTAL HEIGHT (FEET)												
	20	30	40	50	60	70	80	90	100	110	120	130	140
INCHES	----- CUBIC FEET -----												
5:													
TVOL	2	3	3	4	5	5	6						
WVOL	1	1	1	2	2	3	3						
SVOL	0	1	1	1	1	2	2						
7:													
TVOL	3	5	6	8	9	10	11	13	14	15			
WVOL	1	2	3	4	4	5	6	7	8	9			
SVOL	1	1	2	3	3	4	5	5	6	7			
9:													
TVOL	6	8	10	12	15	17	19	21	23	25	26		
WVOL	2	3	5	6	8	9	11	12	14	15	17		
SVOL	2	2	4	5	6	7	8	9	11	12	13		
11:													
TVOL	8	12	15	18	21	24	27	30	33	36	39	42	
WVOL	3	5	8	10	12	14	17	19	21	24	26	29	
SVOL	2	4	6	7	9	11	13	15	17	19	21	23	
13:													
TVOL	11	16	21	25	30	34	38	42	46	50	54	58	
WVOL	5	8	11	14	17	21	24	27	31	34	38	42	
SVOL	4	6	8	11	13	16	19	22	25	28	31	34	
15:													
TVOL		21	28	33	39	45	50	56	61	66	71	76	
WVOL		11	15	19	24	28	33	37	42	47	52	57	
SVOL		8	11	15	19	23	26	31	35	39	43	48	
17:													
TVOL		27	35	43	50	57	64	71	78	84	91	97	104
WVOL		14	20	25	31	37	43	49	56	62	68	75	82
SVOL		11	15	20	25	30	35	41	46	52	58	64	70
19:													
TVOL		34	44	53	62	71	79	88	96	105	113	121	129
WVOL		18	25	32	40	47	55	63	71	79	87	96	104
SVOL		14	20	26	32	39	46	53	60	67	75	82	90
21:													
TVOL		41	53	64	75	86	97	107	117	127	137	147	157
WVOL		22	31	40	49	59	69	78	88	99	109	119	130
SVOL		18	25	33	41	49	58	66	75	85	94	104	113
23:													
TVOL			63	77	90	103	115	128	140	152	164	175	187
WVOL			38	49	60	72	84	96	108	120	133	146	158
SVOL			31	40	50	60	71	82	93	104	116	128	140
25:													
TVOL			74	90	106	121	135	150	164	178	192	206	220
WVOL			46	59	72	86	100	115	130	145	160	175	190
SVOL			37	49	61	73	86	99	113	127	141	155	170

DIAMETER AT
BREAST HEIGHT
OUTSIDE BARK 1/

TOTAL HEIGHT (FEET)

	20	30	40	50	60	70	80	90	100	110	120	130	140
INCHES	----- CUBIC FEET -----												
27:													
TVOL			86	105	123	140	157	174	191	207	223	239	255
WVOL			54	70	86	102	119	136	153	171	189	207	225
SVOL			44	58	73	88	103	119	135	151	168	185	203
29:													
TVOL		99	120	141	161	181	200	219	238	257	275	293	
WVOL		63	81	100	120	139	159	180	200	221	242	264	
SVOL		52	69	86	103	121	140	159	178	198	218	239	
31:													
TVOL			137	160	183	206	228	249	271	292	313	334	
WVOL			94	116	138	161	184	208	232	256	280	305	
SVOL			80	100	120	142	163	185	208	231	255	279	
33:													
TVOL			155	181	207	232	257	282	306	330	353	377	
WVOL			108	133	159	185	211	238	266	294	322	350	
SVOL			93	115	139	164	189	214	240	267	294	322	
35:													
TVOL			173	203	232	260	288	316	343	370	396	422	
WVOL			123	152	181	210	241	271	303	334	366	398	
SVOL			106	132	159	187	216	245	275	306	337	369	
37:													
TVOL			193	226	258	290	321	352	382	412	441	470	
WVOL			139	171	204	238	272	307	342	377	414	450	
SVOL			121	150	181	213	246	279	313	348	383	419	
39:													
TVOL			214	250	286	321	355	389	423	456	489	521	
WVOL			156	192	229	267	305	344	384	424	464	505	
SVOL			136	170	205	240	277	315	354	393	433	474	
41:													
TVOL			236	276	315	354	392	429	466	503	539	574	
WVOL			174	214	256	298	341	384	428	473	518	564	
SVOL			153	191	230	270	311	354	397	441	486	532	
43:													
TVOL			258	302	346	388	430	471	511	551	591	630	
WVOL			193	238	284	331	378	426	475	525	575	626	
SVOL			171	213	256	301	348	395	443	492	542	593	
45:													
TVOL			282	330	378	424	469	514	558	602	645		
WVOL			214	263	314	365	418	471	525	580	636		
SVOL			189	236	285	335	386	438	492	547	602		

NOTE: BLOCK INDICATES RANGE OF DATA.

1/TVOL = TOTAL ABOVEGROUND VOLUME OF WOOD AND BARK; EXCLUDES FOLIAGE.

WVOL = VOLUME OF WOOD FROM A 1-FOOT STUMP TO A 4-INCH TOP OUTSIDE BARK; EXCLUDES BARK AND FOLIAGE.

SVOL = SAW-LOG VOLUME IN STRAIGHT MERCHANTABLE SECTIONS AT LEAST 8 FEET LONG TO A 9-INCH TOP OUTSIDE BARK ABOVE A 1-FOOT STUMP.

Table 10--Total tree, wood, and saw-log volume for California white oak

DIAMETER AT BREAST HEIGHT OUTSIDE BARK 1/	TOTAL HEIGHT (FEET)											
	20	30	40	50	60	70	80	90	100	110	120	130
INCHES	----- CUBIC FEET -----											
5:												
TVOL	2	2	3									
WVOL	1	1	2									
SVOL	0	1	2									
7:												
TVOL	4	5	6	8	9	10	11					
WVOL	2	3	4	5	6	7	8					
SVOL	1	2	3	4	6	7	9					
9:												
TVOL	7	9	12	14	16	17	19	21				
WVOL	4	5	7	9	11	12	14	16				
SVOL	1	3	5	7	9	11	14	17				
11:												
TVOL	11	15	18	22	25	28	31	34				
WVOL	6	9	12	14	17	20	23	26				
SVOL	2	4	7	10	13	17	21	25				
13:												
TVOL	16	22	27	32	37	41	46	50	54	58		
WVOL	9	13	17	22	26	30	34	39	43	47		
SVOL	3	6	9	13	18	23	28	34	41	48		
15:												
TVOL		31	38	45	51	58	64	70	75	81	86	92
WVOL		18	24	30	36	42	48	54	60	66	72	78
SVOL		8	12	17	23	30	37	45	53	62	72	82
17:												
TVOL		41	51	60	69	77	85	93	101	108	116	123
WVOL		25	33	41	49	57	65	73	82	90	98	106
SVOL		10	15	22	29	38	47	57	67	79	91	103
19:												
TVOL		53	66	78	89	100	111	121	131	141	150	159
WVOL		32	43	54	64	75	85	96	106	117	127	138
SVOL		12	19	27	36	46	58	70	83	97	112	127
21:												
TVOL		67	83	98	113	127	140	153	165	178	190	201
WVOL		41	55	68	82	95	108	122	135	149	162	175
SVOL		14	23	32	44	56	70	84	100	117	135	153
23:												
TVOL			103	122	140	157	173	189	205	220	235	249
WVOL			68	85	102	118	135	152	168	185	201	218
SVOL			27	38	52	66	83	100	119	138	160	182
25:												
TVOL			125	148	170	190	210	230	249	267	285	303
WVOL			83	104	124	144	165	185	205	226	246	266
SVOL			31	45	60	78	97	117	139	162	186	212

DIAMETER AT BREAST HEIGHT OUTSIDE BARK <u>1/</u>	TOTAL HEIGHT (FEET)											
	20	30	40	50	60	70	80	90	100	110	120	130
INCHES	----- CUBIC FEET -----											
27:												
TVOL			150	177	203	228	252	275	298	320	341	362
WVOL			100	124	149	174	198	223	247	271	296	320
SVOL			36	52	70	90	111	135	160	187	215	245
29:												
TVOL			177	209	240	269	298	325	352	378	403	428
WVOL			118	148	177	206	235	264	293	322	351	380
SVOL			41	59	80	103	127	154	183	214	246	280
31:												
TVOL			207	245	280	315	348	380	411	441	471	500
WVOL			139	173	208	242	276	310	344	378	412	446
SVOL			47	67	91	116	144	175	208	242	279	318
33:												
TVOL				283	324	364	402	440	476	511	545	579
WVOL				201	241	281	320	360	399	439	478	518
SVOL				76	102	131	162	197	233	272	314	357
35:												
TVOL				325	372	418	462	504	546	586	626	664
WVOL				232	278	323	369	414	460	505	551	596
SVOL				84	114	146	181	220	260	304	350	399
37:												
TVOL				370	424	476	526	574	621	667	712	756
WVOL				265	317	369	421	473	525	577	629	681
SVOL				94	126	162	201	244	289	337	389	443
39:												
TVOL				418	479	538	595	649	703	755	806	855
WVOL				300	360	419	478	537	596	655	714	773
SVOL				103	139	179	222	269	319	372	429	489
41:												
TVOL				470	539	605	668	730	790	848	905	961
WVOL				339	405	472	539	605	672	738	805	871
SVOL				114	153	196	244	295	350	409	471	537
43:												
TVOL				525	602	676	747	816	883	948	1012	1074
WVOL				379	454	529	604	679	753	828	902	976
SVOL				124	167	215	267	323	383	447	515	587
45:												
TVOL				584	670	752	831	907	982	1054	1125	1195
WVOL				423	507	590	673	757	840	923	1006	1088
SVOL				135	182	234	290	352	417	487	561	639

NOTE: BLOCK INDICATES RANGE OF DATA.

1/TVOL = TOTAL ABOVEGROUND VOLUME OF WOOD AND BARK; EXCLUDES FOLIAGE.

WVOL = VOLUME OF WOOD FROM A 1-FOOT STUMP TO A 4-INCH TOP OUTSIDE BARK; EXCLUDES BARK AND FOLIAGE.

SVOL = SAW-LOG VOLUME IN STRAIGHT MERCHANTABLE SECTIONS AT LEAST 8 FEET LONG TO A 9-INCH TOP OUTSIDE BARK ABOVE A 1-FOOT STUMP.

Table 11--Total tree, wood, and saw-log volume for bigleaf maple

DIAMETER AT BREAST HEIGHT OUTSIDE BARK 1/	TOTAL HEIGHT (FEET)														
	20	30	40	50	60	70	80	90	100	110	120	130	140	150	
INCHES	----- CUBIC FEET-----														
5:															
TVOL	2	3	3	3											
WVOL	1	2	2	2											
SVOLI	1	1	2	2											
SVOLX	0	1	1	1											
7:															
TVOL	4	5	6	7	8	9	10								
WVOL	3	4	4	5	6	6	7								
SVOLI	2	3	4	4	5	6	7								
SVOLX	1	1	1	2	2	3	3								
9:															
TVOL	8	10	11	13	14	16	17	18							
WVOL	5	6	8	9	10	12	13	14							
SVOLI	3	4	6	8	9	11	13	14							
SVOLX	1	2	2	3	4	4	5	6							
11:															
TVOL	12	15	18	20	22	24	26	28	30						
WVOL	8	10	13	15	17	19	20	22	24						
SVOLI	4	7	9	12	14	17	19	22	24						
SVOLX	2	3	4	5	6	7	8	9	10						
13:															
TVOL	17	22	26	29	32	35	38	41	43						
WVOL	12	15	19	22	25	28	30	33	35						
SVOLI	6	9	13	16	20	24	27	31	35						
SVOLX	2	4	5	7	8	9	11	12	14						
15:															
TVOL		30	35	40	44	49	52	56	60	63					
WVOL		21	26	31	35	39	42	46	49	53					
SVOLI		13	17	22	27	32	37	42	47	52					
SVOLX		5	7	9	11	13	15	17	19	21					
17:															
TVOL		39	46	53	59	64	69	74	79	83					
WVOL		29	35	41	46	52	57	62	66	71					
SVOLI		17	23	29	35	42	48	55	61	68					
SVOLX		7	9	11	14	17	19	22	24	27					
19:															
TVOL		50	60	68	75	82	89	95	101	107	112				
WVOL		37	46	53	60	67	74	80	86	92	98				
SVOLI		21	29	36	44	52	61	69	77	86	94				
SVOLX		8	11	14	18	21	24	27	31	34	38				
21:															
TVOL		63	74	85	94	103	111	119	126	133	140	147			
WVOL		47	58	67	76	85	93	101	109	117	124	131			
SVOLI		26	35	45	55	65	75	85	95	106	116	127			
SVOLX		10	14	18	22	26	30	34	38	42	46	50			
23:															
TVOL			91	104	115	126	136	145	154	163	171	179	187		
WVOL			71	83	95	105	116	126	135	144	153	162	171		
SVOLI			43	54	66	78	91	103	116	128	141	154	167		
SVOLX			17	22	26	31	36	41	46	51	56	61	66		
25:															
TVOL			110	125	138	151	163	175	186	196	206	216	225	235	
WVOL			87	101	115	128	141	153	164	176	187	197	208	218	
SVOLI			51	65	79	93	108	123	138	153	168	183	198	214	
SVOLX			20	26	31	37	43	49	55	61	67	73	79	85	

DIAMETER AT BREAST HEIGHT OUTSIDE BARK ^{1/}	TOTAL HEIGHT (FEET)														
	20	30	40	50	60	70	80	90	100	110	120	130	140	150	
INCHES	----- CUBIC FEET -----														
27:															
TVOL			130	148	164	179	194	207	220	233	245	256	267	278	
WVOL			104	122	138	154	169	183	197	211	224	237	249	261	
SVOLI			60	76	93	110	127	144	162	180	197	215	233	251	
SVOLX			24	30	37	44	51	57	64	71	79	86	93	100	
29:															
TVOL			152	173	193	210	227	243	258	273	287	300	314	326	
WVOL			123	144	163	182	200	217	233	249	265	280	295	309	
SVOLI			70	89	108	128	148	168	188	209	229	250	271	292	
SVOLX			28	35	43	51	59	67	75	83	91	100	108	116	
31:															
TVOL			177	201	223	244	264	282	300	317	333	349	364	378	
WVOL			144	168	191	213	234	253	273	291	310	327	345	362	
SVOLI			80	102	124	147	170	193	216	240	264	288	312	336	
SVOLX			32	41	49	58	68	77	86	96	105	115	124	134	
33:															
TVOL			203	231	257	280	303	324	344	364	382	401	418	435	
WVOL			167	195	221	247	271	294	316	338	359	379	399	419	
SVOLI			91	116	142	168	194	220	247	274	301	328	356	383	
SVOLX			36	46	56	67	77	88	98	109	120	131	142	153	
35:															
TVOL			232	263	293	320	345	369	393	415	436	457	476	496	
WVOL			192	224	254	283	311	337	363	388	412	436	459	481	
SVOLI			103	132	160	190	219	249	279	310	341	372	403	434	
SVOLX			41	52	64	75	87	99	111	123	136	148	160	173	
37:															
TVOL			262	298	331	362	391	418	444	469	493	517	539	561	
WVOL			219	255	290	323	354	384	414	442	470	497	523	548	
SVOLI			116	148	180	213	246	280	314	348	383	418	453	488	
SVOLX			46	59	72	85	98	111	125	139	152	166	180	194	
39:															
TVOL			295	335	372	407	439	470	499	528	555	581	606	631	
WVOL			247	289	328	365	401	435	468	500	532	562	592	621	
SVOLI			130	165	201	238	275	313	351	389	428	466	506	545	
SVOLX			52	66	80	95	110	125	140	155	170	186	201	217	
41:															
TVOL			329	375	416	455	491	525	558	590	620	649	677		
WVOL			278	325	369	411	451	489	527	563	598	632	666		
SVOLI			144	184	224	265	306	348	390	432	475	518	562		
SVOLX			57	73	89	105	122	138	155	172	189	206	224		
43:															
TVOL			366	416	462	505	546	584	621	656	689	722	753		
WVOL			311	364	413	460	504	548	589	630	669	707	745		
SVOLI			159	203	247	292	338	384	431	478	525	573	621		
SVOLX			63	81	98	116	135	153	171	190	209	228	247		
45:															
TVOL			405	461	512	559	604	646	687	725	763	798	833		
WVOL			347	405	460	512	561	609	656	701	744	787	829		
SVOLI			175	223	272	322	372	423	474	526	578	630	683		
SVOLX			70	89	108	128	148	168	189	209	230	251	272		

NOTE: BLOCK INDICATES RANGE OF DATA.

^{1/}TVOL = TOTAL ABOVEGROUND VOLUME OF WOOD AND BARK; EXCLUDES FOLIAGE.

WVOL = VOLUME OF WOOD FROM A 1-FOOT STUMP TO A 4-INCH TOP OUTSIDE BARK; EXCLUDES BARK AND FOLIAGE.

SVOLI = SAW-LOG VOLUME IN STRAIGHT MERCHANTABLE SECTIONS AT LEAST 8 FEET LONG TO A 9-INCH TOP OUTSIDE BARK IN TREES WITH A MERCHANTABLE FIRST SECTION ABOVE A 1-FOOT STUMP.

SVOLX = SAW-LOG VOLUME IN STRAIGHT MERCHANTABLE SECTIONS AT LEAST 8 FEET LONG TO A 9-INCH TOP OUTSIDE BARK IN TREES WITHOUT A MERCHANTABLE FIRST SECTION ABOVE A 1-FOOT STUMP.

Table 12--Total tree, wood, and saw-log volume for California black oak

DIAMETER AT BREAST HEIGHT OUTSIDE BARK 1/	TOTAL HEIGHT (FEET)													
	20	30	40	50	60	70	80	90	100	110	120	130	140	150
INCHES	----- CUBIC FEET -----													
5:														
TVOL	2	3	4	5	6	6								
WVOL	1	2	2	3	3	4								
SVOLI	1	1	1	1	1	1								
SVOLX	0	0	0	0	1	1								
7:														
TVOL	4	6	8	9	11	12	14							
WVOL	3	4	5	6	7	8	9							
SVOLI	2	2	2	2	3	3	3							
SVOLX	1	1	1	1	1	1	1							
9:														
TVOL	7	10	12	15	18	20	22	25	27					
WVOL	5	7	9	10	12	14	15	17	18					
SVOLI	3	4	4	5	5	5	6	6	6					
SVOLX	2	2	2	2	3	3	3	3	3					
11:														
TVOL	10	14	18	22	26	30	33	37	40	44				
WVOL	7	10	13	16	18	21	23	26	28	30				
SVOLI	5	6	7	8	8	9	10	10	10	11				
SVOLX	3	3	4	4	4	5	5	5	5	6				
13:														
TVOL	14	20	26	31	36	41	46	51	56	61	65			
WVOL	10	15	19	22	26	30	33	37	40	43	46			
SVOLI	8	10	11	12	13	14	15	16	16	17	18			
SVOLX	4	5	6	6	7	7	8	8	9	9	9			
15:														
TVOL	19	27	34	41	48	55	61	68	74	81	87			
WVOL	14	20	25	30	35	40	45	50	54	59	63			
SVOLI	12	14	16	18	19	21	22	23	24	25	26			
SVOLX	6	8	8	9	10	11	11	12	13	13	14			
17:														
TVOL	24	34	44	53	62	70	79	87	95	103	111			
WVOL	18	26	33	40	46	52	59	65	71	76	82			
SVOLI	17	20	23	25	27	29	31	32	34	35	36			
SVOLX	9	11	12	13	14	15	16	17	18	18	19			
19:														
TVOL		43	54	66	77	88	98	108	119	129	138			
WVOL		33	42	50	58	66	74	82	89	97	104			
SVOLI		27	31	34	37	39	41	43	45	47	49			
SVOLX		14	16	18	19	20	21	23	24	25	26			
21:														
TVOL		52	66	80	94	107	119	132	144	157	169			
WVOL		41	52	62	72	82	92	101	111	120	129			
SVOLI		36	40	44	48	51	54	57	59	62	64			
SVOLX		19	21	23	25	27	28	30	31	32	33			
23:														
TVOL		62	79	96	112	128	143	158	173	187	202			
WVOL		49	63	75	88	100	112	123	134	145	156			
SVOLI		45	51	56	61	65	69	72	76	79	82			
SVOLX		24	27	29	32	34	36	38	39	41	43			
25:														
TVOL			93	113	132	150	169	186	204	221	238	255	271	288
WVOL			75	90	105	119	133	147	160	174	187	200	212	225
SVOLI			64	71	76	81	86	91	95	99	102	106	109	113
SVOLX			33	37	40	42	45	47	49	51	53	55	57	59

TOTAL HEIGHT (FEET)

DIAMETER AT
BREAST HEIGHT
OUTSIDE BARK 1/

	20	30	40	50	60	70	80	90	100	110	120	130	140	150
INCHES	----- CUBIC FEET -----													
27:														
TVOL			109	132	154	175	196	217	237	257	277	297	316	335
WVOL			88	106	123	140	157	173	189	204	220	235	250	265
SVOLI			79	87	94	100	106	111	116	121	126	130	134	138
SVOLX			41	45	49	52	55	58	61	63	65	68	70	72
29:														
TVOL			125	152	177	202	226	250	273	296	319	341	364	386
WVOL			102	123	144	163	183	201	220	238	256	274	291	308
SVOLI			96	105	114	121	128	135	141	147	152	158	163	168
SVOLX			50	55	59	63	67	70	73	76	79	82	85	87
31:														
TVOL				173	202	230	258	285	312	338	364	389	415	440
WVOL				142	166	188	210	232	253	274	295	315	335	355
SVOLI				126	136	145	153	161	169	176	182	189	195	200
SVOLX				65	71	75	80	84	88	91	95	98	101	104
33:														
TVOL				196	228	260	292	322	353	382	412	441	469	498
WVOL				162	189	215	240	265	289	313	337	360	383	406
SVOLI				149	161	171	181	191	200	208	216	223	230	237
SVOLX				77	84	89	94	99	104	108	112	116	120	123
35:														
TVOL				220	256	292	328	362	396	429	462	495	527	559
WVOL				184	214	244	272	300	328	355	382	408	434	460
SVOLI				174	188	201	212	223	234	243	252	261	269	277
SVOLX				91	98	104	111	116	122	127	131	136	140	144
37:														
TVOL				245	286	326	366	404	442	479	516	552	588	624
WVOL				207	241	274	306	338	369	400	430	459	489	517
SVOLI				202	218	233	247	259	271	282	293	303	313	322
SVOLX				105	114	121	128	135	141	147	152	158	163	168
39:														
TVOL				272	318	362	406	448	490	532	573	613	653	692
WVOL				232	270	307	343	378	413	447	481	514	546	579
SVOLI				233	251	268	284	299	312	325	337	349	360	371
SVOLX				121	131	140	148	155	162	169	175	182	187	193
41:														
TVOL				300	351	400	448	495	541	587	632	676	720	764
WVOL				258	300	341	381	421	459	497	534	571	608	644
SVOLI				266	287	307	325	341	357	372	386	399	412	424
SVOLX				138	150	160	169	178	186	193	201	208	214	221
43:														
TVOL						439	492	544	595	645	694	743	791	839
WVOL						377	422	465	508	550	591	632	672	712
SVOLI						349	369	388	406	422	438	453	468	482
SVOLX						181	192	202	211	220	228	236	243	251
45:														
TVOL						480	538	595	650	705	759	813	866	918
WVOL						416	465	513	560	606	651	696	741	785
SVOLI						394	417	438	458	477	495	512	529	544
SVOLX						205	217	228	238	248	258	266	275	283

NOTE: BLOCK INDICATES RANGE OF DATA.

1/TVOL = TOTAL ABOVEGROUND VOLUME OF WOOD AND BARK; EXCLUDES FOLIAGE.

WVOL = VOLUME OF WOOD FROM A 1-FOOT STUMP TO A 4-INCH TOP OUTSIDE BARK; EXCLUDES BARK AND FOLIAGE.

SVOLI = SAW-LOG VOLUME IN STRAIGHT MERCHANTABLE SECTIONS AT LEAST 8 FEET LONG TO A 9-INCH TOP OUTSIDE BARK IN TREES WITH A MERCHANTABLE FIRST SECTION ABOVE A 1-FOOT STUMP.

SVOLX = SAW-LOG VOLUME IN STRAIGHT MERCHANTABLE SECTIONS AT LEAST 8 FEET LONG TO A 9-INCH TOP OUTSIDE BARK IN TREES WITHOUT A MERCHANTABLE FIRST SECTION ABOVE A 1-FOOT STUMP.

Table 13--Total tree and wood volume for Engelmann oak

DIAMETER AT BREAST HEIGHT OUTSIDE BARK 1/	TOTAL HEIGHT (FEET)					
	20	30	40	50	60	70
INCHES	----- CUBIC FEET -----					
5:						
TVOL	2	2	3			
WVOL	1	1	1			
7:						
TVOL	5	5	6	6	6	
WVOL	2	3	3	3	3	
9:						
TVOL	9	10	11	11	12	
WVOL	4	5	5	6	6	
11:						
TVOL	14	16	17	18	19	20
WVOL	7	8	9	10	10	11
13:						
TVOL	21	24	26	27	29	30
WVOL	11	13	14	15	16	16
15:						
TVOL		33	36	38	40	42
WVOL		18	20	22	23	24
17:						
TVOL		45	49	52	55	57
WVOL		25	28	30	32	33
19:						
TVOL		59	64	68	71	74
WVOL		34	37	40	42	44
21:						
TVOL		75	81	86	91	95
WVOL		44	48	52	55	58
23:						
TVOL		93	101	107	113	118
WVOL		56	61	66	70	73
25:						
TVOL		114	123	131	138	144
WVOL		70	76	82	86	91

DIAMETER AT BREAST HEIGHT OUTSIDE BARK 1/	TOTAL HEIGHT (FEET)					
	20	30	40	50	60	70
INCHES	----- CUBIC FEET -----					
27:						
TVOL		137	148	158	166	173
WVOL		85	93	100	106	111
29:						
TVOL		162	176	187	197	206
WVOL		103	112	120	127	134
31:						
TVOL		190	206	220	231	241
WVOL		122	134	143	152	159
33:						
TVOL		221	240	255	269	281
WVOL		144	157	169	179	187
35:						
TVOL		255	276	294	309	323
WVOL		168	184	197	208	218
37:						
TVOL		291	316	336	354	369
WVOL		194	212	227	241	253
39:						
TVOL		330	358	381	401	419
WVOL		223	244	261	276	290
41:						
TVOL		404	430	453	473	
WVOL		278	297	315	330	
43:						
TVOL		453	482	507	530	
WVOL		314	337	357	374	

NOTE: BLOCK INDICATES RANGE OF DATA.

1/TVOL = TOTAL ABOVEGROUND VOLUME OF WOOD AND BARK; EXCLUDES FOLIAGE.

WVOL = VOLUME OF WOOD FROM A 1-FOOT STUMP TO A 4-INCH TOP OUTSIDE BARK; EXCLUDES BARK AND FOLIAGE.

Table 14--Total tree, wood, and saw-log volume for blue oak

DIAMETER AT BREAST HEIGHT OUTSIDE BARK 1/	TOTAL HEIGHT (FEET)									
	20	30	40	50	60	70	80	90	100	
INCHES	----- CUBIC FEET-----									
5:										
TVOL	2									
WVOL	1									
SVOL I	1									
SVOL X	1									
7:										
TVOL	5	6	6	7						
WVOL	3	3	4	4						
SVOL I	2	3	4	5						
SVOL X	2	2	3	3						
9:										
TVOL	8	10	11	13	14	15				
WVOL	5	6	7	8	9	10				
SVOL I	3	5	6	7	9	10				
SVOL X	2	3	4	5	6	7				
11:										
TVOL	13	16	18	20	22	24	25			
WVOL	9	10	12	14	15	16	17			
SVOL I	5	7	9	11	12	14	16			
SVOL X	3	5	6	7	9	10	11			
13:										
TVOL	20	24	27	30	33	35	37	39		
WVOL	13	16	18	21	23	25	26	28		
SVOL I	7	9	12	14	17	19	21	23		
SVOL X	5	6	8	10	12	13	15	16		
15:										
TVOL	27	33	38	42	46	49	52	55	58	
WVOL	19	23	27	30	33	35	38	40	42	
SVOL I	9	12	15	18	21	24	27	30	33	
SVOL X	6	8	11	13	15	17	19	21	23	
17:										
TVOL	37	44	51	56	61	65	70	73	77	
WVOL	26	32	36	41	45	48	52	55	58	
SVOL I	11	15	19	23	27	31	34	38	41	
SVOL X	7	10	13	16	19	21	24	26	29	
19:										
TVOL	48	57	66	73	79	85	90	95	100	
WVOL	34	42	48	54	59	64	69	73	77	
SVOL I	13	18	23	28	33	37	42	46	50	
SVOL X	9	13	16	20	23	26	29	32	35	
21:										
TVOL	60	72	83	92	100	107	114	120	126	
WVOL	44	54	62	70	77	83	89	94	99	
SVOL I	16	22	28	34	39	45	50	55	60	
SVOL X	11	15	19	23	27	31	35	38	42	
23:										
TVOL	74	90	102	113	123	132	141	149	156	
WVOL	55	68	79	88	97	104	112	119	125	
SVOL I	18	26	33	40	46	53	59	65	71	
SVOL X	13	18	23	28	32	37	41	45	49	
25:										
TVOL	90	109	124	138	150	161	171	181	190	
WVOL	68	84	97	109	119	129	138	147	155	
SVOL I	21	30	38	46	54	61	68	76	83	
SVOL X	15	21	27	32	37	42	47	52	57	

DIAMETER AT BREAST HEIGHT OUTSIDE BARK 1/	TOTAL HEIGHT (FEET)									
	20	30	40	50	60	70	80	90	100	
INCHES	----- CUBIC FEET-----									
27:										
TVOL	130	149	165	179	192	205	216	227		
WVOL	102	118	132	145	157	168	178	188		
SVOL I	35	44	53	62	70	79	87	95		
SVOL X	24	30	37	43	49	54	60	66		
29:										
TVOL	154	176	195	212	227	242	255	268		
WVOL	123	142	159	174	188	201	214	225		
SVOL I	39	50	60	70	80	89	99	108		
SVOL X	27	35	42	49	55	62	68	75		
31:										
TVOL	180	205	227	247	265	282	298	313		
WVOL	145	168	188	206	223	238	253	267		
SVOL I	44	56	68	79	90	101	111	122		
SVOL X	31	39	47	55	62	70	77	84		
33:										
TVOL	208	237	263	286	307	327	345	362		
WVOL	170	197	220	242	261	279	297	313		
SVOL I	50	63	76	89	101	113	125	136		
SVOL X	34	44	53	61	70	78	86	94		
35:										
TVOL	238	272	302	328	352	375	396	415		
WVOL	198	228	256	280	303	324	344	363		
SVOL I	55	70	85	99	112	125	138	151		
SVOL X	38	49	59	68	78	87	96	105		
37:										
TVOL	271	310	343	374	401	426	450	473		
WVOL	227	263	295	323	349	374	397	418		
SVOL I	61	77	93	109	124	139	153	167		
SVOL X	42	54	65	75	86	96	106	116		
39:										
TVOL	307	350	388	422	453	482	509	534		
WVOL	260	301	337	369	399	427	453	478		
SVOL I	67	85	103	120	136	152	168	184		
SVOL X	46	59	71	83	94	105	116	127		

NOTE: BLOCK INDICATES RANGE OF DATA.

1/TVOL = TOTAL ABOVEGROUND VOLUME OF WOOD AND BARK; EXCLUDES FOLIAGE.

WVOL = VOLUME OF WOOD FROM A 1-FOOT STUMP TO A 4-INCH TOP OUTSIDE BARK; EXCLUDES BARK AND FOLIAGE.

SVOL I = SAW-LOG VOLUME IN STRAIGHT MERCHANTABLE SECTIONS AT LEAST 8 FEET LONG TO A 9-INCH TOP OUTSIDE BARK IN TREES WITH A MERCHANTABLE FIRST SECTION ABOVE A 1-FOOT STUMP.

SVOL X = SAW-LOG VOLUME IN STRAIGHT MERCHANTABLE SECTIONS AT LEAST 8 FEET LONG TO A 9-INCH TOP OUTSIDE BARK IN TREES WITHOUT A MERCHANTABLE FIRST SECTION ABOVE A 1-FOOT STUMP.

Table 15--Total tree, wood, and saw-log volume for Pacific madrone

DIAMETER AT BREAST HEIGHT OUTSIDE BARK 1/	TOTAL HEIGHT (FEET)										
	20	30	40	50	60	70	80	90	100	110	120
INCHES	----- CUBIC FEET -----										
5:											
TVOL	2	3	3	4							
WVOL	1	2	3	3							
SVOLI	1	2	3	3							
SVOLX	0	1	1	1							
7:											
TVOL	4	5	7	8	9						
WVOL	3	4	5	7	8						
SVOLI	2	3	5	6	8						
SVOLX	1	1	2	3	3						
9:											
TVOL	6	9	11	13	15	18	20				
WVOL	4	6	9	11	13	15	17				
SVOLI	3	5	7	9	12	14	17				
SVOLX	1	2	3	4	5	6	7				
11:											
TVOL	9	13	16	20	23	26	29	32	35	38	
WVOL	6	10	13	16	19	23	26	29	33	36	
SVOLI	4	7	10	13	16	20	24	27	31	35	
SVOLX	2	3	4	5	7	8	10	11	13	15	
13:											
TVOL	13	18	23	27	32	36	40	45	49	53	57
WVOL	9	13	18	23	27	32	36	41	46	50	55
SVOLI	5	9	13	17	22	27	32	37	42	47	53
SVOLX	2	4	5	7	9	11	13	15	18	20	22
15:											
TVOL	17	24	30	36	42	48	54	59	65	70	75
WVOL	12	18	24	30	36	42	48	55	61	67	73
SVOLI	7	12	17	22	28	34	40	47	54	60	68
SVOLX	3	5	7	9	12	14	17	20	22	25	28
17:											
TVOL	22	30	38	46	54	61	69	76	83	89	96
WVOL	15	23	31	39	46	54	62	70	78	86	94
SVOLI	9	15	21	28	35	42	50	58	67	75	84
SVOLX	4	6	9	12	15	18	21	24	28	31	35
19:											
TVOL	27	38	48	58	67	76	85	94	103	111	120
WVOL	19	29	38	48	58	68	77	87	97	107	117
SVOLI	11	18	25	34	42	51	61	71	81	91	102
SVOLX	4	7	11	14	18	21	25	30	34	38	42
21:											
TVOL	33	46	58	70	82	93	104	115	125	135	146
WVOL	23	35	47	59	71	83	95	107	119	131	143
SVOLI	13	21	30	40	50	61	72	84	96	108	121
SVOLX	5	9	13	17	21	26	30	35	40	45	50
23:											
TVOL	39	55	70	84	98	111	124	137	150	162	174
WVOL	28	42	56	70	85	99	113	128	142	157	171
SVOLI	15	24	35	47	59	71	85	98	112	127	141
SVOLX	6	10	15	20	25	30	35	41	47	53	59
25:											
TVOL	46	65	82	99	115	131	146	161	176	191	205
WVOL	33	49	66	83	100	117	134	151	168	185	202
SVOLI	17	28	41	54	68	82	98	113	130	146	163
SVOLX	7	12	17	23	28	34	41	47	54	61	68
27:											
TVOL		75	95	115	134	152	170	188	205	222	239
WVOL		58	77	97	117	136	156	176	196	216	236
SVOLI		32	46	62	78	94	112	129	148	167	186
SVOLX		13	19	26	32	39	47	54	62	70	78

DIAMETER AT BREAST HEIGHT OUTSIDE BARK <u>1/</u>	TOTAL HEIGHT (FEET)										
	20	30	40	50	60	70	80	90	100	110	120
INCHES	----- CUBIC FEET-----										
29:											
TVOL		86	110	132	154	175	196	216	236	255	275
WVOL		66	89	112	134	157	180	203	226	249	272
SVOLI		37	53	70	88	107	126	146	167	189	211
SVOLX		15	22	29	37	45	53	61	70	79	88
31:											
TVOL		98	125	151	176	200	223	246	269	291	313
WVOL		76	102	128	154	180	206	232	258	284	310
SVOLI		41	59	78	98	120	142	164	188	212	236
SVOLX		17	25	33	41	50	59	69	79	89	99
33:											
TVOL				171	199	226	253	279	304	329	354
WVOL				144	174	203	233	262	292	322	351
SVOLI				87	110	133	158	183	209	236	263
SVOLX				36	46	56	66	77	87	99	110
35:											
TVOL				191	223	254	283	313	342	370	398
WVOL				162	196	229	262	295	328	362	395
SVOLI				96	121	147	175	203	232	261	292
SVOLX				40	51	62	73	85	97	109	122
37:											
TVOL					249	283	316	349	381	412	444
WVOL					218	255	292	330	367	404	441
SVOLI					134	162	192	223	255	287	321
SVOLX					56	68	80	93	107	120	134
39:											
TVOL					276	314	351	387	422	457	492
WVOL					243	284	325	366	407	449	490
SVOLI					146	178	210	244	279	315	351
SVOLX					61	74	88	102	117	132	147
41:											
TVOL					304	346	387	427	466	505	
WVOL					268	313	359	404	450	496	
SVOLI					159	194	229	266	304	343	
SVOLX					67	81	96	111	127	144	
43:											
TVOL					334	380	425	469	512	554	
WVOL					295	345	395	445	495	545	
SVOLI					173	210	249	289	330	373	
SVOLX					72	88	104	121	138	156	
45:											
TVOL					365	416	465	513	560	606	
WVOL					323	377	432	487	542	597	
SVOLI					187	228	269	313	357	403	
SVOLX					78	95	113	131	149	169	

NOTE: BLOCK INDICATES RANGE OF DATA.

1/TVOL = TOTAL ABOVEGROUND VOLUME OF WOOD AND BARK; EXCLUDES FOLIAGE.

WVOL = VOLUME OF WOOD FROM A 1-FOOT STUMP TO A 4-INCH TOP OUTSIDE BARK; EXCLUDES BARK AND FOLIAGE.

SVOLI = SAW-LOG VOLUME IN STRAIGHT MERCHANTABLE SECTIONS AT LEAST 8 FEET LONG TO A 9-INCH TOP OUTSIDE BARK IN TREES WITH A MERCHANTABLE FIRST SECTION ABOVE A 1-FOOT STUMP.

SVOLX = SAW-LOG VOLUME IN STRAIGHT MERCHANTABLE SECTIONS AT LEAST 8 FEET LONG TO A 9-INCH TOP OUTSIDE BARK IN TREES WITHOUT A MERCHANTABLE FIRST SECTION ABOVE A 1-FOOT STUMP.

Table 16--Total tree, wood, and saw-log volume for Oregon white oak

DIAMETER AT BREAST HEIGHT OUTSIDE BARK 1/	TOTAL HEIGHT (FEET)													
	20	30	40	50	60	70	80	90	100	110	120	130	140	150
INCHES	----- CUBIC FEET -----													
5:														
TVOL	2	3	4	4	5									
WVOL	1	2	2	3	3									
SVOL I	1	1	2	2	2									
SVOLX	0	1	1	1	1									
7:														
TVOL	4	6	7	9	10	11	12	13						
WVOL	3	4	5	6	7	8	9	10						
SVOL I	2	2	3	4	4	5	6	6						
SVOLX	1	1	1	2	2	2	3	3						
9:														
TVOL	7	10	12	15	17	19	21	23	25	26	28			
WVOL	5	7	9	10	12	14	16	17	19	21	22			
SVOL I	3	4	5	6	8	9	10	11	12	13	14			
SVOLX	1	2	2	3	4	4	5	5	6	6	7			
11:														
TVOL	11	15	19	23	26	29	32	35	38	41	43			
WVOL	7	10	13	16	19	22	25	27	30	33	35			
SVOL I	4	6	8	10	11	13	15	17	18	20	22			
SVOLX	2	3	4	5	5	6	7	8	9	9	10			
13:														
TVOL	16	22	27	32	37	42	46	50	54	58	62			
WVOL	11	15	20	24	28	32	36	40	44	47	51			
SVOL I	6	9	11	14	16	19	21	24	26	28	31			
SVOLX	3	4	5	7	8	9	10	11	12	13	14			
15:														
TVOL	22	30	37	44	50	56	62	68	74	79	84			
WVOL	15	21	27	33	39	44	50	55	60	66	71			
SVOL I	8	12	15	19	22	25	29	32	35	38	42			
SVOLX	4	6	7	9	10	12	14	15	17	18	20			
17:														
TVOL	29	39	49	57	66	74	81	89	96	103	110			
WVOL	20	28	36	44	51	59	66	73	80	87	94			
SVOL I	11	15	20	24	29	33	37	42	46	50	54			
SVOLX	5	7	9	11	14	16	18	20	22	24	26			
19:														
TVOL	37	50	62	73	84	94	103	113	122	131	140			
WVOL	25	36	46	56	66	75	85	94	103	112	120			
SVOL I	13	19	25	31	36	42	47	53	58	63	68			
SVOLX	6	9	12	15	17	20	22	25	27	30	32			
21:														
TVOL	46	62	77	90	104	116	128	140	151	162	173			
WVOL	32	45	58	70	83	94	106	118	129	140	151			
SVOL I	16	24	31	38	45	52	58	65	71	78	84			
SVOLX	8	11	15	18	21	24	27	31	34	37	40			
23:														
TVOL	56	75	93	110	126	141	156	170	184	197	210	223	236	248
WVOL	39	55	71	86	101	116	130	144	158	172	185	199	212	225
SVOL I	20	29	38	46	54	63	71	79	87	94	102	110	118	125
SVOLX	9	14	18	22	26	29	33	37	41	45	48	52	55	59
25:														
TVOL	67	90	111	131	150	169	186	203	220	236	252	267	282	297
WVOL	47	67	86	104	122	140	157	174	191	207	224	240	256	272
SVOL I	24	34	45	55	65	75	84	94	103	113	122	131	140	149
SVOLX	11	16	21	26	31	35	40	44	49	53	57	62	66	70

DIAMETER AT BREAST HEIGHT OUTSIDE BARK <u>1/</u>	TOTAL HEIGHT (FEET)													
	20	30	40	50	60	70	80	90	100	110	120	130	140	150
INCHES	----- CUBIC FEET -----													
27:														
TVOL	106	131	155	177	199	220	240	259	278	297	315	333	350	
WVOL	80	102	124	146	166	187	207	227	247	266	285	304	323	
SVOL I	40	53	64	76	88	99	110	121	132	143	154	165	176	
SVOLX	19	25	30	36	41	47	52	57	62	68	73	78	83	
29:														
TVOL	124	153	181	207	232	256	279	302	324	346	367	388	408	
WVOL	93	120	146	171	196	220	243	267	290	313	335	358	380	
SVOL I	47	61	75	89	102	115	128	141	154	167	179	192	204	
SVOLX	22	29	35	42	48	54	60	67	73	79	85	90	96	
31:														
TVOL	143	177	208	239	267	295	322	349	374	399	423	447	471	
WVOL	109	140	170	199	227	255	283	310	337	363	390	416	441	
SVOL I	54	70	86	102	117	132	147	162	177	192	206	221	235	
SVOLX	26	33	41	48	55	62	70	77	84	90	97	104	111	
33:														
TVOL	163	202	238	273	306	338	369	398	428	456	484	512	538	
WVOL	125	161	195	229	262	294	326	357	388	419	449	479	508	
SVOL I	62	80	98	116	134	151	168	185	202	219	235	252	268	
SVOLX	29	38	46	55	63	71	79	87	95	103	111	119	126	
35:														
TVOL	185	229	270	309	347	383	418	452	485	518	549	580	611	
WVOL	143	184	223	261	299	336	372	408	443	478	512	547	580	
SVOL I	70	91	111	132	151	171	190	210	229	248	266	285	303	
SVOLX	33	43	53	62	71	81	90	99	108	117	126	134	143	
37:														
TVOL	208	258	304	349	391	431	471	509	547	583	619	654	688	
WVOL	162	208	253	296	339	381	422	462	502	542	581	620	658	
SVOL I	79	102	125	148	170	192	214	236	257	278	299	320	341	
SVOLX	37	48	59	70	80	91	101	111	121	131	141	151	161	
39:														
TVOL	233	289	341	390	437	483	527	570	612	653	693	732	770	
WVOL	182	234	285	334	381	429	475	520	566	610	654	698	741	
SVOL I	88	114	140	165	190	215	239	263	287	311	335	358	381	
SVOLX	41	54	66	78	90	101	113	124	135	147	158	169	180	
41:														
TVOL	260	321	379	434	487	538	587	635	681	726	771	815	857	
WVOL	204	262	319	373	427	480	532	583	633	683	732	781	829	
SVOL I	98	127	155	184	211	239	266	293	319	346	372	398	424	
SVOLX	46	60	73	87	100	113	125	138	150	163	175	188	200	
43:														
TVOL	288	356	420	481	539	595	650	703	754	805	854	902	949	
WVOL	227	292	355	416	475	534	592	649	705	760	815	870	924	
SVOL I	108	140	172	203	234	264	294	323	353	382	411	440	468	
SVOLX	51	66	81	96	110	124	139	153	166	180	194	207	221	
45:														
TVOL	317	392	463	530	594	656	716	775	831	887	941	994	1047	
WVOL	252	324	393	461	527	592	656	719	781	842	903	964	1023	
SVOL I	119	154	189	223	257	290	323	356	388	420	452	484	515	
SVOLX	56	73	89	105	121	137	152	168	183	198	213	228	243	

NOTE: BLOCK INDICATES RANGE OF DATA.

1/TVOL = TOTAL ABOVEGROUND VOLUME OF WOOD AND BARK; EXCLUDES FOLIAGE.

WVOL = VOLUME OF WOOD FROM A 1-FOOT STUMP TO A 4-INCH TOP OUTSIDE BARK; EXCLUDES BARK AND FOLIAGE.

SVOL I = SAW-LOG VOLUME IN STRAIGHT MERCHANTABLE SECTIONS AT LEAST 8 FEET LONG TO A 9-INCH TOP OUTSIDE BARK IN TREES WITH A MERCHANTABLE FIRST SECTION ABOVE A 1-FOOT STUMP.

SVOLX = SAW-LOG VOLUME IN STRAIGHT MERCHANTABLE SECTIONS AT LEAST 8 FEET LONG TO A 9-INCH TOP OUTSIDE BARK IN TREES WITHOUT A MERCHANTABLE FIRST SECTION ABOVE A 1-FOOT STUMP.

Table 17--Total tree, wood, and saw-log volume for canyon live oak

DIAMETER AT BREAST HEIGHT OUTSIDE BARK 1/ INCHES	TOTAL HEIGHT (FEET)												
	20	30	40	50	60	70	80	90	100	110	120	130	140
----- CUBIC FEET -----													
5:													
TVOL	2	3	3	4	4								
WVOL	1	2	2	2	3								
SVOLI	1	1	1	2	2								
SVOLX	0	0	0	1	1								
7:													
TVOL	4	6	7	8	9	10	10	11					
WVOL	3	4	5	5	6	7	8	8					
SVOLI	2	2	3	3	4	4	5	5					
SVOLX	1	1	1	1	1	2	2	2					
9:													
TVOL	8	10	12	14	15	17	18	19	21				
WVOL	5	7	8	10	11	12	14	15	16				
SVOLI	3	4	5	6	7	8	9	10	10				
SVOLX	1	1	2	2	3	3	3	4	4				
11:													
TVOL	12	15	18	21	24	26	28	30	32				
WVOL	8	10	13	15	18	20	22	24	26				
SVOLI	4	6	8	9	11	12	14	15	16				
SVOLX	2	2	3	3	4	5	5	6	6				
13:													
TVOL	17	22	27	31	34	38	41	44	47	49	52		
WVOL	11	15	19	23	26	29	32	35	38	41	43		
SVOLI	6	9	11	14	16	18	20	22	24	26	28		
SVOLX	2	3	4	5	6	7	7	8	9	9	10		
15:													
TVOL	24	31	37	42	47	51	56	60	64	68	72		
WVOL	16	22	27	32	36	40	45	49	53	57	60		
SVOLI	9	12	16	19	22	25	27	30	33	35	38		
SVOLX	3	5	6	7	8	9	10	11	12	13	14		
17:													
TVOL	31	40	48	55	62	68	74	79	84	89	94		
WVOL	21	29	36	42	48	54	60	65	71	76	81		
SVOLI	12	16	21	25	29	33	36	40	43	47	50		
SVOLX	4	6	8	9	11	12	13	15	16	17	19		
19:													
TVOL	40	52	62	71	79	87	94	101	108	114	120	127	132
WVOL	28	37	46	55	63	70	77	85	91	98	105	111	117
SVOLI	15	21	26	32	37	42	47	51	56	60	65	69	73
SVOLX	6	8	10	12	14	15	17	19	21	22	24	25	27
21:													
TVOL	50	64	77	88	98	108	117	126	134	142	150	158	165
WVOL	35	47	58	69	79	88	98	107	115	124	132	140	148
SVOLI	19	26	33	40	46	52	58	64	70	75	81	86	92
SVOLX	7	10	12	15	17	19	21	24	26	28	30	32	34
23:													
TVOL	61	79	94	107	120	132	143	154	164	174	184	193	202
WVOL	43	58	72	85	97	109	121	132	143	153	163	173	183
SVOLI	23	32	41	49	57	64	71	79	86	93	99	106	113
SVOLX	9	12	15	18	21	24	26	29	32	34	37	39	41
25:													
TVOL	74	94	113	129	144	159	172	185	197	209	221	232	243
WVOL	52	71	88	103	118	133	147	160	173	186	198	210	222
SVOLI	28	39	49	59	68	77	86	95	103	112	120	128	136
SVOLX	10	14	18	22	25	28	32	35	38	41	44	47	50

DIAMETER AT BREAST HEIGHT OUTSIDE BARK ^{1/}	TOTAL HEIGHT (FEET)												
	20	30	40	50	60	70	80	90	100	110	120	130	140
INCHES	----- CUBIC FEET -----												
27:													
TVOL	87	112	134	153	171	188	204	219	234	248	262	275	287
WVOL	63	85	105	124	142	159	175	191	207	222	237	251	266
SVOLI	33	46	58	70	81	92	102	113	123	133	142	152	161
SVOLX	12	17	21	26	30	34	38	41	45	49	52	56	59
29:													
TVOL	102	131	156	179	200	220	239	257	274	290	306	322	336
WVOL	74	100	124	146	167	187	207	226	244	262	280	297	314
SVOLI	39	54	68	82	95	108	120	132	144	156	167	178	189
SVOLX	14	20	25	30	35	40	44	49	53	57	62	66	70
31:													
TVOL		152	181	208	232	255	277	297	317	336	355	372	390
WVOL		117	144	170	195	219	242	264	285	306	327	347	366
SVOLI		63	79	95	110	125	140	154	167	181	194	207	220
SVOLX		23	29	35	41	46	51	57	62	67	72	76	81
33:													
TVOL		174	208	238	266	293	318	341	364	386	407	428	447
WVOL		135	167	197	226	253	280	305	330	354	378	401	424
SVOLI		72	91	110	127	144	161	177	193	208	223	238	253
SVOLX		27	34	40	47	53	59	65	71	77	82	88	93
35:													
TVOL		198	237	271	303	333	362	389	415	439	464	487	509
WVOL		155	191	226	259	290	320	350	378	406	433	460	486
SVOLI		83	104	125	145	164	183	202	220	238	255	272	289
SVOLX		30	38	46	53	61	68	74	81	87	94	100	106
37:													
TVOL		224	268	307	343	377	409	439	469	497	524	550	576
WVOL		176	218	257	294	330	365	398	431	462	493	523	553
SVOLI		93	118	142	164	186	208	229	249	269	289	308	327
SVOLX		34	44	52	61	69	76	84	92	99	106	114	121
39:													
TVOL		252	300	344	385	423	459	493	526	558	588	618	647
WVOL		199	246	291	333	373	412	450	487	522	557	591	625
SVOLI		105	133	159	185	210	234	257	280	303	325	347	368
SVOLX		39	49	59	68	77	86	95	103	112	120	128	136
41:													
TVOL				385	430	472	513	551	588	623	657	690	722
WVOL				326	374	419	463	505	547	587	626	664	702
SVOLI				178	207	235	261	288	314	339	364	388	412
SVOLX				66	76	86	96	106	115	125	134	143	152
43:													
TVOL				427	478	525	569	612	653	692	730	766	802
WVOL				365	418	468	517	565	611	655	699	742	784
SVOLI				198	230	261	291	320	349	377	405	432	459
SVOLX				73	85	96	107	118	128	139	149	159	169
45:													
TVOL				472	528	580	630	677	722	765	807	847	887
WVOL				405	464	521	575	628	679	728	777	825	872
SVOLI				220	255	289	322	355	386	417	448	478	508
SVOLX				81	94	106	119	131	142	154	165	176	187

NOTE: BLOCK INDICATES RANGE OF DATA.

^{1/}TVOL = TOTAL ABOVEGROUND VOLUME OF WOOD AND BARK; EXCLUDES FOLIAGE.

WVOL = VOLUME OF WOOD FROM A 1-FOOT STUMP TO A 4-INCH TOP OUTSIDE BARK; EXCLUDES BARK AND FOLIAGE.

SVOLI = SAW-LOG VOLUME IN STRAIGHT MERCHANTABLE SECTIONS AT LEAST 8 FEET LONG TO A 9-INCH TOP OUTSIDE BARK IN TREES WITH A MERCHANTABLE FIRST SECTION ABOVE A 1-FOOT STUMP.

SVOLX = SAW-LOG VOLUME IN STRAIGHT MERCHANTABLE SECTIONS AT LEAST 8 FEET LONG TO A 9-INCH TOP OUTSIDE BARK IN TREES WITHOUT A MERCHANTABLE FIRST SECTION ABOVE A 1-FOOT STUMP.

Table 18--Total tree, wood, and saw-log volume for coast live oak

DIAMETER AT BREAST HEIGHT OUTSIDE BARK 1/	TOTAL HEIGHT (FEET)												
	20	30	40	50	60	70	80	90	100	110	120	130	140
----- CUBIC FEET-----													
5:													
TVOL	2	2	3										
WVOL	1	1	1										
SVOLI	1	1	1										
SVOLX	0	0	0										
7:													
TVOL	4	5	6	7	8	8							
WVOL	2	3	3	4	4	4							
SVOLI	2	2	3	3	4	4							
SVOLX	1	1	1	1	1	2							
9:													
TVOL	7	9	11	12	14	15	17						
WVOL	4	5	6	7	8	8	9						
SVOLI	3	4	5	6	7	8	9						
SVOLX	1	1	2	2	3	3	3						
11:													
TVOL	11	14	17	20	22	24	26						
WVOL	7	8	10	11	13	14	15						
SVOLI	4	6	8	9	11	12	14						
SVOLX	2	2	3	3	4	5	5						
13:													
TVOL	16	21	25	29	32	36	39	42	45	47			
WVOL	10	13	15	18	20	22	23	25	27	28			
SVOLI	6	9	11	14	16	18	20	22	24	26			
SVOLX	2	3	4	5	6	7	7	8	9	9			
15:													
TVOL	23	29	35	40	45	50	54	58	62	66			
WVOL	14	18	22	25	28	31	34	36	38	41			
SVOLI	9	12	16	19	22	25	27	30	33	35			
SVOLX	3	5	6	7	8	9	10	11	12	13			
17:													
TVOL	30	39	47	54	60	66	72	78	83	88	93	98	102
WVOL	20	25	30	35	39	42	46	49	53	56	59	62	65
SVOLI	12	16	21	25	29	33	36	40	43	47	50	54	57
SVOLX	4	6	8	9	11	12	13	15	16	17	19	20	21
19:													
TVOL	39	51	61	70	78	86	93	101	107	114	120	127	133
WVOL	26	34	40	46	51	56	61	66	70	74	78	82	86
SVOLI	15	21	26	32	37	42	47	51	56	60	65	69	73
SVOLX	6	8	10	12	14	15	17	19	21	22	24	25	27
21:													
TVOL	50	64	76	88	99	108	118	127	136	144	152	160	167
WVOL	34	43	52	59	66	73	79	85	90	95	101	106	111
SVOLI	19	26	33	40	46	52	58	64	70	75	81	86	92
SVOLX	7	10	12	15	17	19	21	24	26	28	30	32	34
23:													
TVOL	61	79	94	109	122	134	146	157	167	178	188	197	207
WVOL	43	55	65	74	83	91	99	106	113	120	127	133	139
SVOLI	23	32	41	49	57	64	71	79	86	93	99	106	113
SVOLX	9	12	15	18	21	24	26	29	32	34	37	39	41
25:													
TVOL	74	96	115	132	148	163	177	190	203	216	228	239	251
WVOL	53	67	80	92	103	113	122	131	140	148	157	164	172
SVOLI	28	39	49	59	68	77	86	95	103	112	120	128	136
SVOLX	10	14	18	22	25	28	32	35	38	41	44	47	50

TOTAL HEIGHT (FEET)

DIAMETER AT
BREAST HEIGHT
OUTSIDE BARK 1/

20 30 40 50 60 70 80 90 100 110 120 130 140

INCHES	----- CUBIC FEET-----												
	20	30	40	50	60	70	80	90	100	110	120	130	140
27:													
TVOL		114	137	157	176	194	211	227	243	258	272	286	300
WVOL		82	98	112	125	137	149	160	170	180	190	200	209
SVOLI		46	58	70	81	92	102	113	123	133	142	152	161
SVOLX		17	21	26	30	34	38	41	45	49	52	56	59
29:													
TVOL		135	162	186	208	229	249	268	287	304	321	338	354
WVOL		98	117	134	150	164	178	191	204	216	228	239	250
SVOLI		54	68	82	95	108	120	132	144	156	167	178	189
SVOLX		20	25	30	35	40	44	49	53	57	62	66	70
31:													
TVOL		158	189	217	243	268	291	313	335	355	375	394	413
WVOL		116	138	159	177	195	211	227	242	256	270	283	296
SVOLI		63	79	95	110	125	140	154	167	181	194	207	220
SVOLX		23	29	35	41	46	51	57	62	67	72	76	81
33:													
TVOL		182	218	251	281	310	336	362	387	411	434	456	477
WVOL		136	162	186	208	228	247	266	283	300	316	332	347
SVOLI		72	91	110	127	144	161	177	193	208	223	238	253
SVOLX		27	34	40	47	53	59	65	71	77	82	88	93
35:													
TVOL		209	250	287	322	355	386	415	443	471	497	522	547
WVOL		158	188	216	241	265	287	308	329	348	367	385	403
SVOLI		83	104	125	145	164	183	202	220	238	255	272	289
SVOLX		30	38	46	53	61	68	74	81	87	94	100	106
37:													
TVOL		238	284	327	366	404	439	472	504	535	565	594	623
WVOL		182	217	248	277	305	330	355	378	401	423	444	464
SVOLI		93	118	142	164	186	208	229	249	269	289	308	327
SVOLX		34	44	52	61	69	76	84	92	99	106	114	121
39:													
TVOL			321	369	414	456	496	534	570	605	639	672	703
WVOL			248	284	317	348	377	405	432	458	483	507	530
SVOLI			133	159	185	210	234	257	280	303	325	347	368
SVOLX			49	59	68	77	86	95	103	112	120	128	136
41:													
TVOL			361	415	465	512	557	599	640	679	717	754	790
WVOL			281	322	360	395	428	460	491	520	548	575	602
SVOLI			149	178	207	235	261	288	314	339	364	388	412
SVOLX			55	66	76	86	96	106	115	125	134	143	152
43:													
TVOL			403	463	519	572	622	669	715	759	801	842	882
WVOL			317	363	406	446	483	519	553	586	618	649	679
SVOLI			166	198	230	261	291	320	349	377	405	432	459
SVOLX			61	73	85	96	107	118	128	139	149	159	169
45:													
TVOL			448	515	577	635	691	744	794	843	890	936	980
WVOL			356	408	455	500	542	582	621	658	694	728	762
SVOLI			183	220	255	289	322	355	386	417	448	478	508
SVOLX			68	81	94	106	119	131	142	154	165	176	187

NOTE: BLOCK INDICATES RANGE OF DATA.

1/TVOL = TOTAL ABOVEGROUND VOLUME OF WOOD AND BARK; EXCLUDES FOLIAGE.

WVOL = VOLUME OF WOOD FROM A 1-FOOT STUMP TO A 4-INCH TOP OUTSIDE BARK; EXCLUDES BARK AND FOLIAGE.

SVOLI = SAW-LOG VOLUME IN STRAIGHT MERCHANTABLE SECTIONS AT LEAST 8 FEET LONG TO A 9-INCH TOP OUTSIDE BARK IN TREES WITH A MERCHANTABLE FIRST SECTION ABOVE A 1-FOOT STUMP.

SVOLX = SAW-LOG VOLUME IN STRAIGHT MERCHANTABLE SECTIONS AT LEAST 8 FEET LONG TO A 9-INCH TOP OUTSIDE BARK IN TREES WITHOUT A MERCHANTABLE FIRST SECTION ABOVE A 1-FOOT STUMP.

Table 19--Total tree, wood, and saw-log volume for Interior live oak

DIAMETER AT BREAST HEIGHT OUTSIDE BARK 1/	TOTAL HEIGHT (FEET)											
	20	30	40	50	60	70	80	90	100	110	120	130
INCHES	----- CUBIC FEET-----											
5:												
TVOL	2	3	4									
WVOL	1	2	2									
SVOLI	1	1	1									
SVOLX	0	0	0									
7:												
TVOL	5	6	7	8	9	10						
WVOL	3	4	5	6	7	7						
SVOLI	2	2	3	3	4	4						
SVOLX	1	1	1	1	1	2						
9:												
TVOL	8	10	12	14	16	17	19	20				
WVOL	5	7	8	10	11	13	14	15				
SVOLI	3	4	5	6	7	8	9	10				
SVOLX	1	1	2	2	3	3	3	4				
11:												
TVOL	12	15	18	21	24	26	28	31				
WVOL	7	10	13	15	17	19	22	24				
SVOLI	4	6	8	9	11	12	14	15				
SVOLX	2	2	3	3	4	5	5	6				
13:												
TVOL	17	21	26	30	33	37	40	43				
WVOL	11	14	18	21	25	28	31	34				
SVOLI	6	9	11	14	16	18	20	22				
SVOLX	2	3	4	5	6	7	7	8				
15:												
TVOL	22	29	34	40	44	49	53	58				
WVOL	14	20	25	29	34	38	42	46				
SVOLI	9	12	16	19	22	25	27	30				
SVOLX	3	5	6	7	8	9	10	11				
17:												
TVOL	29	37	44	51	57	63	69	74	79			
WVOL	19	26	32	38	44	50	55	60	65			
SVOLI	12	16	21	25	29	33	36	40	43			
SVOLX	4	6	8	9	11	12	13	15	16			
19:												
TVOL	36	46	56	64	72	79	86	93	99			
WVOL	24	33	41	48	56	63	70	77	83			
SVOLI	15	21	26	32	37	42	47	51	56			
SVOLX	6	8	10	12	14	15	17	19	21			
21:												
TVOL	44	57	68	78	88	97	106	114	122	129		
WVOL	29	40	51	60	69	78	87	95	103	111		
SVOLI	19	26	33	40	46	52	58	64	70	75		
SVOLX	7	10	12	15	17	19	21	24	26	28		
23:												
TVOL	53	68	82	94	106	117	127	137	146	155		
WVOL	36	49	61	73	84	95	105	116	125	135		
SVOLI	23	32	41	49	57	64	71	79	86	93		
SVOLX	9	12	15	18	21	24	26	29	32	34		
25:												
TVOL	63	81	97	112	125	138	151	162	173	184	195	205
WVOL	43	59	74	87	101	114	126	138	150	162	173	184
SVOLI	28	39	49	59	68	77	86	95	103	112	120	128
SVOLX	10	14	18	22	25	28	32	35	38	41	44	47

DIAMETER AT BREAST HEIGHT OUTSIDE BARK <u>1/</u>	TOTAL HEIGHT (FEET)											
	20	30	40	50	60	70	80	90	100	110	120	130
INCHES	----- CUBIC FEET -----											
27:												
TVOL	95	114	131	147	162	176	190	203	215	227	239	
WVOL	69	87	103	119	134	149	163	177	191	204	217	
SVOLI	46	58	70	81	92	102	113	123	133	142	152	
SVOLX	17	21	26	30	34	38	41	45	49	52	56	
29:												
TVOL	109	131	151	170	187	203	219	234	249	263	277	
WVOL	81	101	120	139	156	173	190	206	222	238	253	
SVOLI	54	68	82	95	108	120	132	144	156	167	178	
SVOLX	20	25	30	35	40	44	49	53	57	62	66	
31:												
TVOL	125	150	173	194	214	233	251	268	285	301	317	
WVOL	93	117	139	160	180	200	219	238	256	274	292	
SVOLI	63	79	95	110	125	140	154	167	181	194	207	
SVOLX	23	29	35	41	46	51	57	62	67	72	76	
33:												
TVOL	142	171	196	220	243	264	285	305	324	342	360	
WVOL	107	133	159	183	206	229	251	272	293	314	334	
SVOLI	72	91	110	127	144	161	177	193	208	223	238	
SVOLX	27	34	40	47	53	59	65	71	77	82	88	
35:												
TVOL	160	192	221	248	274	298	321	343	365	385	405	
WVOL	121	151	180	208	234	260	285	309	333	356	379	
SVOLI	83	104	125	145	164	183	202	220	238	255	272	
SVOLX	30	38	46	53	61	68	74	81	87	94	100	
37:												
TVOL	179	215	248	278	307	334	359	384	408	431	454	
WVOL	136	171	203	234	264	293	321	348	375	401	427	
SVOLI	93	118	142	164	186	208	229	249	269	289	308	
SVOLX	34	44	52	61	69	76	84	92	99	106	114	
39:												
TVOL	200	239	276	309	341	371	400	428	454	480	505	
WVOL	153	191	227	262	295	328	359	390	420	450	478	
SVOLI	105	133	159	185	210	234	257	280	303	325	347	
SVOLX	39	49	59	68	77	86	95	103	112	120	128	
41:												
TVOL		265	305	343	378	411	443	473	503	531	559	
WVOL		213	253	292	329	365	400	434	468	501	533	
SVOLI		149	178	207	235	261	288	314	339	364	388	
SVOLX		55	66	76	86	96	106	115	125	134	143	
43:												
TVOL		292	336	377	416	453	488	521	554	585	615	
WVOL		236	280	323	364	404	443	481	518	554	590	
SVOLI		166	198	230	261	291	320	349	377	405	432	
SVOLX		61	73	85	96	107	118	128	139	149	159	
45:												
TVOL		320	369	414	456	496	535	572	607	642	675	
WVOL		260	309	356	402	446	489	530	571	611	651	
SVOLI		183	220	255	289	322	355	386	417	448	478	
SVOLX		68	81	94	106	119	131	142	154	165	176	

NOTE: BLOCK INDICATES RANGE OF DATA.

1/TVOL = TOTAL ABOVEGROUND VOLUME OF WOOD AND BARK; EXCLUDES FOLIAGE.

WVOL = VOLUME OF WOOD FROM A 1-FOOT STUMP TO A 4-INCH TOP OUTSIDE BARK; EXCLUDES BARK AND FOLIAGE.

SVOLI = SAW-LOG VOLUME IN STRAIGHT MERCHANTABLE SECTIONS AT LEAST 8 FEET LONG TO A 9-INCH TOP OUTSIDE BARK IN TREES WITH A MERCHANTABLE FIRST SECTION ABOVE A 1-FOOT STUMP.

SVOLX = SAW-LOG VOLUME IN STRAIGHT MERCHANTABLE SECTIONS AT LEAST 8 FEET LONG TO A 9-INCH TOP OUTSIDE BARK IN TREES WITHOUT A MERCHANTABLE FIRST SECTION ABOVE A 1-FOOT STUMP.

Table 20--Total tree, wood, and saw-log volume for giant chinkapin

DIAMETER AT BREAST HEIGHT OUTSIDE BARK ^{1/}	TOTAL HEIGHT (METERS)													
	3	6	9	12	15	18	21	24	27	30	33	36	39	42
CENTIMETERS	----- CUBIC METERS -----													
10:														
TVOL	0.03	0.04	0.06	0.07	0.08	0.09	0.10							
WVOL	.02	.03	.04	.05	.05	.06	.07							
SVOL	.01	.01	.02	.02	.03	.03	.04							
20:														
TVOL	.11	.17	.23	.28	.32	.36	.40	0.44	0.48					
WVOL	.07	.11	.15	.19	.23	.26	.30	.33	.36					
SVOL	.04	.07	.10	.12	.15	.17	.19	.21	.23					
30:														
TVOL	.24	.39	.51	.63	.73	.83	.92	1.01	1.09	1.17	1.25	1.33		
WVOL	.15	.26	.36	.45	.53	.61	.69	.77	.84	.91	.98	1.05		
SVOL	.11	.19	.26	.33	.39	.45	.50	.56	.61	.66	.71	.76		
40:														
TVOL		.70	.92	1.12	1.30	1.48	1.64	1.80	1.95	2.10	2.24	2.38		
WVOL		.48	.65	.81	.97	1.11	1.26	1.39	1.53	1.65	1.78	1.91		
SVOL		.38	.52	.65	.77	.89	1.00	1.11	1.22	1.32	1.42	1.52		
50:														
TVOL			1.44	1.76	2.05	2.32	2.58	2.83	3.06	3.29	3.52	3.73	3.94	4.15
WVOL			1.03	1.29	1.54	1.77	1.99	2.21	2.42	2.63	2.83	3.03	3.22	3.41
SVOL			.89	1.11	1.31	1.51	1.70	1.89	2.07	2.24	2.41	2.58	2.75	2.91
60:														
TVOL			2.08	2.54	2.96	3.35	3.73	4.09	4.43	4.76	5.09	5.40	5.70	6.00
WVOL			1.51	1.89	2.24	2.58	2.91	3.23	3.53	3.83	4.13	4.42	4.70	4.98
SVOL			1.37	1.71	2.03	2.34	2.63	2.92	3.19	3.46	3.73	3.99	4.24	4.49
70:														
TVOL				3.47	4.04	4.58	5.09	5.58	6.05	6.51	6.95	7.37	7.79	8.20
WVOL				2.59	3.08	3.55	4.00	4.44	4.86	5.28	5.68	6.08	6.47	6.85
SVOL				2.47	2.93	3.37	3.80	4.21	4.61	5.00	5.38	5.76	6.12	6.48
80:														
TVOL				4.54	5.30	6.00	6.67	7.31	7.93	8.52	9.10	9.66	10.20	10.74
WVOL				3.42	4.07	4.68	5.28	5.85	6.41	6.96	7.49	8.01	8.53	9.03
SVOL				3.39	4.03	4.64	5.22	5.79	6.34	6.88	7.40	7.91	8.42	8.91

NOTE: BLOCK INDICATES RANGE OF DATA.

^{1/}TVOL = TOTAL ABOVEGROUND VOLUME OF WOOD AND BARK; EXCLUDES FOLIAGE.

WVOL = VOLUME OF WOOD FROM A 0.3 METER STUMP TO A 10-CENTIMETER TOP OUTSIDE BARK; EXCLUDES BARK AND FOLIAGE.

SVOL = SAW-LOG VOLUME IN STRAIGHT MERCHANTABLE SECTIONS AT LEAST 2.5 METERS LONG TO A 23-CENTIMETER TOP OUTSIDE BARK ABOVE A 0.3-METER STUMP.

Table 21--Total tree, wood, and saw-log volume for California-laurel

DIAMETER AT BREAST HEIGHT OUTSIDE BARK ^{1/}	TOTAL HEIGHT (METERS)												
	3	6	9	12	15	18	21	24	27	30	33	36	39
CENTIMETERS	----- CUBIC METERS -----												
10:													
TVOL	0.02	0.03	0.05	0.06	0.07	0.09	0.10	0.11					
WVOL	.01	.02	.03	.04	.05	.06	.07	.08					
SVOL	.00	.01	.02	.02	.03	.03	.04	.04					
20:													
TVOL	.07	.13	.18	.23	.28	.33	.38	.43	0.48	0.52			
WVOL	.04	.07	.11	.16	.20	.24	.28	.32	.36	.41			
SVOL	.02	.05	.07	.10	.12	.15	.18	.20	.23	.25			
30:													
TVOL	.15	.28	.40	.51	.63	.73	.84	.95	1.05	1.15	1.25	1.36	1.45
WVOL	.08	.17	.26	.36	.45	.55	.65	.74	.84	.94	1.04	1.14	1.24
SVOL	.06	.12	.18	.24	.31	.37	.43	.50	.56	.63	.69	.76	.83
40:													
TVOL		.49	.70	.90	1.09	1.29	1.47	1.66	1.84	2.02	2.20	2.37	2.55
WVOL		.31	.48	.65	.82	.99	1.17	1.34	1.52	1.70	1.88	2.06	2.24
SVOL		.23	.34	.46	.58	.70	.83	.95	1.07	1.20	1.32	1.44	1.57
50:													
TVOL		.75	1.08	1.39	1.69	1.98	2.27	2.56	2.84	3.12	3.39	3.66	3.93
WVOL		.49	.76	1.03	1.30	1.57	1.85	2.13	2.41	2.69	2.97	3.26	3.55
SVOL		.37	.56	.76	.96	1.16	1.36	1.56	1.76	1.97	2.17	2.38	2.58
60:													
TVOL		1.07	1.53	1.98	2.41	2.83	3.24	3.65	4.05	4.44	4.83	5.22	5.60
WVOL		.72	1.10	1.49	1.89	2.29	2.69	3.10	3.50	3.92	4.33	4.74	5.16
SVOL		.56	.85	1.14	1.44	1.74	2.04	2.34	2.65	2.95	3.26	3.57	3.88
70:													
TVOL		1.45	2.07	2.67	3.25	3.82	4.38	4.92	5.46	6.00	6.52	7.05	7.56
WVOL		.99	1.51	2.05	2.59	3.14	3.69	4.25	4.81	5.38	5.95	6.52	7.09
SVOL		.78	1.20	1.61	2.03	2.45	2.88	3.30	3.73	4.17	4.60	5.03	5.47
80:													
TVOL				3.46	4.21	4.95	5.67	6.38	7.08	7.78	8.46	9.14	9.80
WVOL				2.70	3.41	4.13	4.86	5.60	6.34	7.08	7.83	8.58	9.33
SVOL				2.17	2.73	3.30	3.88	4.45	5.03	5.61	6.19	6.78	7.36
90:													
TVOL					5.30	6.23	7.13	8.03	8.91	9.78	10.64	11.49	12.33
WVOL					4.35	5.27	6.20	7.13	8.08	9.02	9.98	10.93	11.89
SVOL					3.56	4.30	5.04	5.79	6.54	7.30	8.05	8.81	9.58
100:													
TVOL					6.50	7.64	8.76	9.85	10.94	12.00	13.06	14.10	15.14
WVOL					5.40	6.55	7.70	8.86	10.03	11.21	12.39	13.58	14.78
SVOL					4.50	5.43	6.37	7.32	8.27	9.23	10.19	11.15	12.11
110:													
TVOL					7.83	9.20	10.54	11.86	13.16	14.45	15.72	16.97	18.22
WVOL					6.57	7.97	9.37	10.78	12.21	13.64	15.08	16.53	17.98
SVOL					5.56	6.72	7.88	9.06	10.23	11.41	12.60	13.79	14.98

NOTE: BLOCK INDICATES RANGE OF DATA.

^{1/}TVOL = TOTAL ABOVEGROUND VOLUME OF WOOD AND BARK; EXCLUDES FOLIAGE.

WVOL = VOLUME OF WOOD FROM A 0.3 METER STUMP TO A 10-CENTIMETER TOP OUTSIDE BARK; EXCLUDES BARK AND FOLIAGE.

SVOL = SAW-LOG VOLUME IN STRAIGHT MERCHANTABLE SECTIONS AT LEAST 2.5 METERS LONG TO A 23-CENTIMETER TOP OUTSIDE BARK ABOVE A 0.3-METER STUMP.

Table 22--Total tree, wood, and saw-log volume for tanoak

DIAMETER AT BREAST HEIGHT OUTSIDE BARK ^{1/}	TOTAL HEIGHT (METERS)												
	3	6	9	12	15	18	21	24	27	30	33	36	39
CENTIMETERS	----- CUBIC METERS -----												
10:													
TVOL	0.02	0.03	0.04	0.06	0.07	0.08	0.09	0.10					
WVOL	.00	.01	.02	.02	.03	.03	.04	.05					
SVOL	.00	.01	.01	.01	.02	.02	.03	.03					
20:													
TVOL	.07	.12	.17	.22	.27	.31	.36	.40	0.44	0.49			
WVOL	.02	.05	.07	.10	.13	.16	.19	.22	.25	.29			
SVOL	.01	.03	.05	.07	.09	.12	.14	.17	.19	.22			
30:													
TVOL	.15	.27	.38	.48	.59	.69	.79	.88	.98	1.07	1.16		
WVOL	.05	.11	.18	.24	.32	.39	.46	.54	.62	.69	.77		
SVOL	.03	.08	.13	.18	.24	.30	.36	.42	.49	.55	.62		
40:													
TVOL		.46	.66	.85	1.03	1.20	1.37	1.54	1.71	1.87	2.03	2.19	2.35
WVOL		.21	.33	.46	.59	.73	.87	1.01	1.16	1.31	1.46	1.61	1.76
SVOL		.15	.25	.36	.47	.58	.70	.82	.95	1.08	1.21	1.34	1.48
50:													
TVOL		.72	1.02	1.30	1.58	1.85	2.12	2.38	2.63	2.88	3.13	3.38	3.62
WVOL		.34	.54	.75	.97	1.19	1.42	1.65	1.89	2.13	2.38	2.63	2.88
SVOL		.26	.42	.60	.78	.97	1.17	1.38	1.59	1.80	2.03	2.25	2.48
60:													
TVOL			1.45	1.86	2.25	2.64	3.02	3.39	3.75	4.11	4.46	4.81	5.16
WVOL			.81	1.12	1.44	1.78	2.12	2.47	2.82	3.18	3.55	3.92	4.29
SVOL			.64	.91	1.19	1.48	1.79	2.10	2.42	2.75	3.09	3.43	3.78
70:													
TVOL			1.95	2.51	3.04	3.56	4.07	4.57	5.06	5.54	6.02	6.49	6.96
WVOL			1.13	1.57	2.02	2.49	2.97	3.46	3.96	4.46	4.98	5.50	6.02
SVOL			.91	1.29	1.70	2.11	2.55	3.00	3.46	3.93	4.41	4.89	5.39
80:													
TVOL				3.94	4.62	5.28	5.92	6.56	7.18	7.80	8.41	9.01	
WVOL				2.71	3.34	3.98	4.64	5.31	5.99	6.67	7.37	8.07	
SVOL				2.31	2.88	3.47	4.08	4.70	5.34	6.00	6.66	7.34	
90:													
TVOL				4.96	5.80	6.63	7.44	8.24	9.03	9.81	10.57	11.33	
WVOL				3.52	4.33	5.16	6.01	6.87	7.75	8.64	9.54	10.46	
SVOL				3.03	3.78	4.55	5.35	6.17	7.01	7.87	8.75	9.64	
100:													
TVOL				6.08	7.12	8.14	9.13	10.11	11.08	12.03	12.97	13.90	
WVOL				4.43	5.46	6.50	7.57	8.66	9.77	10.89	12.03	13.18	
SVOL				3.87	4.82	5.81	6.83	7.87	8.95	10.04	11.16	12.29	
110:													
TVOL				7.32	8.57	9.79	10.99	12.17	13.33	14.48	15.61	16.73	
WVOL				5.46	6.73	8.02	9.34	10.68	12.04	13.43	14.83	16.25	
SVOL				4.82	6.01	7.24	8.51	9.81	11.15	12.51	13.90	15.32	
120:													
TVOL				8.66	10.14	11.59	13.01	14.41	15.78	17.14	18.48		
WVOL				6.61	8.14	9.71	11.30	12.93	14.58	16.25	17.95		
SVOL				5.89	7.34	8.85	10.40	12.00	13.63	15.30	17.00		

NOTE: BLOCK INDICATES RANGE OF DATA.

^{1/}TVOL = TOTAL ABOVEGROUND VOLUME OF WOOD AND BARK; EXCLUDES FOLIAGE.

WVOL = VOLUME OF WOOD FROM A 0.3 METER STUMP TO A 10-CENTIMETER TOP OUTSIDE BARK; EXCLUDES BARK AND FOLIAGE.

SVOL = SAW-LOG VOLUME IN STRAIGHT MERCHANTABLE SECTIONS AT LEAST 2.5 METERS LONG TO A 23-CENTIMETER TOP OUTSIDE BARK ABOVE A 0.3-METER STUMP.

Table 23--Total tree, wood, and saw-log volume for California white oak

DIAMETER AT BREAST HEIGHT OUTSIDE BARK 1/	TOTAL HEIGHT (METERS)												
	3	6	9	12	15	18	21	24	27	30	33	36	39
CENTIMETERS	----- CUBIC METERS -----												
10:													
TVOL	0.02	0.03	0.04	0.05									
WVOL	.01	.01	.02	.03									
SVOL	.00	.01	.02	.03									
20:													
TVOL	.08	.14	.19	.24	0.28	0.32	0.36	0.40					
WVOL	.04	.07	.11	.15	.18	.22	.25	.29					
SVOL	.01	.03	.06	.10	.14	.19	.25	.31					
30:													
TVOL	.22	.36	.49	.61	.72	.82	.92	1.02	1.12				
WVOL	.10	.19	.29	.38	.48	.57	.67	.76	.86				
SVOL	.02	.07	.13	.21	.30	.41	.53	.65	.79				
40:													
TVOL	.1	.96	1.19	1.41	1.61	1.81	2.00	2.18	2.36	2.54			
WVOL	.39	.58	.76	.95	1.14	1.33	1.52	1.71	1.89	2.08			
SVOL	.12	.23	.36	.52	.70	.90	1.12	1.36	1.61	1.88			
50:													
TVOL	1.19	1.62	2.00	2.37	2.72	3.05	3.37	3.68	3.98	4.28			
WVOL	.66	.98	1.31	1.63	1.95	2.27	2.59	2.91	3.23	3.55			
SVOL	.18	.35	.55	.79	1.07	1.37	1.70	2.06	2.45	2.86			
60:													
TVOL	1.83	2.47	3.07	3.63	4.16	4.67	5.16	5.63	6.10	6.55	6.99	7.42	
WVOL	1.02	1.52	2.02	2.52	3.02	3.51	4.01	4.50	5.00	5.49	5.99	6.48	
SVOL	.25	.49	.78	1.12	1.50	1.93	2.40	2.90	3.44	4.02	4.63	5.27	
70:													
TVOL	3.55	4.40	5.20	5.96	6.69	7.39	8.07	8.74	9.38	10.02	10.63		
WVOL	2.20	2.92	3.64	4.36	5.08	5.80	6.52	7.23	7.95	8.66	9.37		
SVOL	.65	1.04	1.49	2.00	2.57	3.20	3.87	4.59	5.36	6.18	7.03		
80:													
TVOL	4.85	6.01	7.10	8.14	9.14	10.10	11.03	11.94	12.82	13.68	14.53		
WVOL	3.03	4.02	5.02	6.01	7.00	7.99	8.97	9.96	10.94	11.93	12.91		
SVOL	.83	1.33	1.91	2.57	3.31	4.11	4.97	5.90	6.89	7.93	9.03		
90:													
TVOL	9.35	10.72	12.03	13.30	14.53	15.72	16.88	18.02	19.13				
WVOL	6.65	7.97	9.28	10.59	11.90	13.20	14.51	15.81	17.11				
SVOL	2.39	3.21	4.12	5.12	6.20	7.36	8.59	9.89	11.26				
100:													
TVOL	11.96	13.71	15.39	17.01	18.58	20.10	21.59	23.04	24.47				
WVOL	8.56	10.26	11.94	13.63	15.31	17.00	18.67	20.35	22.03				
SVOL	2.91	3.91	5.02	6.24	7.55	8.96	10.46	12.05	13.72				
110:													
TVOL	14.95	17.14	19.23	21.25	23.21	25.12	26.98	28.79	30.57				
WVOL	10.76	12.89	15.01	17.13	19.24	21.35	23.46	25.57	27.68				
SVOL	3.47	4.67	6.00	7.46	9.03	10.71	12.51	14.41	16.41				
120:													
TVOL	18.32	21.00	23.57	26.04	28.45	30.78	33.06	35.28	37.46				
WVOL	13.25	15.87	18.49	21.10	23.70	26.30	28.90	31.50	34.09				
SVOL	4.09	5.50	7.06	8.78	10.63	12.61	14.72	16.96	19.31				
130:													
TVOL	22.09	25.32	28.41	31.40	34.30	37.11	39.86	42.54	45.17				
WVOL	16.06	19.23	22.39	25.55	28.71	31.86	35.01	38.16	41.30				
SVOL	4.75	6.39	8.21	10.20	12.35	14.65	17.10	19.70	22.43				

NOTE: BLOCK INDICATES RANGE OF DATA.

1/TVOL = TOTAL ABOVEGROUND VOLUME OF WOOD AND BARK; EXCLUDES FOLIAGE.

WVOL = VOLUME OF WOOD FROM A 0.3 METER STUMP TO A 10-CENTIMETER TOP OUTSIDE BARK; EXCLUDES BARK AND FOLIAGE.

SVOL = SAW-LOG VOLUME IN STRAIGHT MERCHANTABLE SECTIONS AT LEAST 2.5 METERS LONG TO A 23-CENTIMETER TOP OUTSIDE BARK ABOVE A 0.3-METER STUMP.

Table 24--Total tree, wood, and saw-log volume for bigleaf maple

DIAMETER AT BREAST HEIGHT OUTSIDE BARK 1/	TOTAL HEIGHT (METERS)													
	3	6	9	12	15	18	21	24	27	30	33	36	39	42
CENTIMETERS	CUBIC METERS													
10:														
TVOL	0.02	0.03	0.04	0.05	0.06									
WVOL	.01	.02	.03	.03	.04									
SVOLI	.01	.01	.02	.03	.04									
SVOLX	.00	.01	.01	.01	.01									
20:														
TVOL	.11	.16	.20	.24	.27	0.30	0.32	0.35						
WVOL	.06	.10	.13	.16	.19	.21	.24	.26						
SVOLI	.03	.06	.09	.12	.16	.19	.23	.26						
SVOLX	.01	.02	.04	.05	.06	.08	.09	.11						
30:														
TVOL	.26	.39	.49	.58	.66	.73	.80	.86	0.92					
WVOL	.16	.26	.34	.42	.49	.55	.62	.68	.73					
SVOLI	.06	.14	.21	.29	.37	.45	.54	.62	.71					
SVOLX	.03	.05	.09	.12	.15	.18	.21	.25	.28					
40:														
TVOL		.74	.93	1.10	1.25	1.39	1.52	1.64	1.75	1.86	1.97			
WVOL		.51	.67	.82	.96	1.09	1.21	1.33	1.44	1.55	1.66			
SVOLI		.25	.39	.54	.68	.83	.98	1.14	1.29	1.45	1.61			
SVOLX		.10	.16	.21	.27	.33	.39	.45	.51	.58	.64			
50:														
TVOL		1.21	1.53	1.81	2.05	2.28	2.49	2.69	2.88	3.06	3.23	3.40		
WVOL		.86	1.14	1.39	1.62	1.84	2.05	2.25	2.44	2.62	2.80	2.98		
SVOLI		.40	.63	.86	1.09	1.33	1.57	1.82	2.07	2.32	2.57	2.83		
SVOLX		.16	.25	.34	.43	.53	.63	.72	.82	.92	1.02	1.12		
60:														
TVOL			2.30	2.71	3.08	3.42	3.74	4.04	4.32	4.59	4.85	5.10	5.34	5.57
WVOL			1.74	2.13	2.49	2.82	3.14	3.45	3.74	4.03	4.31	4.57	4.84	5.09
SVOLI			.92	1.26	1.60	1.95	2.31	2.67	3.03	3.40	3.77	4.15	4.52	4.90
SVOLX			.37	.50	.64	.78	.92	1.06	1.21	1.35	1.50	1.65	1.80	1.95
70:														
TVOL					4.34	4.82	5.27	5.69	6.09	6.47	6.84	7.19	7.53	7.86
WVOL					3.58	4.06	4.52	4.96	5.38	5.79	6.19	6.58	6.95	7.32
SVOLI					2.22	2.70	3.19	3.69	4.20	4.70	5.22	5.73	6.26	6.78
SVOLX					.88	1.08	1.27	1.47	1.67	1.87	2.08	2.28	2.49	2.70
80:														
TVOL					5.84	6.49	7.09	7.66	8.20	8.71	9.20	9.67	10.13	10.57
WVOL					4.90	5.56	6.19	6.79	7.37	7.93	8.47	9.00	9.52	10.02
SVOLI					2.94	3.58	4.23	4.89	5.56	6.23	6.91	7.59	8.28	8.98
SVOLX					1.17	1.42	1.68	1.95	2.21	2.48	2.75	3.02	3.30	3.57
90:														
TVOL					7.60	8.44	9.22	9.96	10.65	11.32	11.96	12.57	13.17	13.74
WVOL					6.46	7.33	8.16	8.96	9.72	10.46	11.18	11.88	12.56	13.22
SVOLI					3.76	4.58	5.42	6.26	7.12	7.98	8.85	9.73	10.61	11.50
SVOLX					1.50	1.82	2.16	2.49	2.83	3.18	3.52	3.87	4.22	4.58
100:														
TVOL					9.60	10.66	11.65	12.59	13.47	14.31	15.12	15.89	16.64	17.37
WVOL					8.28	9.40	10.46	11.48	12.46	13.41	14.33	15.22	16.09	16.95
SVOLI					4.69	5.72	6.76	7.82	8.88	9.96	11.05	12.14	13.24	14.35
SVOLX					1.87	2.28	2.69	3.11	3.54	3.96	4.40	4.83	5.27	5.71
110:														
TVOL					11.87	13.18	14.41	15.56	16.65	17.69	18.69	19.65	20.57	21.47
WVOL					10.36	11.76	13.09	14.37	15.59	16.78	17.93	19.05	20.14	21.21
SVOLI					5.73	6.99	8.26	9.55	10.86	12.17	13.50	14.84	16.18	17.54
SVOLX					2.28	2.78	3.29	3.80	4.32	4.84	5.37	5.90	6.44	6.98
120:														
TVOL					14.40	16.00	17.48	18.88	20.20	21.47	22.68	23.84	24.97	
WVOL					12.71	14.43	16.07	17.63	19.14	20.59	22.00	23.38	24.72	
SVOLI					6.89	8.39	9.92	11.47	13.04	14.62	16.21	17.82	19.43	
SVOLX					2.74	3.34	3.95	4.56	5.19	5.82	6.45	7.09	7.73	
130:														
TVOL					17.21	19.12	20.89	22.56	24.14	25.65	27.10	28.49	29.83	
WVOL					15.35	17.42	19.40	21.29	23.10	24.86	26.57	28.22	29.84	
SVOLI					8.15	9.93	11.74	13.57	15.43	17.30	19.18	21.08	23.00	
SVOLX					3.24	3.95	4.67	5.40	6.14	6.88	7.63	8.39	9.15	

NOTE: BLOCK INDICATES RANGE OF DATA.

1/TVOL = TOTAL ABOVEGROUND VOLUME OF WOOD AND BARK; EXCLUDES FOLIAGE.

WVOL = VOLUME OF WOOD FROM A 0.3 METER STUMP TO A 10-CENTIMETER TOP OUTSIDE BARK; EXCLUDES BARK AND FOLIAGE.

SVOLI = SAW-LOG VOLUME IN STRAIGHT MERCHANTABLE SECTIONS AT LEAST 2.5 METERS LONG TO A 23-CENTIMETER TOP OUTSIDE BARK IN TREES WITH A MERCHANTABLE FIRST SECTION ABOVE A 0.3-METER STUMP.

SVOLX = SAW-LOG VOLUME IN STRAIGHT MERCHANTABLE SECTIONS AT LEAST 2.5 METERS LONG TO A 23-CENTIMETER TOP OUTSIDE BARK IN TREES WITHOUT A MERCHANTABLE FIRST SECTION ABOVE A 0.3-METER STUMP.

Table 25--Total tree, wood, and saw-log volume for California black oak

DIAMETER AT BREAST HEIGHT OUTSIDE BARK 1/	TOTAL HEIGHT (METERS)														
	3	6	9	12	15	18	21	24	27	30	33	36	39	42	
CENTIMETERS	----- CUBIC METERS -----														
10:															
TVOL	0.02	0.04	0.05	0.07	0.08	0.10	0.11								
WVOL	.01	.02	.03	.04	.05	.06	.07								
SVOLI	.01	.01	.01	.01	.01	.01	.01								
SVOLX	.00	.00	.01	.01	.01	.01	.01								
20:															
TVOL	.08	.15	.21	.27	.32	.38	.43	0.48							
WVOL	.06	.10	.14	.18	.22	.25	.29	.32							
SVOLI	.05	.06	.07	.08	.09	.10	.10	.11							
SVOLX	.02	.03	.04	.04	.05	.05	.05	.06							
30:															
TVOL	.18	.33	.47	.59	.72	.84	.96	1.07	1.18	1.30					
WVOL	.13	.24	.33	.42	.51	.59	.68	.76	.83	.91					
SVOLI	.13	.18	.21	.24	.27	.29	.31	.32	.34	.36					
SVOLX	.07	.09	.11	.13	.14	.15	.16	.17	.18	.19					
40:															
TVOL		.58	.82	1.05	1.27	1.48	1.69	1.89	2.09	2.29					
WVOL		.44	.61	.78	.94	1.10	1.25	1.39	1.54	1.68					
SVOLI		.39	.46	.52	.58	.62	.66	.70	.74	.77					
SVOLX		.20	.24	.27	.30	.32	.35	.37	.38	.40					
50:															
TVOL			1.28	1.63	1.97	2.30	2.62	2.94	3.25	3.55	3.85	4.15			
WVOL			.99	1.26	1.51	1.76	2.00	2.24	2.47	2.70	2.92	3.14			
SVOLI			.84	.95	1.05	1.13	1.21	1.28	1.34	1.40	1.46	1.52			
SVOLX			.44	.50	.54	.59	.63	.66	.70	.73	.76	.79			
60:															
TVOL			1.83	2.34	2.82	3.30	3.76	4.21	4.65	5.09	5.52	5.94			
WVOL			1.46	1.85	2.23	2.60	2.95	3.30	3.64	3.97	4.30	4.62			
SVOLI			1.37	1.55	1.71	1.84	1.97	2.08	2.19	2.29	2.38	2.47			
SVOLX			.71	.81	.89	.96	1.02	1.08	1.14	1.19	1.24	1.29			
70:															
TVOL				3.17	3.83	4.47	5.10	5.71	6.31	6.90	7.48	8.06	8.63	9.19	
WVOL				2.57	3.09	3.60	4.10	4.58	5.05	5.51	5.97	6.42	6.86	7.30	
SVOLI				2.35	2.58	2.79	2.98	3.15	3.31	3.46	3.60	3.74	3.87	3.99	
SVOLX				1.22	1.34	1.45	1.55	1.64	1.72	1.80	1.88	1.95	2.01	2.08	
80:															
TVOL				4.12	4.98	5.82	6.63	7.43	8.21	8.98	9.74	10.49	11.23	11.96	
WVOL				3.41	4.11	4.78	5.44	6.08	6.71	7.32	7.93	8.52	9.11	9.69	
SVOLI				3.36	3.69	3.99	4.26	4.50	4.74	4.95	5.16	5.35	5.54	5.71	
SVOLX				1.75	1.92	2.07	2.21	2.34	2.46	2.58	2.68	2.78	2.88	2.97	
90:															
TVOL					6.29	7.34	8.37	9.38	10.36	11.33	12.29	13.23	14.17	15.09	
WVOL					5.28	6.15	6.99	7.81	8.62	9.41	10.18	10.95	11.71	12.45	
SVOLI					5.06	5.47	5.84	6.18	6.49	6.79	7.07	7.34	7.59	7.83	
SVOLX					2.63	2.84	3.04	3.21	3.38	3.53	3.68	3.82	3.95	4.07	
100:															
TVOL						9.04	10.30	11.54	12.76	13.96	15.13	16.30	17.44	18.58	
WVOL						7.69	8.74	9.77	10.78	11.77	12.74	13.70	14.65	15.58	
SVOLI						7.25	7.74	8.19	8.61	9.01	9.38	9.73	10.07	10.39	
SVOLX						3.77	4.03	4.26	4.48	4.69	4.88	5.06	5.24	5.40	
110:															
TVOL							10.91	12.44	13.93	15.40	16.84	18.27	19.67	21.05	22.42
WVOL							9.42	10.71	11.97	13.20	14.41	15.61	16.78	17.94	19.08
SVOLI							9.36	10.00	10.58	11.12	11.63	12.11	12.56	13.00	13.41
SVOLX							4.87	5.20	5.50	5.78	6.05	6.30	6.54	6.76	6.98
120:															
TVOL								14.77	16.54	18.29	20.00	21.69	23.36	25.00	26.63
WVOL								12.88	14.40	15.89	17.34	18.78	20.19	21.58	22.96
SVOLI								12.62	13.36	14.04	14.68	15.29	15.87	16.41	16.94
SVOLX								6.57	6.95	7.30	7.64	7.95	8.25	8.54	8.81
130:															
TVOL									19.38	21.42	23.43	25.40	27.35	29.28	31.19
WVOL									17.07	18.83	20.56	22.26	23.93	25.59	27.22
SVOLI									16.56	17.40	18.20	18.95	19.66	20.34	20.99
SVOLX									8.61	9.05	9.47	9.86	10.23	10.58	10.92

NOTE: BLOCK INDICATES RANGE OF DATA.

1/TVOL = TOTAL ABOVEGROUND VOLUME OF WOOD AND BARK; EXCLUDES FOLIAGE.

WVOL = VOLUME OF WOOD FROM A 0.3 METER STUMP TO A 10-CENTIMETER TOP OUTSIDE BARK; EXCLUDES BARK AND FOLIAGE.

SVOLI = SAW-LOG VOLUME IN STRAIGHT MERCHANTABLE SECTIONS AT LEAST 2.5 METERS LONG TO A 23-CENTIMETER TOP OUTSIDE BARK IN TREES WITH A MERCHANTABLE FIRST SECTION ABOVE A 0.3-METER STUMP.

SVOLX = SAW-LOG VOLUME IN STRAIGHT MERCHANTABLE SECTIONS AT LEAST 2.5 METERS LONG TO A 23-CENTIMETER TOP OUTSIDE BARK IN TREES WITHOUT A MERCHANTABLE FIRST SECTION ABOVE A 0.3-METER STUMP.

Table 26--Total tree and wood volume for Engelmann oak

DIAMETER AT BREAST HEIGHT OUTSIDE BARK <u>1</u> / CENTIMETERS	TOTAL HEIGHT (METERS)						
	3	6	9	12	15	18	21
	- - - - - CUBIC METERS - - - - -						
10: TVOL WVOL	0.03 .01	0.03 .01	0.04 .02	0.04 .02			
20: TVOL WVOL	.15 .07	.18 .08	.20 .10	.22 .10	.23 .11		
30: TVOL WVOL	.39 .20	.47 .24	.53 .28	.57 .30	.61 .32	.64 .34	.67 .36
40: TVOL WVOL		.94 .52	1.05 .59	1.14 .64	1.22 .69	1.28 .73	1.34 .76
50: TVOL WVOL		1.61 .93	1.80 1.05	1.95 1.15	2.08 1.23	2.19 1.30	2.29 1.37
60: TVOL WVOL		2.49 1.49	2.79 1.69	3.03 1.85	3.22 1.98	3.39 2.10	3.54 2.20
70: TVOL WVOL		3.61 2.23	4.04 2.53	4.38 2.77	4.67 2.97	4.91 3.14	5.13 3.30
80: TVOL WVOL		4.97 3.16	5.57 3.59	6.04 3.93	6.43 4.21	6.77 4.45	7.07 4.67
90: TVOL WVOL		6.60 4.31	7.40 4.88	8.02 5.34	8.54 5.72	8.99 6.06	9.38 6.36
100: TVOL WVOL			9.53 6.43	10.33 7.03	11.00 7.54	11.57 7.98	12.09 8.37
110: TVOL WVOL			11.98 8.25	12.99 9.02	13.83 9.67	14.55 10.24	15.20 10.74

NOTE: BLOCK INDICATES RANGE OF DATA.

1/TVOL = TOTAL ABOVEGROUND VOLUME OF WOOD AND BARK; EXCLUDES FOLIAGE.

WVOL = VOLUME OF WOOD FROM A 0.3 METER STUMP TO A 10-CENTIMETER TOP OUTSIDE BARK; EXCLUDES BARK AND FOLIAGE.

Table 27--Total tree, wood, and saw-log volume for blue oak

DIAMETER AT BREAST HEIGHT OUTSIDE BARK 1/	TOTAL HEIGHT (METERS)										
	3	6	9	12	15	18	21	24	27	30	33
CENTIMETERS	----- CUBIC METERS -----										
10:											
TVOL	0.02	0.03									
WVOL	.01	.02									
SVOLI	.01	.02									
SVOLX	.01	.01									
20:											
TVOL	.12	.17	0.21	0.24	0.26						
WVOL	.07	.10	.13	.15	.16						
SVOLI	.04	.08	.11	.13	.16						
SVOLX	.03	.05	.07	.09	.11						
30:											
TVOL	.32	.44	.53	.61	.67	0.73	0.79	0.84			
WVOL	.20	.29	.35	.41	.46	.50	.54	.58			
SVOLI	.09	.16	.22	.28	.34	.39	.44	.50			
SVOLX	.06	.11	.15	.19	.23	.27	.31	.34			
40:											
TVOL		.86	1.04	1.19	1.32	1.43	1.54	1.64	1.73	1.81	
WVOL		.59	.73	.84	.95	1.04	1.12	1.20	1.27	1.34	
SVOLI		.26	.37	.47	.56	.66	.75	.83	.92	1.01	
SVOLX		.18	.25	.32	.39	.45	.52	.58	.64	.70	
50:											
TVOL		1.45	1.75	2.00	2.22	2.41	2.59	2.75	2.91	3.05	3.19
WVOL		1.05	1.29	1.49	1.67	1.83	1.97	2.11	2.24	2.37	2.48
SVOLI		.39	.55	.70	.84	.98	1.11	1.25	1.37	1.50	1.63
SVOLX		.27	.38	.48	.58	.68	.77	.86	.95	1.04	1.13
60:											
TVOL		2.22	2.68	3.06	3.39	3.69	3.96	4.21	4.45	4.67	4.88
WVOL		1.66	2.04	2.36	2.65	2.90	3.14	3.36	3.56	3.76	3.94
SVOLI		.54	.76	.97	1.17	1.36	1.55	1.73	1.91	2.08	2.26
SVOLX		.37	.53	.67	.81	.94	1.07	1.20	1.32	1.44	1.56
70:											
TVOL			3.84	4.38	4.86	5.28	5.67	6.03	6.37	6.69	6.99
WVOL			3.02	3.50	3.92	4.29	4.64	4.97	5.27	5.56	5.83
SVOLI			1.00	1.28	1.54	1.79	2.04	2.28	2.52	2.75	2.98
SVOLX			.69	.88	1.06	1.24	1.41	1.58	1.74	1.90	2.06
80:											
TVOL			5.24	5.98	6.63	7.21	7.74	8.24	8.70	9.13	9.54
WVOL			4.24	4.91	5.50	6.03	6.52	6.97	7.40	7.80	8.19
SVOLI			1.27	1.62	1.95	2.28	2.59	2.90	3.20	3.50	3.79
SVOLX			.88	1.12	1.35	1.58	1.79	2.01	2.22	2.42	2.62
90:											
TVOL			6.90	7.87	8.73	9.49	10.19	10.84	11.44	12.01	12.55
WVOL			5.72	6.62	7.41	8.13	8.79	9.40	9.98	10.53	11.05
SVOLI			1.57	2.00	2.42	2.81	3.20	3.58	3.95	4.32	4.68
SVOLX			1.09	1.39	1.67	1.95	2.22	2.48	2.74	2.99	3.24
100:											
TVOL			8.82	10.07	11.16	12.13	13.03	13.86	14.63	15.36	16.05
WVOL			7.48	8.65	9.69	10.62	11.48	12.29	13.04	13.76	14.44
SVOLI			1.90	2.42	2.92	3.40	3.87	4.33	4.78	5.22	5.66
SVOLX			1.32	1.68	2.02	2.36	2.68	3.00	3.31	3.62	3.92

NOTE: BLOCK INDICATES RANGE OF DATA.

1/TVOL = TOTAL ABOVEGROUND VOLUME OF WOOD AND BARK; EXCLUDES FOLIAGE.

WVOL = VOLUME OF WOOD FROM A 0.3 METER STUMP TO A 10-CENTIMETER TOP OUTSIDE BARK; EXCLUDES BARK AND FOLIAGE.

SVOLI = SAW-LOG VOLUME IN STRAIGHT MERCHANTABLE SECTIONS AT LEAST 2.5 METERS LONG TO A 23-CENTIMETER TOP OUTSIDE BARK IN TREES WITH A MERCHANTABLE FIRST SECTION ABOVE A 0.3-METER STUMP.

SVOLX = SAW-LOG VOLUME IN STRAIGHT MERCHANTABLE SECTIONS AT LEAST 2.5 METERS LONG TO A 23-CENTIMETER TOP OUTSIDE BARK IN TREES WITHOUT A MERCHANTABLE FIRST SECTION ABOVE A 0.3-METER STUMP.

Table 28--Total tree, wood, and saw-log volume for Pacific madrone

DIAMETER AT BREAST HEIGHT OUTSIDE BARK 1/	TOTAL HEIGHT (METERS)											
	3	6	9	12	15	18	21	24	27	30	33	36
CENTIMETERS ----- CUBIC METERS -----												
10:												
TVOL	0.02	0.03	0.05	0.06	0.07							
WVOL	.01	.02	.03	.05	.06							
SVOL I	.01	.02	.03	.05	.06							
SVOLX	.00	.01	.01	.02	.03							
20:												
TVOL	.07	.13	.19	.24	.28	0.33	0.38					
WVOL	.05	.09	.14	.18	.23	.28	.33					
SVOL I	.03	.06	.11	.15	.20	.26	.31					
SVOLX	.01	.03	.04	.06	.09	.11	.13					
30:												
TVOL	.16	.29	.41	.52	.63	.74	.84	0.94	1.03	1.13	1.22	
WVOL	.10	.20	.31	.41	.52	.63	.73	.84	.94	1.05	1.16	
SVOL I	.05	.13	.21	.31	.41	.52	.63	.74	.86	.99	1.11	
SVOLX	.02	.05	.09	.13	.17	.22	.26	.31	.36	.41	.46	
40:												
TVOL		.52	.73	.92	1.11	1.30	1.47	1.65	1.82	1.98	2.15	
WVOL		.36	.55	.73	.92	1.11	1.30	1.49	1.67	1.86	2.05	
SVOL I		.21	.35	.51	.67	.85	1.03	1.22	1.42	1.62	1.83	
SVOLX		.09	.15	.21	.28	.35	.43	.51	.59	.68	.76	
50:												
TVOL		.80	1.13	1.43	1.73	2.01	2.29	2.55	2.82	3.08	3.33	3.58
WVOL		.57	.86	1.15	1.44	1.73	2.02	2.32	2.61	2.91	3.20	3.50
SVOL I		.31	.52	.75	.99	1.25	1.52	1.79	2.08	2.38	2.68	3.00
SVOLX		.13	.22	.31	.41	.52	.63	.75	.87	.99	1.12	1.25
60:												
TVOL		1.15	1.61	2.05	2.47	2.88	3.27	3.66	4.03	4.41	4.77	5.13
WVOL		.82	1.23	1.65	2.07	2.49	2.91	3.33	3.76	4.18	4.60	5.03
SVOL I		.43	.71	1.02	1.36	1.71	2.08	2.46	2.85	3.26	3.68	4.10
SVOLX		.18	.30	.43	.57	.71	.87	1.03	1.19	1.36	1.54	1.72
70:												
TVOL			2.18	2.78	3.34	3.89	4.43	4.95	5.46	5.96	6.46	6.94
WVOL			1.67	2.24	2.81	3.38	3.96	4.53	5.11	5.68	6.26	6.84
SVOL I			.93	1.34	1.77	2.23	2.71	3.21	3.72	4.25	4.80	5.36
SVOLX			.39	.56	.74	.93	1.13	1.34	1.56	1.78	2.01	2.24
80:												
TVOL			2.84	3.61	4.35	5.06	5.76	6.44	7.10	7.76	8.40	
WVOL			2.18	2.92	3.67	4.41	5.16	5.91	6.66	7.42	8.17	
SVOL I			1.17	1.68	2.23	2.81	3.41	4.04	4.69	5.36	6.04	
SVOLX			.49	.70	.93	1.17	1.43	1.69	1.96	2.24	2.53	
90:												
TVOL				4.55	5.48	6.38	7.26	8.12	8.95	9.78	10.59	
WVOL				3.70	4.64	5.58	6.53	7.48	8.43	9.38	10.33	
SVOL I				2.06	2.73	3.44	4.18	4.95	5.74	6.56	7.40	
SVOLX				.86	1.14	1.44	1.75	2.07	2.40	2.74	3.10	
100:												
TVOL				5.60	6.74	7.85	8.93	9.98	11.01	12.03	13.02	
WVOL				4.56	5.72	6.89	8.05	9.22	10.40	11.57	12.74	
SVOL I				2.47	3.28	4.13	5.01	5.94	6.89	7.87	8.88	
SVOLX				1.03	1.37	1.73	2.10	2.48	2.88	3.29	3.71	
110:												
TVOL					8.13	9.47	10.77	12.04	13.29	14.51		
WVOL					6.92	8.33	9.74	11.15	12.57	13.99		
SVOL I					3.86	4.86	5.91	7.00	8.12	9.28		
SVOLX					1.62	2.03	2.47	2.93	3.40	3.88		
120:												
TVOL					9.65	11.24	12.78	14.29	15.76	17.21		
WVOL					8.23	9.90	11.58	13.26	14.95	16.64		
SVOL I					4.49	5.65	6.87	8.13	9.44	10.79		
SVOLX					1.88	2.36	2.87	3.40	3.95	4.51		
130:												
TVOL					11.30	13.15	14.96	16.72	18.45	20.15		
WVOL					9.65	11.62	13.59	15.56	17.54	19.52		
SVOL I					5.15	6.49	7.89	9.34	10.84	12.38		
SVOLX					2.16	2.71	3.30	3.91	4.53	5.18		

NOTE: BLOCK INDICATES RANGE OF DATA.

1/TVOL = TOTAL ABOVEGROUND VOLUME OF WOOD AND BARK; EXCLUDES FOLIAGE.

WVOL = VOLUME OF WOOD FROM A 0.3 METER STUMP TO A 10-CENTIMETER TOP OUTSIDE BARK; EXCLUDES BARK AND FOLIAGE.

SVOL I = SAW-LOG VOLUME IN STRAIGHT MERCHANTABLE SECTIONS AT LEAST 2.5 METERS LONG TO A 23-CENTIMETER TOP OUTSIDE BARK IN TREES WITH A MERCHANTABLE FIRST SECTION ABOVE A 0.3-METER STUMP.

SVOLX = SAW-LOG VOLUME IN STRAIGHT MERCHANTABLE SECTIONS AT LEAST 2.5 METERS LONG TO A 23-CENTIMETER TOP OUTSIDE BARK IN TREES WITHOUT A MERCHANTABLE FIRST SECTION ABOVE A 0.3-METER STUMP.

Table 29--Total tree, wood, and saw-log volume for Oregon white oak

DIAMETER AT BREAST HEIGHT OUTSIDE BARK 1/	TOTAL HEIGHT (METERS)													
	3	6	9	12	15	18	21	24	27	30	33	36	39	42
CENTIMETERS ----- CUBIC METERS -----														
10:														
TVOL	0.02	0.04	0.05	0.06	0.07	0.08								
WVOL	.01	.02	.03	.04	.05	.05								
SVOLI	.01	.01	.02	.03	.03	.04								
SVOLX	.00	.01	.01	.01	.01	.02								
20:														
TVOL	.09	.16	.21	.26	.31	.35	0.40	0.44	0.48					
WVOL	.05	.10	.14	.18	.22	.25	.29	.32	.36					
SVOLI	.03	.06	.08	.11	.13	.16	.18	.21	.23					
SVOLX	.01	.03	.04	.05	.06	.07	.09	.10	.11					
30:														
TVOL	.22	.37	.50	.62	.74	.84	.95	1.04	1.14	1.23	1.32	1.41		
WVOL	.13	.24	.34	.44	.54	.63	.72	.81	.90	.98	1.07	1.15		
SVOLI	.07	.14	.20	.26	.32	.37	.43	.48	.54	.59	.65	.70		
SVOLX	.03	.06	.09	.12	.15	.18	.20	.23	.25	.28	.31	.33		
40:														
TVOL		.69	.93	1.16	1.37	1.56	1.75	1.94	2.11	2.28	2.45	2.62		
WV		.46	.66	.85	1.03	1.20	1.38	1.55	1.71	1.88	2.04	2.20		
SVOLI		.25	.36	.47	.58	.68	.79	.89	.99	1.09	1.19	1.28		
SVOLX		.12	.17	.22	.27	.32	.37	.42	.47	.51	.56	.61		
50:														
TVOL		1.12	1.51	1.87	2.20	2.52	2.83	3.12	3.41	3.69	3.96	4.22		
WVOL		.77	1.09	1.40	1.70	1.99	2.28	2.56	2.84	3.11	3.38	3.64		
SVOLI		.40	.58	.75	.93	1.09	1.26	1.42	1.58	1.74	1.90	2.06		
SVOLX		.19	.27	.36	.44	.52	.59	.67	.75	.82	.90	.97		
60:														
TVOL		1.65	2.23	2.76	3.26	3.73	4.18	4.62	5.04	5.45	5.85	6.24	6.62	6.99
WVOL		1.15	1.64	2.11	2.56	3.01	3.44	3.86	4.28	4.69	5.10	5.50	5.90	6.29
SVOLI		.59	.85	1.11	1.36	1.60	1.85	2.09	2.32	2.56	2.79	3.02	3.25	3.47
SVOLX		.28	.40	.52	.64	.76	.87	.98	1.09	1.21	1.31	1.42	1.53	1.64
70:														
TVOL			3.10	3.84	4.53	5.19	5.82	6.42	7.01	7.58	8.13	8.68	9.21	9.73
WVOL			2.33	2.99	3.63	4.26	4.87	5.47	6.06	6.64	7.22	7.78	8.35	8.90
SVOLI			1.18	1.53	1.88	2.22	2.55	2.89	3.21	3.54	3.86	4.18	4.49	4.81
SVOLX			.56	.72	.89	1.05	1.20	1.36	1.51	1.67	1.82	1.97	2.12	2.27
80:														
TVOL			4.13	5.11	6.03	6.91	7.74	8.55	9.33	10.09	10.83	11.55	12.26	12.95
WVOL			3.15	4.04	4.91	5.75	6.58	7.39	8.19	8.98	9.75	10.52	11.28	12.03
SVOLI			1.56	2.03	2.49	2.94	3.38	3.82	4.26	4.69	5.11	5.53	5.95	6.37
SVOLX			.74	.96	1.17	1.39	1.60	1.80	2.01	2.21	2.41	2.61	2.81	3.00
90:														
TVOL			5.31	6.58	7.76	8.89	9.97	11.01	12.01	12.99	13.94	14.87	15.78	16.67
WVOL			4.10	5.27	6.40	7.50	8.58	9.64	10.68	11.71	12.72	13.72	14.71	15.70
SVOLI			2.00	2.60	3.19	3.77	4.34	4.90	5.46	6.01	6.55	7.09	7.63	8.16
SVOLX			.94	1.23	1.50	1.78	2.05	2.31	2.57	2.83	3.09	3.34	3.60	3.85
100:														
TVOL			6.66	8.25	9.73	11.14	12.49	13.79	15.05	16.28	17.47	18.64	19.78	20.90
WVOL			5.20	6.68	8.12	9.52	10.88	12.23	13.55	14.85	16.13	17.40	18.66	19.91
SVOLI			2.50	3.25	3.98	4.71	5.42	6.12	6.81	7.50	8.18	8.85	9.53	10.19
SVOLX			1.18	1.53	1.88	2.22	2.55	2.88	3.21	3.54	3.86	4.17	4.49	4.81
110:														
TVOL			8.17	10.12	11.94	13.67	15.32	16.92	18.47	19.97	21.43	22.86	24.26	25.63
WVOL			6.45	8.29	10.07	11.80	13.49	15.16	16.80	18.41	20.00	21.58	23.14	24.68
SVOLI			3.06	3.97	4.87	5.75	6.62	7.48	8.33	9.16	10.00	10.82	11.64	12.46
SVOLX			1.44	1.87	2.30	2.71	3.12	3.53	3.93	4.32	4.71	5.10	5.49	5.87
120:														
TVOL			9.85	12.19	14.38	16.47	18.47	20.39	22.25	24.06	25.83	27.55	29.23	30.89
WVOL			7.85	10.09	12.25	14.36	16.42	18.45	20.44	22.40	24.34	26.26	28.16	30.03
SVOLI			3.67	4.77	5.85	6.91	7.95	8.98	10.00	11.01	12.01	13.00	13.99	14.96
SVOLX			1.73	2.25	2.76	3.26	3.75	4.23	4.71	5.19	5.66	6.13	6.59	7.06
130:														
TVOL			11.69	14.47	17.08	19.55	21.92	24.20	26.42	28.56	30.66	32.70	34.71	36.67
WVOL			9.40	12.08	14.67	17.20	19.67	22.10	24.48	26.84	29.16	31.46	33.73	35.98
SVOLI			4.35	5.65	6.92	8.18	9.41	10.63	11.84	13.03	14.21	15.39	16.55	17.71
SVOLX			2.05	2.66	3.26	3.86	4.44	5.01	5.58	6.14	6.70	7.26	7.81	8.35

NOTE: BLOCK INDICATES RANGE OF DATA.

1/TVOL = TOTAL ABOVEGROUND VOLUME OF WOOD AND BARK; EXCLUDES FOLIAGE.

WVOL = VOLUME OF WOOD FROM A 0.3 METER STUMP TO A 10-CENTIMETER TOP OUTSIDE BARK; EXCLUDES BARK AND FOLIAGE.

SVOLI = SAW-LOG VOLUME IN STRAIGHT MERCHANTABLE SECTIONS AT LEAST 2.5 METERS LONG TO A 23-CENTIMETER TOP OUTSIDE BARK IN TREES WITH A MERCHANTABLE FIRST SECTION ABOVE A 0.3-METER STUMP.

SVOLX = SAW-LOG VOLUME IN STRAIGHT MERCHANTABLE SECTIONS AT LEAST 2.5 METERS LONG TO A 23-CENTIMETER TOP OUTSIDE BARK IN TREES WITHOUT A MERCHANTABLE FIRST SECTION ABOVE A 0.3-METER STUMP.

Table 30--Total tree, wood, and saw-log volume for canyon live oak

DIAMETER AT BREAST HEIGHT OUTSIDE BARK ^{1/}	TOTAL HEIGHT (METERS)												
	3	6	9	12	15	18	21	24	27	30	33	36	39
CENTIMETERS	----- CUBIC METERS -----												
10:													
TVOL	0.02	0.04	0.04	0.05	0.06	0.07							
WVOL	.01	.02	.03	.03	.04	.05							
SVOLI	.01	.01	.02	.02	.03	.03							
SVOLX	.00	.00	.01	.01	.01	.01							
20:													
TVOL	.11	.16	.21	.25	.28	.32	.35	.38	0.41				
WVOL	.06	.10	.13	.17	.20	.23	.25	.28	.31				
SVOLI	.03	.06	.08	.10	.12	.14	.16	.18	.20				
SVOLX	.01	.02	.03	.04	.05	.05	.06	.07	.07				
30:													
TVOL	.26	.40	.51	.60	.69	.78	.85	.92	.99	1.06			
WVOL	.15	.26	.35	.43	.51	.58	.65	.72	.78	.85			
SVOLI	.08	.14	.20	.25	.31	.35	.40	.45	.49	.54			
SVOLX	.03	.05	.07	.09	.11	.13	.15	.16	.18	.20			
40:													
TVOL		.75	.96	1.14	1.31	1.46	1.61	1.74	1.87	2.00	2.12	2.23	
WVOL		.50	.68	.84	.99	1.13	1.27	1.40	1.53	1.65	1.77	1.89	
SVOLI		.28	.38	.49	.58	.68	.77	.85	.94	1.02	1.11	1.19	
SVOLX		.10	.14	.18	.21	.25	.28	.31	.35	.38	.41	.44	
50:													
TVOL		1.22	1.56	1.87	2.14	2.39	2.63	2.85	3.06	3.27	3.46	3.65	
WVOL		.84	1.13	1.41	1.66	1.90	2.13	2.35	2.57	2.78	2.98	3.18	
SVOLI		.46	.63	.80	.96	1.11	1.26	1.41	1.55	1.69	1.82	1.96	
SVOLX		.17	.23	.30	.35	.41	.47	.52	.57	.62	.67	.72	
60:													
TVOL		1.82	2.34	2.79	3.20	3.57	3.93	4.26	4.58	4.89	5.18	5.46	5.74
WVOL		1.28	1.73	2.15	2.53	2.90	3.26	3.60	3.92	4.24	4.56	4.86	5.16
SVOLI		.69	.95	1.21	1.45	1.68	1.90	2.12	2.33	2.54	2.75	2.95	3.15
SVOLX		.25	.35	.44	.53	.62	.70	.78	.86	.94	1.01	1.09	1.16
70:													
TVOL		2.56	3.29	3.92	4.49	5.02	5.52	5.99	6.43	6.86	7.28	7.67	8.06
WVOL		1.84	2.48	3.07	3.63	4.15	4.66	5.14	5.62	6.07	6.52	6.96	7.38
SVOLI		.97	1.35	1.71	2.04	2.37	2.69	3.00	3.30	3.59	3.88	4.17	4.45
SVOLX		.36	.50	.63	.75	.87	.99	1.10	1.21	1.32	1.43	1.53	1.64
80:													
TVOL			4.41	5.26	6.03	6.74	7.41	8.04	8.64	9.21	9.77	10.30	10.82
WVOL			3.38	4.19	4.95	5.67	6.35	7.02	7.66	8.28	8.89	9.49	10.07
SVOLI			1.82	2.30	2.76	3.20	3.63	4.04	4.45	4.85	5.24	5.62	6.00
SVOLX			.67	.85	1.02	1.18	1.34	1.49	1.64	1.79	1.93	2.07	2.21
90:													
TVOL			5.72	6.82	7.82	8.74	9.60	10.42	11.20	11.95	12.66	13.36	14.03
WVOL			4.45	5.51	6.51	7.45	8.36	9.23	10.07	10.89	11.69	12.48	13.24
SVOLI			2.37	3.00	3.59	4.17	4.73	5.27	5.80	6.32	6.83	7.33	7.82
SVOLX			.87	1.10	1.32	1.54	1.74	1.94	2.14	2.33	2.51	2.70	2.88
100:													
TVOL			7.21	8.60	9.86	11.03	12.12	13.15	14.13	15.07	15.98	16.85	17.70
WVOL			5.69	7.04	8.31	9.52	10.68	11.79	12.87	13.92	14.94	15.94	16.92
SVOLI			3.00	3.80	4.55	5.28	5.99	6.67	7.34	8.00	8.65	9.28	9.90
SVOLX			1.11	1.40	1.68	1.94	2.20	2.46	2.70	2.95	3.18	3.42	3.65
110:													
TVOL				12.17	13.60	14.95	16.22	17.44	18.60	19.71	20.79	21.83	
WVOL				10.38	11.88	13.33	14.72	16.06	17.37	18.65	19.89	21.11	
SVOLI				5.64	6.54	7.41	8.26	9.10	9.91	10.71	11.49	12.27	
SVOLX				2.08	2.41	2.73	3.04	3.35	3.65	3.94	4.23	4.52	
120:													
TVOL				14.74	16.48	18.11	19.65	21.12	22.53	23.88	25.19	26.45	
WVOL				12.70	14.55	16.31	18.02	19.67	21.27	22.83	24.36	25.85	
SVOLI				6.85	7.95	9.01	10.05	11.06	12.05	13.02	13.97	14.91	
SVOLX				2.52	2.93	3.32	3.70	4.07	4.44	4.79	5.15	5.49	
130:													
TVOL				17.59	19.66	21.61	23.45	25.20	26.88	28.49	30.05	31.56	
WVOL				15.30	17.52	19.65	21.70	23.69	25.62	27.50	29.34	31.14	
SVOLI				8.20	9.51	10.79	12.02	13.23	14.42	15.58	16.72	17.85	
SVOLX				3.02	3.50	3.97	4.43	4.87	5.31	5.74	6.16	6.57	

NOTE: BLOCK INDICATES RANGE OF DATA.

^{1/}TVOL = TOTAL ABOVEGROUND VOLUME OF WOOD AND BARK; EXCLUDES FOLIAGE.

WVOL = VOLUME OF WOOD FROM A 0.3 METER STUMP TO A 10-CENTIMETER TOP OUTSIDE BARK; EXCLUDES BARK AND FOLIAGE.

SVOLI = SAW-LOG VOLUME IN STRAIGHT MERCHANTABLE SECTIONS AT LEAST 2.5 METERS LONG TO A 23-CENTIMETER TOP OUTSIDE BARK IN TREES WITH A MERCHANTABLE FIRST SECTION ABOVE A 0.3-METER STUMP.

SVOLX = SAW-LOG VOLUME IN STRAIGHT MERCHANTABLE SECTIONS AT LEAST 2.5 METERS LONG TO A 23-CENTIMETER TOP OUTSIDE BARK IN TREES WITHOUT A MERCHANTABLE FIRST SECTION ABOVE A 0.3-METER STUMP.

Table 31--Total tree, wood, and saw-log volume for coast live oak

DIAMETER AT BREAST HEIGHT OUTSIDE BARK 1/	TOTAL HEIGHT (METERS)													
	3	6	9	12	15	18	21	24	27	30	33	36	39	42
CENTIMETERS	----- CUBIC METERS -----													
10:														
TVOL	0.02	0.03	0.04	0.04										
WVOL	.01	.01	.02	.02										
SVOLI	.01	.01	.02	.02										
SVOLX	.00	.00	.01	.01										
20:														
TVOL	.09	.14	.18	.22	0.25	0.28	0.31							
WVOL	.05	.08	.10	.12	.14	.15	.17							
SVOLI	.03	.06	.08	.10	.12	.14	.16							
SVOLX	.01	.02	.03	.04	.05	.05	.06							
30:														
TVOL	.24	.37	.47	.56	.65	.73	.80	0.87	0.94					
WVOL	.15	.22	.28	.34	.39	.43	.47	.51	.55					
SVOLI	.08	.14	.20	.25	.31	.35	.40	.45	.49					
SVOLX	.03	.05	.07	.09	.11	.13	.15	.16	.18					
40:														
TVOL		.71	.92	1.10	1.26	1.42	1.56	1.70	1.83	1.95	2.07			
WVOL		.46	.59	.70	.80	.89	.98	1.06	1.14	1.22	1.29			
SVOLI		.28	.38	.49	.58	.68	.77	.85	.94	1.02	1.11			
SVOLX		.10	.14	.18	.21	.25	.28	.31	.35	.38	.41			
50:														
TVOL		1.20	1.54	1.84	2.12	2.38	2.62	2.85	3.06	3.27	3.47	3.67	3.86	
WVOL		.81	1.03	1.23	1.41	1.57	1.73	1.87	2.01	2.15	2.27	2.40	2.52	
SVOLI		.46	.63	.80	.96	1.11	1.26	1.41	1.55	1.69	1.82	1.96	2.09	
SVOLX		.17	.23	.30	.35	.41	.47	.52	.57	.62	.67	.72	.77	
60:														
TVOL		1.83	2.35	2.82	3.24	3.63	4.00	4.34	4.68	4.99	5.30	5.60	5.88	6.16
WVOL		1.28	1.64	1.95	2.23	2.50	2.74	2.97	3.19	3.40	3.61	3.80	3.99	4.18
SVOLI		.69	.95	1.21	1.45	1.68	1.90	2.12	2.33	2.54	2.75	2.95	3.15	3.34
SVOLX		.25	.35	.44	.53	.62	.70	.78	.86	.94	1.01	1.09	1.16	1.23
70:														
TVOL		2.61	3.36	4.03	4.63	5.19	5.71	6.21	6.69	7.14	7.58	8.00	8.41	8.81
WVOL		1.89	2.42	2.88	3.30	3.69	4.05	4.39	4.72	5.03	5.33	5.62	5.90	6.17
SVOLI		.97	1.35	1.71	2.04	2.37	2.69	3.00	3.30	3.59	3.88	4.17	4.45	4.72
SVOLX		.36	.50	.63	.75	.87	.99	1.10	1.21	1.32	1.43	1.53	1.64	1.74
80:														
TVOL			4.58	5.49	6.31	7.07	7.79	8.47	9.11	9.73	10.33	10.91	11.47	12.01
WVOL			3.39	4.04	4.63	5.17	5.68	6.16	6.62	7.05	7.48	7.88	8.27	8.66
SVOLI			1.82	2.30	2.76	3.20	3.63	4.04	4.45	4.85	5.24	5.62	6.00	6.38
SVOLX			.67	.85	1.02	1.18	1.34	1.49	1.64	1.79	1.93	2.07	2.21	2.35
90:														
TVOL			6.03	7.21	8.29	9.29	10.23	11.13	11.98	12.79	13.58	14.34	15.07	15.79
WVOL			4.57	5.45	6.24	6.97	7.65	8.30	8.92	9.51	10.07	10.62	11.15	11.66
SVOLI			2.37	3.00	3.59	4.17	4.73	5.27	5.80	6.32	6.83	7.33	7.82	8.30
SVOLX			.87	1.10	1.32	1.54	1.74	1.94	2.14	2.33	2.51	2.70	2.88	3.06
100:														
TVOL				9.21	10.59	11.87	13.07	14.21	15.29	16.33	17.34	18.31	19.25	20.16
WVOL				7.11	8.15	9.10	10.00	10.84	11.64	12.41	13.15	13.87	14.56	15.23
SVOLI				3.80	4.55	5.28	5.99	6.67	7.34	8.00	8.65	9.28	9.90	10.52
SVOLX				1.40	1.68	1.94	2.20	2.46	2.70	2.95	3.18	3.42	3.65	3.87
110:														
TVOL				11.49	13.21	14.80	16.30	17.72	19.08	20.37	21.63	22.83	24.01	25.15
WVOL				9.06	10.37	11.59	12.72	13.80	14.82	15.80	16.75	17.66	18.54	19.39
SVOLI				4.70	5.64	6.54	7.41	8.26	9.10	9.91	10.71	11.49	12.27	13.03
SVOLX				1.73	2.08	2.41	2.73	3.04	3.35	3.65	3.94	4.23	4.52	4.80
120:														
TVOL				14.06	16.16	18.11	19.95	21.68	23.34	24.93	26.46	27.94	29.38	30.77
WVOL				11.29	12.93	14.44	15.86	17.20	18.48	19.70	20.88	22.01	23.11	24.17
SVOLI				5.72	6.85	7.95	9.01	10.05	11.06	12.05	13.02	13.97	14.91	15.84
SVOLX				2.11	2.52	2.93	3.32	3.70	4.07	4.44	4.79	5.15	5.49	5.83
130:														
TVOL				16.93	19.46	21.81	24.02	26.11	28.10	30.02	31.86	33.64	35.37	37.05
WVOL				13.83	15.84	17.69	19.43	21.07	22.63	24.13	25.57	26.96	28.30	29.60
SVOLI				6.84	8.20	9.51	10.79	12.02	13.23	14.42	15.58	16.72	17.85	18.96
SVOLX				2.52	3.02	3.50	3.97	4.43	4.87	5.31	5.74	6.16	6.57	6.98

NOTE: BLOCK INDICATES RANGE OF DATA.

1/TVOL = TOTAL ABOVEGROUND VOLUME OF WOOD AND BARK; EXCLUDES FOLIAGE.

WVOL = VOLUME OF WOOD FROM A 0.3 METER STUMP TO A 10-CENTIMETER TOP OUTSIDE BARK; EXCLUDES BARK AND FOLIAGE.

SVOLI = SAW-LOG VOLUME IN STRAIGHT MERCHANTABLE SECTIONS AT LEAST 2.5 METERS LONG TO A 23-CENTIMETER TOP OUTSIDE BARK IN TREES WITH A MERCHANTABLE FIRST SECTION ABOVE A 0.3-METER STUMP.

SVOLX = SAW-LOG VOLUME IN STRAIGHT MERCHANTABLE SECTIONS AT LEAST 2.5 METERS LONG TO A 23-CENTIMETER TOP OUTSIDE BARK IN TREES WITHOUT A MERCHANTABLE FIRST SECTION ABOVE A 0.3-METER STUMP.

Table 32--Total tree, wood, and saw-log volume for interior live oak

DIAMETER AT BREAST HEIGHT OUTSIDE BARK 1/	TOTAL HEIGHT (METERS)												
	3	6	9	12	15	18	21	24	27	30	33	36	39
CENTIMETERS	----- CUBIC METERS -----												
10:													
TVOL	0.03	0.04	0.05	0.06									
WVOL	.01	.02	.03	.04									
SVOLI	.01	.01	.02	.02									
SVOLX	.00	.00	.01	.01									
20:													
TVOL	.11	.17	.22	.26	0.30	0.34	0.37						
WVOL	.06	.10	.14	.17	.20	.24	.27						
SVOLI	.03	.06	.08	.10	.12	.14	.16						
SVOLX	.01	.02	.03	.04	.05	.05	.06						
30:													
TVOL	.25	.38	.50	.59	.68	.77	.85	0.92	0.99				
WVOL	.14	.24	.33	.41	.49	.56	.63	.70	.77				
SVOLI	.08	.14	.20	.25	.31	.35	.40	.45	.49				
SVOLX	.03	.05	.07	.09	.11	.13	.15	.16	.18				
40:													
TVOL		.69	.89	1.07	1.23	1.38	1.52	1.65	1.78				
WVOL		.44	.61	.76	.91	1.04	1.18	1.31	1.43				
SVOLI		.28	.38	.49	.58	.68	.77	.85	.94				
SVOLX		.10	.14	.18	.21	.25	.28	.31	.35				
50:													
TVOL		1.08	1.40	1.68	1.93	2.17	2.39	2.60	2.80	2.99			
WVOL		.72	.98	1.23	1.46	1.69	1.90	2.11	2.31	2.51			
SVOLI		.46	.63	.80	.96	1.11	1.26	1.41	1.55	1.69			
SVOLX		.17	.23	.30	.35	.41	.47	.52	.57	.62			
60:													
TVOL		1.57	2.02	2.43	2.79	3.14	3.46	3.76	4.05	4.33	4.60		
WVOL		1.06	1.45	1.82	2.17	2.50	2.81	3.12	3.42	3.71	4.00		
SVOLI		.69	.95	1.21	1.45	1.68	1.90	2.12	2.33	2.54	2.75		
SVOLX		.25	.35	.44	.53	.62	.70	.78	.86	.94	1.01		
70:													
TVOL			2.77	3.32	3.82	4.29	4.73	5.14	5.54	5.92	6.29	6.65	6.99
WVOL			2.03	2.53	3.02	3.48	3.92	4.35	4.77	5.17	5.57	5.96	6.34
SVOLI			1.35	1.71	2.04	2.37	2.69	3.00	3.30	3.59	3.88	4.17	4.45
SVOLX			.50	.63	.75	.87	.99	1.10	1.21	1.32	1.43	1.53	1.64
80:													
TVOL			3.63	4.35	5.01	5.62	6.20	6.74	7.27	7.77	8.25	8.72	9.17
WVOL			2.70	3.38	4.02	4.63	5.22	5.79	6.35	6.89	7.42	7.94	8.45
SVOLI			1.82	2.30	2.76	3.20	3.63	4.04	4.45	4.85	5.24	5.62	6.00
SVOLX			.67	.85	1.02	1.18	1.34	1.49	1.64	1.79	1.93	2.07	2.21
90:													
TVOL			4.61	5.53	6.36	7.14	7.87	8.57	9.23	9.87	10.48	11.07	11.65
WVOL			3.48	4.35	5.18	5.96	6.73	7.46	8.18	8.88	9.56	10.23	10.89
SVOLI			2.37	3.00	3.59	4.17	4.73	5.27	5.80	6.32	6.83	7.33	7.82
SVOLX			.87	1.10	1.32	1.54	1.74	1.94	2.14	2.33	2.51	2.70	2.88
100:													
TVOL			5.70	6.84	7.88	8.84	9.75	10.61	11.43	12.22	12.98	13.71	14.42
WVOL			4.36	5.46	6.49	7.48	8.43	9.36	10.26	11.13	11.99	12.83	13.66
SVOLI			3.00	3.80	4.55	5.28	5.99	6.67	7.34	8.00	8.65	9.28	9.90
SVOLX			1.11	1.40	1.68	1.94	2.20	2.46	2.70	2.95	3.18	3.42	3.65
110:													
TVOL				8.30	9.56	10.73	11.83	12.87	13.87	14.83	15.75	16.64	17.50
WVOL				6.70	7.97	9.18	10.35	11.49	12.59	13.66	14.72	15.75	16.76
SVOLI				4.70	5.64	6.54	7.41	8.26	9.10	9.91	10.71	11.49	12.27
SVOLX				1.73	2.08	2.41	2.73	3.04	3.35	3.65	3.94	4.23	4.52
120:													
TVOL				9.91	11.41	12.81	14.12	15.36	16.55	17.69	18.79	19.85	20.88
WVOL				8.07	9.60	11.07	12.48	13.85	15.18	16.47	17.74	18.99	20.21
SVOLI				5.72	6.85	7.95	9.01	10.05	11.06	12.05	13.02	13.97	14.91
SVOLX				2.11	2.52	2.93	3.32	3.70	4.07	4.44	4.79	5.15	5.49
130:													
TVOL				11.66	13.42	15.06	16.61	18.07	19.47	20.81	22.10	23.35	24.57
WVOL				9.59	11.41	13.15	14.82	16.45	18.03	19.57	21.07	22.55	24.00
SVOLI				6.84	8.20	9.51	10.79	12.02	13.23	14.42	15.58	16.72	17.85
SVOLX				2.52	3.02	3.50	3.97	4.43	4.87	5.31	5.74	6.16	6.57

NOTE: BLOCK INDICATES RANGE OF DATA.

1/TVOL = TOTAL ABOVEGROUND VOLUME OF WOOD AND BARK; EXCLUDES FOLIAGE.

WVOL = VOLUME OF WOOD FROM A 0.3 METER STUMP TO A 10-CENTIMETER TOP OUTSIDE BARK; EXCLUDES BARK AND FOLIAGE.

SVOLI = SAW-LOG VOLUME IN STRAIGHT MERCHANTABLE SECTIONS AT LEAST 2.5 METERS LONG TO A 23-CENTIMETER TOP OUTSIDE BARK IN TREES WITH A MERCHANTABLE FIRST SECTION ABOVE A 0.3-METER STUMP.

SVOLX = SAW-LOG VOLUME IN STRAIGHT MERCHANTABLE SECTIONS AT LEAST 2.5 METERS LONG TO A 23-CENTIMETER TOP OUTSIDE BARK IN TREES WITHOUT A MERCHANTABLE FIRST SECTION ABOVE A 0.3-METER STUMP.