United States
Department of
Agriculture

Forest Service

Southeastern Forest
Experiment Station

Research Paper
SE-250

Weight, Volume, and Physical Properties of Major Hardwood Species in the Gulf and Atlantic Coastal Plains

Alexander Clark III
Douglas R. Phillips
Douglas J. Frederick

Weight, Volume, and Physical Properties of Major Hardwood Species in the Gulf and Atlantic Coastal Plains

Alexander Clark III, Wood Scientist
Southeastern Forest Experiment Station
Athens, Georgia

Douglas R. Phillips, Mensurationist
Southeastern Forest Experiment Station
Clemson, South Carolina

and

Douglas J. Frederick, Associate Professor
School of Forest Resources
North Carolina State University
Raleigh, North Carolina

Contents

Page

Procedure

Field 1
Laboratory 3
Analysis 4

Results

Physical Properties of Sample Trees 6
Prediction Equations 8
How to Use Prediction Equations 9

Literature Cited 12

Tables (for hardwood species in the Gulf and Atlantic Coastal Plains)

1. Mean and range of tree age and measurements, by species and tree size class 13

2. Average specific gravity of wood, bark, and wood and bark combined, by tree component and size class 16

3. Average moisture content of wood, bark, and wood and bark combined, by tree component and size class 23

4. Average proportion of wood and bark green weight in bark, by tree component and size class 28

5. Average green weight per cubic foot of wood, bark, and wood and bark combined, by tree component and size class 30

6. Average green weight of wood and bark per cubic foot of wood, by tree component and size class 35

7. Regression equations for estimating green and dry weight of the above-stump total-tree wood, bark and foliage, wood and bark combined, and wood alone, with d.b.h. as the independent variable 37

8. Regression equations for estimating green and dry weight of total-stem wood and bark combined and wood alone, with d.b.h. as the independent variable 40

9. Regression equations for estimating cubic-foot volume of the above-stump total-tree wood and bark combined and wood alone, with d.b.h. as the independent variable 42

10. Regression equations for estimating cubic-foot volume of total-stem wood and bark combined and wood alone, with d.b.h. as the independent variable 43

Page

11. Regression equations for estimating green and dry weight of the above-stump total-tree wood, bark and foliage, wood and bark combined, and wood alone, with d.b.h. and total height as the independent variables 44

12. Regression equations for estimating green and dry weight of total-stem wood and bark combined and wood alone, with d.b.h. and total height as the independent variables 47

13. Regression equations for estimating cubic-foot volume of the above-stump total-tree wood and bark combined and wood alone, with d.b.h. and total height as the independent variables 49

14. Regression equations for estimating cubic-foot volume of total-stem wood and bark combined and wood alone, with d.b.h. and total height as the independent variables 50

15. Regression equations for estimating green and dry weight of the above-stump total-tree wood, bark and foliage, wood and bark combined, and wood alone, with d.b.h. and height to a 4-inch top as the independent variables 51

16. Regression equations for estimating green and dry weight of total-stem wood and bark combined and wood alone, with d.b.h. and height to 4-inch top as the independent variables 54

17. Regression equations for estimating cubic-foot volume of the above-stump total-tree wood and bark combined and wood alone, with d.b.h. and height to 4-inch top as the independent variables 56

18. Regression equations for estimating cubic-foot volume of total-stem wood and bark combined and wood alone, with d.b.h. and height to 4-inch top as the independent variables 57

19. Regression equations for estimating green and dry weight of the above-stump total-tree wood, bark and foliage, wood and bark combined, and wood alone, with d.b.h. and saw-log merchantable height as the independent variables 58

20. Regression equations for estimating green and dry weight of the saw-log merchantable-stem wood and bark combined and wood alone, with d.b.h. and saw-log merchantable height as the independent variables 60

21. Regression equations for estimating cubic-foot volume of the above-stump total-tree wood and bark combined and wood alone, with d.b.h. and saw-log merchantable height as the independent variables 61

22. Regression equations for estimating cubic-foot volume of the saw-log merchantable-stem wood and bark combined and wood alone, with d.b.h. and saw-log merchantable height as the independent variables 62

Page

23. Regression coefficients for estimating above-stump stem weight to a specified d.o.b. top diameter as a proportion of the total stem weight 63

24. Regression coefficients for estimating above-stump stem volume to a specified d.o.b. top diameter as a proportion of the total stem volume 64

25. Regression coefficients for estimating stem weight to a specified d.o.b. top diameter as a proportion of the saw-log stem weight 65

26. Regression coefficients for estimating stem volume to a specified d.o.b. top diameter as a proportion of the saw-log stem volume 66

ABSTRACT

The weight, volume, and physical properties of trees 1 to 20 inches d.b.h. were determined for green ash, blackgum, red maple, sweetgum, water tupelo, yellow-poplar, hickory, laurel oak, water oak, and white oak in the Gulf and Atlantic Coastal Plains. Hard hardwood, soft hardwood, and individual species equations are presented for predicting green and dry weight and green volume of the total tree above stump and its components by using d.b.h. and total height, d.b.h. and height to a 4-inch top, d.b.h. and saw-log merchantable height, and d.b.h. alone. Average specific gravity, moisture content, and weight per cubic foot of wood, bark, and wood and bark combined are presented for each species, by tree size class and component. Bark percent is also presented for each species by tree size class and component.

Keywords: Biomass, equations, specific gravity, moisture percent, bark percent, weight per cubic foot.

The hardwood forests of the Gulf and Atlantic Coastal Plains can contribute significantly to supplies of solid wood, fiber, and energy wood through improved utilization and forest management. Few data, however, exist on the weight, volume, and physical properties of the total tree and its components for hardwood species of this region.

To meet this need, a southwide study was initiated by the North Carolina State Hardwood Research Cooperative and the USDA Forest Service. The primary objectives of this regional study were to determine the amount and distribution of biomass in even-aged fully stocked natural stands and to develop equations for estimating the weight and volume of forest stands, individual trees, and tree components. The secondary objectives were to determine the specific gravity, moisture content, and energy potential of southern hardwoods, and the distribution of the nutrients N, P, K, Ca, Mg. Portions of these data have been reported in earlier publications (Clark and others 1983; Frederick and others 1983; Gower and others 1983; Messina and others 1983).

This Paper presents green volume and green and dry weight equations for the total tree and tree components of 10 species--green ash (*Fraxinus pennsylvanica* Marsh.), blackgum (*Nyssa sylvatica* var. *biflora* (Walt.) Sarg.), red maple (*Acer rubrum* L.), sweetgum (*Liquidambar styraciflua* L.), water tupelo (*Nyssa aquatica* L.), yellow-poplar (*Liriodendron tulipifera* L.), hickory species (*Carya* spp.), laurel oak (*Quercus laurifolia* Michx.), water oak (*Q. nigra* L.), and white oak (*Q. alba* L.). Equations were developed from tree data collected in the Coastal Plain. These species account for 77 percent of the commercial hardwood volume in the Coastal Plain. Equations were also developed for the combined hard hardwoods, soft hardwoods, and all 10 species.

Equations are given for estimating the weight and volume of wood and bark, and wood only in the total tree, total stem, and the saw-log component of the stem. Ratio equations are also included for estimating saw-log stem weight or volume to any specified top diameter outside bark (d.o.b.). Wood and bark specific gravity, moisture content, bark content, and green weight per cubic foot are presented for the total tree and its components, by species and tree size classes.

Procedure

Field

Twenty-five 1/10-acre circular biomass plots were sampled in mixed, even-aged hardwood stands on the Gulf and Atlantic Coastal Plains (fig. 1). Four age classes (10, 20, 40, and 60 years) were sampled on three site types:

Bottom land. Flood plain of a major drainage system in which drainage is fairly rapid and the soils are loam to silt loam.

Swamp. Broad interstream areas characterized by poor drainage with silt loam to clay soil that contains large amounts of raw organic material.

Wet flat. Broad interstream areas in which drainage is intermediate between bottom lands and swamps and the soils are nonalluvial and contain some organic matter accumulation.

All age and site combinations were replicated twice except the 40-year-old bottom-land site, which was replicated three times. Plots for all ages and site types were randomly located within representative fully stocked stands. Tree data collected on all plots except the 10-year-old plots were used to develop the species equations reported in this study. Not all diameter classes of some important species were filled. Figure 1 shows the location of the fixed area plots, by site type, as well as the supplemental plots established for sampling trees in diameter classes needed to develop the equations.

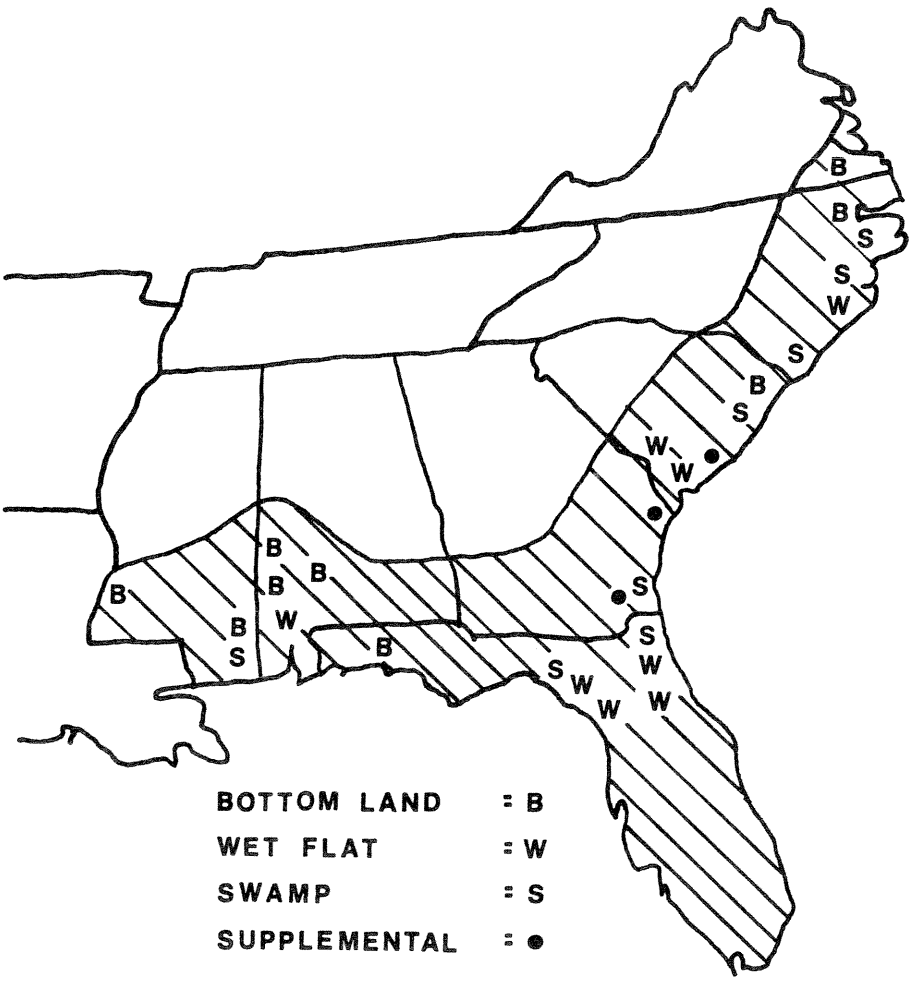

Figure 1.--Location of plots where trees were sampled for development of species equations.

Data for above-stump total-tree and tree component weights and volumes were collected for trees 1 inch diameter at breast height (d.b.h.) and larger. All trees ≥ 5.0 inches d.b.h. on the 1/10-acre plots were sampled. At the center of each plot a concentric 1/50-acre subplot was located on which all trees 1.0 to 4.9 inches d.b.h. were sampled. At the supplemental locations, a stratified random sample of three trees per 2-inch d.b.h. class was taken for commercially important species requiring additional sample trees for equation development. Means and ranges in age and tree dimensions measured are shown in table 1 for each species and species group sampled. Stump height averaged 0.2 feet for trees 1.0 to 4.9 inches d.b.h., 0.5 feet for trees 5.0 to 10.9 inches d.b.h., and 0.7 feet for trees ≥ 11.0 inches d.b.h. Form class of the sawtimber-size trees (≥ 11.0 inches d.b.h.) ranged from 63 to 87 and averaged 76 for the soft hardwoods, and ranged from 67 to 85 and averaged 77 for the hard hardwoods.

Each tree was felled and measured for d.o.b. at 4-foot intervals up the stem. Total height, and height to the saw-log top, 9-, 4-, and 2-inch d.o.b., and base of full live crown were also recorded. Cross-sectional disks of wood and bark were removed from the stem and branches of sample trees for laboratory determination of specific gravity, moisture content, bark percent, energy value, and nutrient concentration. In all trees ≥ 5.0 inches d.b.h, except sawtimber quality trees (≥ 11.0 inches d.b.h. with a minimum of one 16-foot grade 3 log), disks were cut at the butt, d.b.h., and quarter-points to the 4-inch d.o.b. top and at the 2-inch top. In sawtimber trees, disks were removed at the butt, at each saw-log bucking point, and at the stem location where d.o.b. measured 9, 4, and 2 inches. For trees less than 5.0 inches d.b.h., three disks per stem were taken--at stump height and at 25 and 75 percent of total stem height.

The branches of each tree were cut from the stem and weighed in four categories: extra large (≥ 4.0 inches d.o.b.), large (2.0 to 3.9 inches d.o.b.), medium (0.6 to 1.9 inches d.o.b.), and small (≤ 0.5 inches d.o.b.). Three cross-sectional disks were cut from randomly selected branches in each category for analysis in the laboratory. Sample branches were randomly selected and weighed with and without foliage to estimate foliage weight. A subsample of the foliage was taken to determine foliage moisture content.

The stem of each tree was weighed by components (saw logs, pulpwood, and topwood) and the branches of each tree were weighted by size category.

Laboratory

Specific gravity was computed on green volume and ovendry weight. Moisture content was computed based on ovendry weight after samples were dried to a constant weight at 215 °F. Percentage of bark was determined from disks and based on the green weight of sample disks. Moisture content, specific gravity, and percentage of bark in stem, branches, and total tree were calculated by weighting disk values in proportion to the volume of the component they represented. Weighted values for moisture content were used to convert component green weight to ovendry weight.

By using species diameter inside bark (d.i.b.) prediction equations, developed from d.o.b. and d.i.b. stem disk measurements, and the d.o.b. and height measurements taken at 4-foot intervals up the stem of each tree, the volumes of wood in the stem to the saw log, 9-inch, 4-inch, 3-inch, 2-inch, and tip were calculated by Smalian's formula. Green weight per cubic foot of stem bark and branch wood and bark were calculated from weighted values for specific gravity and moisture content with the equation:

$$\text{Green weight per cubic foot} = \left[1 + \frac{MC}{100} \right] \cdot (SG) \cdot (C) \qquad (1)$$

where: MC = weighted moisture content in percent

SG = weighted specific gravity

C = 62.4 pounds (weight of water per cubic foot)

Cubic-foot volume of stem bark and branch wood and bark were computed by dividing green component weight by its green weight per cubic foot. Cubic-foot volume of stem wood and bark combined was computed by adding the volume of bark to the volume of wood.

Analysis

Regression equations were developed to predict green and dry weight and green volume of wood and bark in the total tree above stump, stem from butt to tip, and saw-log stem. Independent variables were: diameter at breast height (D), total height (Th), saw-log merchantable height (Mh), and height to a 4-inch d.o.b. top (H4).

A logarithmic transformation (base 10) was used to obtain a relatively homogeneous variance, which is assumed in regression analysis. Thus, regression equations for estimating weights and volumes were developed from the models:

$$\log Y = a + b \log X + E \qquad (2)$$

$$\log Y = a + b \log X_1 + c \log X_2 + E \qquad (3)$$

where: Y = predicted component weight or volume

$X = D^2$, D^2Th, D^2H4, or D^2Mh

$X_1 = D^2$

X_2 = Th, H4, or Mh

E = experimental error

a, b, c = regression coefficients

Plots of residuals showed that equations (2) and (3) underestimated total-tree and total-stem weights and volumes of soft hardwoods--particularly sweetgum and blackgum trees ≥ 14 inches d.b.h.--when only one equation was used for trees 1 inch and larger. When equation (3) was used with D^2+Mh for trees ≥ 11 inches, the residuals indicated good predictability for all trees ≥ 11.0 inches. Thus, equation (3) was selected for use with d.b.h. and saw-log merchantable height. Two equations were developed for the d.b.h., d.b.h. and total height, and d.b.h. and height to 4-inch top--one for trees < 11.0 inches d.b.h. and one for trees ≥ 11.0 inches d.b.h. The 11-inch point was not the optimum point to shift from one equation to the other for all species or tree components, but it was the most desirable from a practical standpoint. Hardwood trees < 11 inches in diameter are classified as sapling or poletimber, and trees ≥ 11 inches are classified as sawtimber. The procedure outlined by Draper and Smith (1981) for fitting two linear equations with a known point of intersection was used to develop the following equations:

$$\log Y_p = a + b \log X + E \quad (4)$$

$$\log Y_s = a + b \log (11^2H) + c \log (D^2/11^2) + E \quad (5)$$

where: Y_p = predicted component weight or volume for trees < 11.0 inches d.b.h.

Y_s = predicted component weight or volume for trees ⩾ 11.0 inches d.b.h.

X = D^2, D^2Th, or D^2H4

H = Th or H4

D = d.b.h.

E = experimental error

a, b, c = regression coefficients

When logarithmic estimates are converted back to original units, they are biased downward because the antilogarithm of an estimated mean gives the geometric rather then the arithmetic mean (Cunia 1964). To adjust for this bias, a correction factor was computed and applied to each model by using Baskerville's (1972) procedure. The final equations including correction factors were:

$$Y = 10^{a + b \log (D^2) + c \log (Mh) + (S^2_{y.x} \log_e 10)/2} \quad (6)$$

$$Y_p = 10^{a + b \log (D^2H) + (S^2_{y.x} \log_e 10)/2} \quad (7)$$

$$Y_s = 10^{a + b \log (11^2H) + c \log (D^2/11^2) + (S^2_{y.x} \log_e 10)/2} \quad (8)$$

Equations (6), (7), and (8) can be simplified to:

$$Y = a' (D^2)^b (Mh)^c \quad (9)$$

$$Y_p = a' (D^2H)^b \quad (10)$$

$$Y_s = a'' (D^2)^b (H)^c \quad (11)$$

where: $a' = 10^{a + (S^2_{y.x} \log_e 10)/2}$

$a'' = a' (11^2)^{b-c}$

$S^2_{y.x}$ = error mean square from regression analysis

Comparison of average deviations (actual minus predicted) by d.b.h. classes and the sums of the squared deviations for the single log-log equation and segmented log-log equation showed that segmented log-log equations (10) and (11) gave the best results for the d.b.h., d.b.h. and total height, and d.b.h. and height to 4-inch top independent variable combinations (Clark and others 1985). Equations (10) and (11) are more complex than a single equation, but the improved accuracy justified their use.

The following exponential ratio equation was used to estimate the proportion of predicted total-stem weight or volume to a specified top d.o.b.:

$$Y_R = e^a (d^b D^c) \tag{12}$$

where: Y_R = ratio of stem weight or volume to top d.o.b. to predicted total stem

d = specified stem top diameter in inches

D = tree diameter at breast height in inches

a, b, c = regression coefficients

e = base of natural log = 2.71828

The following exponential ratio model was developed to estimate a ratio for expanding saw-log stem weight or volume to any d.o.b. top above the saw-log top.

$$Y_{R_{sa}} = e^a \left[(Mh)^b \left(\left(1-\left(\frac{d}{.78D}\right)^2\right)^2\right)^c \right] \tag{13}$$

where: $Y_{R_{sa}}$ = ratio of stem weight or volume to top d.o.b.

Mh = saw-log merchantable height in feet

d = specified top diameter in inches

D = tree diameter at breast height in inches

.78 = constant based on average form class

a, b, c = regression coefficients

e = base of natural log

Results

Physical Properties of Sample Trees

Hardwoods are often classified as soft hardwoods or hard hardwoods, based on their wood density expressed as specific gravity or dry weight per unit volume. In this study the species were classified into soft and hard hardwood groups based on their green weight per cubic foot, branching habit (excurrent or deliquescent), and specific gravity. These criteria were used because the primary objective was to develop equations for estimating the weight of the total tree and its components. Based on these criteria, green ash, blackgum, red maple, sweetgum, water tupelo, and yellow-poplar were classified as soft hardwoods and hickory, laurel oak, water oak, and white oak were classified as hard hardwoods.

The average specific gravity of wood and bark by tree component is shown in table 2 for individual species, soft hardwoods, hard hardwoods, and all trees combined. The average total-tree wood specific gravity of the soft hardwood species was 0.453 for saplings (1.0 to 4.9 inches d.b.h.), 0.471 for poletimber (5.0 to 10.9 inches d.b.h.), and 0.477 for sawtimber (≥ 11.0 inches d.b.h.) compared with hard hardwood species, which averaged 0.587 for saplings, 0.596 for poletimber, and 0.617 for sawtimber. Water tupelo had the lowest average total-tree wood specific

gravity and green ash the highest for the soft hardwood group. In the hard hardwood group, water oak had the lowest average total-tree wood specific gravity and white oak the highest.

On the average, branch wood specific gravity was slightly higher than that of stem wood for the soft hardwoods and hard hardwoods (table 2). Specific gravity of bark was lower than that of the wood for all soft hardwood species except red maple, and for all hard hardwood species except laurel and water oak.

The average moisture content of wood and bark, by tree component and size class, is shown in table 3 for the species and species groups sampled. Total-tree wood moisture content for the soft hardwoods averaged 75 percent for saplings, 96 percent for poletimber, and 101 percent for sawtimber compared with the hard hardwoods, which averaged 72 percent for saplings and 73 percent for poletimber and sawtimber. In the soft hardwood group, sweetgum had the highest average total-tree wood moisture content compared with green ash, which had the lowest. In the hard hardwood group, hickory had the lowest total-tree wood moisture content compared with laurel and water oak, which had the highest.

Average total-tree bark moisture content was relatively uniform across tree size classes for the soft hardwoods but varied significantly with size class for the hard hardwoods (table 3). Total-tree average bark moisture content for the soft hardwoods was 112 percent in saplings, 108 percent in poletimber, and 98 percent in sawtimber compared with 107 percent saplings, 73 percent for poletimber, and 66 percent for sawtimber for the hard hardwood species.

Table 4 shows the average proportion of bark in the tree, based on green weight of wood and bark, by tree component and size class, for the species sampled. The percentage of stem weight in bark increased as stem d.o.b. decreased. Thus, the sapling-size trees had a higher proportion of their green weight in bark than did poletimber or sawtimber-size trees. Branches had the highest percentage of green weight in bark. Yellow-poplar had the highest bark percentage of the soft hardwoods, and hickory had the highest for the hard hardwoods.

The average green weight per cubic foot of wood and bark, by tree component and size class, is shown in table 5. The green weight per cubic foot of wood for the total tree averaged 50 to 60 pounds for the soft hardwoods and 62 to 66 pounds for the hard hardwoods. Green ash had the lowest average total-tree green weight of wood per cubic foot, and sweetgum had the highest of the soft hardwood species. Green ash had the lowest green weight of wood per cubic foot because of its low moisture content, whereas sweetgum had the highest because of its high moisture content (table 3). On the average, hickory had the lowest total-tree green weight of wood per cubic foot and white oak the highest of the hard hardwood species.

The average green weight per cubic foot of bark for the total tree (table 5) was approximately 8 pounds less for the soft hardwood group compared with that for the hard hardwood group. Red maple had the highest average green weight per cubic foot for bark in the total tree of the soft hardwoods, and laurel oak had the highest for the hard hardwoods.

The average green weight of wood and bark per cubic foot of wood and bark for the total tree averaged 51 to 59 pounds for soft hardwoods and 62 to 66 for hard hardwoods.

The weight of wood and bark per cubic-foot volume of wood is a useful factor for estimating the volume of wood in a tree or its components when weight of wood and bark is known. The average green weight of wood and bark per cubic foot of wood, by tree component and size class for the species sampled, is shown in table 6. The green weight of wood and bark per cubic foot of wood for the total tree averaged 63 to 69 pounds for the soft hardwoods and 78 pounds for the hard hardwoods. Average total-tree green weight of wood and bark per cubic foot of wood was relatively uniform among the hard hardwood species; however, it varied significantly among the soft hardwood species, with the lowest for green ash and the highest for sweetgum.

The average green weight of wood and bark per cubic foot of wood was highest for branches and decreased with increasing stem diameter (table 6).

Prediction Equations

A series of equations was developed to predict total-tree and tree component weight and volume for each species, the soft hardwood and hard hardwood groups, and all species combined. Equations were developed for predicting the green and dry weight of wood, bark and foliage, wood and bark combined, and wood alone in the above-stump total tree. Stem equations were developed for estimating the green and dry weight of wood and bark combined and wood alone from the total stem. Volume equations were also developed for wood and bark combined and for wood alone in the above-stump total tree and total stem.

Since tree height is measured to different top limits by various organizations, equations were developed by using diameter (D) alone and in combination with total height (Th), height to 4-inch top (H4), and merchantable height (Mh) as independent variables. Equation (10) was used to estimate the weight and volume of the total tree and stem for trees 1.0 to 10.9 inches d.b.h., and equation (11) was used for trees ≥ 11.0 inches d.b.h. when D alone, D and Th, or D and H4 were the independent variables. Equations (10) and (11) were used for each species or species group sampled except water tupelo, green ash, and red maple. Insufficient numbers of trees ≥ 11 inches d.b.h. were sampled for these species (table 1) for development of segmented equations. Thus, a single equation having the same form as equation (10) was developed for all trees ≥ 1.0 inch for these three species. When estimating weights or volumes of large trees (trees ≥ 16 inches), the equation for the soft hardwood group should be used for these species.

Equation (9) was used to estimate weight and volume of the total tree and saw-log merchantable stem for trees ≥ 11.0 inches when D and Mh were the independent variables. Equations based on D and Mh were developed only for species sampled sufficiently in the sawtimber diameter classes. Equations were developed for the soft hardwoods, hard hardwoods, and all species, and for sweetgum, blackgum, white oak, and water and laurel oaks combined.

Equation (12) was used to estimate the proportion of total stem weight or volume in the stem to any d.o.b. top when stem weight or volume was estimated with D, D and Th, or D and H4 as the independent variable. Equation (13) was used to estimate a ratio for expanding estimated saw-log merchantable stem weight or volume to any d.o.b. top above the saw-log top when D and Mh were the independent variables.

Equations that use D with Th or D with H4 fit the existing total-tree and total-stem weight and volume data well, based on the criteria of mean square error and absolute deviation of observed from predicted. Equations using D and Mh fit existing saw-log merchantable stem weight and volume data well. When average tree height and stem taper are similar to those of our sample trees, the equations with D alone will result in good estimates of the tree weight and volume. When average tree heights by d.b.h. class are different, however, the equations that include a height variable should be applied directly, or used to develop local weight-volume tables based on D alone.

Regression coefficients for estimating weight and volume are listed below, by variable and table number:

Independent variable	Weight	Volume
D alone	tables 7, 8	tables 9, 10
D and Th	tables 11, 12	tables 13, 14
D and H4	tables 15, 16	tables 17, 18
D and Mh	tables 19, 20	tables 21, 22

In addition to the regression coefficients, tables 7 through 22 contain the coefficients of determination and standard error ($\log_{10}$) for each equation.

Regression coefficients for estimating the proportion of the total-stem weight and volume in the stem to a specified d.o.b. top are given in tables 23 and 24. Table 23 contains coefficients for estimating ratios for stem green and dry weight of wood and bark combined and wood only, and table 24 contains the coefficients for stem volume of wood and bark combined and wood alone. Equation coefficients for expanding estimated saw-log merchantable stem weight and volume are shown in tables 25 and 26, respectively.

How to Use Prediction Equations

The following examples illustrate how to use the equations in table 7 through 26 to estimate the weight or volume of the total tree and its components.

This tabulation presents the tree data needed to estimate weight and volume when d.b.h. and Th are measured and equations (10) and (11) are used:

Example of trees < 11.0 inches d.b.h.

D = 10.0 inches

Th = 70 feet

Example of trees ⩾ 11.0 inches

D = 14.0 inches

Th = 90 feet

To estimate total-stem wood and bark green weight (Y_{STEMWB}) of a soft hardwood with these dimensions, the following equations would be selected from table 12 and solved as follows:

Trees < 11.0 inches d.b.h--using equation (10)

$$Y_{STEMWB} = a' \ (D^2Th)^b \qquad (10)$$

$$= 0.22265 \ ((10^2) \ (70))^{0.94182}$$

$$= 0.22265 \ (7000)^{0.94182}$$

$$= 0.22265 \ (4,182.06)$$

$$Y_{STEMWB} = 931 \text{ pounds}$$

Trees ⩾ 11.0 inches d.b.h.--using equation (11)

$$Y_{STEMWB} = a'' \ (D^2)^b \ (Th)^c \qquad (11)$$

$$= 0.11546 \ (14^2)^{1.07875} \ (90)^{0.94182}$$

$$= 0.11546 \ (196)^{1.07875} \ (90)^{0.94182}$$

$$= 0.11546 \ (297.01) \ (69.27)$$

$$Y_{STEMWB} = 2,375 \text{ pounds}$$

This same mathematical procedure would be used to solve equations (10) or (11) for any of the tree component equations in tables 7 through 22.

To estimate the proportion of total-stem green weight of wood and bark in the stem of a 10-inch d.b.h. tree to a 4-inch d.o.b. top (Y_R), the following ratio regression coefficients for soft hardwoods would be selected from table 23 and solved by using equation (12) as shown below. The same equation is used for all size trees.

$$Y_R = e^{a\,(d)^b\,(D)^c} \qquad (12)$$

$$= 2.71828 \left[-1.93940\ (4)^{4.35017}\ (10)^{-4.49235} \right]$$

$$= 2.71828 \left[-1.93940\ (415.97)\ (0.000032) \right]$$

$$= 2.71828^{-0.02596}$$

$$Y_R = 0.974$$

Stem weight to 4-inch top = $(Y_{STEMWB})\ (Y_R)$

= 931 (0.974)

Stem weight to 4-inch top = 907 pounds

This procedure shown above can be used to estimate the proportion of total stem in the stem to any d.o.b. top by substituting for d in equation (12).

The following tabulation shows the tree data needed to estimate weights and volumes when d.b.h. and Mh are measured and equation (9) is used.

D = 14.0 inches d.b.h.

Mh = 2.0 logs

To use equation (9), Mh must be in feet, thus:

Mh = 33.1 ft = (2.0 logs) (16.3 ft/log) + (0.5 ft for stump)

To estimate the green weight of wood and bark in the saw-log merchantable stem (Y_{SAWWB}) of a soft hardwood tree, the following equation coefficients would be selected from table 20 and solved as follows:

$$Y_{SAWWB} = a'(D^2)^b\ (Mh)^c \qquad (9)$$

$$= 0.87399\ (14^2)^{0.88900}\ (33.1)^{0.79965}$$

$$= 0.87339\ (109.10)\ (16.42)$$

$$Y_{SAWWB} = 1{,}565 \text{ pounds}$$

This same mathematical procedure would be used to solve equation (9) for any saw-timber tree component equation in tables 19 through 22.

To estimate a ratio (Y_R) for expanding estimated saw-log merchantable-stem green weight of wood and bark of the previous tree to weight to a 4-inch d.o.b. top, the following soft hardwood ratio equation would be selected from table 25 and solved by using equation (13) as shown below:

$$Y_R = e^{a\left[(Mh)^b\left((1-(\frac{d}{.78D})^2)^2\right)^c\right]} \qquad (13)$$

$$= 2.71828^{8.37557\left[(33.1)^{-0.92624}\left((1-(\frac{d}{.78D})^2)^2\right)^{0.4897}\right]}$$

$$= 2.71828^{8.37557(0.03911)(0.86836)}$$

$$= 2.71828^{0.28444}$$

$$Y_R = 1.329$$

Stem weight to 4-inch top = $(Y_{SAWWB})\ (Y_R)$

= 1,566 (1.329)

Stem weight to 4-inch top = 2,081 pounds

The tree components predicted by using the equations provided can be used to calculate additional tree components. For example, to estimate the weight of foliage, subtract estimated total-tree weight of wood and bark from estimated total-tree weight of wood, bark, and foliage. To estimate the weight or volume of the crown (branches, topwood, and foliage) subtract estimated weight of the stem to a specified d.o.b. top from total-tree weight of wood, bark, and foliage. The weight or volume of bark alone can also be estimated by subtracting component weight or volume of wood from wood and bark.

Similar-size trees may vary in weight and volume because of differences in crown size, stem taper, and weight per cubic foot. Therefore, these equations should be applied only to trees growing in natural, fully stocked stands with tree dimensions and weight per cubic-foot values similar to the tree sampled.

Literature Cited

Baskerville, G.L. Use of logarithmic regression in the estimation of plant biomass. Canadian Journal of Forest Research 2:49-53; 1972.

Clark, Alexander, III; Muse, H. David; Phillips, Douglas R.; Frederick, Douglas J. Use of segmented log-log equations to estimate tree biomass. In: Saucier, Joseph R., ed. Proceedings of the 1984 southern forest biomass workshop. Sixth annual meeting of the Southern Forest Biomass Working Group; 1984 June 5-7; Athens, GA. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station; 1985:51-57.

Clark, Alexander, III; Phillips, Douglas R.; Frederick, Douglas J. Biomass distribution and production of Coastal Plain hardwood stands. In: Energy from biomass and wastes 7: proceedings of Institute of Gas Technology symposium; 1983 January 24-28; Lake Buena Vista, FL; 1983:101-115. [Available from Institute of Gas Technology, Chicago, IL]

Cunia, T. Weighted least squares method and construction of volume tables. Forest Science 10:180-191; 1964.

Draper, N.R.; Smith, H. Applied regression analyses. 2d ed. New York: John Wiley & Sons, Inc.; 1981. 709 pp.

Frederick, Douglas J.; Clark, Alexander, III; Phillips, Douglas R. Biomass, nutrient and energy relationships of Coastal Plain hardwoods. In: The hardwood resource and its utilization: where are we going?: 11th annual hardwood symposium of the Hardwood Research Council; 1983 May 10-13; High Hampton, NC; 1983:139-147. [Available from U.S. Department of Agriculture, Forest Service, Southern Forest Experiment Station, New Orleans, LA]

Gower, S.T.; Frederick, D.J.; Clark, A., III. Caloric content estimation and distribution in seven bottomland hardwood tree species growing in natural stands in the South. In: Proceedings: fourth central hardwood forest conference; 1982 November 8-10; Lexington, KY: University of Kentucky; 1983:384-390.

Messina, M.G.; Gower, S.T.; Frederick, D.J.; Clark, A., III; Phillips, D.R. Biomass, nutrient, and energy content of southeastern wetland hardwood forests. Hardwood Research Cooperative Series No. 2. Raleigh, NC: North Carolina State University; 1983: 28 pp.

Table 1.--Mean and range of tree age and measurements, by species and tree size class

Tree size class (inches)	Sample trees	Age		D.b.h.		Total height		Height to 4-inch d.i.b. top		Height to saw-log merchantable top		D.o.b. at saw-log merchantable top	
		Average	Range	Average	Range	Average	Range	Average	Range	Average	Range	Average	Range
	Number			- - - Inches - - -		- - - - - - - - - - - - - - Feet - - - - - - - - - - - - - -						- - - Inches - - -	
						SOFT HARDWOODS							
1.0-4.9	276	18	5-46	2.3	1.0- 4.9	30	11-63	--	--	--	--	--	--
5.0-10.9	396	33	12-105	7.3	5.0-10.9	62	27-103	34	8-76	--	--	--	--
≥ 11.0	170	54	23-142	14.7	11.0-20.9	84	50-109	66	37-91	40	17-71	10.3	9.0-15.5
All trees	842	33	5-142	7.1	1.0-20.9	56	11-109	44	8-91	40	17-71	10.3	9.0-15.5
						GREEN ASH							
1.0-4.9	116	20	8-44	1.9	1.0- 4.4	28	13-49	--	--	--	--	--	--
5.0-10.9	32	44	24-105	7.4	5.1-10.9	64	27-89	36	8-64	--	--	--	--
≥ 11.0	10	42	37-49	13.6	11.1-18.1	86	72-93	62	51-69	37	17-48	9.9	9.0-12.0
All trees	158	31	8-105	3.8	1.0-18.1	39	13-93	42	8-69	37	17-48	9.8	9.0-12.0
						BLACKGUM							
1.0-4.9	23	16	8-29	2.4	1.0- 4.7	30	17-46	--	--	--	--	--	--
5.0-10.9	49	42	21-94	7.8	5.0-10.9	58	34-80	35	12-61	--	--		--
≥ 11.0	63	56	40-110	14.5	11.0-19.5	78	50-101	62	37-85	35	17-56	10.5	9.0-14.0
All trees	135	43	8-110	9.9	1.0-19.5	62	17-101	50	12-85	35	17-56	10.5	9.0-14.0
						RED MAPLE							
1.0-4.9	35	21	10-37	2.4	1.0- 4.9	32	16-52	--	--	--	--	--	--
5.0-10.9	45	38	21-67	7.8	5.0-10.9	63	40-78	37	12-56	--	--	--	--
≥ 11.0	5	42	35-54	12.8	11.2-14.7	77	70-83	52	46-58	30	28-32	9.7	9.0-11.2
All trees	85	31	10-67	5.8	1.0-14.7	51	16-83	37	12-58	30	28-32	9.7	9.0-11.2
						SWEETGUM							
1.0-4.9	48	14	5-46	2.8	1.0-4.9	34	12-63	--	--	--	--	--	--
5.0-10.9	195	27	12-83	6.9	5.0-10.9	63	38-103	35	11-76	--	--	--	--
≥ 11.0	70	54	25-83	14.8	11.2-20.0	89	55-109	71	41-91	42	22-71	10.4	9.0-15.5
All trees	313	29	5-83	8.1	1.0-20.0	65	12-109	43	11-91	42	22-71	10.4	9.0-15.5

Continued

Table 1.--Mean and range of tree age and measurements, by species and tree size class--Continued

Tree size class (inches)	Sample trees	Age		D.b.h.		Total height		Height to 4-inch d.i.b. top		Height to saw-log merchantable top		D.o.b. at saw-log merchantable top	
		Average	Range	Average	Range	Average	Range	Average	Range	Average	Range	Average	Range
	Number			- - - Inches - - -		- - - - - - - - - - - - - - Feet - - - - - - - - - - - - - -						- - - Inches - - -	
						WATER TUPELO							
1.0-4.9	27	20	9-34	3.1	1.0- 4.9	35	15-53	--	--	--	--	--	--
5.0-10.9	49	32	26-52	7.1	5.1-10.0	59	44-67	28	10-45	--	--	--	--
> 11.0	3	112	81-142	15.2	11.0-19.9	68	65-70	49	45-52	--	--	--	--
All trees	79	31	9-142	6.1	1.0-19.9	51	15-70	29	10-52	--	--	--	--
						YELLOW-POPLAR							
1.0-4.9	--	--	--	--	--	--	--	--	--	--	--	--	--
5.0-10.9	11	30	13-45	8.1	5.5-10.8	67	51-82	43	26-59	--	--	--	--
> 11.0	15	55	37-82	15.8	11.0-20.9	92	80-103	73	63-85	49	27-61	9.9	9.0-12.9
All trees	26	44	13-82	12.6	5.5-20.9	82	51-103	60	26-85	49	27-61	9.9	9.0-12.9
						HARD HARDWOODS							
1.0-4.9	108	17	5-45	2.1	1.0- 4.5	28	10-50	--	--	--	--	--	--
5.0-10.9	106	38	19-71	7.3	5.0-10.9	60	32-93	35	8-71	--	--	--	--
> 11.0	89	63	29-140	14.7	11.2-20.7	80	49-100	61	32-81	40	17-50	10.9	9.0-16.5
All trees	303	36	5-140	7.6	1.0-20.7	54	10-100	47	8-81	32	17-53	10.9	9.0-16.5
						HICKORY							
1.0-4.9	20	17	5-42	2.2	1.0- 4.5	31	20-48	--	--	--	--	--	--
5.0-10.9	9	32	21-50	6.5	5.3- 9.2	66	55-90	33	15-66	--	--	--	--
> 11.0	13	69	31-140	14.1	11.6-18.2	84	65-94	64	50-71	31	20-47	10.5	9.0-14.6
All trees	42	39	5-140	6.8	1.0-18.2	55	20-94	52	15-71	31	20-47	10.5	9.0-14.6
						LAUREL OAK							
1.0-4.9	14	12	7-17	1.8	1.1- 2.5	25	19-34	--	--	--	--	--	--
5.0-10.9	21	40	22-49	8.1	5.1-10.5	59	37-61	39	16-61	--	--	--	--
> 11.0	12	41	38-44	13.8	11.2-17.3	61	49-90	46	32-61	25	17-34	10.9	9.0-12.9
All trees	47	28	7-49	7.7	1.1-17.3	50	19-90	41	16-61	25	17-34	10.9	9.0-12.9

Continued

Table 1.--Mean and range of tree age and measurements, by species and tree size class--Continued

Tree size class (inches)	Sample trees	Age		D.b.h.		Total height		Height to 4-inch d.i.b. top		Height to saw-log merchantable top		D.o.b. at saw-log merchantable top	
		Average	Range	Average	Range	Average	Range	Average	Range	Average	Range	Average	Range
	Number			- - - Inches - - -		- - - - - - - - - - - - - - Feet - - - - - - - - - - - - - -						- - - Inches - - -	
						WATER OAK							
1.0- 4.9	34	16	9-38	2.2	1.0- 4.6	29	15-45	--	--	--	--	--	--
5.0-10.9	45	40	19-71	7.6	5.1-10.7	63	38-93	39	17-71	--	--	--	--
≥ 11.0	33	55	32-88	15.1	11.6-20.0	83	68-100	64	47-81	33	24-47	11.3	9.0-16.5
All trees	112	38	9-88	8.2	1.0-20.0	59	15-100	50	17-81	33	24-47	11.3	9.0-16.5
						WHITE OAK							
1.0- 4.9	--	--	--	--	--	--	--	--	--	--	--	--	--
5.0-10.9	10	26	20-42	7.5	5.6- 9.4	54	41-67	31	20-44	--	--	--	--
≥ 11.0	28	75	53-86	15.2	11.3-20.7	82	61-97	63	43-78	36	20-53	11.1	9.0-15.9
All trees	38	72	26-86	13.2	5.6-20.7	75	41-97	55	20-78	36	20-53	11.1	9.0-15.9
						ALL SPECIES							
1.0-4.9	384	18	5-46	2.3	1.0- 4.9	29	10-63	--	--	--	--	--	--
5.0-10.9	502	33	12-105	7.3	5.0-10.9	62	27-103	35	8-76	--	--	--	--
≥ 11.0	259	56	23-142	14.7	11.0-20.9	83	49-109	65	31-91	37	17-71	10.6	9.0-16.5
All trees	1145	33	5-142	7.3	1.0-20.9	55	10-109	45	8-91	37	17-71	10.6	9.0-16.5

Table 2.--Average specific gravity of wood, bark, and wood and bark combined, by tree component and size class, for hardwood species in the Gulf and Atlantic Coastal Plains

Tree size class (inches)	Average and standard deviation						
		Stem					
	Total tree	Butt to 9-inch top	9-inch to 4-inch top	Butt to 4-inch top	4-inch to tip	Butt to tip	Branches
				SOFT HARDWOODS			
				Wood			
1.0-4.9	0.453 ± 0.053	--	--	--	--	0.451 ± 0.056	0.476 ± 0.054
5.0-10.9	0.471 ± 0.036	--	--	0.469 ± 0.038	0.476 ± 0.043	0.470 ± 0.037	0.481 ± 0.039
> 11.0	0.477 ± 0.037	0.468 ± 0.042	0.475 ± 0.038	0.474 ± 0.039	0.496 ± 0.045	0.474 ± 0.039	0.490 ± 0.037
				Bark			
1.0-4.9	0.410 ± 0.060	--	--	--	--	0.409 ± 0.068	0.422 ± 0.056
5.0-10.9	0.404 ± 0.059	--	--	0.390 ± 0.074	0.424 ± 0.053	0.399 ± 0.066	0.426 ± 0.047
> 11.0	0.442 ± 0.066	0.430 ± 0.082	0.440 ± 0.079	0.435 ± 0.077	0.462 ± 0.058	0.436 ± 0.076	0.453 ± 0.044
				Wood and Bark			
1.0-4.9	0.446 ± 0.044	--	--	--	--	0.444 ± 0.046	0.458 ± 0.046
5.0-10.9	0.462 ± 0.034	--	--	0.458 ± 0.035	0.465 ± 0.037	0.461 ± 0.034	0.464 ± 0.035
> 11.0	0.473 ± 0.036	0.464 ± 0.041	0.469 ± 0.038	0.469 ± 0.038	0.488 ± 0.040	0.470 ± 0.037	0.481 ± 0.035
				GREEN ASH			
				Wood			
1.0-4.9	0.438 ± 0.039	--	--	--	--	0.434 ± 0.042	0.492 ± 0.036
5.0-10.9	0.501 ± 0.033	--	--	0.487 ± 0.041	0.554 ± 0.042	0.498 ± 0.033	0.537 ± 0.038
> 11.0	0.539 ± 0.039	0.524 ± 0.049	0.525 ± 0.042	0.528 ± 0.042	0.612 ± 0.034	0.529 ± 0.041	0.589 ± 0.030
				Bark			
1.0-4.9	0.416 ± 0.028	--	--	--	--	0.414 ± 0.027	0.426 ± 0.052
5.0-10.9	0.409 ± 0.038	--	--	0.388 ± 0.043	0.432 ± 0.046	0.397 ± 0.041	0.474 ± 0.051
> 11.0	0.437 ± 0.035	0.399 ± 0.049	0.406 ± 0.037	0.407 ± 0.037	0.473 ± 0.043	0.410 ± 0.037	0.495 ± 0.032
				Wood and Bark			
1.0-4.9	0.434 ± 0.032	--	--	--	--	0.430 ± 0.032	0.470 ± 0.037
5.0-10.9	0.490 ± 0.030	--	--	0.474 ± 0.036	0.529 ± 0.037	0.483 ± 0.030	0.518 ± 0.037
> 11.0	0.527 ± 0.034	0.509 ± 0.038	0.505 ± 0.033	0.512 ± 0.034	0.575 ± 0.022	0.514 ± 0.033	0.566 ± 0.022

Continued

Table 2.--Average specific gravity of wood, bark, and wood and bark combined, by tree component and size class, for hardwood species in the Gulf and Atlantic Coastal Plains--Continued

Tree size class (inches)	Average and standard deviation						
		Stem					
	Total tree	Butt to 9-inch top	9-inch to 4-inch top	Butt to 4-inch top	4-inch to tip	Butt to tip	Branches
				BLACKGUM			
				Wood			
1.0-4.9	0.418 ± 0.070	--	--	--	--	0.413 ± 0.073	0.480 ± 0.054
5.0-10.9	0.477 ± 0.036	--	--	0.475 ± 0.038	0.482 ± 0.045	0.477 ± 0.038	0.477 ± 0.034
> 11.0	0.478 ± 0.036	0.468 ± 0.048	0.475 ± 0.038	0.476 ± 0.039	0.495 ± 0.034	0.477 ± 0.038	0.486 ± 0.026
				Bark			
1.0-4.9	0.409 ± 0.071	--	--	--	--	0.405 ± 0.077	0.442 ± 0.041
5.0-10.9	0.411 ± 0.067	--	--	0.408 ± 0.077	0.419 ± 0.069	0.411 ± 0.076	0.413 ± 0.029
> 11.0	0.428 ± 0.061	0.414 ± 0.078	0.420 ± 0.072	0.418 ± 0.072	0.458 ± 0.054	0.420 ± 0.071	0.450 ± 0.040
				Wood and Bark			
1.0-4.9	0.416 ± 0.056	--	--	--	--	0.412 ± 0.059	0.467 ± 0.043
5.0-10.9	0.468 ± 0.035	--	--	0.466 ± 0.039	0.466 ± 0.043	0.468 ± 0.039	0.459 ± 0.028
> 11.0	0.472 ± 0.035	0.463 ± 0.047	0.467 ± 0.037	0.470 ± 0.038	0.486 ± 0.033	0.471 ± 0.038	0.477 ± 0.027
				RED MAPLE			
				Wood			
1.0-4.9	0.461 ± 0.021	--	--	--	--	0.462 ± 0.022	0.457 ± 0.029
5.0-10.9	0.463 ± 0.031	--	--	0.463 ± 0.032	0.459 ± 0.032	0.462 ± 0.032	0.468 ± 0.036
> 11.0	0.457 ± 0.013	0.463 ± 0.017	0.460 ± 0.015	0.458 ± 0.016	0.452 ± 0.013	0.458 ± 0.015	0.453 ± 0.016
				Bark			
1.0-4.9	0.496 ± 0.042	--	--	--	--	0.502 ± 0.004	0.474 ± 0.058
5.0-10.9	0.504 ± 0.041	--	--	0.514 ± 0.045	0.487 ± 0.046	0.511 ± 0.043	0.485 ± 0.043
> 11.0	0.491 ± 0.053	0.514 ± 0.055	0.509 ± 0.059	0.510 ± 0.058	0.463 ± 0.043	0.507 ± 0.058	0.464 ± 0.049
				Wood and Bark			
1.0-4.9	0.466 ± 0.021	--	--	--	--	0.468 ± 0.021	0.459 ± 0.028
5.0-10.9	0.469 ± 0.030	--	--	0.469 ± 0.030	0.463 ± 0.029	0.469 ± 0.030	0.471 ± 0.032
> 11.0	0.462 ± 0.009	0.467 ± 0.013	0.467 ± 0.013	0.464 ± 0.013	0.454 ± 0.006	0.465 ± 0.012	0.455 ± 0.007

Continued

Table 2.--Average specific gravity of wood, bark, and wood and bark combined, by tree component and size class, for hardwood species in the Gulf and Atlantic Coastal Plains--Continued

Tree size class (inches)	Average and standard deviation						
		Stem					
	Total tree	Butt to 9-inch top	9-inch to 4-inch top	Butt to 4-inch top	4-inch to tip	Butt to tip	Branches
				SWEETGUM			
				Wood			
1.0-4.9	0.472 ± 0.033	--	--	--	--	0.473 ± 0.032	0.466 ± 0.042
5.0-10.9	0.473 ± 0.021	--	--	0.474 ± 0.023	0.469 ± 0.023	0.472 ± 0.022	0.481 ± 0.025
> 11.0	0.482 ± 0.025	0.477 ± 0.028	0.482 ± 0.026	0.480 ± 0.027	0.493 ± 0.032	0.480 ± 0.027	0.492 ± 0.024
				Bark			
1.0-4.9	0.364 ± 0.047	--	--	--	--	0.357 ± 0.055	0.387 ± 0.039
5.0-10.9	0.390 ± 0.046	--	--	0.368 ± 0.061	0.423 ± 0.041	0.382 ± 0.051	0.422 ± 0.033
> 11.0	0.473 ± 0.058	0.467 ± 0.073	0.483 ± 0.070	0.475 ± 0.066	0.479 ± 0.061	0.475 ± 0.066	0.462 ± 0.040
				Wood and Bark			
1.0-4.9	0.455 ± 0.027	--	--	--	--	0.454 ± 0.025	0.441 ± 0.034
5.0-10.9	0.462 ± 0.020	--	--	0.459 ± 0.022	0.460 ± 0.022	0.461 ± 0.021	0.463 ± 0.023
> 11.0	0.482 ± 0.023	0.476 ± 0.025	0.484 ± 0.025	0.479 ± 0.024	0.492 ± 0.033	0.479 ± 0.024	0.485 ± 0.024
				WATER TUPELO			
				Wood			
1.0-4.9	0.425 ± 0.029	--	--	--	--	0.426 ± 0.030	0.400 ± 0.033
5.0-10.9	0.449 ± 0.020	--	--	0.446 ± 0.023	0.466 ± 0.027	0.449 ± 0.021	0.455 ± 0.027
> 11.0	0.454 ± 0.008	0.431 ± 0.008	0.451 ± 0.009	0.446 ± 0.001	0.500 ± 0.006	0.447 ± 0.001	0.479 ± 0.029
				Bark			
1.0-4.9	0.336 ± 0.018	--	--	--	--	0.330 ± 0.020	0.371 ± 0.045
5.0-10.9	0.369 ± 0.022	--	--	0.360 ± 0.023	0.388 ± 0.031	0.367 ± 0.023	0.377 ± 0.026
> 11.0	0.371 ± 0.019	0.331 ± 0.012	0.348 ± 0.025	0.345 ± 0.021	0.392 ± 0.045	0.348 ± 0.021	0.408 ± 0.024
				Wood and Bark			
1.0-4.9	0.411 ± 0.025	--	--	--	--	0.411 ± 0.027	0.391 ± 0.029
5.0-10.9	0.440 ± 0.019	--	--	0.436 ± 0.021	0.451 ± 0.023	0.439 ± 0.020	0.432 ± 0.022
> 11.0	0.443 ± 0.009	0.421 ± 0.009	0.431 ± 0.012	0.434 ± 0.004	0.471 ± 0.015	0.436 ± 0.003	0.458 ± 0.030

Continued

Table 2.--Average specific gravity of wood, bark, and wood and bark combined, by tree component and size class, for hardwood species in the Gulf and Atlantic Coastal Plains--Continued

Tree size class (inches)	Average and standard deviation						
		Stem					
	Total tree	Butt to 9-inch top	9-inch to 4-inch top	Butt to 4-inch top	4-inch to tip	Butt to tip	Branches
				YELLOW-POPLAR			
				Wood			
1.0-4.9	--	--	--	--	--	--	--
5.0-10.9	0.400 ± 0.029	--	--	0.395 ± 0.030	0.411 ± 0.037	0.396 ± 0.030	0.429 ± 0.047
> 11.0	0.431 ± 0.023	0.425 ± 0.023	0.427 ± 0.023	0.426 ± 0.023	0.462 ± 0.033	0.426 ± 0.023	0.459 ± 0.026
				Bark			
1.0-4.9	--	--	--	--	--	--	--
5.0-10.9	0.351 ± 0.012	--	--	0.346 ± 0.017	0.359 ± 0.014	0.346 ± 0.015	0.368 ± 0.020
> 11.0	0.352 ± 0.024	0.334 ± 0.027	0.344 ± 0.024	0.339 ± 0.025	0.404 ± 0.018	0.340 ± 0.025	0.395 ± 0.025
				Wood and Bark			
1.0-4.9	--	--	--	--	--	--	--
5.0-10.9	0.393 ± 0.026	--	--	0.388 ± 0.027	0.401 ± 0.031	0.389 ± 0.027	0.412 ± 0.035
> 11.0	0.419 ± 0.021	0.411 ± 0.020	0.413 ± 0.020	0.412 ± 0.021	0.447 ± 0.028	0.413 ± 0.021	0.441 ± 0.020
				HARD HARDWOODS			
				Wood			
1.0-4.9	0.587 ± 0.046	--	--	--	--	0.587 ± 0.047	0.581 ± 0.056
5.0-10.9	0.596 ± 0.044	--	--	0.592 ± 0.046	0.602 ± 0.048	0.592 ± 0.045	0.612 ± 0.054
> 11.0	0.617 ± 0.041	0.605 ± 0.048	0.617 ± 0.046	0.608 ± 0.047	0.646 ± 0.041	0.608 ± 0.047	0.643 ± 0.037
				Bark			
1.0-4.9	0.480 ± 0.090	--	--	--	--	0.489 ± 0.091	0.461 ± 0.097
5.0-10.9	0.592 ± 0.083	--	--	0.608 ± 0.095	0.590 ± 0.082	0.607 ± 0.093	0.542 ± 0.065
> 11.0	0.619 ± 0.077	0.632 ± 0.093	0.627 ± 0.089	0.632 ± 0.091	0.599 ± 0.077	0.631 ± 0.091	0.592 ± 0.063
				Wood and Bark			
1.0-4.9	0.569 ± 0.045	--	--	--	--	0.568 ± 0.046	0.547 ± 0.055
5.0-10.9	0.596 ± 0.041	--	--	0.593 ± 0.042	0.598 ± 0.044	0.594 ± 0.042	0.592 ± 0.050
> 11.0	0.618 ± 0.035	0.608 ± 0.042	0.617 ± 0.041	0.610 ± 0.041	0.632 ± 0.038	0.611 ± 0.040	0.629 ± 0.038

Continued

Table 2.--Average specific gravity of wood, bark, and wood and bark combined, by tree component and size class, for hardwood species in the Gulf and Atlantic Coastal Plains--Continued

Tree size class (inches)	Average and standard deviation						
		Stem					
	Total tree	Butt to 9-inch top	9-inch to 4-inch top	Butt to 4-inch top	4-inch to tip	Butt to tip	Branches
				HICKORY			
				Wood			
1.0-4.9	0.636 ± 0.043	--	--	--	--	0.643 ± 0.044	0.587 ± 0.047
5.0-10.9	0.610 ± 0.060	--	--	0.624 ± 0.055	0.597 ± 0.068	0.615 ± 0.062	0.556 ± 0.067
> 11.0	0.639 ± 0.034	0.639 ± 0.038	0.643 ± 0.036	0.643 ± 0.036	0.666 ± 0.048	0.643 ± 0.036	0.625 ± 0.044
				Bark			
1.0-4.9	0.498 ± 0.054	--	--	--	--	0.498 ± 0.061	0.496 ± 0.030
5.0-10.9	0.479 ± 0.053	--	--	0.486 ± 0.059	0.470 ± 0.051	0.483 ± 0.059	0.472 ± 0.035
> 11.0	0.498 ± 0.059	0.510 ± 0.056	0.509 ± 0.059	0.509 ± 0.059	0.486 ± 0.065	0.508 ± 0.059	0.478 ± 0.063
				Wood and Bark			
1.0-4.9	0.610 ± 0.040	--	--	--	--	0.609 ± 0.042	0.559 ± 0.038
5.0-10.9	0.590 ± 0.060	--	--	0.601 ± 0.056	0.571 ± 0.064	0.594 ± 0.063	0.530 ± 0.055
> 11.0	0.617 ± 0.031	0.618 ± 0.034	0.618 ± 0.033	0.620 ± 0.033	0.618 ± 0.048	0.621 ± 0.033	0.581 ± 0.041
				LAUREL OAK			
				Wood			
1.0-4.9	0.591 ± 0.031	--	--	--	--	0.589 ± 0.034	0.609 ± 0.033
5.0-10.9	0.610 ± 0.037	--	--	0.606 ± 0.040	0.625 ± 0.036	0.607 ± 0.039	0.631 ± 0.034
> 11.0	0.600 ± 0.017	0.583 ± 0.022	0.616 ± 0.033	0.589 ± 0.022	0.634 ± 0.019	0.589 ± 0.022	0.627 ± 0.003
				Bark			
1.0-4.9	0.551 ± 0.065	--	--	--	--	0.549 ± 0.075	0.556 ± 0.064
5.0-10.9	0.635 ± 0.065	--	--	0.660 ± 0.073	0.626 ± 0.054	0.656 ± 0.072	0.547 ± 0.057
> 11.0	0.678 ± 0.048	0.699 ± 0.082	0.704 ± 0.034	0.701 ± 0.071	0.683 ± 0.037	0.700 ± 0.069	0.627 ± 0.008
				Wood and Bark			
1.0-4.9	0.583 ± 0.028	--	--	--	--	0.580 ± 0.030	0.595 ± 0.025
5.0-10.9	0.615 ± 0.025	--	--	0.613 ± 0.026	0.620 ± 0.025	0.615 ± 0.028	0.608 ± 0.030
> 11.0	0.613 ± 0.018	0.597 ± 0.026	0.632 ± 0.033	0.603 ± 0.025	0.649 ± 0.019	0.604 ± 0.024	0.628 ± 0.002

Continued

Table 2.--Average specific gravity of wood, bark, and wood and bark combined, by tree component and size class, for hardwood species in the Gulf and Atlantic Coastal Plains--Continued

Tree size class (inches)	Average and standard deviation						
		Stem					
	Total tree	Butt to 9-inch top	9-inch to 4-inch top	Butt to 4-inch top	4-inch to tip	Butt to tip	Branches
				WATER OAK			
				Wood			
1.0-4.9	0.599 ± 0.026	--	--	--	--	0.595 ± 0.027	0.618 ± 0.032
5.0-10.9	0.603 ± 0.021	--	--	0.593 ± 0.023	0.613 ± 0.025	0.595 ± 0.022	0.638 ± 0.031
> 11.0	0.590 ± 0.026	0.572 ± 0.032	0.585 ± 0.035	0.574 ± 0.031	0.633 ± 0.026	0.575 ± 0.031	0.638 ± 0.021
				Bark			
1.0-4.9	0.508 ± 0.074	--	--	--	--	0.522 ± 0.079	0.474 ± 0.072
5.0-10.9	0.635 ± 0.050	--	--	0.661 ± 0.048	0.635 ± 0.047	0.659 ± 0.048	0.563 ± 0.061
> 11.0	0.663 ± 0.024	0.686 ± 0.031	0.678 ± 0.037	0.686 ± 0.032	0.635 ± 0.038	0.685 ± 0.032	0.616 ± 0.029
				Wood and Bark			
1.0-4.9	0.584 ± 0.032	--	--	--	--	0.582 ± 0.033	0.575 ± 0.039
5.0-10.9	0.608 ± 0.020	--	--	0.602 ± 0.022	0.617 ± 0.023	0.603 ± 0.021	0.617 ± 0.022
> 11.0	0.602 ± 0.021	0.586 ± 0.028	0.597 ± 0.029	0.588 ± 0.028	0.634 ± 0.022	0.589 ± 0.027	0.633 ± 0.017
				WHITE OAK			
				Wood			
1.0-4.9	-	--	--	--	--	--	--
5.0-10.9	0.682 ± 0.021	--	--	0.630 ± 0.030	0.622 ± 0.036	0.629 ± 0.028	0.621 ± 0.000
> 11.0	0.653 ± 0.022	0.645 ± 0.028	0.652 ± 0.023	0.646 ± 0.027	0.667 ± 0.032	0.647 ± 0.027	0.675 ± 0.015
				Bark			
1.0-4.9	-	--	--	--	--	--	--
5.0-10.9	0.547 ± 0.031	--	--	0.531 ± 0.055	0.539 ± 0.027	0.532 ± 0.052	0.575 ± 0.000
> 11.0	0.612 ± 0.044	0.613 ± 0.061	0.606 ± 0.064	0.611 ± 0.061	0.583 ± 0.040	0.611 ± 0.060	0.611 ± 0.026
				Wood and Bark			
1.0-4.9	-	--	--	--	--	--	--
5.0-10.9	0.616 ± 0.018	--	--	0.615 ± 0.027	0.603 ± 0.025	0.615 ± 0.024	0.609 ± 0.001
> 11.0	0.647 ± 0.022	0.642 ± 0.028	0.644 ± 0.023	0.642 ± 0.027	0.640 ± 0.029	0.643 ± 0.027	0.658 ± 0.011

Continued

Table 2.--Average specific gravity of wood, bark, and wood and bark combined, by tree component and size class, for hardwood species in the Gulf and Atlantic Coastal Plains--Continued

Tree size class (inches)	Average and standard deviation						
	Total tree	Stem					Branches
		Butt to 9-inch top	9-inch to 4-inch top	Butt to 4-inch top	4-inch to tip	Butt to tip	
ALL SPECIES							
Wood							
1.0-4.9	0.490 ± 0.079	--	--	--	--	0.490 ± 0.081	0.506 ± 0.072
5.0-10.9	0.497 ± 0.064	--	--	0.495 ± 0.064	0.502 ± 0.068	0.496 ± 0.063	0.508 ± 0.069
> 11.0	0.525 ± 0.077	0.516 ± 0.079	0.523 ± 0.079	0.520 ± 0.076	0.548 ± 0.084	0.520 ± 0.076	0.543 ± 0.082
Bark							
1.0-4.9	0.430 ± 0.077	--	--	--	--	0.431 ± 0.083	0.433 ± 0.072
5.0-10.9	0.443 ± 0.101	--	--	0.436 ± 0.119	0.459 ± 0.091	0.443 ± 0.112	0.450 ± 0.070
> 11.0	0.503 ± 0.110	0.500 ± 0.129	0.504 ± 0.112	0.503 ± 0.124	0.509 ± 0.092	0.503 ± 0.123	0.501 ± 0.084
Wood and Bark							
1.0-4.9	0.480 ± 0.071	--	--	--	--	0.479 ± 0.073	0.483 ± 0.063
5.0-10.9	0.491 ± 0.065	--	--	0.487 ± 0.066	0.493 ± 0.067	0.489 ± 0.065	0.491 ± 0.065
> 11.0	0.523 ± 0.078	0.514 ± 0.080	0.520 ± 0.080	0.517 ± 0.077	0.538 ± 0.079	0.518 ± 0.077	0.532 ± 0.079

Table 3.--Average moisture content of wood, bark, and wood and bark combined, by tree component and size class, for hardwood species in the Gulf and Atlantic Coastal Plains

Tree size class (inches)	Average and standard deviation						
		Stem					
	Total tree	Butt to 9-inch top	9-inch to 4-inch top	Butt to 4-inch top	4-inch to tip	Butt to tip	Branches
	Percent						
SOFT HARDWOODS							
Wood							
1.0-4.9	75 ± 20.3	--	--	--	--	75 ± 20.8	78 ± 21.0
5.0-10.9	96 ± 21.7	--	--	96 ± 22.7	95 ± 22.3	96 ± 22.4	94 ± 19.1
> 11.0	101 ± 21.2	103 ± 23.1	100 ± 21.5	102 ± 22.9	95 ± 18.2	102 ± 22.8	98 ± 16.6
Bark							
1.0-4.9	112 ± 16.1	--	--	--	--	112 ± 17.3	116 ± 21.5
5.0-10.9	108 ± 18.9	--	--	103 ± 21.5	114 ± 20.6	105 ± 21.1	123 ± 20.0
> 11.0	98 ± 23.8	97 ± 29.2	94 ± 26.2	95 ± 26.4	103 ± 29.3	95 ± 26.3	110 ± 23.3
Wood and Bark							
1.0-4.9	81 ± 17.9	--	--	--	--	82 ± 17.6	89 ± 18.6
5.0-10.9	97 ± 19.4	--	--	96 ± 20.1	98 ± 18.9	97 ± 19.7	103 ± 18.0
> 11.0	101 ± 17.9	102 ± 19.7	98 ± 17.3	101 ± 19.4	96 ± 16.0	101 ± 19.5	101 ± 14.9
GREEN ASH							
Wood							
1.0-4.9	58 ± 6.4	--	--	--	--	57 ± 6.5	63 ± 8.8
5.0-10.9	53 ± 7.3	--	--	53 ± 7.2	50 ± 8.3	53 ± 7.4	55 ± 10.0
> 11.0	47 ± 3.9	45 ± 3.1	47 ± 4.2	47 ± 4.2	47 ± 2.2	47 ± 4.2	49 ± 3.5
Bark							
1.0-4.9	111 ± 8.9	--	--	--	--	111 ± 9.4	109 ± 13.3
5.0-10.9	107 ± 17.4	--	--	110 ± 20.0	107 ± 18.0	109 ± 19.5	97 ± 15.1
> 11.0	98 ± 16.8	105 ± 18.1	101 ± 19.6	101 ± 19.5	97 ± 15.9	100 ± 19.2	92 ± 13.2
Wood and Bark							
1.0-4.9	67 ± 5.5	--	--	--	--	69 ± 5.3	78 ± 8.3
5.0-10.9	60 ± 7.4	--	--	61 ± 7.5	62 ± 8.7	61 ± 7.7	68 ± 10.6
> 11.0	53 ± 3.6	52 ± 1.9	57 ± 4.0	54 ± 3.7	59 ± 4.5	54 ± 3.9	60 ± 5.0
BLACKGUM							
Wood							
1.0-4.9	77 ± 12.9	--	--	--	--	77 ± 13.2	88 ± 19.2
5.0-10.9	94 ± 11.9	--	--	93 ± 11.5	97 ± 21.1	94 ± 12.7	93 ± 10.1
> 11.0	98 ± 11.9	96 ± 14.6	97 ± 13.9	98 ± 13.1	95 ± 14.0	98 ± 13.1	100 ± 9.7
Bark							
1.0-4.9	108 ± 18.4	--	--	--	--	107 ± 19.7	116 ± 21.5
5.0-10.9	97 ± 22.0	--	--	91 ± 26.2	99 ± 25.0	92 ± 25.6	119 ± 13.7
> 11.0	92 ± 22.9	95 ± 30.8	90 ± 25.1	91 ± 25.6	89 ± 23.0	91 ± 25.2	101 ± 22.1

Continued

Table 3.--Average moisture content of wood, bark, and wood and bark combined, by tree component and size class, for hardwood species in the Gulf and Atlantic Coastal Plains--Continued

Tree size class (inches)	Average and standard deviation						
		Stem					
	Total tree	Butt to 9-inch top	9-inch to 4-inch top	Butt to 4-inch top	4-inch to tip	Butt to tip	Branches
	Percent						
				Wood and Bark			
1.0-4.9	83 ± 10.5	--	--	--	--	83 ± 10.2	96 ± 15.6
5.0-10.9	94 ± 9.2	--	--	92 ± 8.4	96 ± 16.1	94 ± 9.7	100 ± 9.2
> 11.0	96 ± 8.9	95 ± 10.7	94 ± 10.3	96 ± 9.7	91 ± 10.8	96 ± 10.0	100 ± 9.0
				RED MAPLE			
				Wood			
1.0-4.9	71 ± 6.2	--	--	--	--	70 ± 6.4	72 ± 9.3
5.0-10.9	70 ± 7.5	--	--	69 ± 8.7	75 ± 9.7	69 ± 8.2	74 ± 9.4
> 11.0	73 ± 5.4	69 ± 7.5	69 ± 6.8	70 ± 6.2	79 ± 3.9	70 ± 6.1	82 ± 6.2
				Bark			
1.0-4.9	105 ± 12.9	--	--	--	--	104 ± 13.8	109 ± 16.3
5.0-10.9	100 ± 14.9	--	--	96 ± 17.4	111 ± 16.3	98 ± 16.2	106 ± 17.6
> 11.0	112 ± 20.1	104 ± 19.9	107 ± 21.9	107 ± 21.3	121 ± 15.4	108 ± 21.2	119 ± 20.7
				Wood and Bark			
1.0-4.9	76 ± 6.4	--	--	--	--	76 ± 6.6	81 ± 7.7
5.0-10.9	74 ± 7.2	--	--	71 ± 8.6	81 ± 8.8	73 ± 8.0	82 ± 10.0
> 11.0	78 ± 6.7	72 ± 8.7	74 ± 8.5	73 ± 7.8	86 ± 2.9	75 ± 7.9	90 ± 7.8
				SWEETGUM			
				Wood			
1.0-4.9	106 ± 14.9	--	--	--	--	107 ± 15.4	101 ± 18.8
5.0-10.9	110 ± 13.5	--	--	111 ± 14.5	106 ± 15.2	111 ± 14.3	105 ± 10.5
> 11.0	113 ± 17.6	116 ± 19.9	112 ± 17.3	115 ± 19.7	101 ± 13.6	115 ± 19.6	102 ± 11.9
				Bark			
1.0-4.9	129 ± 16.3	--	--	--	--	128 ± 17.8	141 ± 23.5
5.0-10.9	110 ± 17.7	--	--	104 ± 20.1	117 ± 19.0	106 ± 19.8	131 ± 14.8
> 11.0	92 ± 19.9	88 ± 23.1	84 ± 20.5	86 ± 20.8	108 ± 31.8	86 ± 20.9	115 ± 22.3
				Wood and Bark			
1.0-4.9	110 ± 13.8	--	--	--	--	110 ± 14.3	113 ± 16.2
5.0-10.9	110 ± 12.2	--	--	110 ± 12.9	108 ± 13.2	110 ± 13.0	113 ± 9.3
> 11.0	110 ± 14.6	113 ± 16.9	106 ± 14.1	111 ± 16.6	101 ± 13.3	112 ± 16.8	105 ± 10.9
				WATER TUPELO			
				Wood			
1.0-4.9	92 ± 6.9	--	--	--	--	91 ± 7.1	107 ± 10.2
5.0-10.9	92 ± 4.5	--	--	89 ± 4.2	99 ± 9.6	91 ± 4.7	100 ± 12.0
> 11.0	93 ± 4.1	93 ± 6.3	94 ± 3.7	93 ± 4.6	96 ± 1.7	93 ± 4.5	92 ± 5.3

Continued

Table 3.--Average moisture content of wood, bark, and wood and bark combined, by tree component and size class, for hardwood species in the Gulf and Atlantic Coastal Plains--Continued

Tree size class (inches)	Average and standard deviation						
	Total tree	Stem					Branches
		Butt to 9-inch top	9-inch to 4-inch top	Butt to 4-inch top	4-inch to tip	Butt to tip	
	Percent						
				Bark			
1.0-4.9	114 ± 13.0	--	--	--	--	113 ± 14.8	117 ± 22.0
5.0-10.9	109 ± 9.8	--	--	105 ± 10.3	114 ± 11.9	107 ± 10.1	126 ± 16.8
> 11.0	111 ± 3.3	125 ± 9.8	116 ± 8.1	117 ± 6.4	117 ± 27.5	117 ± 7.0	104 ± 12.7
				Wood and Bark			
1.0-4.9	95 ± 6.1	--	--	--	--	95 ± 6.3	110 ± 11.3
5.0-10.9	94 ± 3.9	--	--	90 ± 3.7	102 ± 8.2	93 ± 4.1	108 ± 12.2
> 11.0	95 ± 3.7	96 ± 6.4	98 ± 3.9	96 ± 4.0	101 ± 6.7	96 ± 4.0	96 ± 8.0
				YELLOW-POPLAR			
				Wood			
1.0-4.9	--	--	--	--	--	--	--
5.0-10.9	111 ± 12.6	--	--	113 ± 14.4	104 ± 23.4	112 ± 13.9	103 ± 15.0
> 11.0	104 ± 7.6	105 ± 8.2	104 ± 8.5	105 ± 8.3	103 ± 9.5	105 ± 8.3	105 ± 11.1
				Bark			
1.0-4.9	--	--	--	--	--	--	--
5.0-10.9	144 ± 20.3	--	--	139 ± 25.0	149 ± 21.1	140 ± 24.9	154 ± 12.8
> 11.0	135 ± 14.7	137 ± 18.5	134 ± 15.2	136 ± 17.0	136 ± 11.2	136 ± 16.7	134 ± 16.1
				Wood and Bark			
1.0-4.9	--	--	--	--	--	--	--
5.0-10.9	115 ± 11.1	--	--	117 ± 13.2	113 ± 18.5	116 ± 12.7	117 ± 10.6
> 11.0	109 ± 7.1	110 ± 7.9	110 ± 7.9	110 ± 8.0	111 ± 8.5	109 ± 7.9	113 ± 11.6
				HARD HARDWOODS			
				Wood			
1.0-4.9	72 ± 11.7	--	--	--	--	72 ± 11.7	70 ± 13.9
5.0-10.9	73 ± 9.0	--	--	75 ± 9.7	71 ± 9.6	75 ± 9.6	68 ± 8.4
> 11.0	73 ± 11.2	77 ± 13.1	73 ± 11.4	76 ± 13.1	63 ± 8.8	76 ± 13.1	62 ± 7.8
				Bark			
1.0-4.9	107 ± 30.6	--	--	--	--	105 ± 28.8	114 ± 39.7
5.0-10.9	73 ± 16.9	--	--	71 ± 19.5	74 ± 18.4	72 ± 18.6	81 ± 17.9
> 11.0	66 ± 16.5	64 ± 17.5	64 ± 17.9	64 ± 17.9	69 ± 20.6	65 ± 17.9	69 ± 15.2
				Wood and Bark			
1.0-4.9	78 ± 10.7	--	--	--	--	78 ± 10.6	82 ± 15.1
5.0-10.9	73 ± 7.7	--	--	75 ± 8.2	71 ± 8.7	74 ± 8.0	71 ± 9.3
> 11.0	72 ± 8.9	76 ± 11.1	72 ± 9.3	75 ± 10.9	65 ± 7.7	75 ± 10.8	64 ± 6.7

Continued

Table 3.--Average moisture content of wood, bark, and wood and bark combined, by tree component and size class, for hardwood species in the Gulf and Atlantic Coastal Plains--Continued

Tree size class (inches)	Average and standard deviation						
	Total tree	Stem					Branches
		Butt to 9-inch top	9-inch to 4-inch top	Butt to 4-inch top	4-inch to tip	Butt to tip	
	Percent						
				HICKORY			
				Wood			
1.0-4.9	54 ± 5.0	--	--	--	--	53 ± 5.0	54 ± 7.5
5.0-10.9	55 ± 5.0	--	--	56 ± 6.0	51 ± 4.6	55 ± 5.1	58 ± 8.5
> 11.0	57 ± 5.3	60 ± 7.5	58 ± 6.0	58 ± 5.9	52 ± 5.7	58 ± 5.9	54 ± 6.2
				Bark			
1.0-4.9	105 ± 18.8	--	--	--	--	105 ± 19.3	105 ± 18.4
5.0-10.9	91 ± 18.6	--	--	91 ± 20.2	97 ± 20.3	92 ± 20.2	85 ± 14.1
> 11.0	96 ± 16.2	92 ± 15.3	94 ± 17.3	94 ± 17.4	106 ± 21.4	94 ± 17.6	97 ± 13.5
				Wood and Bark			
1.0-4.9	63 ± 5.6	--	--	--	--	66 ± 6.2	69 ± 9.2
5.0-10.9	60 ± 6.9	--	--	62 ± 8.5	61 ± 7.3	61 ± 7.9	66 ± 7.9
> 11.0	63 ± 5.2	66 ± 7.5	65 ± 6.2	64 ± 6.1	66 ± 8.8	64 ± 6.0	67 ± 6.6
				LAUREL OAK			
				Wood			
1.0-4.9	78 ± 5.7	--	--	--	--	78 ± 5.8	78 ± 6.6
5.0-10.9	77 ± 6.6	--	--	78 ± 7.9	72 ± 5.2	78 ± 7.6	69 ± 4.5
> 11.0	82 ± 5.5	88 ± 7.3	76 ± 5.4	87 ± 6.8	69 ± 2.8	86 ± 6.8	70 ± 0.9
				Bark			
1.0-4.9	89 ± 15.9	--	--	--	--	88 ± 17.2	98 ± 25.6
5.0-10.9	67 ± 7.5	--	--	62 ± 8.9	69 ± 11.8	62 ± 9.2	85 ± 13.6
> 11.0	62 ± 5.5	58 ± 9.5	56 ± 7.7	57 ± 8.0	58 ± 8.8	57 ± 7.8	74 ± 0.5
				Wood and Bark			
1.0-4.9	80 ± 6.2	--	--	--	--	80 ± 6.4	83 ± 9.1
5.0-10.9	75 ± 5.4	--	--	76 ± 6.6	71 ± 5.7	76 ± 6.4	73 ± 6.7
> 11.0	79 ± 4.5	84 ± 6.5	72 ± 5.8	82 ± 5.8	65 ± 4.3	82 ± 5.9	71 ± 0.8
				WATER OAK			
				Wood			
1.0-4.9	76 ± 6.2	--	--	--	--	78 ± 6.7	70 ± 6.8
5.0-10.9	75 ± 5.1	--	--	77 ± 6.0	71 ± 4.4	77 ± 5.7	66 ± 4.8
> 11.0	80 ± 7.5	86 ± 10.1	81 ± 10.4	85 ± 9.9	68 ± 5.4	85 ± 9.8	66 ± 2.5
				Bark			
1.0-4.9	103 ± 26.4	--	--	--	--	103 ± 31.8	107 ± 20.2
5.0-10.9	64 ± 10.2	--	--	61 ± 8.9	64 ± 12.5	62 ± 9.1	72 ± 15.4
> 11.0	61 ± 6.1	61 ± 7.3	61 ± 7.1	61 ± 7.3	62 ± 9.8	61 ± 7.3	61 ± 5.8

Continued

Table 3.--Average moisture content of wood, bark, and wood and bark combined, by tree component and size class, for hardwood species in the Gulf and Atlantic Coastal Plains--Continued

Tree size class (inches)	Average and standard deviation						
	Total tree	Stem					Branches
		Butt to 9-inch top	9-inch to 4-inch top	Butt to 4-inch top	4-inch to tip	Butt to tip	
	Percent						
				Wood and Bark			
1.0-4.9	80 ± 8.3	--	--	--	--	82 ± 9.9	81 ± 9.6
5.0-10.9	73 ± 4.6	--	--	75 ± 5.5	70 ± 5.0	75 ± 5.2	68 ± 6.3
> 11.0	77 ± 6.2	83 ± 8.9	78 ± 8.8	82 ± 8.7	67 ± 4.9	82 ± 8.6	65 ± 2.5
				WHITE OAK			
				Wood			
1.0-4.9	--	--	--	--	--	--	--
5.0-10.9	69 ± 5.6	--	--	71 ± 7.2	69 ± 9.8	71 ± 7.0	63 ± 2.9
> 11.0	66 ± 5.7	70 ± 6.7	67 ± 5.0	69 ± 6.5	59 ± 6.2	69 ± 6.5	57 ± 4.8
				Bark			
1.0-4.9	--	--	--	--	--	--	--
5.0-10.9	81 ± 4.6	--	--	82 ± 7.8	77 ± 6.3	82 ± 7.1	78 ± 2.3
> 11.0	59 ± 14.0	57 ± 17.6	57 ± 16.8	57 ± 17.0	63 ± 13.7	57 ± 16.9	63 ± 10.5
				Wood and Bark			
1.0-4.9	--	--	--	--	--	--	--
5.0-10.9	71 ± 4.7	--	--	73 ± 5.9	71 ± 8.2	72 ± 5.7	67 ± 2.5
> 11.0	65 ± 6.5	68 ± 7.6	66 ± 5.7	68 ± 7.4	60 ± 8.2	68 ± 7.3	59 ± 5.7
				ALL SPECIES			
				Wood			
1.0-4.9	74 ± 18.3	--	--	--	--	74 ± 18.7	76 ± 19.5
5.0-10.9	91 ± 21.7	--	--	92 ± 22.3	90 ± 22.7	92 ± 22.1	89 ± 20.5
> 11.0	91 ± 22.8	94 ± 23.5	91 ± 22.7	93 ± 23.5	84 ± 21.8	93 ± 23.4	86 ± 22.1
				Bark			
1.0-4.9	111 ± 21.3	--	--	--	--	110 ± 21.3	115 ± 27.8
5.0-10.9	100 ± 23.2	--	--	96 ± 24.7	105 ± 25.8	98 ± 24.6	114 ± 26.1
> 11.0	87 ± 26.3	86 ± 30.2	83 ± 27.5	84 ± 27.9	92 ± 31.3	84 ± 27.8	96 ± 28.3
				Wood and Bark			
1.0-4.9	80 ± 16.3	--	--	--	--	81 ± 16.0	87 ± 17.9
5.0-10.9	92 ± 20.1	--	--	92 ± 20.3	93 ± 20.5	92 ± 20.2	96 ± 21.0
> 11.0	90 ± 20.5	93 ± 21.1	89 ± 19.6	92 ± 21.0	85 ± 20.2	92 ± 21.1	88 ± 21.4

Table 4.--Average proportion of wood and bark green weight in bark, by tree component and size class, for hardwood species in the Gulf and Atlantic Coastal Plains

Tree size class (inches)	Average and standard deviation						
	Total tree	Stem					Branches
		Butt to 9-inch top	9-inch to 4-inch top	Butt to 4-inch top	4-inch to tip	Butt to tip	
	Percent						
				SOFT HARDWOODS			
1.0-4.9	20 ± 4.1	--	--	--	--	19 ± 4.3	32 ± 6.6
5.0-10.9	14 ± 2.9	--	--	12 ± 2.8	20 ± 5.7	13 ± 2.9	29 ± 4.2
> 11.0	14 ± 2.6	11 ± 2.9	16 ± 4.7	12 ± 2.7	28 ± 7.1	12 ± 2.6	25 ± 4.0
				GREEN ASH			
1.0-4.9	23 ± 2.5	--	--	--	--	22 ± 2.4	35 ± 5.6
5.0-10.9	16 ± 2.3	--	--	14 ± 2.4	22 ± 3.6	15 ± 2.3	33 ± 4.6
> 11.0	16 ± 1.6	12 ± 1.8	19 ± 6.4	13 ± 1.5	26 ± 5.7	14 ± 1.5	27 ± 3.9
				BLACKGUM			
1.0-4.9	20 ± 3.1	--	--	--	--	19 ± 3.1	30 ± 5.6
5.0-10.9	16 ± 3.1	--	--	13 ± 2.9	23 ± 6.9	14 ± 2.9	27 ± 3.5
> 11.0	14 ± 2.2	11 ± 2.6	16 ± 5.3	12 ± 2.3	29 ± 7.9	12 ± 2.3	24 ± 3.9
				RED MAPLE			
1.0-4.9	18 ± 2.0	--	--	--	--	16 ± 2.0	29 ± 4.3
5.0-10.9	16 ± 3.1	--	--	13 ± 3.4	19 ± 4.4	14 ± 3.8	28 ± 5.1
> 11.0	16 ± 1.2	12 ± 0.5	17 ± 3.0	13 ± 0.7	21 ± 3.0	13 ± 0.7	23 ± 3.7
				SWEETGUM			
1.0-4.9	18 ± 4.5	--	--	--	--	17 ± 4.6	32 ± 5.7
5.0-10.9	14 ± 2.6	--	--	11 ± 2.5	19 ± 5.8	12 ± 2.7	30 ± 3.7
> 11.0	13 ± 2.2	10 ± 2.5	16 ± 4.4	11 ± 2.4	27 ± 6.7	11 ± 2.4	24 ± 3.4
				WATER TULPELO			
1.0-4.9	18 ± 3.9	--	--	--	--	17 ± 3.9	31 ± 6.7
5.0-10.9	13 ± 0.9	--	--	10 ± 0.8	16 ± 2.2	12 ± 0.8	29 ± 2.7
> 11.0	14 ± 0.8	10 ± 1.0	17 ± 4.0	11 ± 0.4	25 ± 2.6	11 ± 0.5	28 ± 6.5
				YELLOW-POPLAR			
1.0-4.9	--	--	--	--	--	--	--
5.0-10.9	16 ± 1.3	--	--	13 ± 0.9	22 ± 7.3	14 ± 1.1	29 ± 3.2
> 11.0	17 ± 2.4	15 ± 2.6	16 ± 2.7	15 ± 2.5	27 ± 6.9	15 ± 2.5	27 ± 3.6
				HARD HARDWOODS			
1.0-4.9	20 ± 4.2	--	--	--	--	18 ± 4.7	27 ± 5.1
5.0-10.9	16 ± 2.7	--	--	13 ± 2.8	19 ± 5.9	14 ± 2.9	25 ± 3.8
> 11.0	16 ± 3.2	13 ± 3.2	16 ± 3.7	13 ± 3.1	27 ± 7.3	13 ± 3.0	23 ± 5.1

Continued

Table 4.--Average proportion of wood and bark green weight in bark, by tree component and size class, for hardwood species in the Gulf and Atlantic Coastal Plains--Continued

Tree size class (inches)	Average and standard deviation						
		Stem					
	Total tree	Butt to 9-inch top	9-inch to 4-inch top	Butt to 4-inch top	4-inch to tip	Butt to tip	Branches
	Percent						
				HICKORY			
1.0-4.9	24 ± 3.6	--	--	--	--	23 ± 3.9	32 ± 2.8
5.0-10.9	18 ± 2.8	--	--	16 ± 2.5	22 ± 3.6	17 ± 2.9	31 ± 2.9
> 11.0	21 ± 4.2	17 ± 3.8	19 ± 3.2	17 ± 3.3	28 ± 6.4	18 ± 3.3	30 ± 6.4
				LAUREL OAK			
1.0-4.9	21 ± 2.8	--	--	--	--	20 ± 3.5	27 ± 4.1
5.0-10.9	16 ± 3.1	--	--	14 ± 3.5	24 ± 8.3	15 ± 3.4	24 ± 1.9
> 11.0	15 ± 1.7	12 ± 3.0	19 ± 3.6	13 ± 2.6	31 ± 7.4	14 ± 2.6	18 ± 1.4
				WATER OAK			
1.0-4.9	19 ± 2.8	--	--	--	--	17 ± 2.8	28 ± 3.6
5.0-10.9	16 ± 2.3	--	--	13 ± 2.2	19 ± 4.6	14 ± 2.3	25 ± 3.4
> 11.0	15 ± 1.8	13 ± 2.2	15 ± 2.9	13 ± 2.1	22 ± 5.2	13 ± 2.1	21 ± 2.4
				WHITE OAK			
1.0-4.9	--	--	--	--	--	--	--
5.0-10.9	16 ± 1.1	--	--	13 ± 1.3	20 ± 2.0	14 ± 1.4	26 ± 1.7
> 11.0	15 ± 2.1	11 ± 2.4	15 ± 3.1	11 ± 2.2	31 ± 6.0	11 ± 2.2	25 ± 3.1
				ALL SPECIES			
1.0-4.9	20 ± 4.1	--	--	--	--	19 ± 4.4	30 ± 6.6
5.0-10.9	15 ± 2.9	--	--	12 ± 2.9	20 ± 5.8	13 ± 2.9	29 ± 4.5
> 11.0	14 ± 2.9	11 ± 3.1	16 ± 4.4	12 ± 2.9	27 ± 7.2	12 ± 2.9	24 ± 4.5

Table 5.--Average green weight per cubic foot of wood, bark, and wood and bark combined, by tree component and size class, for hardwood species in the Gulf and Atlantic Coastal Plains

Tree size class (inches)	Average and standard deviation						
	Total tree	Stem					Branches
		Butt to 9-inch top	9-inch to 4-inch top	Butt to 4-inch top	4-inch to tip	Butt to tip	
	Pounds per cubic foot						
SOFT HARDWOODS							
Wood							
1.0-4.9	50 ± 7.0	--	--	--	--	50 ± 7.4	52 ± 7.8
5.0-10.9	58 ± 6.7	--	--	58 ± 7.2	62 ± 8.7	58 ± 7.0	58 ± 5.4
11.0	60 ± 6.0	59 ± 7.2	60 ± 7.5	60 ± 6.6	60 ± 7.6	60 ± 6.5	60 ± 4.1
Bark							
1.0-4.9	54 ± 6.8	--	--	--	--	53 ± 7.9	57 ± 11.3
5.0-10.9	52 ± 5.9	--	--	49 ± 7.4	56 ± 6.9	50 ± 6.5	59 ± 4.8
> 11.0	54 ± 4.7	52 ± 5.6	53 ± 5.9	52 ± 5.4	57 ± 4.8	52 ± 5.3	58 ± 4.2
Wood and Bark							
1.0-4.9	51 ± 5.6	--	--	--	--	51 ± 6.0	53 ± 5.2
5.0-10.9	57 ± 5.6	--	--	56 ± 6.1	60 ± 7.2	57 ± 5.9	58 ± 4.6
> 11.0	59 ± 5.4	58 ± 6.6	59 ± 6.4	59 ± 6.1	59 ± 5.8	59 ± 6.0	60 ± 3.3
GREEN ASH							
Wood							
1.0-4.9	45 ± 4.8	--	--	--	--	45 ± 5.3	50 ± 7.8
5.0-10.9	49 ± 4.4	--	--	47 ± 5.7	55 ± 8.9	48 ± 4.5	52 ± 3.3
> 11.0	49 ± 2.4	48 ± 2.3	49 ± 7.0	48 ± 2.4	57 ± 9.7	48 ± 2.4	55 ± 2.4
Bark							
1.0-4.9	54 ± 3.6	--	--	--	--	54 ± 3.5	57 ± 11.4
5.0-10.9	52 ± 3.0	--	--	50 ± 3.3	55 ± 4.2	51 ± 3.2	58 ± 4.1
> 11.0	53 ± 3.7	50 ± 2.6	51 ± 4.9	51 ± 3.5	59 ± 3.6	51 ± 3.4	59 ± 4.6
Wood and Bark							
1.0-4.9	47 ± 3.9	--	--	--	--	47 ± 4.3	52 ± 5.1
5.0-10.9	49 ± 3.9	--	--	48 ± 5.0	55 ± 7.2	49 ± 4.0	54 ± 3.1
> 11.0	49 ± 2.4	49 ± 2.0	50 ± 5.9	48 ± 2.4	57 ± 6.6	48 ± 2.3	56 ± 2.4
BLACKGUM							
Wood							
1.0-4.9	48 ± 5.9	--	--	--	--	48 ± 6.3	56 ± 5.3
5.0-10.9	56 ± 4.4	--	--	55 ± 5.5	60 ± 6.9	56 ± 4.7	57 ± 3.1
> 11.0	58 ± 3.5	56 ± 5.4	60 ± 5.9	58 ± 3.8	58 ± 7.5	58 ± 3.7	61 ± 3.5
Bark							
1.0-4.9	52 ± 8.1	--	--	--	--	52 ± 8.6	60 ± 7.4
5.0-10.9	49 ± 4.0	--	--	48 ± 4.6	51 ± 5.4	48 ± 4.4	56 ± 2.7
> 11.0	50 ± 3.5	49 ± 4.6	49 ± 4.6	49 ± 4.2	53 ± 3.3	49 ± 4.1	56 ± 3.1
Wood and Bark							
1.0-4.9	49 ± 4.8	--	--	--	--	48 ± 5.1	57 ± 4.7
5.0-10.9	55 ± 3.9	--	--	54 ± 4.8	58 ± 5.7	54 ± 4.2	57 ± 2.3
> 11.0	57 ± 3.1	55 ± 4.9	58 ± 5.0	56 ± 3.5	56 ± 5.0	56 ± 3.4	59 ± 2.5

Continued

Table 5.--Average green weight per cubic foot of wood, bark, and wood and bark combined, by tree component and size class, for hardwood species in the Gulf and Atlantic Coastal Plains--Continued

Tree size class (inches)	Average and standard deviation						
	Total tree	Stem					Branches
		Butt to 9-inch top	9-inch to 4-inch top	Butt to 4-inch top	4-inch to tip	Butt to tip	
	Pounds per cubic foot						
				RED MAPLE			
				Wood			
1.0-4.9	52 ± 3.5	--	--	--	--	53 ± 3.8	49 ± 4.0
5.0-10.9	52 ± 3.6	--	--	52 ± 4.0	55 ± 6.9	52 ± 4.1	51 ± 4.2
> 11.0	53 ± 4.2	53 ± 4.7	54 ± 6.6	53 ± 4.8	56 ± 7.1	53 ± 4.8	51 ± 2.3
				Bark			
1.0-4.9	63 ± 3.8	--	--	--	--	63 ± 3.5	64 ± 14.8
5.0-10.9	63 ± 2.6	--	--	62 ± 3.6	64 ± 4.0	63 ± 3.4	62 ± 4.5
> 11.0	64 ± 1.9	65 ± 2.2	66 ± 3.6	65 ± 2.5	64 ± 3.4	65 ± 2.6	63 ± 1.3
				Wood and Bark			
1.0-4.9	54 ± 3.1	--	--	--	--	54 ± 3.4	52 ± 3.0
5.0-10.9	53 ± 3.2	--	--	53 ± 3.6	56 ± 5.9	53 ± 3.6	53 ± 4.1
> 11.0	54 ± 3.7	54 ± 4.3	55 ± 5.3	54 ± 4.4	58 ± 5.4	54 ± 4.4	54 ± 1.8
				SWEETGUM			
				Wood			
1.0-4.9	57 ± 5.7	--	--	--	--	57 ± 6.2	58 ± 5.8
5.0-10.9	63 ± 4.5	--	--	63 ± 4.6	65 ± 7.9	63 ± 4.7	62 ± 3.6
> 11.0	64 ± 4.3	65 ± 5.2	63 ± 6.7	65 ± 4.9	64 ± 6.4	65 ± 4.8	62 ± 3.4
				Bark			
1.0-4.9	52 ± 6.4	--	--	--	--	51 ± 7.7	59 ± 8.2
5.0-10.9	50 ± 4.6	--	--	46 ± 6.0	56 ± 6.2	49 ± 4.9	61 ± 3.3
> 11.0	56 ± 3.3	54 ± 5.0	56 ± 3.6	54 ± 4.1	60 ± 4.0	55 ± 4.0	61 ± 2.9
				Wood and Bark			
1.0-4.9	56 ± 4.9	--	--	--	--	56 ± 5.4	58 ± 4.0
5.0-10.9	61 ± 4.1	--	--	61 ± 4.3	63 ± 6.9	61 ± 4.4	61 ± 3.0
> 11.0	63 ± 3.8	64 ± 4.7	62 ± 5.6	64 ± 4.4	63 ± 4.9	64 ± 4.3	62 ± 2.6
				WATER TUPELO			
				Wood			
1.0-4.9	55 ± 3.6	--	--	--	--	55 ± 3.7	53 ± 10.6
5.0-10.9	56 ± 3.4	--	--	54 ± 4.0	64 ± 3.6	56 ± 3.6	57 ± 3.7
> 11.0	53 ± 4.1	54 ± 4.4	48 ± 3.3	52 ± 4.8	58 ± 5.0	52 ± 4.7	57 ± 1.9
				Bark			
1.0-4.9	45 ± 1.9	--	--	--	--	44 ± 2.0	51 ± 11.9
5.0-10.9	48 ± 2.8	--	--	46 ± 2.8	51 ± 4.4	47 ± 2.9	53 ± 3.8
> 11.0	48 ± 2.0	47 ± 3.0	47 ± 2.3	47 ± 2.6	52 ± 0.7	47 ± 2.4	52 ± 0.6

Continued

Table 5.--Average green weight per cubic foot of wood, bark, and wood and bark combined, by tree component and size class, for hardwood species in the Gulf and Atlantic Coastal Plains--Continued

Tree size class (inches)	Average and standard deviation						
		Stem					
	Total tree	Butt to 9-inch top	9-inch to 4-inch top	Butt to 4-inch top	4-inch to tip	Butt to tip	Branches
	Pounds per cubic foot						
				Wood and Bark			
1.0-4.9	53 ± 2.8	--	--	--	--	53 ± 2.9	52 ± 4.8
5.0-10.9	55 ± 2.9	--	--	53 ± 3.4	62 ± 3.2	55 ± 3.1	55 ± 3.3
> 11.0	52 ± 3.8	54 ± 4.2	48 ± 3.0	51 ± 4.5	56 ± 3.5	52 ± 4.3	56 ± 1.4
				YELLOW-POPLAR			
				Wood			
1.0-4.9	--	--	--	--	--	--	--
5.0-10.9	51 ± 3.3	--	--	52 ± 3.5	47 ± 6.5	51 ± 3.4	54 ± 5.2
> 11.0	55 ± 4.4	55 ± 4.9	61 ± 9.2	55 ± 4.7	59 ± 5.1	55 ± 4.6	58 ± 3.3
				Bark			
1.0-4.9	--	--	--	--	--	--	--
5.0-10.9	53 ± 3.9	--	--	52 ± 4.7	58 ± 10.4	52 ± 4.7	58 ± 2.3
> 11.0	51 ± 2.4	49 ± 2.4	52 ± 2.3	50 ± 2.3	59 ± 2.2	50 ± 2.3	57 ± 3.4
				Wood and Bark			
1.0-4.9	--	--	--	--	--	--	--
5.0-10.9	52 ± 3.1	--	--	52 ± 3.3	49 ± 6.0	51 ± 3.2	55 ± 4.3
> 11.0	55 ± 3.8	54 ± 4.3	59 ± 7.4	54 ± 4.1	59 ± 4.2	54 ± 4.1	58 ± 3.0
				HARD HARDWOODS			
				Wood			
1.0-4.9	62 ± 5.8	--	--	--	--	63 ± 6.8	62 ± 6.0
5.0-10.9	66 ± 4.6	--	--	66 ± 5.4	68 ± 8.0	67 ± 5.0	64 ± 4.7
> 11.0	66 ± 3.7	67 ± 4.6	67 ± 7.9	66 ± 4.4	64 ± 7.9	66 ± 4.3	65 ± 3.1
				Bark			
1.0-4.9	60 ± 6.7	--	--	--	--	61 ± 6.8	60 ± 10.9
5.0-10.9	63 ± 5.2	--	--	64 ± 6.1	63 ± 5.6	64 ± 6.0	60 ± 4.7
> 11.0	63 ± 5.3	64 ± 6.9	64 ± 6.1	64 ± 6.7	62 ± 5.0	64 ± 6.6	62 ± 4.9
				Wood and Bark			
1.0-4.9	62 ± 5.3	--	--	--	--	62 ± 6.2	61 ± 5.4
5.0-10.9	66 ± 4.2	--	--	66 ± 5.0	67 ± 6.7	66 ± 4.6	63 ± 4.0
> 11.0	66 ± 3.7	66 ± 4.4	66 ± 7.0	66 ± 4.3	64 ± 6.1	66 ± 4.2	64 ± 3.2
				HICKORY			
				Wood			
1.0-4.9	61 ± 3.4	--	--	--	--	61 ± 4.1	57 ± 3.2
5.0-10.9	63 ± 4.6	--	--	64 ± 5.5	63 ± 7.5	64 ± 5.0	54 ± 5.0
> 11.0	60 ± 2.8	65 ± 4.8	66 ± 4.9	64 ± 3.7	60 ± 5.9	64 ± 3.7	60 ± 3.1

Continued

Table 5.--Average green weight per cubic foot of wood, bark, and wood and bark combined, by tree component and size class, for hardwood species in the Gulf and Atlantic Coastal Plains--Continued

Tree size class (inches)	Average and standard deviation						
	Total tree	Stem					Branches
		Butt to 9-inch top	9-inch to 4-inch top	Butt to 4-inch top	4-inch to tip	Butt to tip	
	Pounds per cubic foot						
				Bark			
1.0-4.9	63 ± 4.8	--	--	--	--	63 ± 5.0	62 ± 6.8
5.0-10.9	57 ± 1.8	--	--	57 ± 2.2	57 ± 2.6	57 ± 2.1	55 ± 2.7
> 11.0	60 ± 2.9	61 ± 2.4	63 ± 3.4	61 ± 2.2	62 ± 3.1	61 ± 2.2	58 ± 4.5
				Wood and Bark			
1.0-4.9	61 ± 3.0	--	--	--	--	62 ± 3.4	59 ± 2.7
5.0-10.9	61 ± 4.1	--	--	63 ± 4.8	61 ± 6.2	62 ± 4.5	54 ± 3.9
> 11.0	63 ± 2.2	64 ± 3.9	65 ± 4.2	64 ± 3.0	60 ± 4.1	64 ± 3.0	59 ± 3.3
				LAUREL OAK			
				Wood			
1.0-4.9	62 ± 5.3	--	--	--	--	61 ± 6.4	68 ± 4.7
5.0-10.9	69 ± 2.2	--	--	69 ± 2.9	70 ± 10.5	70 ± 2.9	67 ± 2.5
> 11.0	67 ± 2.7	68 ± 4.3	66 ± 5.6	68 ± 3.7	63 ± 7.2	67 ± 3.7	67 ± 0.6
				Bark			
1.0-4.9	65 ± 4.3	--	--	--	--	64 ± 4.7	69 ± 11.6
5.0-10.9	66 ± 6.0	--	--	67 ± 7.1	65 ± 6.3	66 ± 7.0	63 ± 4.8
> 11.0	68 ± 4.4	69 ± 7.0	69 ± 3.3	69 ± 6.3	68 ± 3.8	69 ± 6.2	68 ± 1.1
				Wood and Bark			
1.0-4.9	62 ± 4.3	--	--	--	--	62 ± 5.3	68 ± 3.8
5.0-10.9	68 ± 2.3	--	--	69 ± 2.9	69 ± 8.5	69 ± 2.9	65 ± 2.0
> 11.0	67 ± 2.5	68 ± 4.1	66 ± 4.9	68 ± 3.6	64 ± 5.3	68 ± 3.5	67 ± 0.5
				WATER OAK			
				Wood			
1.0-4.9	67 ± 3.9	--	--	--	--	67 ± 4.8	65 ± 2.8
5.0-10.9	68 ± 3.0	--	--	68 ± 3.8	69 ± 6.8	68 ± 3.6	66 ± 1.8
> 11.0	67 ± 2.4	67 ± 3.4	68 ± 7.3	68 ± 2.9	67 ± 5.4	68 ± 2.9	66 ± 1.5
				Bark			
1.0-4.9	63 ± 3.9	--	--	--	--	65 ± 5.3	61 ± 6.2
5.0-10.9	64 ± 2.9	--	--	66 ± 3.2	65 ± 3.3	66 ± 3.0	60 ± 4.1
> 11.0	66 ± 2.1	69 ± 2.3	68 ± 2.7	69 ± 2.3	64 ± 3.8	69 ± 2.3	62 ± 3.5
				Wood and Bark			
1.0-4.9	66 ± 3.5	--	--	--	--	67 ± 4.3	64 ± 2.2
5.0-10.9	67 ± 2.6	--	--	68 ± 3.3	68 ± 5.7	68 ± 3.2	64 ± 1.9
> 11.0	67 ± 2.1	68 ± 3.1	68 ± 6.4	68 ± 2.7	67 ± 4.3	68 ± 2.6	65 ± 1.4

Continued

Table 5.--Average green weight per cubic foot of wood, bark, and wood and bark combined, by tree component and size class, for hardwood species in the Gulf and Atlantic Coastal Plains--Continued

Tree size class (inches)	Average and standard deviation						
		Stem					
	Total tree	Butt to 9-inch top	9-inch to 4-inch top	Butt to 4-inch top	4-inch to tip	Butt to tip	Branches
	Pounds per cubic foot						
	WHITE OAK						
	Wood						
1.0-4.9	--	--	--	--	--	--	--
5.0-10.9	69 ± 2.3	--	--	70 ± 3.6	67 ± 4.2	70 ± 3.0	63 ± 1.1
> 11.0	66 ± 4.1	66 ± 5.1	68 ± 8.1	67 ± 4.9	64 ± 10.1	67 ± 4.9	66 ± 1.7
	Bark						
1.0-4.9	--	--	--	--	--	--	--
5.0-10.9	61 ± 3.5	--	--	60 ± 5.4	60 ± 3.8	60 ± 5.2	64 ± 0.9
> 11.0	60 ± 3.2	60 ± 4.1	60 ± 3.7	59 ± 3.7	60 ± 2.8	59 ± 3.7	62 ± 3.7
	Wood and Bark						
1.0-4.9	--	--	--	--	--	--	--
5.0-10.9	67 ± 2.0	--	--	69 ± 3.1	65 ± 3.3	68 ± 2.5	63 ± 1.0
> 11.0	65 ± 3.5	66 ± 4.5	67 ± 6.7	66 ± 4.3	63 ± 7.3	66 ± 4.3	65 ± 2.0
	ALL SPECIES						
	Wood						
1.0-4.9	54 ± 8.6	--	--	--	--	54 ± 9.1	55 ± 8.4
5.0-10.9	60 ± 7.1	--	--	60 ± 7.7	63 ± 8.9	60 ± 7.4	59 ± 5.8
> 11.0	62 ± 6.1	62 ± 7.3	63 ± 8.2	62 ± 6.8	62 ± 7.9	62 ± 6.7	62 ± 4.4
	Bark						
1.0-4.9	56 ± 7.4	--	--	--	--	56 ± 8.4	58 ± 11.2
5.0-10.9	54 ± 7.4	--	--	52 ± 9.5	57 ± 7.3	53 ± 8.5	59 ± 4.8
> 11.0	57 ± 6.8	56 ± 8.4	57 ± 8.0	56 ± 8.2	59 ± 5.4	56 ± 8.1	60 ± 4.7
	Wood and Bark						
1.0-4.9	54 ± 7.4	--	--	--	--	54 ± 8.0	56 ± 6.2
5.0-10.9	59 ± 6.4	--	--	58 ± 7.0	62 ± 7.6	59 ± 6.7	59 ± 4.8
> 11.0	61 ± 5.9	61 ± 7.0	62 ± 7.4	61 ± 6.6	61 ± 6.3	61 ± 6.5	61 ± 3.9

Table 6.--Average green weight of wood and bark per cubic foot of wood, by tree component and size class, for hardwood species in the Gulf and Atlantic Coastal Plains

Tree size class (inches)	Average and standard deviation						
		Stem					
	Total tree	Butt to 9-inch top	9-inch to 4-inch top	Butt to 4-inch top	4-inch to tip	Butt to tip	Branches
	Pounds per cubic foot						
				SOFT HARDWOODS			
1.0-4.9	63 ± 7.4	--	--	--	--	62 ± 7.8	77 ± 10.4
5.0-10.9	68 ± 7.2	--	--	65 ± 7.6	77 ± 9.3	67 ± 7.3	82 ± 8.7
> 11.0	69 ± 6.3	66 ± 7.6	72 ± 8.2	67 ± 6.8	84 ± 10.1	68 ± 6.8	80 ± 5.6
				GREEN ASH			
1.0-4.9	59 ± 6.2	--	--	--	--	57 ± 6.8	77 ± 9.5
5.0-10.9	58 ± 5.4	--	--	55 ± 6.7	70 ± 11.2	57 ± 5.5	77 ± 5.5
> 11.0	58 ± 3.2	55 ± 3.0	61 ± 6.9	55 ± 3.1	76 ± 8.4	55 ± 3.0	75 ± 5.2
				BLACKGUM			
1.0-4.9	61 ± 7.6	--	--	--	--	59 ± 7.8	80 ± 7.8
5.0-10.9	66 ± 6.2	--	--	63 ± 7.1	79 ± 7.9	65 ± 6.3	79 ± 4.6
> 11.0	67 ± 4.7	63 ± 6.8	71 ± 6.7	65 ± 4.7	82 ± 11.6	66 ± 4.7	80 ± 5.1
				RED MAPLE			
1.0-4.9	64 ± 4.1	--	--	--	--	63 ± 4.4	69 ± 6.1
5.0-10.9	62 ± 4.1	--	--	59 ± 4.1	67 ± 7.7	60 ± 4.2	70 ± 7.7
> 11.0	63 ± 4.8	60 ± 5.1	65 ± 6.8	61 ± 5.5	71 ± 7.1	61 ± 5.5	67 ± 3.9
				SWEETGUM			
1.0-4.9	70 ± 6.2	--	--	--	--	68 ± 6.5	84 ± 8.5
5.0-10.9	73 ± 4.2	--	--	71 ± 4.5	81 ± 7.2	72 ± 4.3	88 ± 5.9
> 11.0	74 ± 4.3	72 ± 5.2	75 ± 7.0	72 ± 4.8	88 ± 7.2	73 ± 4.8	81 ± 4.8
				WATER TUPELO			
1.0-4.9	66 ± 4.6	--	--	--	--	66 ± 4.7	77 ± 11.8
5.0-10.9	64 ± 3.9	--	--	60 ± 4.2	77 ± 4.5	63 ± 4.1	79 ± 5.2
> 11.0	61 ± 4.4	60 ± 5.0	57 ± 5.6	58 ± 5.4	77 ± 6.6	59 ± 5.2	80 ± 5.6
				YELLOW-POPLAR			
1.0-4.9	--	--	--	--	--	--	--
5.0-10.9	61 ± 3.9	--	--	59 ± 4.1	60 ± 5.8	59 ± 4.0	76 ± 6.6
> 11.0	66 ± 4.8	64 ± 5.3	73 ± 11.2	65 ± 4.8	81 ± 7.3	65 ± 4.8	80 ± 5.8
				HARD HARDWOODS			
1.0-4.9	78 ± 7.2	--	--	--	--	77 ± 8.2	85 ± 8.1
5.0-10.9	78 ± 5.9	--	--	77 ± 6.8	84 ± 10.0	77 ± 6.3	85 ± 6.4
> 11.0	78 ± 4.2	76 ± 4.8	80 ± 9.5	76 ± 4.8	88 ± 9.2	77 ± 4.8	85 ± 5.7

Continued

Table 6.--Average green weight of wood and bark per cubic foot of wood, by tree component and size class, for hardwood species in the Gulf and Atlantic Coastal Plains--Continued

Tree size class (inches)	Average and standard deviation						
	Total tree	Stem					Branches
		Butt to 9-inch top	9-inch to 4-inch top	Butt to 4-inch top	4-inch to tip	Butt to tip	
	Pounds per cubic foot						
				HICKORY			
1.0-4.9	80 ± 5.2	--	--	--	--	80 ± 5.8	84 ± 3.3
5.0-10.9	77 ± 4.2	--	--	76 ± 5.9	80 ± 9.4	76 ± 5.0	79 ± 5.3
> 11.0	80 ± 4.5	77 ± 4.6	81 ± 6.9	78 ± 4.1	83 ± 7.9	78 ± 4.1	87 ± 10.4
				LAUREL OAK			
1.0-4.9	79 ± 7.1	--	--	--	--	76 ± 8.3	92 ± 5.0
5.0-10.9	82 ± 3.8	--	--	81 ± 4.0	92 ± 10.8	82 ± 4.4	87 ± 3.4
> 11.0	79 ± 2.9	77 ± 4.1	81 ± 7.7	78 ± 3.8	91 ± 4.9	78 ± 3.8	81 ± 0.8
				WATER OAK			
1.0-4.9	82 ± 4.5	--	--	--	--	80 ± 5.1	90 ± 2.9
5.0-10.9	80 ± 3.2	--	--	78 ± 4.0	84 ± 7.4	79 ± 3.7	88 ± 3.8
> 11.0	79 ± 3.1	77 ± 4.0	80 ± 8.4	78 ± 3.4	86 ± 6.5	78 ± 3.4	83 ± 3.4
				WHITE OAK			
1.0-4.9	-	--	--	--	--	--	--
5.0-10.9	82 ± 3.0	--	--	81 ± 4.7	84 ± 5.7	81 ± 4.0	86 ± 0.4
> 11.0	78 ± 4.5	74 ± 5.0	80 ± 9.9	75 ± 5.1	93 ± 11.3	75 ± 5.1	88 ± 3.4
				ALL SPECIES			
1.0-4.9	67 ± 9.9	--	--	--	--	66 ± 10.3	79 ± 10.4
5.0-10.9	71 ± 8.1	--	--	68 ± 8.7	78 ± 9.9	69 ± 8.2	83 ± 8.3
> 11.0	72 ± 7.2	70 ± 8.2	75 ± 9.4	70 ± 7.6	85 ± 10.0	71 ± 7.5	82 ± 6.1

Table 7.--Regression equations for estimating green and dry weight of the above-stump total-tree wood, bark and foliage, wood and bark combined, and wood alone for hardwood species in the Gulf and Atlantic Coastal Plains, with d.b.h. as the independent variable

Species or species group	Weight green or dry	Regression equation coefficients: Trees < 11.0 in d.b.h.[1] a'	b	Trees > 11.0 in d.b.h.[2] a"	b	Coefficient of determination (R^2)	Standard error[3] ($S_{y.x}$)
		TOTAL-TREE WOOD, BARK, AND FOLIAGE					
Soft Hardwoods	Green	4.12471	1.22173	2.85269	1.29862	0.99	0.0906
	Dry	2.30894	1.20171	1.77809	1.25619	0.99	0.0925
Sweetgum	Green	4.03105	1.25174	3.40394	1.28700	0.99	0.0682
	Dry	1.82108	1.26350	1.72982	1.27422	0.99	0.0750
Blackgum	Green	4.44066	1.19024	2.67067	1.29626	0.99	0.0673
	Dry	2.51790	1.16725	1.35415	1.29659	0.99	0.0725
Yellow-poplar	Green	2.63257	1.32921	6.44693	1.14245	0.99	0.0513
	Dry	1.26986	1.31689	2.31097	1.19204	0.99	0.0513
Water tupelo	Green	3.76613	1.18246			0.99	0.0614
	Dry	1.88335	1.18842			0.99	0.0592
Green ash	Green	4.81132	1.13845			0.98	0.1078
	Dry	2.76583	1.15849			0.98	0.1056
Red maple	Green	4.54559	1.19158			0.99	0.0699
	Dry	2.52363	1.19648			0.99	0.0739
Hard Hardwoods	Green	5.93066	1.18870	4.89242	1.22882	0.99	0.0791
	Dry	3.21016	1.20430	2.94963	1.22195	0.99	0.0810
White oak	Green	4.77576	1.22086	2.80326	1.33196	0.98	0.0635
	Dry	2.39278	1.25903	1.64515	1.33715	0.98	0.0662
Water oak	Green	6.57657	1.18389	8.00403	1.14293	0.99	0.0598
	Dry	3.47724	1.20469	6.13318	1.08636	0.99	0.0616
Laurel oak	Green	5.93636	1.18338	12.24608	1.03239	0.99	0.0781
	Dry	3.18283	1.19758	9.68515	0.96554	0.99	0.0788
Hickory	Green	5.48349	1.18344	2.40391	1.35539	0.99	0.0673
	Dry	3.20895	1.19583	1.65480	1.33392	0.99	0.0696
All Species	Green	4.87165	1.20101	3.10292	1.29507	0.99	0.1016
	Dry	2.70669	1.19345	1.86115	1.27155	0.98	0.1130
		TOTAL-TREE WOOD AND BARK					
Soft Hardwoods	Green	3.86183	1.22952	2.71351	1.30311	0.99	0.0919
	Dry	2.20170	1.20751	1.69855	1.26161	0.99	0.0935
Sweetgum	Green	3.61505	1.27027	3.39629	1.28328	0.99	0.0718
	Dry	1.69699	1.27523	1.68032	1.27729	0.99	0.0773
Blackgum	Green	4.26854	1.19276	2.56801	1.29872	0.99	0.0695
	Dry	2.43427	1.16974	1.30697	1.29943	0.99	0.0745
Yellow-poplar	Green	2.48214	1.33434	6.07604	1.14767	0.99	0.0515
	Dry	1.23262	1.31950	2.24272	1.19469	0.99	0.0515
Water tupelo	Green	3.63112	1.18534			0.99	0.0604
	Dry	1.84183	1.18976			0.99	0.0591

Continued

Table 7.--Regression equations for estimating green and dry weight of the above-stump total-tree wood, bark and foliage, wood and bark combined, and wood alone for hardwood species in the Gulf and Atlantic Coastal Plains, with d.b.h. as the independent variable--Continued

Species or species group	Weight green or dry	Regression equation coefficients: Trees < 11.0 in d.b.h.[1] a'	b	Trees > 11.0 in d.b.h.[2] a"	b	Coefficient of determination (R^2)	Standard error[3] ($S_{y.x}$)
Green ash	Green	4.55368	1.14668			0.98	0.1081
	Dry	2.66900	1.16332			0.98	0.1051
Red maple	Green	4.24321	1.19641			0.99	0.0718
	Dry	2.39959	1.20030			0.99	0.0755
Hard Hardwoods	Green	5.36727	1.20262	4.75670	1.22780	0.99	0.0772
	Dry	2.97559	1.21433	2.89492	1.22006	0.99	0.0794
White oak	Green	4.27940	1.23631	2.65094	1.33617	0.98	0.0623
	Dry	2.20767	1.26916	1.56965	1.34028	0.98	0.0658
Water oak	Green	5.82381	1.20245	7.74851	1.14291	0.99	0.0595
	Dry	3.15067	1.21955	5.99898	1.08527	0.99	0.0616
Laurel oak	Green	5.27250	1.20282	13.15525	1.01217	0.99	0.0817
	Dry	2.89221	1.21296	10.22597	0.94962	0.99	0.0815
Hickory	Green	4.98301	1.19621	2.32237	1.35540	0.99	0.0633
	Dry	3.00150	1.20454	1.62114	1.33298	0.99	0.0667
All Species	Green	4.49149	1.21167	2.99135	1.29642	0.99	0.1003
	Dry	2.54671	1.20138	1.80526	1.27313	0.98	0.1113
			TOTAL-TREE WOOD				
Soft Hardwoods	Green	2.99919	1.25111	2.29893	1.30656	0.99	0.0975
	Dry	1.79236	1.21949	1.52709	1.25289	0.99	0.0983
Sweetgum	Green	2.73168	1.30076	2.93819	1.28556	0.99	0.0754
	Dry	1.31889	1.29832	1.52043	1.26867	0.99	0.0817
Blackgum	Green	3.26660	1.21374	2.00864	1.31514	0.99	0.0726
	Dry	1.96342	1.17543	0.98193	1.31991	0.99	0.0818
Yellow-poplar	Green	2.07884	1.33571	5.57919	1.12985	0.99	0.0539
	Dry	1.05599	1.32058	2.10291	1.17695	0.99	0.0543
Water tupelo	Green	2.82688	1.21400			0.99	0.0655
	Dry	1.47617	1.21349			0.99	0.0629
Green ash	Green	3.41565	1.17146			0.98	0.1115
	Dry	2.13509	1.18288			0.98	0.1071
Red maple	Green	3.42773	1.20716			0.99	0.0727
	Dry	2.00806	1.20814			0.99	0.0753
Hard Hardwoods	Green	4.21260	1.22073	4.47853	1.20797	0.99	0.0825
	Dry	2.45806	1.21934	2.64598	1.20397	0.99	0.0824
White oak	Green	3.31665	1.25567	2.20685	1.34062	0.98	0.0626
	Dry	1.80751	1.27675	1.36144	1.33584	0.98	0.0647
Water oak	Green	4.63948	1.21728	6.88329	1.13502	0.99	0.0625
	Dry	2.61867	1.22135	5.16232	1.07982	0.99	0.0646
Laurel oak	Green	4.06864	1.22301	10.45888	1.02614	0.99	0.0893
	Dry	2.28979	1.22448	8.11125	0.96075	0.99	0.0917

Continued

Table 7.--Regression equations for estimating green and dry weight of the above-stump total-tree wood, bark and foliage, wood and bark combined, and wood alone for hardwood species in the Gulf and Atlantic Coastal Plains, with d.b.h. as the independent variable--Continued

Species or species group	Weight green or dry	Regression equation coefficients: Trees < 11.0 in d.b.h.[1] a'	b	Trees > 11.0 in d.b.h.[2] a"	b	Coefficient of determination (R^2)	Standard error[3] ($S_{y.x}$)
Hickory	Green	3.60535	1.22775	3.50010	1.23393	0.99	0.0675
	Dry	2.35840	1.22495	2.40089	1.22117	0.99	0.0697
All Species	Green	3.50390	1.23181	2.63217	1.29146	0.99	0.1049
	Dry	2.08485	1.21067	1.63531	1.26131	0.98	0.1137

[1]Trees < 11.0 inches d.b.h.

$Y = a'(D^2)^b$

Where: Y = component weight in pounds
D = tree d.b.h. in inches
a', b = regression coefficients

[2]Trees > 11.0 inches d.b.h.

$Y = a''(D^2)^b$

[3]$\log_{10}$ form

Table 8.--Regression equations for estimating green and dry weight of total stem wood and bark combined and wood alone for hardwood species in the Gulf and Atlantic Coastal Plains, with d.b.h. as the independent variable

Species or species group	Weight green or dry	Regression equation coefficients: Trees < 11.0 in d.b.h.[1] a'	b	Trees > 11.0 in d.b.h.[2] a"	b	Coefficient of determination (R^2)	Standard error[3] ($S_{y.x}$)
			TOTAL-STEM WOOD AND BARK				
Soft Hardwoods	Green	3.25693	1.24016	4.07310	1.19354	0.99	0.0969
	Dry	1.85608	1.21878	2.66998	1.14297	0.99	0.0963
Sweetgum	Green	3.14869	1.28091	6.18246	1.14022	0.99	0.0780
	Dry	1.46547	1.28820	3.27472	1.12054	0.99	0.0836
Blackgum	Green	3.91675	1.17726	3.07533	1.22769	0.99	0.0737
	Dry	2.25875	1.15213	1.56300	1.22890	0.99	0.0784
Yellow-poplar	Green	2.17372	1.33272	6.57448	1.10194	0.99	0.0524
	Dry	1.05224	1.32458	2.56099	1.13911	0.99	0.0540
Water tupelo	Green	3.45359	1.17719			0.99	0.0659
	Dry	1.76692	1.18048			0.99	0.0654
Green ash	Green	4.13694	1.14070			0.98	0.1095
	Dry	2.43527	1.15738			0.98	0.1060
Red maple	Green	3.82002	1.17297			0.99	0.0758
	Dry	2.16556	1.17911			0.99	0.0819
Hard Hardwoods	Green	4.23406	1.20896	7.17301	1.09903	0.99	0.0850
	Dry	2.36137	1.21832	4.69652	1.07495	0.99	0.0890
White oak	Green	2.87661	1.27470	3.91631	1.21037	0.98	0.0585
	Dry	1.49505	1.30388	2.35453	1.20917	0.97	0.0644
Water oak	Green	4.73762	1.20426	10.82920	1.03188	0.99	0.0699
	Dry	2.54980	1.22097	9.36032	0.94981	0.99	0.0736
Laurel oak	Green	4.57260	1.18733	23.88149	0.84265	0.99	0.0859
	Dry	2.51586	1.19580	20.99830	0.75337	0.99	0.0831
Hickory	Green	4.33636	1.19470	7.89917	1.06965	0.99	0.0614
	Dry	2.62439	1.20231	5.55893	1.04581	0.99	0.0638
All Species	Green	3.66396	1.22272	4.64328	1.17333	0.99	0.0988
	Dry	2.07727	1.21198	2.96253	1.13796	0.99	0.1054
			TOTAL-STEM WOOD				
Soft Hardwoods	Green	2.57385	1.26224	3.45400	1.20091	0.99	0.1013
	Dry	1.52883	1.23194	2.38881	1.13888	0.99	0.1008
Sweetgum	Green	2.42500	1.31127	5.27883	1.14908	0.99	0.0813
	Dry	1.15985	1.31061	2.91118	1.11872	0.99	0.0877
Blackgum	Green	3.02670	1.20027	2.41471	1.24737	0.99	0.0766
	Dry	1.83761	1.15912	1.13618	1.25937	0.99	0.0873
Yellow-poplar	Green	1.86332	1.33396	6.30007	1.07994	0.98	0.0555
	Dry	0.91702	1.32587	2.45553	1.12049	0.98	0.0585
Water tupelo	Green	2.71538	1.20709			0.99	0.0706
	Dry	1.42597	1.20582			0.99	0.0694

Continued

Table 8.--Regression equations for estimating green and dry weight of total-stem wood and bark combined and wood alone for hardwood species in the Gulf and Atlantic Coastal Plains, with d.b.h. as the independent variable--Continued

Species or species group	Weight green or dry	Regression equation coefficients: Trees < 11.0 in d.b.h.[1] a'	b	Trees > 11.0 in d.b.h.[2] a"	b	Coefficient of determination (R^2)	Standard error[3] ($S_{y.x}$)
Green ash	Green	3.15694	1.16606			0.98	0.1137
	Dry	1.96939	1.17845			0.98	0.1086
Red maple	Green	3.13380	1.18624			0.99	0.0795
	Dry	1.82975	1.18997			0.99	0.0845
Hard Hardwoods	Green	3.37871	1.22850	6.65514	1.08715	0.99	0.0889
	Dry	1.98106	1.22423	4.21332	1.06688	0.99	0.0911
White oak	Green	2.27848	1.29671	3.28469	1.22044	0.98	0.0591
	Dry	1.25120	1.31352	2.05186	1.21038	0.98	0.0632
Water oak	Green	3.87112	1.21814	9.79207	1.02463	0.99	0.0728
	Dry	2.16781	1.22182	8.15968	0.94544	0.99	0.0761
Laurel oak	Green	3.57722	1.20856	20.54548	0.84406	0.99	0.0952
	Dry	2.02231	1.20679	18.07864	0.75004	0.99	0.0964
Hickory	Green	3.17385	1.22831	9.88910	0.99134	0.99	0.0670
	Dry	2.07666	1.22508	7.15671	0.96708	0.99	0.0684
All Species	Green	2.90806	1.24369	4.06361	1.17392	0.99	0.1029
	Dry	1.72416	1.22225	2.65469	1.13225	0.99	0.1083

[1]Trees < 11.0 inches d.b.h.

$Y = a'(D^2)^b$

Where: Y = component weight in pounds
D = tree d.b.h. in inches
a', b = regression coefficients

[2]Trees > 11.0 inches d.b.h.

$Y = a''(D^2)^b$

[3]$\log_{10}$ form

Table 9.--Regression equations for estimating cubic-foot volume of the above-stump total-tree wood and bark combined and wood alone for hardwood species in the Gulf and Atlantic Coastal Plains, with d.b.h. as the independent variable

Species or species group	Volume wood & bark or wood only	Regression equation coefficients: Trees < 11.0 in d.b.h.[1] a'	b	Trees > 11.0 in d.b.h.[2] a"	b	Coefficient of determination (R^2)	Standard error[3] ($S_{y.x}$)
			TOTAL STEM				
Soft Hardwoods	Wood & bark	0.07733	1.19839	0.05621	1.26491	0.99	0.0827
	Wood	0.06069	1.21506	0.04803	1.26384	0.99	0.0872
Sweetgum	Wood & bark	0.06768	1.23496	0.05392	1.28236	0.99	0.0721
	Wood	0.05026	1.26340	0.04285	1.29668	0.99	0.0740
Blackgum	Wood & bark	0.09237	1.14565	0.04527	1.29438	0.99	0.0713
	Wood	0.07301	1.15416	0.03350	1.31661	0.99	0.0749
Yellow-poplar	Wood & bark	0.06931	1.24420	0.09974	1.16830	0.99	0.0449
	Wood	0.06336	1.22510	0.09162	1.14821	0.99	0.0462
Water tupelo	Wood & bark	0.06909	1.17684			0.99	0.0492
	Wood	0.05126	1.21190			0.99	0.0534
Green ash	Wood & bark	0.09868	1.13347			0.98	0.1061
	Wood	0.07772	1.15089			0.98	0.1122
Red maple	Wood & bark	0.07863	1.19849			0.99	0.0677
	Wood	0.06546	1.20853			0.99	0.0672
Hard Hardwoods	Wood & bark	0.08926	1.18145	0.06601	1.24435	0.99	0.0738
	Wood	0.06945	1.19927	0.05991	1.23008	0.99	0.0779
White oak	Wood & bark	0.06067	1.24861	0.03457	1.36588	0.98	0.0653
	Wood	0.04600	1.26861	0.02721	1.37810	0.98	0.0655
Water oak	Wood & bark	0.08979	1.19386	0.10898	1.15348	0.99	0.0613
	Wood	0.07052	1.21038	0.09336	1.15188	0.99	0.0636
Laurel oak	Wood & bark	0.08637	1.17716	0.15717	1.05233	0.99	0.0786
	Wood	0.06766	1.19154	0.11008	1.09006	0.99	0.0845
Hickory	Wood & bark	0.08283	1.18691	0.03403	1.37239	0.99	0.0613
	Wood	0.06135	1.20820	0.04268	1.28389	0.99	0.0650
All Species	Wood & bark	0.08241	1.18890	0.05714	1.26524	0.99	0.0818
	Wood	0.06443	1.20616	0.05001	1.25898	0.99	0.0857

[1]Trees < 11.0 inches d.b.h.

$Y = a'(D^2)^b$

Where: Y = component volume in cubic feet
D = tree d.b.h. in inches
a', b = regression coefficients

[2]Trees > 11.0 inches d.b.h.

$Y = a''(D^2)^b$

[3]$\log_{10}$ form

Table 10.--Regression equations for estimating cubic-foot volume of total-stem wood and bark combined and wood alone for hardwood species in the Gulf and Atlantic Coastal Plains, with d.b.h. as the independent variable

Species or species group	Volume wood & bark or wood only	Regression equation coefficients: Trees < 11.0 in d.b.h.[1] a'	b	Trees > 11.0 in d.b.h.[2] a"	b	Coefficient of determination (R^2)	Standard error[3] ($S_{y.x}$)
			TOTAL STEM				
Soft Hardwoods	Wood & bark	0.06483	1.21134	0.08572	1.15310	0.99	0.0893
	Wood	0.05158	1.22880	0.07273	1.15717	0.99	0.0919
Sweetgum	Wood & bark	0.05950	1.24328	0.09990	1.13524	0.98	0.0778
	Wood	0.04505	1.27096	0.07748	1.15791	0.99	0.0796
Blackgum	Wood & bark	0.08639	1.12734	0.05373	1.22637	0.99	0.0774
	Wood	0.06890	1.13762	0.03917	1.25537	0.99	0.0811
Yellow-poplar	Wood & bark	0.06185	1.24016	0.10689	1.12610	0.99	0.0459
	Wood	0.05756	1.22130	0.10080	1.10447	0.99	0.0476
Water tupelo	Wood & bark	0.06518	1.17127			0.99	0.0553
	Wood	0.04861	1.20871			0.99	0.0596
Green ash	Wood & bark	0.09022	1.12953			0.98	0.1109
	Wood	0.07208	1.14772			0.98	0.1185
Red maple	Wood & bark	0.07006	1.17756			0.99	0.0707
	Wood	0.05905	1.18999			0.99	0.0718
Hard Hardwoods	Wood & bark	0.07013	1.18638	0.09619	1.12049	0.99	0.0789
	Wood	0.05574	1.20507	0.08576	1.11525	0.99	0.0828
White oak	Wood & bark	0.03975	1.29001	0.04665	1.25660	0.97	0.0653
	Wood	0.03043	1.31501	0.03649	1.27714	0.98	0.0659
Water oak	Wood & bark	0.07228	1.19646	0.15433	1.03830	0.99	0.0712
	Wood	0.05862	1.21135	0.13441	1.03832	0.99	0.0731
Laurel oak	Wood & bark	0.07637	1.15537	0.26513	0.89585	0.99	0.0811
	Wood	0.06057	1.17148	0.20360	0.91869	0.99	0.0893
Hickory	Wood & bark	0.07192	1.18167	0.10714	1.09857	0.99	0.0626
	Wood	0.05368	1.20640	0.11406	1.04925	0.99	0.0677
All Species	Wood & bark	0.06707	1.20097	0.08903	1.14191	0.99	0.0860
	Wood	0.05335	1.21886	0.07684	1.14278	0.99	0.0891

[1]Trees < 11.0 inches d.b.h.

$Y = a'(D^2)^b$

Where: Y = component volume in cubic feet
D = tree d.b.h. in inches
a', b = regression coefficients

[2]Trees > 11.0 inches d.b.h.

$Y = a''(D^2)^b$

[3]$\log_{10}$ form

Table 11.--Regression equations for estimating green and dry weight of the above-stump total-tree wood, bark and foliage, wood and bark combined, and wood alone for hardwood species in the Gulf and Atlantic Coastal Plains, with d.b.h. and total height as the independent variable

Species or species group	Weight green or dry	Regression equation coefficients: Trees < 11.0 in d.b.h.[1] a'	b	Trees > 11.0 in d.b.h.[2] a"	b	c	Coefficient of determination (R^2)	Standard error[3] ($S_{y.x}$)
				TOTAL-TREE WOOD, BARK AND FOLIAGE				
Soft Hardwoods	Green	0.30019	0.92547	0.08327	1.19287	0.92547	0.99	0.0812
	Dry	0.17484	0.91066	0.05519	1.15108	0.91066	0.99	0.0815
Sweetgum	Green	0.30269	0.93197	0.08502	1.19674	0.93197	0.99	0.0580
	Dry	0.13234	0.94165	0.04196	1.18117	0.94165	0.99	0.0618
Blackgum	Green	0.27185	0.94557	0.12293	1.11106	0.94557	0.99	0.0596
	Dry	0.16170	0.92799	0.06657	1.11305	0.92799	0.99	0.0618
Yellow-poplar	Green	0.09060	1.06125	0.15298	0.95202	1.06125	0.99	0.0428
	Dry	0.04464	1.05256	0.05678	1.00239	1.05256	0.99	0.0417
Water tupelo	Green	0.25439	0.91882				0.99	0.0499
	Dry	0.12557	0.92338				0.99	0.0476
Green ash	Green	0.36273	0.87758				0.99	0.0876
	Dry	0.19954	0.89285				0.99	0.0856
Red maple	Green	0.27237	0.93533				0.99	0.0622
	Dry	0.14868	0.93969				0.99	0.0614
Hard Hardwoods	Green	0.43309	0.91137	0.13696	1.15142	0.91137	0.99	0.0779
	Dry	0.22508	0.92399	0.07944	1.14116	0.92399	0.99	0.0748
White oak	Green	0.44919	0.90576	0.14105	1.14729	0.90576	0.99	0.0505
	Dry	0.20007	0.93915	0.07578	1.14158	0.93915	0.99	0.0496
Water oak	Green	0.47171	0.90675	0.21582	1.06980	0.90675	0.99	0.0601
	Dry	0.23742	0.92299	0.15568	1.01099	0.92299	0.99	0.0592
Laurel oak	Green	0.39431	0.93093	0.09708	1.22319	0.93093	0.99	0.0735
	Dry	0.20494	0.94196	0.07233	1.15911	0.94196	0.99	0.0753
Hickory	Green	0.37623	0.90004	0.02421	1.47209	0.90004	0.99	0.0660
	Dry	0.21465	0.90918	0.01580	1.45321	0.90918	0.99	0.0706
All Species	Green	0.36080	0.91403	0.09108	1.20108	0.91403	0.99	0.0968
	Dry	0.20334	0.90850	0.05600	1.17740	0.90850	0.99	0.1076
				TOTAL-TREE WOOD AND BARK				
Soft Hardwoods	Green	0.27499	0.93190	0.07785	1.19503	0.93190	0.99	0.0792
	Dry	0.16403	0.91545	0.05206	1.15477	0.91545	0.99	0.0801
Sweetgum	Green	0.25874	0.94681	0.08081	1.18946	0.94681	0.99	0.0572
	Dry	0.11972	0.95096	0.03951	1.18215	0.95096	0.99	0.0621
Blackgum	Green	0.25820	0.94824	0.11816	1.11125	0.94824	0.99	0.0578
	Dry	0.15457	0.93057	0.06419	1.11381	0.93057	0.99	0.0603
Yellow-poplar	Green	0.08414	1.06559	0.14211	0.95629	1.06559	0.99	0.0427
	Dry	0.04300	1.05477	0.05470	1.00456	1.05477	0.99	0.0418
Water tupelo	Green	0.24357	0.92110				0.99	0.0483
	Dry	0.12230	0.92453				0.99	0.0465

Continued

Table 11.--Regression equations for estimating green and dry weight of the above-stump total-tree wood, bark and foliage, wood and bark combined, and wood alone for hardwood species in the Gulf and Atlantic Coastal Plains, with d.b.h. and total height as the independent variable--Continued

Species or species group	Weight green or dry	Regression equation coefficients: Trees < 11.0 in d.b.h.[1] a'	b	Trees > 11.0 in d.b.h.[2] a"	b	c	Coefficient of determination (R^2)	Standard error[3] ($S_{y.x}$)
Green ash	Green	0.33610	0.88419				0.99	0.0856
	Dry	0.19022	0.89669				0.99	0.0838
Red maple	Green	0.25003	0.93964				0.99	0.0589
	Dry	0.13962	0.94303				0.99	0.0598
Hard Hardwoods	Green	0.37894	0.92237	0.12821	1.14833	0.92237	0.99	0.0733
	Dry	0.20352	0.93196	0.07591	1.13760	0.93196	0.99	0.0707
White oak	Green	0.38570	0.91869	0.12863	1.14768	0.91869	0.99	0.0476
	Dry	0.17852	0.94827	0.07065	1.14156	0.94827	0.99	0.0476
Water oak	Green	0.39803	0.92168	0.19886	1.06638	0.92168	0.99	0.0528
	Dry	0.20692	0.93496	0.14638	1.00713	0.93496	0.99	0.0532
Laurel oak	Green	0.33216	0.94705	0.09718	1.20333	0.94705	0.99	0.0703
	Dry	0.17850	0.95476	0.07226	1.14333	0.95476	0.99	0.0722
Hickory	Green	0.33196	0.90982	0.02228	1.47308	0.90982	0.99	0.0614
	Dry	0.19688	0.91578	0.01496	1.45322	0.91578	0.99	0.0680
All Species	Green	0.32369	0.92257	0.08550	1.20016	0.92257	0.99	0.0928
	Dry	0.18743	0.91488	0.05327	1.17721	0.91488	0.99	0.1040
TOTAL-TREE WOOD								
Soft Hardwoods	Green	0.20324	0.94858	0.06216	1.19560	0.94858	0.99	0.0832
	Dry	0.12922	0.92526	0.04554	1.14271	0.92526	0.99	0.0808
Sweetgum	Green	0.18273	0.97000	0.06408	1.18851	0.97000	0.99	0.0589
	Dry	0.08740	0.96977	0.03371	1.16844	0.96977	0.99	0.0602
Blackgum	Green	0.18664	0.96575	0.08821	1.12201	0.96575	0.99	0.0554
	Dry	0.12111	0.93680	0.04828	1.12856	0.93680	0.99	0.0588
Yellow-poplar	Green	0.06901	1.06866	0.13003	0.93657	1.06866	0.99	0.0434
	Dry	0.03560	1.05918	0.05116	0.98359	1.05918	0.99	0.0414
Water tupelo	Green	0.17666	0.94394				0.99	0.0491
	Dry	0.09249	0.94339				0.99	0.0472
Green ash	Green	0.23755	0.90361				0.99	0.0862
	Dry	0.14525	0.91199				0.99	0.0837
Red maple	Green	0.19642	0.94831				0.99	0.0571
	Dry	0.11445	0.94938				0.99	0.0572
Hard Hardwoods	Green	0.28520	0.93646	0.11461	1.12655	0.93646	0.99	0.0772
	Dry	0.16565	0.93619	0.06868	1.11978	0.93619	0.99	0.0708
White oak	Green	0.29001	0.93221	0.10202	1.15005	0.93221	0.99	0.0481
	Dry	0.14651	0.95191	0.06002	1.13798	0.95191	0.99	0.0473
Water oak	Green	0.30600	0.93330	0.16927	1.05676	0.93330	0.99	0.0534
	Dry	0.17096	0.93653	0.12553	1.00094	0.93653	0.99	0.0546

Continued

Table 11.--Regression equations for estimating green and dry weight of the above-stump total-tree wood, bark and foliage, wood and bark combined, and wood alone for hardwood species in the Gulf and Atlantic Coastal Plains, with d.b.h. and total height as the independent variable--Continued

Species or species group	Weight green or dry	Regression equation coefficients: Trees < 11.0 in d.b.h.[1] a'	b	Trees > 11.0 in d.b.h.[2] a"	b	c	Coefficient of determination (R^2)	Standard error[3] ($S_{y.x}$)
Laurel oak	Green	0.24140	0.96427	0.07215	1.21610	0.96427	0.99	0.0672
	Dry	0.13530	0.96550	0.05566	1.15071	0.96550	0.99	0.0696
Hickory	Green	0.22218	0.93452	0.03009	1.35138	0.93452	0.99	0.0592
	Dry	0.14675	0.93199	0.02074	1.33999	0.93199	0.99	0.0649
All Species	Green	0.24100	0.93821	0.07115	1.19260	0.93821	0.99	0.0958
	Dry	0.14946	0.92259	0.04728	1.16257	0.92259	0.99	0.1031

[1]Trees < 11.0 inches d.b.h.

$$Y = a'(D^2Th)^b$$

Where: Y = component weight in pounds
D = tree d.b.h. in inches
Th = tree total height in feet
a', b = regression coefficients

[2]Trees ≥ 11.0 inches d.b.h.

$$Y = a''(D^2)^b\ (Th)^c$$

[3]$\log_{10}$ form

Table 12.--Regression equations for estimating green and dry weight of total-stem wood and bark combined and wood alone for hardwood species in the Gulf and Atlantic Coastal Plains, with d.b.h. and total height as the independent variable

Species or species group	Weight green or dry	Regression equation coefficients: Trees < 11.0 in d.b.h.[1] a'	b	Trees > 11.0 in d.b.h.[2] a"	b	c	Coefficient of determination (R^2)	Standard error[3] ($S_{y.x}$)
				TOTAL-STEM WOOD AND BARK				
Soft Hardwoods	Green	0.22265	0.94182	0.11546	1.07875	0.94182	0.99	0.0724
	Dry	0.13252	0.92590	0.08075	1.02919	0.92590	0.99	0.0703
Sweetgum	Green	0.21685	0.95655	0.14407	1.04181	0.95655	0.99	0.0569
	Dry	0.09880	0.96265	0.07499	1.02016	0.96265	0.99	0.0614
Blackgum	Green	0.24174	0.93772	0.14975	1.03758	0.93772	0.99	0.0510
	Dry	0.14706	0.91838	0.08171	1.04092	0.91838	0.99	0.0541
Yellow-poplar	Green	0.06799	1.07390	0.15467	0.90250	1.07390	0.99	0.0320
	Dry	0.03333	1.06831	0.06166	0.94005	1.06831	0.99	0.0335
Water tupelo	Green	0.23347	0.91592				0.99	0.0458
	Dry	0.11862	0.91842				0.99	0.0454
Green ash	Green	0.30787	0.88017				0.99	0.0828
	Dry	0.17495	0.89273				0.99	0.0800
Red maple	Green	0.23406	0.92284				0.99	0.0460
	Dry	0.13030	0.92802				0.99	0.0512
Hard Hardwoods	Green	0.28881	0.92935	0.19479	1.01147	0.92935	0.99	0.0643
	Dry	0.15674	0.93722	0.12504	0.98433	0.93722	0.99	0.0632
White oak	Green	0.22290	0.95609	0.17456	1.00705	0.95609	0.99	0.0328
	Dry	0.10392	0.98376	0.09831	0.99534	0.98376	0.99	0.0357
Water oak	Green	0.31640	0.92502	0.28188	0.94911	0.92502	0.99	0.0440
	Dry	0.16345	0.93819	0.23237	0.86484	0.93819	0.99	0.0449
Laurel oak	Green	0.29238	0.93691	0.19213	1.02447	0.93691	0.99	0.0563
	Dry	0.15822	0.94329	0.16267	0.93751	0.94329	0.99	0.0548
Hickory	Green	0.28725	0.90968	0.07765	1.18246	0.90968	0.99	0.0493
	Dry	0.17143	0.91511	0.05270	1.16106	0.91511	0.99	0.0558
All Species	Green	0.25274	0.93304	0.13139	1.06945	0.93304	0.99	0.0777
	Dry	0.14637	0.92508	0.08674	1.03420	0.92508	0.99	0.0848
				TOTAL-STEM WOOD				
Soft Hardwoods	Green	0.16747	0.95874	0.09201	1.08363	0.95874	0.99	0.0763
	Dry	0.10538	0.93657	0.07004	1.02176	0.93657	0.99	0.0710
Sweetgum	Green	0.15651	0.97937	0.11260	1.04802	0.97937	0.99	0.0595
	Dry	0.07362	0.98085	0.06294	1.01353	0.98085	0.99	0.0598
Blackgum	Green	0.17577	0.95674	0.11153	1.05159	0.95674	0.99	0.0488
	Dry	0.11572	0.92580	0.05934	1.06506	0.92580	0.99	0.0545
Yellow-poplar	Green	0.05742	1.07621	0.14773	0.87918	1.07621	0.99	0.0351
	Dry	0.02812	1.07263	0.05893	0.91840	1.07263	0.99	0.0363
Water tupelo	Green	0.17072	0.93960				0.99	0.0475
	Dry	0.09001	0.93850				0.99	0.0469

Continued

Table 12.--Regression equations for estimating green and dry weight of total-stem wood and bark combined and wood alone for hardwood species in the Gulf and Atlantic Coastal Plains, with d.b.h. and total height as the independent variable--Continued

Species or species group	Weight green or dry	Regression equation coefficients: Trees < 11.0 in d.b.h.[1] a'	b	Trees > 11.0 in d.b.h.[2] a"	b	c	Coefficient of determination (R^2)	Standard error[3] ($S_{y.x}$)
Green ash	Green	0.22125	0.89995				0.99	0.0853
	Dry	0.13468	0.90909				0.99	0.0813
Red maple	Green	0.18585	0.93337				0.99	0.0501
	Dry	0.10723	0.93660				0.99	0.0541
Hard Hardwoods	Green	0.22033	0.94452	0.17078	0.99764	0.94452	0.99	0.0673
	Dry	0.12929	0.94214	0.11074	0.97443	0.94214	0.99	0.0622
White oak	Green	0.17252	0.97013	0.13838	1.01611	0.97013	0.99	0.0353
	Dry	0.08774	0.98773	0.08339	0.99832	0.98773	0.99	0.0363
Water oak	Green	0.25031	0.93579	0.24462	0.94059	0.93579	0.99	0.0467
	Dry	0.13857	0.93894	0.20223	0.86011	0.93894	0.99	0.0477
Laurel oak	Green	0.21465	0.95507	0.15388	1.02446	0.95507	0.99	0.0543
	Dry	0.12153	0.95393	0.13676	0.92931	0.95393	0.99	0.0538
Hickory	Green	0.19381	0.93581	0.08618	1.10480	0.93581	0.99	0.0495
	Dry	0.12811	0.93304	0.06280	1.08168	0.93304	0.99	0.0548
All Species	Green	0.19127	0.94921	0.10835	1.06771	0.94921	0.99	0.0810
	Dry	0.11810	0.93352	0.07592	1.02566	0.93352	0.99	0.0843

[1]Trees < 11.0 inches d.b.h.

$Y = a'(D^2Th)^b$

Where: Y = component weight in pounds
D = tree d.b.h. in inches
Th = tree total height in feet
a', b = regression coefficients

[2]Trees > 11.0 inches d.b.h.

$Y = a''(D^2)^b (Th)^c$

[3]$\log_{10}$ form

Table 13.--Regression equations for estimating cubic-foot volume of the above-stump total-tree wood and bark combined and wood alone for hardwood species in the Gulf and Atlantic Coastal Plains, with d.b.h. and total height as the independent variables

Species or species group	Volume wood & bark or wood only	Regression equation coefficients: Trees < 11.0 in d.b.h.[1] a'	b	Trees > 11.0 in d.b.h.[2] a"	b	c	Coefficient of determination (R^2)	Standard error[3] ($S_{y.x}$)
				TOTAL TREE				
Soft Hardwoods	Wood & bark	0.00587	0.90858	0.00177	1.15872	0.90858	0.99	0.0670
	Wood	0.00443	0.92170	0.00145	1.15469	0.92170	0.99	0.0686
Sweetgum	Wood & bark	0.00513	0.92221	0.00144	1.18752	0.92221	0.99	0.0507
	Wood	0.00357	0.94397	0.00105	1.19855	0.94397	0.99	0.0495
Blackgum	Wood & bark	0.00619	0.91174	0.00237	1.11163	0.91174	0.99	0.0548
	Wood	0.00476	0.91940	0.00173	1.13000	0.91940	0.99	0.0531
Yellow-poplar	Wood & bark	0.00306	0.98949	0.00301	0.99341	0.98949	0.99	0.0406
	Wood	0.00287	0.97705	0.00291	0.97362	0.97705	0.99	0.0393
Water tupelo	Wood & bark	0.00478	0.91328				0.99	0.0459
	Wood	0.00326	0.94095				0.99	0.0462
Green ash	Wood & bark	0.00751	0.87399				0.99	0.0837
	Wood	0.00566	0.88784				0.99	0.0875
Red maple	Wood & bark	0.00464	0.94074				0.99	0.0596
	Wood	0.00376	0.94878				0.99	0.0571
Hard Hardwoods	Wood & bark	0.00658	0.90649	0.00190	1.16497	0.90649	0.99	0.0670
	Wood	0.00491	0.92042	0.00164	1.14859	0.92042	0.99	0.0690
White oak	Wood & bark	0.00493	0.93707	0.00164	1.16617	0.93707	0.99	0.0445
	Wood	0.00358	0.95235	0.00123	1.17491	0.95235	0.99	0.0437
Water oak	Wood & bark	0.00624	0.91538	0.00288	1.07661	0.91538	0.99	0.0520
	Wood	0.00471	0.92827	0.00235	1.07326	0.92827	0.99	0.0521
Laurel oak	Wood & bark	0.00578	0.92673	0.00129	1.23982	0.92673	0.99	0.0682
	Wood	0.00432	0.93935	0.00086	1.27547	0.93935	0.99	0.0631
Hickory	Wood & bark	0.00562	0.90299	0.00034	1.48801	0.90299	0.99	0.0570
	Wood	0.00395	0.91968	0.00040	1.39924	0.91968	0.99	0.0562
All Species	Wood & bark	0.00622	0.90561	0.00175	1.16958	0.90561	0.99	0.0701
	Wood	0.00466	0.91915	0.00147	1.16063	0.91915	0.99	0.7134

[1]Trees < 11.0 inches d.b.h.

$$Y = a'(D^2Th)^b$$

Where: Y = component volume in cubic feet
D = tree d.b.h. in inches
Th = tree total height in feet
a', b = regression coefficients

[2]Trees > 11.0 inches d.b.h.

$$Y = a''(D^2)^b(Th)^c$$

[3]$\log_{10}$ form

Table 14.--Regression equations for estimating cubic-foot volume of total-stem wood and bark combined and wood alone for hardwood species in the Gulf and Atlantic Coastal Plains, with d.b.h. and total height as the independent variables

Species or species group	Volume wood & bark or wood only	Regression equation coefficients: Trees < 11.0 in d.b.h.[1] a'	b	Trees > 11.0 in d.b.h.[2] a"	b	c	Coefficient of determination (R^2)	Standard error[3] ($S_{y.x}$)
				TOTAL STEM				
Soft Hardwoods	Wood & bark	0.00470	0.92038	0.00265	1.03958	0.92038	0.99	0.0596
	Wood	0.00359	0.93399	0.00215	1.04097	0.93399	0.99	0.0597
Sweetgum	Wood & bark	0.00436	0.93042	0.00263	1.03555	0.93042	0.99	0.0487
	Wood	0.00310	0.95142	0.00188	1.05539	0.95142	0.99	0.0484
Blackgum	Wood & bark	0.00594	0.89919	0.00301	1.04085	0.89919	0.99	0.0500
	Wood	0.00459	0.90818	0.00215	1.06591	0.90818	0.99	0.0493
Yellow-poplar	Wood & bark	0.00253	0.99605	0.00326	0.94332	0.99605	0.99	0.0299
	Wood	0.00242	0.98341	0.00325	0.92231	0.98341	0.99	0.0296
Water tupelo	Wood & bark	0.00452	0.90997				0.99	0.0439
	Wood	0.00309	0.93936				0.99	0.0457
Green ash	Wood & bark	0.00688	0.87165				0.99	0.0845
	Wood	0.00526	0.88599				0.99	0.0909
Red maple	Wood & bark	0.00426	0.92603				0.99	0.0433
	Wood	0.00349	0.93582				0.99	0.0441
Hard Hardwoods	Wood & bark	0.00501	0.91241	0.00281	1.03307	0.91241	0.99	0.0527
	Wood	0.00381	0.92700	0.00237	1.02571	0.92700	0.99	0.0552
White oak	Wood & bark	0.00272	0.97844	0.00203	1.03984	0.97844	0.99	0.0329
	Wood	0.00199	0.99655	0.00149	1.05704	0.99655	0.99	0.0331
Water oak	Wood & bark	0.00490	0.91936	0.00413	0.95500	0.91936	0.99	0.0422
	Wood	0.00384	0.93084	0.00344	0.95387	0.93084	0.99	0.0440
Laurel oak	Wood & bark	0.00526	0.91164	0.00243	1.07295	0.91164	0.99	0.0515
	Wood	0.00397	0.92574	0.00177	1.09364	0.92574	0.99	0.0476
Hickory	Wood & bark	0.00489	0.90009	0.00111	1.20854	0.90009	0.99	0.0472
	Wood	0.00344	0.91930	0.00109	1.15981	0.91930	0.99	0.0492
All Species	Wood & bark	0.00483	0.91696	0.00270	1.03820	0.91696	0.99	0.0572
	Wood	0.00368	0.93090	0.00222	1.03660	0.93090	0.99	0.0581

[1]Trees < 11.0 inches d.b.h.

$Y = a'(D^2Th)^b$

Where: Y = component volume in cubic feet
D = tree d.b.h. in inches
Th = tree total height in feet
a', b = regression coefficients

[2]Trees > 11.0 inches d.b.h.

$Y = a''(D^2)^b(Th)^c$

[3]$\log_{10}$ form

Table 18.--Regression equations for estimating cubic-foot volume of total-stem wood and bark combined and wood alone for hardwood species in the Gulf and Atlantic Coastal Plains, with d.b.h. and height to 4-inch top as the independent variables

Species or species group	Volume Wood & bark or wood only	Regression equation coefficients: Trees < 11.0 in d.b.h.[1] a'	b	Trees > 11.0 in d.b.h.[2] a"	b	c	Coefficient of determination (R^2)	Standard error[3] ($S_{y.x}$)
				TOTAL STEM				
Soft Hardwoods	Wood & bark	0.04359	0.69578	0.00829	1.04192	0.69578	0.99	0.0480
	Wood	0.03322	0.71032	0.00689	1.03835	0.71032	0.99	0.0470
Sweetgum	Wood & bark	0.03791	0.71341	0.00760	1.04839	0.71341	0.99	0.0416
	Wood	0.02898	0.72666	0.00548	1.07385	0.72666	0.99	0.0407
Blackgum	Wood & bark	0.04537	0.69433	0.01010	1.00766	0.69433	0.99	0.0496
	Wood	0.03279	0.71211	0.00750	1.01968	0.71211	0.99	0.0505
Yellow-poplar	Wood & bark	0.02210	0.78182	0.00972	0.95305	0.78182	0.99	0.0323
	Wood	0.02057	0.77182	0.00954	0.93201	0.77182	0.99	0.0322
Water tupelo	Wood & bark	0.09335	0.59343				0.96	0.0482
	Wood	0.07670	0.60065				0.96	0.0486
Green ash	Wood & bark	0.05582	0.66587				0.97	0.0626
	Wood	0.04459	0.67539				0.97	0.0639
Red maple	Wood & bark	0.03769	0.71319				0.97	0.0504
	Wood	0.03025	0.72576				0.98	0.0449
Hard Hardwoods	Wood & bark	0.03551	0.72099	0.00893	1.00882	0.72099	0.99	0.0409
	Wood	0.02956	0.72469	0.00730	1.01629	0.72469	0.99	0.0450
White oak	Wood & bark	0.01764	0.80207	0.00701	0.99449	0.80207	0.99	0.0353
	Wood	0.01334	0.81721	0.00528	1.01047	0.81721	0.99	0.0352
Water oak	Wood & bark	0.02904	0.74819	0.01186	0.93486	0.74819	0.99	0.0395
	Wood	0.02339	0.75673	0.00989	0.93620	0.75673	0.99	0.0413
Laurel oak	Wood & bark	0.02547	0.76108	0.00798	1.00312	0.76108	0.99	0.0261
	Wood	0.01816	0.78286	0.00596	1.01509	0.78286	0.99	0.0319
Hickory	Wood & bark	0.04729	0.67885	0.00565	1.12180	0.67885	0.99	0.0369
	Wood	0.03289	0.70059	0.00586	1.06031	0.70059	0.99	0.0303
All Species	Wood & bark	0.04039	0.70512	0.00852	1.02963	0.70512	0.99	0.0457
	Wood	0.03180	0.71567	0.00704	1.03013	0.71567	0.99	0.0462

[1]Trees < 11.0 inches d.b.h.

$$Y = a'(D^2H4)^b$$

Where: Y = component volume in cubic feet
D = tree d.b.h. in inches
H4 = tree total height in feet
a', b = regression coefficients

[2]Trees ≥ 11.0 inches d.b.h.

$$Y = a''(D^2)^b\ (H4)^c$$

[3]$\log_{10}$ form

Table 19.--Regression equations for estimating green and dry weight of the above-stump total-tree wood, bark and foliage, wood and bark combined, and wood alone for hardwood species in the Gulf and Atlantic Coastal Plains, with d.b.h. and saw-log merchantable height as the independent variables

Species or species group	Weight green or dry	Regression equation coefficients[1] a	b	c	Coefficient of determination (R^2)	Standard error[2] ($S_{y.x}$)	Number trees sampled (N)
			TOTAL-TREE WOOD, BARK AND FOLIAGE				
Soft Hardwoods	Green	3.92972	1.00446	0.35301	0.86	0.0672	130
	Dry	2.26575	1.03448	0.26566	0.86	0.0668	130
Sweetgum	Green	2.49534	1.10102	0.35467	0.92	0.0528	62
	Dry	1.32758	1.09257	0.33664	0.88	0.0634	62
Blackgum	Green	3.21543	1.00773	0.39137	0.91	0.0494	39
	Dry	1.56381	0.98263	0.44209	0.89	0.0557	39
Hard Hardwoods	Green	3.65175	1.11015	0.26892	0.89	0.0603	85
	Dry	1.95583	1.06896	0.35726	0.87	0.0664	85
White oak	Green	1.85132	1.22970	0.27207	0.92	0.0604	26
	Dry	1.00194	1.19826	0.35155	0.91	0.0654	26
Water & laurel oaks	Green	4.25294	1.05557	0.31428	0.85	0.0648	44
	Dry	2.86450	1.01336	0.32776	0.82	0.0707	44
All Species	Green	4.88085	1.11343	0.15131	0.83	0.0754	215
	Dry	3.40047	1.16003	0.00479	0.74	0.0967	215
			TOTAL-TREE WOOD AND BARK				
Soft Hardwoods	Green	3.77347	0.99168	0.37605	0.86	0.0687	130
	Dry	2.17341	1.02737	0.28312	0.85	0.0679	130
Sweetgum	Green	2.36634	1.08639	0.38399	0.91	0.0539	62
	Dry	1.27348	1.09223	0.34485	0.88	0.0641	62
Blackgum	Green	3.04226	0.99253	0.42279	0.91	0.0508	39
	Dry	1.48749	0.96988	0.46997	0.89	0.0573	39
Hard Hardwoods	Green	3.46982	1.11055	0.27344	0.90	0.0597	85
	Dry	1.88424	1.06903	0.35965	0.88	0.0662	85
White oak	Green	1.72384	1.22793	0.28571	0.92	0.0596	26
	Dry	0.93222	1.19703	0.36529	0.91	0.0649	26
Water & laurel oaks	Green	3.81019	1.06177	0.32638	0.86	0.0642	44
	Dry	2.63835	1.01781	0.33601	0.83	0.0703	44
All Species	Green	4.63509	1.10518	0.17018	0.83	0.0756	215
	Dry	3.22370	1.15314	0.02403	0.74	0.0957	215
			TOTAL-TREE WOOD				
Soft Hardwoods	Green	3.00714	0.98326	0.40966	0.84	0.0736	130
	Dry	1.71959	0.99782	0.34780	0.84	0.0728	130
Sweetgum	Green	1.87725	1.08275	0.41514	0.91	0.0554	62
	Dry	1.01259	1.06278	0.40913	0.87	0.0673	62
Blackgum	Green	2.35544	0.98841	0.45689	0.91	0.0525	39
	Dry	1.09467	0.95035	0.53695	0.87	0.0651	39

Continued

Table 15.--Regression equations for estimating green and dry weight of the above-stump total-tree wood, bark and foliage, wood and bark combined, and wood alone for hardwood species in the Gulf and Atlantic Coastal Plains, with d.b.h. and height to a 4-inch top as the independent variables

Species or species group	Weight green or dry	Regression equation coefficients: Trees < 11.0 in d.b.h.[1] a'	b	Trees > 11.0 in d.b.h.[2] a"	b	c	Coefficient of determination (R^2)	Standard error[3] ($S_{y.x}$)
				TOTAL-TREE WOOD, BARK AND FOLIAGE				
Soft Hardwoods	Green	3.37612	0.67853	0.26749	1.20720	0.67853	0.97	0.0701
	Dry	1.77391	0.67549	0.17606	1.15719	0.67549	0.97	0.0713
Sweetgum	Green	3.24403	0.68890	0.22273	1.24744	0.68890	0.98	0.0511
	Dry	1.35527	0.70509	0.11711	1.21568	0.70509	0.98	0.0531
Blackgum	Green	2.58872	0.71629	0.44101	1.08533	0.71629	0.99	0.0520
	Dry	1.46810	0.70354	0.23095	1.08919	0.70354	0.98	0.0558
Yellow-poplar	Green	0.94357	0.82884	0.48664	0.96691	0.82884	0.99	0.0499
	Dry	0.44581	0.82474	0.17968	1.01422	0.82474	0.99	0.0458
Water tupelo	Green	6.04639	0.58448				0.94	0.0580
	Dry	2.97893	0.58982				0.94	0.0562
Green ash	Green	2.41633	0.69925				0.94	0.0945
	Dry	1.35281	0.71431				0.94	0.0951
Red maple	Green	2.58739	0.71445				0.93	0.0800
	Dry	1.45695	0.71516				0.93	0.0833
Hard Hardwoods	Green	3.37073	0.70810	0.42484	1.13998	0.70810	0.98	0.0643
	Dry	1.77568	0.71966	0.24679	1.13115	0.71966	0.98	0.0662
White oak	Green	2.61399	0.73879	0.44051	1.11009	0.73879	0.98	0.0547
	Dry	1.24795	0.76548	0.24646	1.10371	0.76548	0.98	0.0546
Water oak	Green	2.87616	0.73146	0.60695	1.05586	0.73146	0.98	0.0536
	Dry	1.56476	0.73852	0.42799	1.00884	0.73852	0.98	0.0540
Laurel oak	Green	2.83811	0.73186	0.30174	1.19921	0.73186	0.96	0.0634
	Dry	1.73090	0.72337	0.21772	1.55566	0.72337	0.96	0.0690
Hickory	Green	2.20393	0.74130	0.15952	1.28882	0.74130	0.99	0.0375
	Dry	1.34237	0.74218	0.09936	1.28504	0.74218	0.99	0.0417
All Species	Green	3.59232	0.68132	0.29262	1.20421	0.68132	0.96	0.0825
	Dry	1.96772	0.67918	0.17757	1.18071	0.67918	0.95	0.1015
				TOTAL-TREE WOOD AND BARK				
Soft Hardwoods	Green	3.02579	0.68811	0.25589	1.20319	0.68811	0.97	0.0690
	Dry	1.63923	0.68245	0.16844	1.15691	0.68245	0.97	0.0705
Sweetgum	Green	2.84275	0.70145	0.21589	1.23896	0.70145	0.99	0.0493
	Dry	1.23956	0.71355	0.11187	1.21505	0.71355	0.98	0.0528
Blackgum	Green	2.39497	0.72242	0.43036	1.08034	0.72242	0.99	0.0511
	Dry	1.36686	0.70950	0.22488	1.08581	0.70950	0.98	0.0553
Yellow-poplar	Green	0.88468	0.83223	0.45423	0.97123	0.83223	0.99	0.0499
	Dry	0.43150	0.82647	0.17352	1.01642	0.82647	0.99	0.0456
Water tupelo	Green	5.84911	0.58560				0.94	0.0579
	Dry	2.92547	0.58991				0.94	0.0559

Continued

Table 15.--Regression equations for estimating green and dry weight of the above-stump total-tree wood, bark and foliage, wood and bark combined, and wood alone for hardwood species in the Gulf and Atlantic Coastal Plains, with d.b.h. and height to a 4-inch top as the independent variables--Continued

Species or species group	Weight green or dry	Regression equation coefficients: Trees < 11.0 in d.b.h.[1] a'	b	Trees > 11.0 in d.b.h.[2] a"	b	c	Coefficient of determination (R^2)	Standard error[3] ($S_{y.x}$)
Green ash	Green	2.39231	0.69798				0.94	0.0913
	Dry	1.34944	0.71280				0.94	0.0932
Red maple	Green	2.26056	0.72571				0.94	0.0782
	Dry	1.33312	0.72225				0.93	0.0819
Hard Hardwoods	Green	3.06739	0.71497	0.40162	1.13890	0.71497	0.98	0.0619
	Dry	1.66082	0.72392	0.23616	1.13064	0.72392	0.98	0.0640
White oak	Green	2.29252	0.74983	0.40888	1.10931	0.74983	0.98	0.0518
	Dry	1.13007	0.77328	0.23265	1.10284	0.77328	0.98	0.0526
Water oak	Green	2.53103	0.74215	0.56705	1.05408	0.74215	0.99	0.0513
	Dry	1.42961	0.74533	0.40296	1.00937	0.74533	0.99	0.0520
Laurel oak	Green	2.50227	0.74296	0.30566	1.18136	0.74296	0.97	0.0573
	Dry	1.55596	0.73274	0.21947	1.14115	0.73274	0.96	0.0641
Hickory	Green	2.21711	0.73563	0.14307	1.30710	0.73563	0.99	0.0392
	Dry	1.36956	0.73600	0.09083	1.30175	0.73600	0.99	0.0433
All Species	Green	3.23193	0.69012	0.27927	1.20070	0.69012	0.97	0.0805
	Dry	1.82072	0.68548	0.17035	1.17948	0.68548	0.95	0.0992
				TOTAL-TREE WOOD				
Soft Hardwoods	Green	2.26909	0.70384	0.21049	1.19962	0.70384	0.97	0.0710
	Dry	1.26520	0.69528	0.15093	1.13862	0.69528	0.97	0.0708
Sweetgum	Green	2.22300	0.71312	0.17098	1.24798	0.71312	0.98	0.0504
	Dry	0.98941	0.72208	0.09406	1.21275	0.72208	0.98	0.0522
Blackgum	Green	1.72305	0.74154	0.33385	1.08375	0.74154	0.99	0.0514
	Dry	1.01323	0.72319	0.17520	1.08913	0.72319	0.98	0.0588
Yellow-poplar	Green	0.72762	0.83511	0.41731	0.95104	0.83511	0.99	0.0500
	Dry	0.36043	0.83004	0.16310	0.99538	0.83004	0.99	0.0452
Water tupelo	Green	5.16471	0.58382				0.94	0.0566
	Dry	2.60441	0.58844				0.95	0.0543
Green ash	Green	1.92324	0.70301				0.95	0.0899
	Dry	1.13816	0.71717				0.94	0.0924
Red maple	Green	1.64813	0.74413				0.95	0.0713
	Dry	1.00509	0.73943				0.94	0.0753
Hard Hardwoods	Green	2.47702	0.72069	0.35288	1.12702	0.72069	0.98	0.0644
	Dry	1.38497	0.72523	0.21166	1.11692	0.72523	0.98	0.0647
White oak	Green	1.75518	0.76186	0.33082	1.10983	0.76186	0.98	0.0516
	Dry	0.92606	0.77730	0.19916	1.09776	0.77730	0.99	0.0515
Water oak	Green	1.99832	0.75087	0.48075	1.04795	0.75087	0.98	0.0532
	Dry	1.15501	0.74971	0.34672	1.00063	0.74971	0.98	0.0552

Continued

Table 15.--Regression equations for estimating green and dry weight of the above-stump total-tree wood, bark and foliage, wood and bark combined, and wood alone for hardwood species in the Gulf and Atlantic Coastal Plains, with d.b.h. and height to a 4-inch top as the independent variables--Continued

Species or species group	Weight green or dry	Regression equation coefficients: Trees < 11.0 in d.b.h.[1] a'	b	Trees > 11.0 in d.b.h.[2] a"	b	c	Coefficient of determination (R^2)	Standard error[3] ($S_{y.x}$)
Laurel oak	Green	1.77235	0.76435	0.23323	1.18723	0.76435	0.97	0.0585
	Dry	1.06736	0.75680	0.17696	1.13151	0.75680	0.96	0.0663
Hickory	Green	1.53149	0.75817	0.20647	1.17600	0.75817	0.99	0.0337
	Dry	0.97146	0.76020	0.14171	1.16159	0.76020	0.99	0.0380
All Species	Green	2.48379	0.70249	0.23590	1.19337	0.70249	0.97	0.0812
	Dry	1.43843	0.69464	0.15335	1.16142	0.69464	0.95	0.0971

[1]Trees < 11.0 inches d.b.h.

$Y = a'(D^2H4)^b$

Where: Y = component weight in pounds
D = tree d.b.h. in inches
H4 = tree total height in feet
a', b = regression coefficients

[2]Trees > 11.0 inches d.b.h.

$Y = a''(D^2)^b (H4)^c$

[3]$\log_{10}$ form

Table 16.--Regression equations for estimating green and dry weight of total-stem wood and bark combined and wood alone for hardwood species in the Gulf and Atlantic Coastal Plains, with d.b.h. and height to 4-inch top as the independent variables

Species or species group	Weight green or dry	Regression equation coefficients: Trees < 11.0 in d.b.h.[1] a'	b	Trees > 11.0 in d.b.h.[2] a"	b	c	Coefficient of determination (R^2)	Standard error[3] ($S_{y.x}$)
				TOTAL-STEM WOOD AND BARK				
Soft Hardwoods	Green	2.42427	0.69922	0.36858	1.09199	0.69922	0.98	0.0664
	Dry	1.30027	0.69496	0.25405	1.03542	0.69496	0.98	0.0622
Sweetgum	Green	2.22317	0.72051	0.40881	1.07362	0.72051	0.99	0.0490
	Dry	0.94694	0.73562	0.22704	1.03341	0.73562	0.98	0.0510
Blackgum	Green	2.11805	0.71813	0.53222	1.00613	0.71813	0.99	0.0450
	Dry	1.21193	0.70517	0.28033	1.01044	0.70517	0.99	0.0496
Yellow-poplar	Green	0.72031	0.84000	0.49988	0.91617	0.84000	0.99	0.0393
	Dry	0.33839	0.83922	0.19917	0.94974	0.83922	0.99	0.0348
Water tupelo	Green	6.61837	0.55741				0.95	0.0497
	Dry	3.35058	0.56061				0.95	0.0474
Green ash	Green	2.85181	0.65974				0.96	0.0734
	Dry	1.60158	0.67554				0.96	0.0741
Red maple	Green	1.93524	0.71819				0.97	0.0541
	Dry	1.13174	0.71733				0.96	0.0627
Hard Hardwoods	Green	2.07883	0.73676	0.63920	0.98267	0.73676	0.99	0.0454
	Dry	1.13472	0.74403	0.40474	0.95899	0.74403	0.99	0.0483
White oak	Green	1.36944	0.78518	0.58963	0.96089	0.78518	0.99	0.0333
	Dry	0.67675	0.80722	0.34331	0.94873	0.80722	0.99	0.0370
Water oak	Green	1.87527	0.75424	0.81647	0.92762	0.75424	0.99	0.0438
	Dry	1.05296	0.75707	0.64269	0.86001	0.75707	0.99	0.0445
Laurel oak	Green	2.16714	0.73413	0.59449	1.00384	0.73413	0.99	0.0311
	Dry	1.36503	0.72171	0.48422	0.93781	0.72171	0.99	0.0334
Hickory	Green	2.27031	0.71473	0.46314	1.04619	0.71473	0.99	0.0332
	Dry	1.40078	0.71557	0.29969	1.03771	0.71557	0.99	0.0375
All Species	Green	2.37622	0.70805	0.42781	1.06557	0.70805	0.98	0.0658
	Dry	1.32663	0.70403	0.27608	1.03133	0.70403	0.97	0.0775
				TOTAL-STEM WOOD				
Soft Hardwoods	Green	1.87816	0.71342	0.30153	1.09483	0.71342	0.97	0.0697
	Dry	1.02975	0.70667	0.22401	1.02474	0.70667	0.98	0.0639
Sweetgum	Green	1.80824	0.72955	0.31540	1.09368	0.72955	0.98	0.0514
	Dry	0.78637	0.74111	0.18546	1.04233	0.74111	0.98	0.0516
Blackgum	Green	1.56216	0.73646	0.41013	1.01532	0.73646	0.99	0.0458
	Dry	0.90264	0.72005	0.21149	1.02264	0.72005	0.98	0.0554
Yellow-poplar	Green	0.61077	0.84195	0.47874	0.89273	0.84195	0.99	0.0417
	Dry	0.28873	0.84241	0.19120	0.92835	0.84241	0.99	0.0379
Water tupelo	Green	5.73940	0.56009				0.95	0.0495
	Dry	2.92373	0.56361				0.96	0.0473

Continued

Table 16.--Regression equations for estimating green and dry weight of total-stem wood and bark combined and wood alone for hardwood species in the Gulf and Atlantic Coastal Plains, with d.b.h. and height to 4-inch top as the independent variables--Continued

Species or species group	Weight green or dry	Regression equation coefficients: Trees < 11.0 in d.b.h.[1] a'	b	Trees > 11.0 in d.b.h.[2] a"	b	c	Coefficient of determination (R^2)	Standard error[3] ($S_{y.x}$)
Green ash	Green	2.27397	0.66829				0.96	0.0739
	Dry	1.34014	0.68298				0.96	0.0747
Red maple	Green	1.43151	0.73816				0.97	0.0502
	Dry	0.86233	0.73600				0.96	0.0586
Hard Hardwoods	Green	1.74358	0.74054	0.54451	0.98321	0.74054	0.99	0.0492
	Dry	0.98023	0.74339	0.35207	0.95690	0.74339	0.99	0.0508
White oak	Green	1.08418	0.79721	0.47653	0.96862	0.79721	0.99	0.0352
	Dry	0.57244	0.81116	0.29326	0.95063	0.81116	0.99	0.0358
Water oak	Green	1.54311	0.76048	0.70261	0.92453	0.76048	0.99	0.0474
	Dry	0.87865	0.75984	0.56216	0.85296	0.75984	0.99	0.0489
Laurel oak	Green	1.54682	0.75682	0.48882	0.99702	0.75682	0.99	0.0389
	Dry	0.93347	0.74773	0.42577	0.91141	0.74773	0.98	0.0412
Hickory	Green	1.60697	0.73647	0.54037	0.96372	0.73647	0.99	0.0251
	Dry	1.02563	0.73770	0.39333	0.93755	0.73770	0.99	0.0310
All Species	Green	1.89251	0.71863	0.35580	1.06712	0.71863	0.97	0.0685
	Dry	1.08071	0.71164	0.24321	1.02264	0.71164	0.97	0.0772

[1]Trees < 11.0 inches d.b.h.

$Y = a'(D^2H4)^b$

Where: Y = component weight in pounds
D = tree d.b.h. in inches
H4 = tree total height in feet
a', b = regression coefficients

[2]Trees > 11.0 inches d.b.h.

$Y = a''(D^2)^b (H4)^c$

[3]$\log_{10}$ form

Table 17.--Regression equations for estimating cubic-foot volume of the above-stump total-tree wood and bark combined and wood alone for hardwood species in the Gulf and Atlantic Coastal Plains, with d.b.h. and height to 4-inch top as the independent variables

Species or species group	Volume Wood & bark or wood only	Regression equation coefficients: Trees < 11.0 in d.b.h.[1] a'	b	Trees > 11.0 in d.b.h.[2] a"	b	c	Coefficient of determination (R^2)	Standard error[3] ($S_{y.x}$)
				TOTAL TREE				
Soft Hardwoods	Wood & bark	0.05458	0.68416	0.00575	1.15325	0.68416	0.98	0.0568
	Wood	0.04034	0.70036	0.00487	1.14128	0.70036	0.98	0.0563
Sweetgum	Wood & bark	0.04827	0.69497	0.00392	1.21872	0.69497	0.99	0.0441
	Wood	0.03570	0.71036	0.00292	1.23274	0.71036	0.99	0.0421
Blackgum	Wood & bark	0.05061	0.69951	0.00818	1.07953	0.69951	0.99	0.0536
	Wood	0.03594	0.71741	0.00621	1.08348	0.71741	0.99	0.0541
Yellow-poplar	Wood & bark	0.02670	0.77507	0.00887	1.00482	0.77507	0.99	0.0444
	Wood	0.02426	0.76563	0.00849	0.98455	0.76563	0.99	0.0427
Water tupelo	Wood & bark	0.08546	0.61643				0.95	0.0541
	Wood	0.07142	0.61934				0.95	0.0526
Green ash	Wood & bark	0.04825	0.69866				0.96	0.0787
	Wood	0.03877	0.70536				0.96	0.0776
Red maple	Wood & bark	0.04440	0.71954				0.94	0.0765
	Wood	0.03485	0.73212				0.95	0.0718
Hard Hardwoods	Wood & bark	0.05279	0.69937	0.00576	1.16130	0.69937	0.98	0.0602
	Wood	0.04242	0.70439	0.00484	1.15686	0.70439	0.98	0.0623
White oak	Wood & bark	0.03065	0.76373	0.00533	1.12846	0.76373	0.99	0.0500
	Wood	0.02279	0.77697	0.00408	1.13556	0.77697	0.99	0.0488
Water oak	Wood & bark	0.03895	0.73794	0.00826	1.06136	0.73794	0.99	0.0494
	Wood	0.02993	0.74915	0.00676	1.05950	0.74915	0.99	0.0500
Laurel oak	Wood & bark	0.03154	0.76203	0.00422	1.18162	0.76203	0.97	0.0563
	Wood	0.02229	0.78246	0.00290	1.20763	0.78246	0.98	0.0543
Hickory	Wood & bark	0.04572	0.70355	0.00189	1.36747	0.70355	0.99	0.0449
	Wood	0.03150	0.72391	0.00236	1.26414	0.72391	0.99	0.0404
All Species	Wood & bark	0.05519	0.68657	0.00558	1.16445	0.68657	0.98	0.0610
	Wood	0.04199	0.69892	0.00472	1.15458	0.69892	0.98	0.0610

[1]Trees < 11.0 inches d.b.h.

$$Y = a'(D^2H4)^b$$

Where: Y = component volume in cubic feet
D = tree d.b.h. in inches
H4 = tree total height in feet
a', b = regression coefficients

[2]Trees ≥ 11.0 inches d.b.h.

$$Y = a''(D^2)^b\ (H4)^c$$

[3]$\log_{10}$ form

Table 19.--Regression equations for estimating green and dry weight of the above-stump total-tree wood, bark and foliage, wood and bark combined, and wood alone for hardwood species in the Gulf and Atlantic Coastal Plains, with d.b.h. and saw-log merchantable height as the independent variables--Continued

Species or species group	Weight green or dry	Regression equation coefficients[1]			Coefficient of determination (R^2)	Standard error[2] ($S_{y.x}$)	Number trees sampled (N)
		a	b	c			
Hard Hardwoods	Green	3.02478	1.10090	0.27899	0.88	0.0635	85
	Dry	1.73260	1.04784	0.36590	0.86	0.0694	85
White oak	Green	1.59257	1.24526	0.23697	0.92	0.0603	26
	Dry	0.91986	1.21673	0.29241	0.91	0.0655	26
Water & laurel oaks	Green	3.31900	1.05185	0.33566	0.84	0.0674	44
	Dry	2.26161	1.00405	0.35105	0.80	0.0756	44
All Species	Green	3.74372	1.09068	0.20756	0.82	0.0781	215
	Dry	2.65444	1.12334	0.07703	0.73	0.0973	215

[1] $Y = a(D^2)^b (Mh)^c$

Where: Y = component weight in pounds
D = tree d.b.h. in inches
Mh = tree saw-log merchantable height in feet
a,b,c = regression coefficients

[2] $\log_{10}$ form

Table 20.--Regression equations for estimating green and dry weight of the saw-log merchantable stem wood and bark combined and wood alone for hardwood species in the Gulf and Atlantic Coastal Plains, with d.b.h. and saw-log merchantable height as the independent variables

Species or species group	Weight green or dry	Regression equation coefficients[1] a	b	c	Coefficient of determination (R^2)	Standard error[2] ($S_{y.x}$)	Number trees sampled (N)
			SAW-LOG STEM WOOD AND BARK				
Soft Hardwoods	Green	0.87401	0.88900	0.79965	0.90	0.0624	130
	Dry	0.50131	0.92331	0.70736	0.92	0.0545	130
Sweetgum	Green	0.79308	0.92245	0.79545	0.94	0.0493	62
	Dry	0.41966	0.92088	0.76707	0.93	0.0517	62
Blackgum	Green	0.85293	0.90659	0.77323	0.96	0.0349	39
	Dry	0.40178	0.88080	0.83500	0.96	0.0377	39
Hard Hardwoods	Green	0.61442	0.96619	0.81400	0.95	0.0443	85
	Dry	0.31829	0.91843	0.91625	0.95	0.0477	85
White oak	Green	0.48441	1.01256	0.80658	0.98	0.0317	26
	Dry	0.25925	0.97581	0.89259	0.97	0.0349	26
Water & laurel oaks	Green	1.01066	0.90432	0.77494	0.96	0.0342	44
	Dry	0.76711	0.84107	0.77939	0.95	0.0371	44
All Species	Green	0.88040	0.95844	0.70536	0.91	0.0604	215
	Dry	0.58791	0.99735	0.57903	0.87	0.0727	215
			SAW-LOG STEM WOOD				
Soft Hardwoods	Green	0.74173	0.88455	0.81914	0.90	0.0671	130
	Dry	0.43430	0.89051	0.76056	0.92	0.0563	130
Sweetgum	Green	0.65538	0.92346	0.81779	0.93	0.0519	62
	Dry	0.35422	0.89014	0.82529	0.93	0.0525	62
Blackgum	Green	0.71851	0.90529	0.78833	0.97	0.0344	39
	Dry	0.31052	0.85953	0.89994	0.95	0.0447	39
Hard Hardwoods	Green	0.54531	0.95556	0.82625	0.94	0.0486	85
	Dry	0.31094	0.88863	0.92803	0.94	0.0492	85
White oak	Green	0.47241	1.03334	0.75032	0.97	0.0354	26
	Dry	0.26686	0.99830	0.81576	0.97	0.0386	26
Water & laurel oaks	Green	0.88424	0.89109	0.79523	0.95	0.0368	44
	Dry	0.64376	0.82294	0.81366	0.93	0.0436	44
All Species	Green	0.74691	0.94575	0.73580	0.91	0.0635	215
	Dry	0.52476	0.96152	0.62755	0.87	0.0723	215

[1] $Y = a(D^2)^b (Mh)^c$

Where: Y = component weight in pounds
D = tree d.b.h. in inches
Mh = tree saw-log merchantable height in feet
a,b,c = regression coefficients

[2] $\log_{10}$ form

Table 21.--Regression equations for estimating cubic-foot volume of the above-stump total-tree wood and bark combined and wood alone for hardwood species in the Gulf and Atlantic Coastal Plains, with d.b.h. and saw-log merchantable height as the independent variables

Species or species group	Volume wood & bark or wood only	Regression equation coefficients[1] a	b	c	Coefficient of determination (R^2)	Standard error[2] ($S_{y.x}$)	Number trees sampled (N)
			TOTAL TREE				
Soft Hardwoods	Wood & bark	0.06292	1.00818	0.35237	0.88	0.0606	130
	Wood	0.04908	1.00055	0.38586	0.88	0.0615	130
Sweetgum	Wood & bark	0.03686	1.07609	0.40322	0.90	0.0573	62
	Wood	0.02784	1.07502	0.43883	0.91	0.0565	62
Blackgum	Wood & bark	0.05001	0.96847	0.47172	0.89	0.0561	39
	Wood	0.03759	0.96393	0.50801	0.90	0.0560	39
Hard Hardwoods	Wood & bark	0.05755	1.09753	0.27012	0.88	0.0643	85
	Wood	0.04742	1.09904	0.27230	0.88	0.0647	85
White oak	Wood & bark	0.01914	1.20351	0.41421	0.93	0.0604	26
	Wood	0.01672	1.21831	0.38150	0.93	0.0602	26
Water & laurel	Wood & bark	0.05829	1.07097	0.30418	0.85	0.0672	44
oaks	Wood	0.05143	1.07052	0.29436	0.84	0.0700	44
All Species	Wood & bark	0.06890	1.07859	0.23259	0.87	0.0650	215
	Wood	0.05431	1.07269	0.26009	0.87	0.0653	215

[1] $Y = a(D^2)^b (Mh)^c$

Where: Y = component volume in cubic feet
D = tree d.b.h. in inches
Mh = saw-log merchantable height in feet
a,b,c = regression coefficients

[2] $\log_{10}$ form

Table 22.--Regression equations for estimating cubic-foot volume of the saw-log merchantale stem wood and bark combined and wood alone for hardwood species in the Gulf and Atlantic Coastal Plains, with d.b.h. and saw-log merchantable height as the independent variables

Species or species group	Volume wood & bark or wood only	Regression equation coefficients[1] a	b	c	Coefficient of determination (R^2)	Standard error[2] ($S_{y.x}$)	Number trees sampled (N)
			SAW-LOG STEM				
Soft Hardwoods	Wood & bark	0.01355	0.91502	0.78524	0.95	0.0438	130
	Wood	0.01109	0.91458	0.80416	0.96	0.0418	130
Sweetgum	Wood & bark	0.01148	0.93311	0.80577	0.96	0.0387	62
	Wood	0.00891	0.93978	0.83198	0.97	0.0366	62
Blackgum	Wood & bark	0.01468	0.86996	0.83477	0.94	0.0430	39
	Wood	0.01235	0.86759	0.84637	0.95	0.0399	39
Hard Hardwoods	Wood & bark	0.00831	0.99382	0.80697	0.97	0.0374	85
	Wood	0.00681	1.00006	0.81544	0.96	0.0389	85
White oak	Wood & bark	0.00451	1.00084	0.96951	0.98	0.0286	26
	Wood	0.00410	1.01997	0.93249	0.98	0.0278	26
Water & laurel	Wood & bark	0.01517	0.93536	0.72406	0.97	0.0289	44
oaks	Wood	0.01311	0.93552	0.72780	0.97	0.0303	44
All Species	Wood & bark	0.01144	0.95237	0.77719	0.96	0.0417	215
	Wood	0.00933	0.95371	0.79429	0.96	0.0409	215

[1] $Y = a(D^2)^b (Mh)^c$

Where: Y = component volume in cubic feet
D = tree d.b.h. in inches
Mh = saw-log merchantable height in feet
a,b,c = regression coefficients

[2] $\log_{10}$ form

Table 23.--Regression coefficients for estimating above-stump stem weight to a specified d.o.b. top diameter as a proportion of the total-stem weight for hardwood species in the Gulf and Atlantic Coastal Plains

Species	Regression equation and coefficients[1] $Y_R = e^{a(d)^b (D)^c}$					
	Green weight			Dry weight		
	a	b	c	a	b	c
			WOOD AND BARK			
Soft Hardwoods	-1.93940	4.35017	-4.49235	-1.72300	4.31377	-4.40980
Green ash	-0.79392	3.04437	-2.95711	-0.79675	3.05645	-2.96884
Blackgum	-1.61064	4.20298	-4.31053	-1.27291	4.23402	-4.24340
Red maple	-2.19261	4.37847	-4.52151	-2.27985	4.42188	-4.59723
Sweetgum	-2.36555	4.44594	-4.66050	-2.17912	4.37749	-4.55793
Water tupelo	-1.96549	3.48342	-3.59728	-1.66379	3.46696	-3.51675
Yellow-poplar	-0.83719	4.22206	-4.09656	-0.86509	4.22701	-4.11086
Hard Hardwoods	-1.58760	4.43386	-4.51924	-1.53809	4.42116	-4.48719
Hickory	-2.70724	4.38961	-4.59609	-2.70268	4.40866	-4.59728
Laurel oak	-2.39112	4.70933	-4.99680	-2.12286	4.59564	-4.83455
Water oak	-1.28626	4.74742	-4.70468	-1.28716	4.69380	-4.65009
White oak	-1.49384	3.73551	-3.90626	-1.43138	3.68884	-3.84353
All Species	-1.80946	4.38990	-4.51267	-1.65511	4.35427	-4.44056
			WOOD ONLY			
Soft Hardwoods	-1.88381	4.54821	-4.67244	-1.73884	4.47735	-4.57588
Green ash	-0.80238	3.16971	-3.09310	-0.81859	3.16181	-3.08978
Blackgum	-1.59408	4.42111	-4.51634	-1.37905	4.35347	-4.40059
Red maple	-2.12514	4.54168	-4.66851	-2.20332	4.56197	-4.71937
Sweetgum	-2.26692	4.65256	-4.84368	-2.13084	4.56383	-4.73251
Water tupelo	-1.98691	3.58422	-3.70804	-1.65907	3.54754	-3.60457
Yellow-poplar	-0.82053	4.34492	-4.20483	-0.86026	4.31966	-4.19801
Hard Hardwoods	-1.59298	4.58912	-4.66983	-1.56717	4.54405	-4.61484
Hickory	-2.63453	4.52693	-4.71874	-2.71340	4.53012	-4.71976
Laurel oak	-2.78813	5.05450	-5.38612	-2.51431	4.93186	-5.22179
Water oak	-1.26046	4.85878	-4.80286	-1.26866	4.79701	-4.74290
White oak	-1.54513	3.93621	-4.10784	-1.47803	3.87194	-4.02826
All Species	-1.78219	4.57488	-4.68510	-1.67757	4.50655	-4.59595

[1]Where: Y_R = stem weight to top d.o.b./total-stem weight ratio

d = stem specified top d.o.b. in inches

D = tree diameter at breast height in inches

a,b,c = regression coefficients

e = 2.71828 (base of log E)

Table 24.--Regression coefficients for estimating above-stump stem volume to a specified d.o.b. top diameter as a proportion of the total stem-volume for hardwood species in the Gulf and Atlantic Coastal Plains

Species	Regression equation and coefficients[1] $Y_R = e^{a(d)^b (D)^c}$					
	Wood and bark			Wood only		
	a	b	c	a	b	c
Soft Hardwoods	-1.95391	4.37630	-4.52902	-1.47142	4.49327	-4.50952
Green ash	-0.75040	3.47756	-3.30574	-0.76979	3.72773	-3.54962
Blackgum	-1.32367	4.18073	-4.22831	-1.04441	4.01532	-4.01211
Red maple	-2.22665	4.34812	-4.51941	-2.18979	4.48186	-4.64393
Sweetgum	-2.45614	4.42270	-4.66557	-2.09610	4.70899	-4.85274
Water tupelo	-1.57486	3.62210	-3.63518	-1.13533	3.54942	-3.43534
Yellow-poplar	-1.24111	4.23982	-4.28488	-1.83627	4.40258	-4.57745
Hard Hardwoods	-1.59973	4.42029	-4.51789	-1.03613	4.42268	-4.34872
Hickory	-3.09998	4.48297	-4.74816	-3.13295	4.65737	-4.92347
Laurel oak	-1.94345	4.53074	-4.75648	-2.15829	4.87144	-5.12303
Water oak	-1.31611	4.75279	-4.72974	-1.20950	4.92378	-4.84797
White oak	-1.83212	3.67631	-3.94651	-1.97649	3.89778	-4.18706
All Species	-1.82731	4.40555	-4.53990	- 1.36256	4.50290	-4.50250

[1]Where: Y_R = stem volume to top d.o.b./total-stem volume ratio

d = stem specified top d.o.b. in inches

D = tree diameter at breast height in inches

a,b,c = regression coefficients

e = 2.71828 (base of log E)

Table 25.--Regression coefficients for estimating stem weight to a specified d.o.b. top diameter as a proportion of the saw-log stem weight for hardwood species in the Gulf and Atlantic Coastal Plains

Species	Ratio equation and coefficients[1] $Y_R = e^{a(Mh)^b}((1-(\frac{d}{.78D})^2)^2)^c$					
	Green weight			Dry weight		
	a	b	c	a	b	c
			WOOD AND BARK			
Soft Hardwoods	8.37557	-0.92624	0.48987	10.99751	-0.99658	0.47563
Blackgum	3.07492	-0.65386	0.51846	3.58985	-0.70132	0.50780
Sweetgum	9.22292	-0.94293	0.43055	13.01029	-1.03030	0.41477
Hard Hardwoods	9.73549	-0.96150	0.40328	11.13972	-0.99333	0.41138
Water & laurel oaks	6.67459	-0.85062	0.40331	6.52912	-0.83960	0.40760
White oak	7.59699	-0.92120	0.36812	9.07229	-0.96632	0.38099
All Species	9.51900	-0.95941	0.44152	11.52701	-1.00732	0.44078
			WOOD ONLY			
Soft Hardwoods	8.26423	-0.93307	0.48211	11.00373	-1.00921	0.47185
Blackgum	2.65186	-0.62289	0.50880	2.90934	-0.64793	0.51068
Sweetgum	9.23108	-0.95380	0.42459	13.36831	-1.04941	0.40957
Hard hardwoods	9.47626	-0.95940	0.39910	9.65663	-0.95967	0.40228
Water & laurel oaks	6.62924	-0.85318	0.39894	6.54618	-0.84499	0.40288
White oak	7.59855	-0.92818	0.36469	7.64818	-0.92614	0.36572
All Species	9.50009	-0.96728	0.43572	10.92035	-1.00248	0.43448

[1]Where: Y_R = stem weight to top d.o.b./total stem weight ratio

d = stem specified top d.o.b. in inches

D = tree diameter at breast height in inches

a,b,c = regression coefficients

e = 2.71828 (base of log E)

Table 26.--Regression coefficients for estimating stem volume to a specified d.o.b. top diameter as a proportion of the saw-log stem volume for hardwood species in the Gulf and Atlantic Coastal Plains

Species	Ratio equation and coefficients[1] $Y_R = e^{a(Mh)^b}((1-(\frac{d}{.78D})^2)^2)^c$					
	Wood and bark			Wood only		
	a	b	c	a	b	c
Soft Hardwoods	10.93583	-1.01701	0.49330	11.40582	-1.04277	0.48530
Blackgum	3.12362	-0.67621	0.54114	2.47014	-0.62586	0.53201
Sweetgum	9.99452	-0.98178	0.43551	10.23031	-1.00270	0.42875
Hard Hardwoods	9.47896	-0.96426	0.41017	9.12129	-0.96109	0.40654
Water & laurel oaks	6.37261	-0.84302	0.40716	6.28001	-0.84489	0.40280
White oak	7.82275	-0.94615	0.36791	7.77524	-0.95538	0.36407
All Species	10.75977	-1.00806	0.44887	10.92899	-1.02381	0.44312

[1]Where: Y_R = stem volume to top d.o.b./total stem volume ratio

d = stem specified top d.o.b. in inches

D = tree diameter at breast height in inches

a,b,c = regression coefficients

e = 2.71828 (base of log E)

☆ U.S. GOVERNMENT PRINTING OFFICE: 1985-549-089

Clark, Alexander III; Phillips, Douglas R.; Frederick, Douglas J.
Weight, volume, and physical properties of major hardwood species in the Gulf and Atlantic Coastal Plains. Res. Pap. SE-250. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station; 1985. 66 pp.

The weight, volume, and physical properties of trees 1 to 20 inches d.b.h. were determined for green ash, blackgum, red maple, sweetgum, water tupelo, yellow-poplar, hickory, laurel oak, water oak, and white oak in the Gulf and Atlantic Coastal Plains. Hard hardwood, soft hardwood, and individual species equations are presented for predicting green and dry weight and green volume of the total tree above stump and its components by using d.b.h. and total height, d.b.h. and height to a 4-inch top, d.b.h. and saw-log merchantable height, and d.b.h. alone. Average specific gravity, moisture content, and weight per cubic foot of wood, bark, and wood and bark combined are presented for each species, by tree size class and component. Bark percent is also presented for each species by tree size class and component.

Keywords: Biomass, equations, specific gravity, moisture percent, bark percent, weight per cubic foot.

Clark, Alexander III; Phillips, Douglas R.; Frederick, Douglas J.
Weight, volume, and physical properties of major hardwood species in the Gulf and Atlantic Coastal Plains. Res. Pap. SE-250. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station; 1985. 66 pp.

The weight, volume, and physical properties of trees 1 to 20 inches d.b.h. were determined for green ash, blackgum, red maple, sweetgum, water tupelo, yellow-poplar, hickory, laurel oak, water oak, and white oak in the Gulf and Atlantic Coastal Plains. Hard hardwood, soft hardwood, and individual species equations are presented for predicting green and dry weight and green volume of the total tree above stump and its components by using d.b.h. and total height, d.b.h. and height to a 4-inch top, d.b.h. and saw-log merchantable height, and d.b.h. alone. Average specific gravity, moisture content, and weight per cubic foot of wood, bark, and wood and bark combined are presented for each species, by tree size class and component. Bark percent is also presented for each species by tree size class and component.

Keywords: Biomass, equations, specific gravity, moisture percent, bark percent, weight per cubic foot.