

## Biomass equations for sixty-five North American tree species

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### Abstract

The paper presents a comprehensive review of the biomass equations for 65 North American tree species. All equations are of the form  $M = aD^b$ , where  $M$  is the oven-dry weight of the biomass component of a tree (kg),  $D$  is diameter at breast height (DBH) (cm), and  $a$  and  $b$  are parameters. Equations for the following tree components were included in the review: total aboveground biomass, stem wood, stem bark, total stem (wood and bark), foliage, and branches (wood and bark). A total of 803 equations are presented with the range of DBH values of the sample, sample size, coefficient of determination  $R^2$ , standard error of the estimate, fitting method used to estimate the parameters  $a$  and  $b$ , correction factor for a bias introduced by logarithmic transformation of the data, site index and geographic location of the sampled stand(s), and a reference to the paper in which the equation (or the data) was published. The review is a unique source of equations that can be used to estimate tree biomass and/or to study the variation of biomass components for a tree species. © 1997 Elsevier Science B.V.

*Keywords:* Aboveground biomass; Stem wood biomass; Stem bark biomass; Foliage biomass; Branch biomass; Dry weight

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### 1. Introduction

In the last few decades, considerable research effort has gone into estimating the biomass of individual trees and relating it to tree characteristics such as diameter at breast height (DBH), total height, etc. Biomass equations for individual trees have been produced in studies of forest production and its correlation with stand density (Baskerville, 1965), in studies comparing biomass and production for individual tree species (Pastor and Bockheim, 1981), and in studies on forest fuel estimation (Agee, 1983), etc.

As a result, several different biomass estimation equations are reported in the literature for the same species.

Whenever there is a need to estimate the biomass of individual trees, the abundance of existing predictive equations provides an alternative to destructive sampling of trees for the purposes of developing local equations. However, the user has to rely on estimates developed for other sites that are most likely different from the conditions on their particular site. Several approaches have been suggested to circumvent this problem: (a) find the geographically closest site; (b) use several reported equations to estimate the range of biomass (Tritton and Hornbeck, 1982); and (c) generate biomass data using various published equations and fit a new equation to the

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generated data (Pastor et al., 1984). Crow and Schlaegel (1988) provided a broad discussion of the application of biomass equations where several equations are available for a species.

Implementation of all three approaches, however, is hampered because the developed biomass equations are scattered across a large body of forestry literature. Many equations are published in internal reports and are presented in conflicting formats that complicate their comparison. Several previous reviews of biomass equations either need to be updated (Stanek and State, 1978) or were designed to suit local geographic needs (Gholz et al., 1979; Tritton and Hornbeck, 1982).

The objective of this paper is to present a comprehensive and consistent review of biomass equations for North American tree species. The review can be used to estimate biomass or as a base to study the cross-site biomass variation of an individual tree species.

## 2. Materials

This review includes equations of the form:

$$M = aD^b \quad (1)$$

where  $M$  is the oven-dry weight of the biomass component of a tree (kg),  $D$  is DBH (cm), and  $a$  and  $b$  are parameters. Although the literature on individual-tree biomass estimation provides a number of equations that either have a form different from Eq. (1) or that include additional independent variables such as tree height, sapwood area, etc., Eq. (1) (often presented in the logarithmic form) is most frequently reported.

The popularity of Eq. (1) in the literature stems from the fact that it provides a good balance of accurate predictions and low data requirements; using the most commonly and easily measured variable in forest studies (DBH). Addition of other tree variables, although statistically significant, does not usually lead to a substantial increase in  $R^2$  or a decrease in SEE. For example, Freedman et al. (1982) noted that addition of total tree height (the second most common variable used to predict biomass) accounted for such a small variation in weight beyond that accounted for by DBH that “the chance of commit-

ting an error by adding the height as a significant variable, when in fact it was not, was seldom less than 0.05”. Similarly low gains from including height were demonstrated by Peterson et al. (1970), Crow (1971), Ralston (1973), Ker (1980a,b, 1984), Schmitt and Grigal (1981), Crow and Erdmann (1983), Hocker and Earley (1983), Ouellet (1983), Grigal and Kernik (1984b), Campbell et al. (1985), and Harding and Grigal (1985). Results from studies using other variables (e.g. sapwood area, Baldwin (1989), Bormann (1990); crown width and crown volume, Ker (1980a), etc.) were inconsistent. We therefore decided to omit equations other than Eq. (1) from our review.

The review includes equations for: total above-ground biomass (AB), stem wood (SW), stem bark (SB), stem total (wood and bark) (ST), foliage (FL), and branches (wood and bark) (BR). Some authors have also reported separate equations for finer components, e.g. for previous year’s or older foliage (Bormann, 1990), but the components listed above are the most commonly reported.

First, we searched the literature to collect as many equations of the same type as Eq. (1) as possible. Original papers were reviewed to verify the study region, the measurement technique, the number of trees sampled, the range of values of the independent variable (DBH), and the method used to fit the regression equation. Only equations fitted with data sampled in the original study were included in the review; we excluded “secondary” equations that were fitted with data generated from equations of a form other than that of Eq. (1). Two exceptions were made as follows.

(a) Perala and Alban (1994) reported two relationships for some species: height versus DBH and biomass component versus DBH and height. Since both relationships were fitted with data from the same sample, we substituted the first relationship for the height term in the second relationship.

(b) Although not clear from their text, we believe that to obtain a set of additive equations, Young et al. (1980) first fitted equations for biomass components, then calculated the sum of biomass components predicted by those equations for a set of incremental DBH values, and fitted the equation for total above-ground biomass to the predicted total above-ground biomass values.

Finally, several authors reported original data used to fit equations different from Eq. (1). We used their data to fit equations of the form of Eq. (1); these equations are included in the review with reference to the original authors.

### 3. Results

Appendix A presents the list of equations for 65 North American tree species. The comments below explain some of the contents of Appendix A.

#### 3.1. Parameters $a$ and $b$

All parameters refer to the form (1) of a corresponding biomass equation. Many authors have reported Eq. (1) in a logarithmic form, i.e. the parameters  $\ln_e a$  (or  $\log_{10} a$ ) and  $b$  were estimated using a linear regression applied to the logarithm of biomass and DBH values. In these cases, we converted the parameters back to arithmetic units to make them comparable with those fitted using nonlinear regression. When necessary, parameters were converted to metric.

#### 3.2. DBH sample range ( $D$ range)

An estimate is presented for several equations for which the authors did not provide a sample range for DBH. For equations by Wiant et al. (1977) and Young et al. (1980), the DBH sample range was estimated from the biomass tables presented in their papers; for equations by Whittaker et al. (1974) it was estimated from the DBH distribution of the stands sampled in their study. These estimates may, thus, exceed the actual sample range used for fitting the equations.

#### 3.3. Sample size ( $N$ )

Wiant et al. (1977) reported a sample size between 19 and 22 for all the species included in their study; a conservative estimate of 19 is used in Appendix A.

#### 3.4. Coefficient of determination ( $R^2$ )

When necessary, the  $R^2$  values were calculated using the  $R$  or adjusted  $R^2$  values reported by the

authors. It should be noted, that the  $R^2$  values in Appendix A are related to the regression method used to fit the parameters  $a$ ,  $b$  in the original study. The reader should therefore check the Fitting method (Mtd) column before comparing the  $R^2$  values of equations for the same species.

#### 3.5. Standard error of estimate ( $SEE$ )

Whittaker and Woodwell (1968), Whittaker et al. (1974), Koerper and Richardson (1980), and Pastor and Bockheim (1981) reported an error of estimate  $E$  calculated as an antilog of the standard error of estimate  $SEE$ ; in these cases,  $SEE$  was calculated as  $\ln_e(E)$  or  $\log_{10}(E)$  depending on the fitting method used in the paper. As with  $R^2$ ,  $SEE$  is related to the regression method used to fit the original parameters, i.e. for equations fitted in the logarithmic form,  $SEE$  is given in corresponding logarithmic units.

#### 3.6. Correction factor ( $C.f.$ )

Application of a linear regression to the log-transformed data introduces a systematic bias when the predicted values are converted back to arithmetic units. To compensate for this bias, Baskerville (1972) suggested using a correction factor calculated as an antilog of one half of the sample variance, the latter being equal to the  $SEE$  squared. To obtain an unbiased estimate, the predicted biomass values should be multiplied by this correction factor. For consistency, all parameters  $a$ ,  $b$  in the table specify raw (uncorrected) equations, including the equations from Gholz et al. (1979) and Snell and Little (1983) that are reported in a corrected form.

#### 3.7. Site index ( $SI$ )

If provided in the source of equation, the site index is specified in Appendix A as the height (m) followed in brackets by the base age (years). The majority of the reviewed papers, however, had either none or little quantitative information about the sites sampled for tree biomass data. Denotations used for sites for which the authors provided a qualitative assessment are defined in Appendix A. It should be noted that for some species, Perala and Alban (1994) reported the basic equations and correction factors

for specific sites; for these species, only parameters for the basic equation are included in Appendix A.

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### Appendix A. Individual tree biomass equations of the form $M = aD^b$ , where $D$ is the diameter at breast height (cm), and $M$ is the aboveground biomass component (kg of oven-dried weight)

For each equation, the table includes parameters  $a$  and  $b$ , DBH sample range ( $D$  range) (cm), the sample size ( $N$ ), coefficient of determination ( $R^2$ ), standard error of estimate (SEE), fitting method (Mtd) used to estimate parameters  $a$  and  $b$ , correction factor (C.f.) for a bias introduced by logarithmic transformation of the data, site index (SI) of the

sampled stand(s) specified as the height (m) followed in brackets by the base age (years), geographic location (Region) of the sampled stand(s), and a reference to the paper (Author) in which the equation (or the data) was published. If missing, the corresponding column indicates n/a (not available). The following denotations are used.

1. Biomass components (M): AB for total above-ground biomass; SW for stem wood; SB for stem bark; ST for total stem biomass (wood + bark); FL for foliage biomass; BR for total biomass of branches (wood + bark). Where the first column is blank, the line refers to the last specified biomass component.

2. Fitting method (Mtd): abs or absw for equations fitted with a nonlinear or weighted nonlinear regression, respectively; ln or log for equations fitted using linear regression applied to  $\log_e$ - or  $\log_{10}$ -transformed data, respectively; calc for equations calculated from two or more equations (see Section 2).

3. Site index (SI): comp for the data from various sites pooled together; intermed for intermediate sites, good and poor for good and poor sites, respectively, with a prefix, c, if the data were pooled from several good or several poor sites.

| <i>M</i>   | <i>a</i> | <i>b</i> | <i>D</i> range   | <i>N</i> | $R^2$ | SEE   | Mtd  | C.f.  | SI   | Region             | Author                              |
|--|----------|----------|------------------|----------|-------|-------|------|-------|------|--------------------|-------------------------------------|
| Alder, red ( <i>Alnus rubra</i> Bong.)                 |          |          |                  |          |       |       |      |       |      |                    |                                     |
| FL:  | 0.0100   | 1.9398   | 3–63             | 53       | 0.929 | 0.444 | ln   | 1.104 | comp | Oregon, Washington | Snell and Little, 1983 <sup>b</sup> |
| BR:  | 0.0069   | 2.6516   | 3–63             | 53       | 0.936 | 0.574 | ln   | 1.179 | comp | Oregon, Washington | Snell and Little, 1983 <sup>b</sup> |
| Alder, speckled ( <i>Alnus rugosa</i> (DuRoi) Spreng.) |          |          |                  |          |       |       |      |       |      |                    |                                     |
| AB:  | 0.2612   | 2.2087   | 3–9 <sup>a</sup> | 30       | n/a   | n/a   | calc | n/a   | comp | Maine              | Young et al., 1980                  |
| ST:  | 0.0456   | 2.5847   | 3–8              | 30       | 0.934 | n/a   | log  | n/a   | comp | Maine              | Ribe, 1973                          |
|  | 0.0463   | 2.5755   | 3–9 <sup>a</sup> | 30       | 0.967 | n/a   | ln   | n/a   | comp | Maine              | Young et al., 1980                  |
| FL:  | 0.0461   | 1.2643   | 3–8              | 30       | 0.667 | n/a   | log  | n/a   | comp | Maine              | Ribe, 1973                          |
|  | 0.0479   | 1.2274   | 3–9 <sup>a</sup> | 30       | 0.802 | n/a   | ln   | n/a   | comp | Maine              | Young et al., 1980                  |
| BR:  | 0.0620   | 1.5184   | 3–8              | 30       | 0.776 | n/a   | log  | n/a   | comp | Maine              | Ribe, 1973                          |
|  | 0.0617   | 1.5201   | 3–9 <sup>a</sup> | 30       | 0.879 | n/a   | ln   | n/a   | comp | Maine              | Young et al., 1980                  |
| Ash, black ( <i>Fraxinus nigra</i> Marsh.)             |          |          |                  |          |       |       |      |       |      |                    |                                     |
| AB:  | 0.1634   | 2.3480   | 4–32             | 18       | n/a   | n/a   | calc | n/a   | n/a  | Upper Great Lakes  | Perala and Alban, 1994              |
| SW:  | 0.0926   | 2.3879   | 4–32             | 17       | n/a   | n/a   | calc | n/a   | n/a  | Upper Great Lakes  | Perala and Alban, 1994              |
| SB:  | 0.0275   | 2.1002   | 4–32             | 17       | n/a   | n/a   | calc | n/a   | n/a  | Upper Great Lakes  | Perala and Alban, 1994              |
| FL:  | 0.0026   | 2.4160   | 4–32             | 17       | 0.953 | 0.348 | ln   | 1.062 | n/a  | Upper Great Lakes  | Perala and Alban, 1994              |
| Ash, white ( <i>Fraxinus americana</i> L.)             |          |          |                  |          |       |       |      |       |      |                    |                                     |
| AB:  | 0.1063   | 2.4798   | 5–50             | 15       | 0.990 | n/a   | log  | n/a   | n/a  | West Virginia      | Brenneman et al., 1978              |
|  | 0.1535   | 2.3213   | 1–28             | 46       | 0.992 | 0.141 | ln   | 1.010 | n/a  | New Brunswick      | Ker, 1980a                          |
|  | 0.1634   | 2.3480   | 4–32             | 18       | n/a   | n/a   | calc | n/a   | n/a  | Upper Great Lakes  | Perala and Alban, 1994              |
| SW:  | 0.0936   | 2.3903   | 1–28             | 47       | 0.992 | 0.141 | ln   | 1.010 | n/a  | New Brunswick      | Ker, 1980a                          |
|  | 0.0926   | 2.3879   | 4–32             | 17       | n/a   | n/a   | calc | n/a   | n/a  | Upper Great Lakes  | Perala and Alban, 1994              |

|  |        |        |                   |     |       |       |      |       |           |                               |  |
|--|--------|--------|-------------------|-----|-------|-------|------|-------|-----------|-------------------------------|--|
| SB:  | 0.0198 | 2.1762 | 1–28              | 47  | 0.971 | 0.243 | ln   | 1.030 | n/a       | New Brunswick                 | Ker, 1980a                             |
|  | 0.0275 | 2.1002 | 4–32              | 17  | n/a   | n/a   | calc | n/a   | n/a       | Upper Great Lakes             | Perala and Alban, 1994                 |
| ST:  | 0.0909 | 2.5600 | 1–21              | 14  | 0.996 | 0.205 | ln   | 1.021 | comp      | New Hampshire                 | Hocker and Earley, 1983                |
|  | 0.1124 | 2.3649 | 1–28              | 47  | 0.991 | 0.141 | ln   | 1.010 | n/a       | New Brunswick                 | Ker, 1980a                             |
| FL:  | 0.0182 | 1.7000 | 1–21              | 8   | 0.839 | 0.778 | ln   | 1.353 | comp      | New Hampshire                 | Hocker and Earley, 1983                |
|  | 0.0163 | 1.6932 | 1–28              | 46  | 0.935 | 0.280 | ln   | 1.040 | n/a       | New Brunswick                 | Ker, 1980a                             |
|  | 0.0026 | 2.4160 | 4–32              | 17  | 0.953 | 0.348 | ln   | 1.062 | n/a       | Upper Great Lakes             | Perala and Alban, 1994                 |
| BR:  | 0.0123 | 2.5400 | 1–21              | 14  | 0.973 | 0.507 | ln   | 1.137 | comp      | New Hampshire                 | Hocker and Earley, 1983                |
|  | 0.0315 | 2.1935 | 1–28              | 46  | 0.927 | 0.312 | ln   | 1.050 | n/a       | New Brunswick                 | Ker, 1980a                             |
| Aspen, largetooth ( <i>Populus grandidentata</i> Michx.) |        |        |                   |     |       |       |      |       |           |                               |  |
| AB:  | 0.0983 | 2.3773 | 1–34              | 30  | 0.995 | 0.156 | ln   | 1.012 | n/a       | Nova Scotia                   | Freedman et al., 1982                  |
|  | 0.0785 | 2.4981 | 3–45              | 57  | n/a   | n/a   | calc | n/a   | 17(50)    | Upper Great Lakes             | Perala and Alban, 1994                 |
| SW:  | 0.0128 | 2.8586 | 1–34              | 23  | 0.966 | 0.225 | ln   | 1.026 | n/a       | Nova Scotia                   | Freedman et al., 1982                  |
|  | 0.0362 | 2.6544 | n/a               | 31  | 0.980 | 0.191 | ln   | 1.018 | comp      | Michigan                      | Koerper and Richardson, 1980           |
|  | 0.1059 | 2.3488 | n/a               | 10  | 0.990 | 0.095 | ln   | 1.005 | good      | Michigan                      | Koerper and Richardson, 1980           |
|  | 0.0503 | 2.5478 | n/a               | 11  | 0.980 | 0.174 | ln   | 1.015 | inter-med | Michigan                      | Koerper and Richardson, 1980           |
|  | 0.0467 | 2.4932 | n/a               | 10  | 0.980 | 0.166 | ln   | 1.014 | poor      | Michigan                      | Koerper and Richardson, 1980           |
|  | 0.0426 | 2.5618 | 3–45              | 58  | n/a   | n/a   | calc | n/a   | 17(50)    | Upper Great Lakes             | Perala and Alban, 1994                 |
| SB:  | 0.0076 | 2.6158 | 1–34              | 23  | 0.958 | 0.231 | ln   | 1.027 | n/a       | Nova Scotia                   | Freedman et al., 1982                  |
|  | 0.0307 | 2.2034 | n/a               | 31  | 0.970 | 0.182 | ln   | 1.017 | comp      | Michigan                      | Koerper and Richardson, 1980           |
|  | 0.0541 | 2.0610 | n/a               | 10  | 0.990 | 0.068 | ln   | 1.002 | good      | Michigan                      | Koerper and Richardson, 1980           |
|  | 0.0419 | 2.1047 | n/a               | 11  | 0.980 | 0.140 | ln   | 1.010 | inter-med | Michigan                      | Koerper and Richardson, 1980           |
|  | 0.0488 | 1.9584 | n/a               | 10  | 0.980 | 0.148 | ln   | 1.011 | poor      | Michigan                      | Koerper and Richardson, 1980           |
|  | 0.0333 | 2.2142 | 3–45              | 56  | n/a   | n/a   | calc | n/a   | 17(50)    | Upper Great Lakes             | Perala and Alban, 1994                 |
| ST:  | 0.0192 | 2.8093 | 1–34              | 23  | 0.969 | 0.212 | ln   | 1.023 | n/a       | Nova Scotia                   | Freedman et al., 1982                  |
| FL:  | 0.0159 | 1.7369 | 1–34              | 30  | 0.951 | 0.376 | ln   | 1.073 | n/a       | Nova Scotia                   | Freedman et al., 1982                  |
|  | 0.0036 | 2.1483 | n/a               | 31  | 0.850 | 0.438 | ln   | 1.101 | comp      | Michigan                      | Koerper and Richardson, 1980           |
|  | 0.0001 | 3.2307 | n/a               | 10  | 0.880 | 0.392 | ln   | 1.080 | good      | Michigan                      | Koerper and Richardson, 1980           |
|  | 0.0009 | 2.6130 | n/a               | 11  | 0.920 | 0.365 | ln   | 1.069 | inter-med | Michigan                      | Koerper and Richardson, 1980           |
|  | 0.0082 | 1.9236 | n/a               | 10  | 0.940 | 0.247 | ln   | 1.031 | poor      | Michigan                      | Koerper and Richardson, 1980           |
|  | 0.0027 | 2.2750 | 3–45              | 57  | 0.852 | 0.487 | ln   | 1.126 | 17(50)    | Upper Great Lakes             | Perala and Alban, 1994                 |
| BR:  | 0.1368 | 1.7510 | 1–34              | 30  | 0.963 | 0.327 | ln   | 1.055 | n/a       | Nova Scotia                   | Freedman et al., 1982                  |
| Aspen, trembling ( <i>Populus tremuloides</i> Michx.)    |        |        |                   |     |       |       |      |       |           |                               |  |
| AB:  | 0.1008 | 2.4341 | 1–30              | 21  | 0.998 | 0.100 | ln   | 1.005 | comp      | Alberta                       | Campbell et al., 1985                  |
|  | 0.0790 | 2.3865 | 1–32              | 23  | 0.995 | 0.120 | ln   | 1.007 | comp      | Alberta                       | Campbell et al., 1985                  |
|  | 0.0911 | 2.2759 | 1–26              | 22  | 0.987 | 0.173 | ln   | 1.015 | comp      | Alberta                       | Campbell et al., 1985                  |
|  | 0.1122 | 2.3500 | 1–32              | 34  | 0.983 | 0.270 | ln   | 1.037 | comp      | Yukon                         | Campbell et al., 1985                  |
|  | 0.0928 | 2.4085 | 1–27              | 26  | 0.995 | 0.162 | ln   | 1.013 | n/a       | Nova Scotia                   | Freedman et al., 1982                  |
|  | 0.1231 | 2.2420 | 3–36              | 20  | 0.971 | 0.300 | ln   | 1.046 | comp      | Utah, Wyoming                 | Johnston and Bartos, 1977 <sup>b</sup> |
|  | 0.0726 | 2.4827 | 2–33              | 46  | 0.990 | 0.141 | ln   | 1.010 | n/a       | Nova Scotia                   | Ker, 1980b                             |
|  | 0.1049 | 2.3910 | 0–36              | 197 | 0.989 | 19.50 | abs  | n/a   | comp      | New Brunswick,<br>Nova Scotia | Ker, 1984                              |
|  | 0.1625 | 2.0673 | 0–15              | 15  | 0.951 | n/a   | log  | n/a   | n/a       | New Brunswick                 | MacLean and Wein, 1976                 |
|  | 0.2065 | 2.2490 | 15–40             | 9   | 0.988 | 0.037 | log  | 1.002 | 21.5(50)  | Wisconsin                     | Pastor and Bockheim, 1981              |
|  | 0.0527 | 2.5084 | 3–50              | 118 | n/a   | n/a   | calc | n/a   | 17(50)    | Upper Great Lakes             | Perala and Alban, 1994                 |
|  | 0.0774 | 2.3466 | 5–33              | 49  | 0.958 | 0.099 | log  | 1.011 | n/a       | Alberta                       | Peterson et al., 1970                  |
|  | 0.0637 | 2.6087 | 3–51 <sup>a</sup> | 52  | n/a   | n/a   | calc | n/a   | comp      | Maine                         | Young et al., 1980                     |
| SW:  | 0.0332 | 2.5816 | 1–27              | 16  | 0.939 | 0.168 | ln   | 1.014 | n/a       | Nova Scotia                   | Freedman et al., 1982                  |
|  | 0.0675 | 2.2450 | 3–36              | 20  | 0.966 | 0.318 | ln   | 1.052 | comp      | Utah, Wyoming                 | Johnston and Bartos, 1977 <sup>b</sup> |
|  | 0.0419 | 2.5325 | 2–33              | 46  | 0.990 | 0.141 | ln   | 1.010 | n/a       | Nova Scotia                   | Ker, 1980b                             |
|  | 0.0639 | 2.3938 | 0–36              | 197 | 0.986 | 13.60 | abs  | n/a   | comp      | New Brunswick,<br>Nova Scotia | Ker, 1984                              |
|  | 0.1714 | 2.1990 | 15–40             | 9   | 0.986 | 0.041 | log  | 1.002 | 21.5(50)  | Wisconsin                     | Pastor and Bockheim, 1981              |

|   |        |        |                   |     |       |       |      |       |          |                               |  |
|---|--------|--------|-------------------|-----|-------|-------|------|-------|----------|-------------------------------|--|
|   | 0.0326 | 2.5178 | 3–50              | 119 | n/a   | n/a   | calc | n/a   | 17(50)   | Upper Great Lakes             | Perala and Alban, 1994                 |
|   | 0.0407 | 2.6060 | 3–31              | 45  | 0.993 | 0.141 | ln   | 1.010 | comp     | Wisconsin                     | Ruark et al., 1987                     |
| SB:   | 0.0199 | 2.3528 | 1–27              | 16  | 0.933 | 0.162 | ln   | 1.013 | n/a      | Nova Scotia                   | Freedman et al., 1982                  |
|   | 0.0339 | 2.1440 | 3–36              | 20  | 0.956 | 0.351 | ln   | 1.064 | comp     | Utah, Wyoming                 | Johnston and Bartos, 1977 <sup>b</sup> |
|   | 0.0139 | 2.4007 | 2–33              | 46  | 0.980 | 0.243 | ln   | 1.030 | n/a      | Nova Scotia                   | Ker, 1980b                             |
|   | 0.0437 | 2.1460 | 15–40             | 9   | 0.955 | 0.076 | log  | 1.007 | 21.5(50) | Wisconsin                     | Pastor and Bockheim, 1981              |
|   | 0.0113 | 2.3198 | 3–50              | 120 | n/a   | n/a   | calc | n/a   | 17(50)   | Upper Great Lakes             | Perala and Alban, 1994                 |
| ST:   | 0.0108 | 2.5520 | 3–31              | 45  | 0.981 | 0.235 | ln   | 1.028 | comp     | Wisconsin                     | Ruark et al., 1987                     |
|   | 0.0508 | 2.5293 | 1–27              | 16  | 0.951 | 0.147 | ln   | 1.011 | n/a      | Nova Scotia                   | Freedman et al., 1982                  |
|   | 0.0985 | 2.1300 | 0–15              | 79  | 0.980 | 0.211 | ln   | 1.023 | comp     | New Hampshire                 | Hocker and Earley, 1983                |
|   | 0.1007 | 2.2190 | 3–36              | 20  | 0.968 | 0.307 | ln   | 1.048 | comp     | Utah, Wyoming                 | Johnston and Bartos, 1977 <sup>b</sup> |
|   | 0.0558 | 2.5046 | 2–33              | 46  | 0.990 | 0.141 | ln   | 1.010 | n/a      | Nova Scotia                   | Ker, 1980b                             |
|   | 0.0774 | 2.3971 | 0–36              | 197 | 0.986 | 16.80 | abs  | n/a   | comp     | New Brunswick,<br>Nova Scotia | Ker, 1984                              |
|   | 0.0985 | 2.1426 | 0–15              | 15  | 0.956 | n/a   | log  | n/a   | n/a      | New Brunswick                 | MacLean and Wein, 1976                 |
|   | 0.0647 | 2.3564 | 5–33              | 49  | 0.947 | 0.112 | log  | 1.015 | n/a      | Alberta                       | Peterson et al., 1970                  |
|   | 0.0346 | 2.7859 | 3–15              | 30  | 0.990 | n/a   | log  | n/a   | comp     | Maine                         | Ribe, 1973                             |
| FL:   | 0.0448 | 2.6709 | 3–51 <sup>a</sup> | 52  | 0.995 | n/a   | ln   | n/a   | comp     | Maine                         | Young et al., 1980                     |
|   | 0.0177 | 1.6093 | 1–27              | 26  | 0.859 | 0.615 | ln   | 1.208 | n/a      | Nova Scotia                   | Freedman et al., 1982                  |
|   | 0.0191 | 2.0900 | 0–15              | 22  | 0.980 | 0.211 | ln   | 1.023 | comp     | New Hampshire                 | Hocker and Earley, 1983                |
|   | 0.0192 | 1.5470 | 3–36              | 20  | 0.841 | 0.524 | ln   | 1.147 | comp     | Utah, Wyoming                 | Johnston and Bartos, 1977 <sup>b</sup> |
|   | 0.0099 | 1.8405 | 2–33              | 46  | 0.930 | 0.341 | ln   | 1.060 | n/a      | Nova Scotia                   | Ker, 1980b                             |
|   | 0.0198 | 1.8031 | 0–36              | 197 | 0.874 | 1.900 | abs  | n/a   | comp     | New Brunswick,<br>Nova Scotia | Ker, 1984                              |
|   | 0.0243 | 1.4920 | 15–40             | 9   | 0.757 | 0.134 | log  | 1.021 | 21.5(50) | Wisconsin                     | Pastor and Bockheim, 1981              |
|   | 0.0114 | 2.0261 | 3–50              | 102 | n/a   | n/a   | calc | n/a   | 17(50)   | Upper Great Lakes             | Perala and Alban, 1994                 |
|   | 0.0050 | 1.9742 | 5–33              | 49  | 0.931 | 0.109 | log  | 1.014 | n/a      | Alberta                       | Peterson et al., 1970                  |
|   | 0.0221 | 1.6796 | 3–15              | 30  | 0.750 | n/a   | log  | n/a   | comp     | Maine                         | Ribe, 1973                             |
|   | 0.0130 | 1.8680 | 3–31              | 45  | 0.967 | 0.231 | ln   | 1.027 | comp     | Wisconsin                     | Ruark et al., 1987                     |
|   | 0.0110 | 2.0766 | 3–51 <sup>a</sup> | 52  | 0.949 | n/a   | ln   | n/a   | comp     | Maine                         | Young et al., 1980                     |
| BR:   | 0.1684 | 1.6262 | 1–27              | 26  | 0.903 | 0.502 | ln   | 1.134 | n/a      | Nova Scotia                   | Freedman et al., 1982                  |
|   | 0.0958 | 2.7200 | 0–15              | 79  | 0.942 | 0.466 | ln   | 1.115 | comp     | New Hampshire                 | Hocker and Earley, 1983                |
|   | 0.0112 | 2.4950 | 3–36              | 20  | 0.935 | 0.512 | ln   | 1.140 | comp     | Utah, Wyoming                 | Johnston and Bartos, 1977 <sup>b</sup> |
|   | 0.0073 | 2.5995 | 2–33              | 46  | 0.950 | 0.415 | ln   | 1.090 | n/a      | Nova Scotia                   | Ker, 1980b                             |
|   | 0.0192 | 2.4468 | 0–36              | 197 | 0.872 | 15.80 | abs  | n/a   | comp     | New Brunswick,<br>Nova Scotia | Ker, 1984                              |
|   | 0.0038 | 2.7680 | 15–40             | 9   | 0.897 | 0.149 | log  | 1.026 | 21.5(50) | Wisconsin                     | Pastor and Bockheim, 1981              |
|   | 0.0080 | 2.3708 | 5–33              | 49  | 0.931 | 0.129 | log  | 1.019 | n/a      | Alberta                       | Peterson et al., 1970                  |
|   | 0.0293 | 1.8545 | 3–15              | 30  | 0.853 | n/a   | log  | n/a   | comp     | Maine                         | Ribe, 1973                             |
|   | 0.0065 | 2.6950 | 3–31              | 45  | 0.982 | 0.247 | ln   | 1.031 | comp     | Wisconsin                     | Ruark et al., 1987                     |
|   | 0.0082 | 2.5244 | 3–51 <sup>a</sup> | 52  | 0.958 | n/a   | ln   | n/a   | comp     | Maine                         | Young et al., 1980                     |
| <b>Basswood (<i>Tilia americana</i> L.)</b>             |        |        |                   |     |       |       |      |       |          |                               |  |
| AB:   | 0.0617 | 2.5328 | 5–50              | 13  | 0.960 | n/a   | log  | n/a   | n/a      | West Virginia                 | Brenneman et al., 1978                 |
|   | 0.0872 | 2.3539 | 4–47              | 31  | n/a   | n/a   | calc | n/a   | n/a      | Upper Great Lakes             | Perala and Alban, 1994                 |
| SW:   | 0.0499 | 2.4024 | 4–47              | 31  | n/a   | n/a   | calc | n/a   | n/a      | Upper Great Lakes             | Perala and Alban, 1994                 |
| SB:   | 0.0432 | 2.0339 | 4–47              | 31  | n/a   | n/a   | calc | n/a   | n/a      | Upper Great Lakes             | Perala and Alban, 1994                 |
| ST:   | 0.0730 | 2.2900 | 2–10              | 5   | 0.984 | 0.254 | ln   | 1.033 | comp     | New Hampshire                 | Hocker and Earley, 1983                |
| FL:   | 0.0465 | 0.7100 | 2–10              | 5   | 0.818 | 0.300 | ln   | 1.046 | comp     | New Hampshire                 | Hocker and Earley, 1983                |
|   | 0.0049 | 2.0940 | 4–47              | 30  | 0.874 | 0.511 | ln   | 1.139 | n/a      | Upper Great Lakes             | Perala and Alban, 1994                 |
| BR:   | 0.0389 | 1.8400 | 2–10              | 5   | 0.911 | 0.511 | ln   | 1.139 | comp     | New Hampshire                 | Hocker and Earley, 1983                |
| <b>Beech, American (<i>Fagus grandifolia</i> Ehrh.)</b> |        |        |                   |     |       |       |      |       |          |                               |  |
| AB:   | 0.0842 | 2.5715 | 5–50              | 56  | 0.970 | n/a   | log  | n/a   | n/a      | West Virginia                 | Brenneman et al., 1978                 |
|   | 0.1958 | 2.2538 | 2–29              | 46  | 0.988 | 0.141 | ln   | 1.010 | n/a      | New Brunswick                 | Ker, 1980a                             |
|   | 0.1957 | 2.3916 | 1–60 <sup>a</sup> | 14  | 0.994 | 0.089 | log  | 1.009 | n/a      | New Hampshire                 | Whittaker et al., 1974                 |
|   | 0.2013 | 2.2988 | 3–66 <sup>a</sup> | 29  | n/a   | n/a   | calc | n/a   | comp     | Maine                         | Young et al., 1980                     |

|   |        |        |                   |     |       |       |      |       |        |                               |                          |
|---|--------|--------|-------------------|-----|-------|-------|------|-------|--------|-------------------------------|--------------------------|
| SW:   | 0.1229 | 2.2956 | 2–29              | 47  | 0.987 | 0.141 | ln   | 1.010 | n/a    | New Brunswick                 | Ker, 1980a               |
|   | 0.0959 | 2.4113 | 1–60 <sup>a</sup> | 14  | 0.996 | 0.080 | log  | 1.007 | n/a    | New Hampshire                 | Whittaker et al., 1974   |
| SB:   | 0.0155 | 2.1154 | 2–29              | 47  | 0.979 | 0.243 | ln   | 1.030 | n/a    | New Brunswick                 | Ker, 1980a               |
|   | 0.0107 | 2.2450 | 1–60 <sup>a</sup> | 14  | 0.994 | 0.090 | log  | 1.009 | n/a    | New Hampshire                 | Whittaker et al., 1974   |
| ST:   | 0.0937 | 2.4700 | 1–42              | 19  | 0.996 | 0.178 | ln   | 1.016 | comp   | New Hampshire                 | Hocker and Earley, 1983  |
|   | 0.1381 | 2.2809 | 2–29              | 47  | 0.988 | 0.141 | ln   | 1.010 | n/a    | New Brunswick                 | Ker, 1980a               |
|   | 0.1155 | 2.4868 | 3–15              | 19  | 0.987 | n/a   | log  | n/a   | comp   | Maine                         | Ribe, 1973               |
|   | 0.1067 | 2.3981 | 1–60 <sup>a</sup> | 14  | 0.996 | 0.079 | log  | 1.007 | n/a    | New Hampshire                 | Whittaker et al., 1974   |
|   | 0.1515 | 2.2997 | 3–66 <sup>a</sup> | 29  | 0.991 | n/a   | ln   | n/a   | comp   | Maine                         | Young et al., 1980       |
| FL:   | 0.0250 | 1.8300 | 1–42              | 12  | 0.979 | 0.357 | ln   | 1.066 | comp   | New Hampshire                 | Hocker and Earley, 1983  |
|   | 0.0233 | 1.6303 | 2–29              | 47  | 0.869 | 0.341 | ln   | 1.060 | n/a    | New Brunswick                 | Ker, 1980a               |
|   | 0.0216 | 1.8089 | 3–15              | 19  | 0.853 | n/a   | log  | n/a   | comp   | Maine                         | Ribe, 1973               |
|   | 0.0183 | 1.9158 | 3–66 <sup>a</sup> | 29  | 0.940 | n/a   | ln   | n/a   | comp   | Maine                         | Young et al., 1980       |
| BR:   | 0.0421 | 2.4100 | 1–42              | 19  | 0.981 | 0.300 | ln   | 1.046 | comp   | New Hampshire                 | Hocker and Earley, 1983  |
|   | 0.0274 | 2.3708 | 2–29              | 47  | 0.892 | 0.494 | ln   | 1.130 | n/a    | New Brunswick                 | Ker, 1980a               |
|   | 0.0944 | 1.5402 | 3–15              | 19  | 0.791 | n/a   | log  | n/a   | comp   | Maine                         | Ribe, 1973               |
|   | 0.0262 | 2.5509 | 1–60 <sup>a</sup> | 14  | 0.980 | 0.180 | log  | 1.038 | n/a    | New Hampshire                 | Whittaker et al., 1974   |
|   | 0.0265 | 2.3634 | 3–66 <sup>a</sup> | 29  | 0.931 | n/a   | ln   | n/a   | comp   | Maine                         | Young et al., 1980       |
| Birch, black ( <i>Betula lenta</i> L.)          |        |        |                   |     |       |       |      |       |        |                               |                          |
| AB:   | 0.0629 | 2.6606 | 5–50              | 8   | 0.990 | n/a   | log  | n/a   | n/a    | West Virginia                 | Brenneman et al., 1978   |
| ST:   | 0.0946 | 2.4900 | 2–10              | 5   | 0.992 | 0.197 | ln   | 1.020 | comp   | New Hampshire                 | Hocker and Earley, 1983  |
| FL:   | 0.0045 | 2.4200 | 2–10              | 5   | 0.936 | 0.545 | ln   | 1.160 | comp   | New Hampshire                 | Hocker and Earley, 1983  |
| BR:   | 0.0036 | 3.4200 | 2–10              | 5   | 0.982 | 0.400 | ln   | 1.083 | comp   | New Hampshire                 | Hocker and Earley, 1983  |
| Birch, grey ( <i>Betula populifolia</i> Marsh.) |        |        |                   |     |       |       |      |       |        |                               |                          |
| AB:   | 0.1218 | 2.3123 | 1–23              | 44  | 0.990 | 0.141 | ln   | 1.010 | n/a    | Nova Scotia                   | Ker, 1980b               |
|   | 0.1564 | 2.3146 | 3–24 <sup>a</sup> | 30  | n/a   | n/a   | calc | n/a   | comp   | Maine                         | Young et al., 1980       |
| SW:   | 0.0670 | 2.4240 | 1–23              | 44  | 0.990 | 0.141 | ln   | 1.010 | n/a    | Nova Scotia                   | Ker, 1980b               |
| SB:   | 0.0185 | 2.2080 | 1–23              | 44  | 0.970 | 0.243 | ln   | 1.030 | n/a    | Nova Scotia                   | Ker, 1980b               |
| ST:   | 0.0956 | 2.3600 | 2–8               | 5   | 0.991 | 0.162 | ln   | 1.013 | comp   | New Hampshire                 | Hocker and Earley, 1983  |
|   | 0.0854 | 2.3875 | 1–23              | 44  | 0.990 | 0.141 | ln   | 1.010 | n/a    | Nova Scotia                   | Ker, 1980b               |
|   | 0.0857 | 2.5139 | 3–15              | 30  | 0.988 | n/a   | log  | n/a   | comp   | Maine                         | Ribe, 1973               |
|   | 0.0826 | 2.5299 | 3–24 <sup>a</sup> | 30  | 0.994 | n/a   | ln   | n/a   | comp   | Maine                         | Young et al., 1980       |
| FL:   | 0.0050 | 2.4100 | 2–8               | 5   | 0.942 | 0.429 | ln   | 1.096 | comp   | New Hampshire                 | Hocker and Earley, 1983  |
|   | 0.0129 | 1.7477 | 1–23              | 44  | 0.900 | 0.341 | ln   | 1.060 | n/a    | Nova Scotia                   | Ker, 1980b               |
|   | 0.0162 | 1.6376 | 3–15              | 30  | 0.871 | n/a   | log  | n/a   | comp   | Maine                         | Ribe, 1973               |
|   | 0.0414 | 1.2276 | 3–24 <sup>a</sup> | 30  | 0.812 | n/a   | ln   | n/a   | comp   | Maine                         | Young et al., 1980       |
| BR:   | 0.0169 | 2.3800 | 2–8               | 5   | 0.970 | 0.298 | ln   | 1.045 | comp   | New Hampshire                 | Hocker and Earley, 1983  |
|   | 0.0192 | 2.1922 | 1–23              | 44  | 0.910 | 0.415 | ln   | 1.090 | n/a    | Nova Scotia                   | Ker, 1980b               |
|   | 0.0674 | 1.6163 | 3–15              | 30  | 0.988 | n/a   | log  | n/a   | comp   | Maine                         | Ribe, 1973               |
|   | 0.0669 | 1.6287 | 3–24 <sup>a</sup> | 30  | 0.897 | n/a   | ln   | n/a   | comp   | Maine                         | Young et al., 1980       |
| Birch, white ( <i>Betula papyrifera</i> Marsh.) |        |        |                   |     |       |       |      |       |        |                               |                          |
| AB:   | 0.0775 | 2.4800 | 2–8               | 24  | 0.960 | n/a   | log  | n/a   | n/a    | New Brunswick                 | Baskerville, 1965        |
|   | 0.1347 | 2.3634 | 1–34              | 37  | 0.990 | 0.215 | ln   | 1.023 | n/a    | Nova Scotia                   | Freedman et al., 1982    |
|   | 0.1074 | 2.4313 | 3–33              | 45  | 0.990 | 0.141 | ln   | 1.010 | n/a    | Nova Scotia                   | Ker, 1980b               |
|   | 0.1545 | 2.3064 | 0–33              | 196 | 0.978 | 24.50 | abs  | n/a   | comp   | New Brunswick,<br>Nova Scotia | Ker, 1984                |
|   | 0.3154 | 1.7284 | 0–15              | 21  | 0.919 | n/a   | log  | n/a   | n/a    | New Brunswick                 | MacLean and Wein, 1976   |
|   | 0.1182 | 2.4287 | 5–32              | 52  | n/a   | n/a   | calc | n/a   | 17(50) | Upper Great Lakes             | Perala and Alban, 1994   |
|   | 0.0882 | 2.5620 | 0–30              | 204 | 0.990 | 10.50 | abs  | n/a   | comp   | Canada–US <sup>c</sup>        | Schmitt and Grigal, 1981 |
|   | 0.0612 | 2.6634 | 3–51 <sup>a</sup> | 51  | n/a   | n/a   | calc | n/a   | comp   | Maine                         | Young et al., 1980       |
| SW:   | 0.0682 | 2.3600 | 2–8               | 24  | 0.941 | n/a   | log  | n/a   | n/a    | New Brunswick                 | Baskerville, 1965        |
|   | 0.0125 | 3.0221 | 1–34              | 29  | 0.983 | 0.172 | ln   | 1.015 | n/a    | Nova Scotia                   | Freedman et al., 1982    |
|   | 0.0631 | 2.4931 | 3–33              | 45  | 0.990 | 0.141 | ln   | 1.010 | n/a    | Nova Scotia                   | Ker, 1980b               |
|   | 0.0739 | 2.3982 | 0–33              | 196 | 0.974 | 17.50 | abs  | n/a   | comp   | New Brunswick,<br>Nova Scotia | Ker, 1984                |

|  |        |        |                   |     |       |       |      |       |         |                               |                                   |
|--|--------|--------|-------------------|-----|-------|-------|------|-------|---------|-------------------------------|-----------------------------------|
|  | 0.0806 | 2.4077 | 5–32              | 52  | n/a   | n/a   | calc | n/a   | 17(50)  | Upper Great Lakes             | Perala and Alban, 1994            |
|  | 0.1171 | 2.3330 | 0–30              | 144 | 0.980 | 5.561 | abs  | n/a   | comp    | Canada–US <sup>c</sup>        | Schmitt and Grigal, 1981          |
|  | 0.2840 | 2.6400 | 1–35              | 74  | 0.990 | 2.880 | abs  | n/a   | comp    | British Columbia              | Wang et al., 1996                 |
| SB:  | 0.0011 | 2.3500 | 2–8               | 24  | 0.810 | n/a   | log  | n/a   | n/a     | New Brunswick                 | Baskerville, 1965                 |
|  | 0.0061 | 2.6627 | 1–34              | 29  | 0.977 | 0.181 | ln   | 1.017 | n/a     | Nova Scotia                   | Freedman et al., 1982             |
|  | 0.0196 | 2.2795 | 3–33              | 45  | 0.990 | 0.141 | ln   | 1.010 | n/a     | Nova Scotia                   | Ker, 1980b                        |
|  | 0.0220 | 2.2150 | 5–32              | 53  | 0.981 | 0.172 | ln   | 1.015 | 17m(50) | Upper Great Lakes             | Perala and Alban, 1994            |
|  | 0.0407 | 2.0150 | 0–30              | 143 | 0.970 | 0.979 | abs  | n/a   | comp    | Canada–US <sup>c</sup>        | Schmitt and Grigal, 1981          |
|  | 0.0370 | 2.1640 | 1–35              | 74  | 0.957 | 0.380 | abs  | n/a   | comp    | British Columbia              | Wang et al., 1996                 |
| ST:  | 0.0173 | 2.9650 | 1–34              | 29  | 0.984 | 0.167 | ln   | 1.014 | n/a     | Nova Scotia                   | Freedman et al., 1982             |
|  | 0.2044 | 2.1700 | 0–34              | 18  | 0.995 | 0.279 | ln   | 1.040 | comp    | New Hampshire                 | Hocker and Earley, 1983           |
|  | 0.0815 | 2.4594 | 3–33              | 45  | 0.990 | 0.141 | ln   | 1.010 | n/a     | Nova Scotia                   | Ker, 1980b                        |
|  | 0.0847 | 2.4029 | 0–33              | 196 | 0.973 | 20.60 | abs  | n/a   | comp    | New Brunswick,<br>Nova Scotia | Ker, 1984                         |
|  | 0.0413 | 2.8770 | 5–8               | 6   | 0.982 | 0.099 | ln   | 1.005 | n/a     | New Hampshire                 | Kinerson and<br>Bartholomew, 1977 |
|  | 0.1472 | 1.8805 | 0–15              | 21  | 0.934 | n/a   | log  | n/a   | n/a     | New Brunswick                 | MacLean and Wein, 1976            |
|  | 0.0134 | 3.2640 | 3–15              | 30  | 0.989 | n/a   | log  | n/a   | comp    | Maine                         | Ribe, 1973                        |
|  | 0.0923 | 2.4800 | 0–30              | 228 | 0.980 | 10.68 | abs  | n/a   | comp    | Canada–US <sup>c</sup>        | Schmitt and Grigal, 1981          |
|  | 0.0263 | 2.8968 | 3–51 <sup>a</sup> | 51  | 0.990 | n/a   | ln   | n/a   | comp    | Maine                         | Young et al., 1980                |
| FL:  | 0.0016 | 2.9400 | 2–8               | 25  | 0.810 | n/a   | log  | n/a   | n/a     | New Brunswick                 | Baskerville, 1965                 |
|  | 0.0180 | 1.7139 | 1–34              | 37  | 0.896 | 0.526 | ln   | 1.148 | n/a     | Nova Scotia                   | Freedman et al., 1982             |
|  | 0.0400 | 1.7700 | 0–34              | 5   | 0.933 | 0.219 | ln   | 1.024 | comp    | New Hampshire                 | Hocker and Earley, 1983           |
|  | 0.0142 | 1.8735 | 3–33              | 45  | 0.910 | 0.341 | ln   | 1.060 | n/a     | Nova Scotia                   | Ker, 1980b                        |
|  | 0.0394 | 1.6286 | 0–33              | 196 | 0.861 | 0.030 | absw | n/a   | comp    | New Brunswick,<br>Nova Scotia | Ker, 1984                         |
|  | 0.0132 | 1.9505 | 5–32              | 54  | n/a   | n/a   | calc | n/a   | 17(50)  | Upper Great Lakes             | Perala and Alban, 1994            |
|  | 0.0295 | 1.7020 | 3–15              | 30  | 0.889 | n/a   | log  | n/a   | comp    | Maine                         | Ribe, 1973                        |
|  | 0.0010 | 3.0050 | 0–30              | 168 | 0.890 | 1.457 | abs  | n/a   | comp    | Canada–US <sup>c</sup>        | Schmitt and Grigal, 1981          |
|  | 0.0210 | 1.9450 | 1–35              | 74  | 0.828 | 0.220 | abs  | n/a   | comp    | British Columbia              | Wang et al., 1996                 |
|  | 0.0162 | 2.0494 | 3–51 <sup>a</sup> | 51  | 0.962 | n/a   | ln   | n/a   | comp    | Maine                         | Young et al., 1980                |
| BR:  | 0.0021 | 3.3000 | 2–8               | 24  | 0.740 | n/a   | log  | n/a   | n/a     | New Brunswick                 | Baskerville, 1965                 |
|  | 0.2364 | 1.6429 | 1–34              | 37  | 0.955 | 0.322 | ln   | 1.053 | n/a     | Nova Scotia                   | Freedman et al., 1982             |
|  | 0.0215 | 2.3000 | 0–34              | 18  | 0.979 | 0.617 | ln   | 1.210 | comp    | New Hampshire                 | Hocker and Earley, 1983           |
|  | 0.0117 | 2.5073 | 3–33              | 45  | 0.920 | 0.457 | ln   | 1.110 | n/a     | Nova Scotia                   | Ker, 1980b                        |
|  | 0.0579 | 2.1458 | 0–33              | 196 | 0.892 | 12.80 | abs  | n/a   | comp    | New Brunswick,<br>Nova Scotia | Ker, 1984                         |
|  | 0.0003 | 4.3680 | 5–8               | 6   | 0.904 | 0.362 | ln   | 1.068 | n/a     | New Hampshire                 | Kinerson and<br>Bartholomew, 1977 |
|  | 0.0507 | 1.7304 | 3–15              | 30  | 0.988 | n/a   | log  | n/a   | comp    | Maine                         | Ribe, 1973                        |
|  | 0.0012 | 3.2750 | 0–30              | 177 | 0.890 | 4.226 | abs  | n/a   | comp    | Canada–US <sup>c</sup>        | Schmitt and Grigal, 1981          |
|  | 0.0194 | 2.2494 | 3–51 <sup>a</sup> | 51  | 0.949 | n/a   | ln   | n/a   | comp    | Maine                         | Young et al., 1980                |
|  | 0.0020 | 2.9130 | 1–35              | 74  | 0.859 | 0.520 | abs  | n/a   | comp    | British Columbia              | Wang et al., 1996                 |
| <b>Birch, yellow (<i>Betula alleghaniensis</i> Britt.)</b> |        |        |                   |     |       |       |      |       |         |                               |                                   |
| AB:  | 0.1540 | 2.3753 | 5–50              | 24  | 0.970 | n/a   | log  | n/a   | n/a     | West Virginia                 | Brenneman et al., 1978            |
|  | 0.1188 | 2.4510 | 3–29              | 24  | 0.991 | 0.180 | ln   | 1.016 | n/a     | Nova Scotia                   | Freedman et al., 1982             |
|  | 0.1541 | 2.3666 | 1–27              | 50  | 0.992 | 0.141 | ln   | 1.010 | n/a     | New Brunswick                 | Ker, 1980a                        |
|  | 0.0872 | 2.5870 | 5–21              | 9   | 0.993 | 0.128 | ln   | 1.008 | 17(50)  | Upper Great Lakes             | Perala and Alban, 1994            |
|  | 0.1684 | 2.4150 | 1–55 <sup>a</sup> | 14  | 0.994 | 0.099 | log  | 1.011 | n/a     | New Hampshire                 | Whittaker et al., 1974            |
|  | 0.1588 | 2.3376 | 3–66 <sup>a</sup> | 42  | n/a   | n/a   | calc | n/a   | comp    | Maine                         | Young et al., 1980                |
| SW:  | 0.0224 | 2.8627 | 3–29              | 17  | 0.946 | 0.260 | ln   | 1.034 | n/a     | Nova Scotia                   | Freedman et al., 1982             |
|  | 0.0866 | 2.4369 | 1–27              | 50  | 0.992 | 0.141 | ln   | 1.010 | n/a     | New Brunswick                 | Ker, 1980a                        |
|  | 0.0548 | 2.6190 | 5–21              | 9   | 0.993 | 0.129 | ln   | 1.008 | 17(50)  | Upper Great Lakes             | Perala and Alban, 1994            |
|  | 0.1131 | 2.2950 | 1–55 <sup>a</sup> | 14  | 0.994 | 0.087 | log  | 1.009 | n/a     | New Hampshire                 | Whittaker et al., 1974            |
| SB:  | 0.0046 | 2.7136 | 3–29              | 17  | 0.935 | 0.271 | ln   | 1.037 | n/a     | Nova Scotia                   | Freedman et al., 1982             |
|  | 0.0172 | 2.3086 | 1–27              | 50  | 0.980 | 0.199 | ln   | 1.020 | n/a     | New Brunswick                 | Ker, 1980a                        |



|     |        |        |                   |    |       |       |     |       |        |                   |                         |
|-----|--------|--------|-------------------|----|-------|-------|-----|-------|--------|-------------------|-------------------------|
|     | 0.0145 | 2.4510 | 5–21              | 9  | 0.985 | 0.181 | ln  | 1.017 | 17(50) | Upper Great Lakes | Perala and Alban, 1994  |
|     | 0.0252 | 2.1083 | 1–55 <sup>a</sup> | 14 | 0.988 | 0.111 | log | 1.014 | n/a    | New Hampshire     | Whittaker et al., 1974  |
| ST: | 0.0269 | 2.8437 | 3–29              | 17 | 0.946 | 0.258 | ln  | 1.034 | n/a    | Nova Scotia       | Freedman et al., 1982   |
|     | 0.0737 | 2.5600 | 1–12              | 13 | 0.952 | 0.577 | ln  | 1.181 | comp   | New Hampshire     | Hocker and Earley, 1983 |
|     | 0.1036 | 2.4200 | 1–27              | 50 | 0.992 | 0.141 | ln  | 1.010 | n/a    | New Brunswick     | Ker, 1980a              |
|     | 0.0874 | 2.5330 | 3–15              | 30 | 0.994 | n/a   | log | n/a   | comp   | Maine             | Ribe, 1973              |
|     | 0.1385 | 2.2683 | 1–55 <sup>a</sup> | 14 | 0.994 | 0.087 | log | 1.009 | n/a    | New Hampshire     | Whittaker et al., 1974  |
|     | 0.1085 | 2.3412 | 3–66 <sup>a</sup> | 42 | 0.939 | n/a   | ln  | n/a   | comp   | Maine             | Young et al., 1980      |
| FL: | 0.0064 | 2.1167 | 3–29              | 24 | 0.961 | 0.322 | ln  | 1.053 | n/a    | Nova Scotia       | Freedman et al., 1982   |
|     | 0.0149 | 1.9900 | 1–12              | 4  | 0.987 | 0.264 | ln  | 1.035 | comp   | New Hampshire     | Hocker and Earley, 1983 |
|     | 0.0165 | 1.7241 | 1–27              | 49 | 0.914 | 0.368 | ln  | 1.070 | n/a    | New Brunswick     | Ker, 1980a              |
|     | 0.0070 | 2.0030 | 5–21              | 9  | 0.785 | 0.632 | ln  | 1.221 | 17(50) | Upper Great Lakes | Perala and Alban, 1994  |
|     | 0.0158 | 1.9683 | 3–15              | 30 | 0.900 | n/a   | log | n/a   | comp   | Maine             | Ribe, 1973              |
|     | 0.0155 | 1.9783 | 3–66 <sup>a</sup> | 42 | 0.963 | n/a   | ln  | n/a   | comp   | Maine             | Young et al., 1980      |
| BR: | 0.3507 | 1.5899 | 3–29              | 24 | 0.919 | 0.360 | ln  | 1.067 | n/a    | Nova Scotia       | Freedman et al., 1982   |
|     | 0.0291 | 2.3500 | 1–12              | 13 | 0.972 | 0.400 | ln  | 1.083 | comp   | New Hampshire     | Hocker and Earley, 1983 |
|     | 0.0287 | 2.3585 | 1–27              | 50 | 0.908 | 0.512 | ln  | 1.140 | n/a    | New Brunswick     | Ker, 1980a              |
|     | 0.0758 | 1.6179 | 3–15              | 30 | 0.898 | n/a   | log | n/a   | comp   | Maine             | Ribe, 1973              |
|     | 0.0113 | 2.7995 | 1–55 <sup>a</sup> | 14 | 0.955 | 0.300 | log | 1.109 | n/a    | New Hampshire     | Whittaker et al., 1974  |
|     | 0.0216 | 2.3795 | 3–66 <sup>a</sup> | 42 | 0.921 | n/a   | ln  | n/a   | comp   | Maine             | Young et al., 1980      |

Cedar, eastern white (*Thuja occidentalis* L.)

|     |        |        |                   |    |       |       |      |       |      |                   |                        |
|-----|--------|--------|-------------------|----|-------|-------|------|-------|------|-------------------|------------------------|
| AB: | 0.1148 | 2.1439 | 2–30              | 46 | 0.991 | 0.141 | ln   | 1.010 | n/a  | New Brunswick     | Ker, 1980a             |
|     | 0.0910 | 2.2340 | 4–31              | 20 | 0.990 | 0.125 | ln   | 1.008 | n/a  | Upper Great Lakes | Perala and Alban, 1994 |
|     | 0.2305 | 1.9269 | 3–51 <sup>a</sup> | 39 | n/a   | n/a   | calc | n/a   | comp | Maine             | Young et al., 1980     |
| SW: | 0.0520 | 2.2804 | 2–30              | 47 | 0.989 | 0.141 | ln   | 1.010 | n/a  | New Brunswick     | Ker, 1980a             |
|     | 0.0606 | 2.1491 | 4–31              | 20 | n/a   | n/a   | calc | n/a   | n/a  | Upper Great Lakes | Perala and Alban, 1994 |
| SB: | 0.0094 | 2.2228 | 2–30              | 47 | 0.987 | 0.199 | ln   | 1.020 | n/a  | New Brunswick     | Ker, 1980a             |
|     | 0.0114 | 2.1240 | 4–31              | 20 | n/a   | n/a   | calc | n/a   | n/a  | Upper Great Lakes | Perala and Alban, 1994 |
| ST: | 0.0618 | 2.2706 | 2–30              | 47 | 0.990 | 0.141 | ln   | 1.010 | n/a  | New Brunswick     | Ker, 1980a             |
|     | 0.0832 | 2.1300 | 3–51 <sup>a</sup> | 39 | 0.991 | n/a   | ln   | n/a   | comp | Maine             | Young et al., 1980     |
| FL: | 0.0350 | 1.6206 | 2–30              | 46 | 0.856 | 0.280 | ln   | 1.040 | n/a  | New Brunswick     | Ker, 1980a             |
|     | 0.0100 | 2.3030 | 4–31              | 20 | 0.893 | 0.450 | ln   | 1.107 | n/a  | Upper Great Lakes | Perala and Alban, 1994 |
|     | 0.1496 | 1.3352 | 3–51 <sup>a</sup> | 39 | 0.961 | n/a   | ln   | n/a   | comp | Maine             | Young et al., 1980     |
| BR: | 0.0472 | 1.7434 | 2–30              | 46 | 0.863 | 0.312 | ln   | 1.050 | n/a  | New Brunswick     | Ker, 1980a             |
|     | 0.0480 | 1.9110 | 3–51 <sup>a</sup> | 39 | 0.973 | n/a   | ln   | n/a   | comp | Maine             | Young et al., 1980     |

Cedar, western red (*Thuja plicata* Donn)

|     |        |        |       |    |       |       |    |       |      |                  |                          |
|-----|--------|--------|-------|----|-------|-------|----|-------|------|------------------|--------------------------|
| SW: | 0.1019 | 2.3000 | 12–47 | 10 | 0.960 | 0.225 | ln | 1.026 | n/a  | British Columbia | Feller, 1992             |
|     | 0.1022 | 2.0880 | 12–61 | 21 | 0.860 | 0.361 | ln | 1.067 | comp | British Columbia | Feller, 1992             |
| SB: | 0.0104 | 2.1980 | 12–47 | 10 | 0.970 | 0.203 | ln | 1.021 | n/a  | British Columbia | Feller, 1992             |
|     | 0.0171 | 1.9990 | 12–61 | 21 | 0.880 | 0.304 | ln | 1.047 | comp | British Columbia | Feller, 1992             |
| ST: | 0.3721 | 1.2928 | 0–12  | 25 | 0.854 | 0.602 | ln | 1.199 | comp | Idaho, Montana   | Brown, 1978 <sup>b</sup> |
| FL: | 0.2805 | 1.3313 | 0–68  | 22 | 0.924 | 0.582 | ln | 1.184 | comp | Idaho, Montana   | Brown, 1978 <sup>b</sup> |
|     | 0.0147 | 2.1910 | 12–47 | 10 | 0.860 | 0.439 | ln | 1.101 | n/a  | British Columbia | Feller, 1992             |
|     | 0.0494 | 1.9220 | 12–61 | 21 | 0.930 | 0.226 | ln | 1.026 | comp | British Columbia | Feller, 1992             |
| BR: | 0.1379 | 1.5986 | 0–68  | 22 | 0.923 | 0.702 | ln | 1.279 | comp | Idaho, Montana   | Brown, 1978 <sup>b</sup> |
|     | 0.0599 | 1.8020 | 12–47 | 10 | 0.800 | 0.452 | ln | 1.108 | n/a  | British Columbia | Feller, 1992             |
|     | 0.0277 | 2.1390 | 12–61 | 21 | 0.910 | 0.281 | ln | 1.040 | comp | British Columbia | Feller, 1992             |

Cedar, yellow (*Chamaecyparis nootkatensis* (D. Don) Spach)

|     |        |        |       |   |       |       |    |       |     |                  |                            |
|-----|--------|--------|-------|---|-------|-------|----|-------|-----|------------------|----------------------------|
| AB: | 0.2498 | 2.1118 | 18–60 | 4 | 0.992 | 0.123 | ln | 1.008 | n/a | British Columbia | Krumlik, 1974 <sup>b</sup> |
| SW: | 0.1323 | 2.1989 | 18–60 | 4 | 0.982 | 0.197 | ln | 1.020 | n/a | British Columbia | Krumlik, 1974 <sup>b</sup> |
| SB: | 0.0175 | 2.0829 | 18–60 | 4 | 0.964 | 0.268 | ln | 1.037 | n/a | British Columbia | Krumlik, 1974 <sup>b</sup> |
| ST: | 0.1492 | 2.1889 | 18–60 | 4 | 0.982 | 0.199 | ln | 1.020 | n/a | British Columbia | Krumlik, 1974 <sup>b</sup> |
| FL: | 0.1258 | 1.6164 | 18–60 | 4 | 0.926 | 0.304 | ln | 1.047 | n/a | British Columbia | Krumlik, 1974 <sup>b</sup> |
| BR: | 0.0293 | 2.1168 | 18–60 | 4 | 0.980 | 0.200 | ln | 1.020 | n/a | British Columbia | Krumlik, 1974 <sup>b</sup> |

Cherry, black (*Prunus serotina* Ehrh.)

|     |        |        |                   |    |       |       |     |     |          |               |                                 |
|-----|--------|--------|-------------------|----|-------|-------|-----|-----|----------|---------------|---------------------------------|
| AB: | 0.0716 | 2.6174 | 5–50              | 26 | 0.990 | n/a   | log | n/a | n/a      | West Virginia | Brenneman et al., 1978          |
|     | 0.1225 | 2.4253 | 5–40 <sup>a</sup> | 19 | 0.994 | 20.41 | abs | n/a | 22.3(50) | West Virginia | Wiant et al., 1977 <sup>d</sup> |

Cherry, choke (*Prunus virginiana* L.)

|     |        |        |                   |    |       |     |      |     |      |       |                    |
|-----|--------|--------|-------------------|----|-------|-----|------|-----|------|-------|--------------------|
| AB: | 0.2643 | 1.7102 | 3–15 <sup>a</sup> | 16 | n/a   | n/a | calc | n/a | comp | Maine | Young et al., 1980 |
| ST: | 0.1161 | 2.0038 | 3–8               | 16 | 0.848 | n/a | log  | n/a | comp | Maine | Ribe, 1973         |
|     | 0.1178 | 1.9936 | 3–15 <sup>a</sup> | 16 | 0.918 | n/a | ln   | n/a | comp | Maine | Young et al., 1980 |
| FL: | 0.0327 | 1.3307 | 3–8               | 16 | 0.595 | n/a | log  | n/a | comp | Maine | Ribe, 1973         |
|     | 0.0319 | 1.3356 | 3–15 <sup>a</sup> | 16 | 0.749 | n/a | ln   | n/a | comp | Maine | Young et al., 1980 |
| BR: | 0.1149 | 1.2191 | 3–8               | 16 | 0.560 | n/a | log  | n/a | comp | Maine | Ribe, 1973         |
|     | 0.1196 | 1.1932 | 3–15 <sup>a</sup> | 16 | 0.742 | n/a | ln   | n/a | comp | Maine | Young et al., 1980 |

Cherry, fire (*Prunus pensylvanica* L.f.)

|     |        |        |      |    |       |     |     |     |     |               |                        |
|-----|--------|--------|------|----|-------|-----|-----|-----|-----|---------------|------------------------|
| AB: | 0.2159 | 1.7041 | 0–10 | 17 | 0.859 | n/a | log | n/a | n/a | New Brunswick | MacLean and Wein, 1976 |
| ST: | 0.1259 | 1.7772 | 0–10 | 17 | 0.881 | n/a | log | n/a | n/a | New Brunswick | MacLean and Wein, 1976 |

Cherry, pin (*Prunus pensylvanica* L.)

|     |        |        |                   |    |       |       |      |       |      |               |                         |
|-----|--------|--------|-------------------|----|-------|-------|------|-------|------|---------------|-------------------------|
| AB: | 0.1556 | 2.1948 | 3–24 <sup>a</sup> | 30 | n/a   | n/a   | calc | n/a   | comp | Maine         | Young et al., 1980      |
| ST: | 0.0783 | 2.4000 | 1–14              | 12 | 0.972 | 0.461 | ln   | 1.112 | comp | New Hampshire | Hocker and Earley, 1983 |
|     | 0.0957 | 2.2988 | 3–15              | 30 | 0.982 | n/a   | log  | n/a   | comp | Maine         | Ribe, 1973              |
|     | 0.0951 | 2.2988 | 3–24 <sup>a</sup> | 30 | 0.991 | n/a   | ln   | n/a   | comp | Maine         | Young et al., 1980      |
| FL: | 0.0198 | 1.9784 | 3–15              | 30 | 0.904 | n/a   | log  | n/a   | comp | Maine         | Ribe, 1973              |
|     | 0.0203 | 2.0380 | 3–24 <sup>a</sup> | 30 | 0.783 | n/a   | ln   | n/a   | comp | Maine         | Young et al., 1980      |
| BR: | 0.0124 | 2.4300 | 1–14              | 12 | 0.934 | 0.725 | ln   | 1.301 | comp | New Hampshire | Hocker and Earley, 1983 |
|     | 0.0441 | 1.8755 | 3–15              | 30 | 0.871 | n/a   | log  | n/a   | comp | Maine         | Ribe, 1973              |
|     | 0.0406 | 1.9197 | 3–24 <sup>a</sup> | 30 | 0.932 | n/a   | ln   | n/a   | comp | Maine         | Young et al., 1980      |

Chinkapin, golden (*Castanopsis chrysophylla* (Dougl.) A. DC.)

|     |        |        |      |    |       |       |    |       |      |                    |                                     |
|-----|--------|--------|------|----|-------|-------|----|-------|------|--------------------|-------------------------------------|
| SW: | 0.0240 | 2.6580 | 6–36 | 19 | 0.980 | 0.210 | ln | 1.022 | n/a  | Oregon             | Gholz et al., 1979                  |
| SB: | 0.0026 | 2.9890 | 6–36 | 19 | 0.970 | 0.261 | ln | 1.035 | n/a  | Oregon             | Gholz et al., 1979                  |
| FL: | 0.0401 | 1.6930 | 6–36 | 19 | 0.810 | 0.430 | ln | 1.097 | n/a  | Oregon             | Gholz et al., 1979                  |
|     | 0.0214 | 1.8042 | 3–60 | 30 | 0.944 | 0.359 | ln | 1.067 | comp | Oregon, California | Snell and Little, 1983 <sup>b</sup> |
| BR: | 0.0092 | 2.5760 | 6–36 | 19 | 0.890 | 0.473 | ln | 1.119 | n/a  | Oregon             | Gholz et al., 1979                  |
|     | 0.0128 | 2.3448 | 3–60 | 30 | 0.942 | 0.477 | ln | 1.120 | comp | Oregon, California | Snell and Little, 1983 <sup>b</sup> |

Eim, American (*Ulmus americana* L.)

|     |        |        |      |    |       |       |      |       |     |                   |                        |
|-----|--------|--------|------|----|-------|-------|------|-------|-----|-------------------|------------------------|
| AB: | 0.0825 | 2.4680 | 4–29 | 14 | 0.991 | 0.148 | ln   | 1.011 | n/a | Upper Great Lakes | Perala and Alban, 1994 |
| SW: | 0.0548 | 2.5086 | 4–29 | 14 | n/a   | n/a   | calc | n/a   | n/a | Upper Great Lakes | Perala and Alban, 1994 |
| SB: | 0.0173 | 2.2320 | 4–29 | 14 | 0.991 | 0.138 | ln   | 1.010 | n/a | Upper Great Lakes | Perala and Alban, 1994 |
| FL: | 0.0062 | 1.9350 | 4–29 | 14 | 0.962 | 0.235 | ln   | 1.028 | n/a | Upper Great Lakes | Perala and Alban, 1994 |

Fir, balsam (*Abies balsamea* (L.) Mill.)

|     |        |        |                   |     |       |       |      |       |      |                               |                          |
|-----|--------|--------|-------------------|-----|-------|-------|------|-------|------|-------------------------------|--------------------------|
| AB: | 0.0523 | 2.5300 | 3–25              | 101 | 0.923 | n/a   | log  | n/a   | n/a  | New Brunswick                 | Baskerville, 1965        |
|     | 0.1075 | 2.3263 | 3–28              | 30  | 0.987 | 0.197 | ln   | 1.020 | n/a  | Nova Scotia                   | Freedman et al., 1982    |
|     | 0.2575 | 2.0543 | 3–40              | 40  | 0.990 | 0.278 | ln   | 1.039 | n/a  | Ontario                       | Honer, 1971 <sup>c</sup> |
|     | 0.0690 | 2.4975 | 3–40              | 40  | 0.970 | 0.123 | ln   | 1.008 | n/a  | Ontario                       | Honer, 1971 <sup>f</sup> |
|     | 0.1598 | 2.1283 | 2–32              | 50  | 0.970 | 0.243 | ln   | 1.030 | n/a  | Nova Scotia                   | Ker, 1980b               |
|     | 0.1746 | 2.1555 | 0–36              | 196 | 0.982 | 19.60 | abs  | n/a   | comp | New Brunswick,<br>Nova Scotia | Ker, 1984                |
|     | 0.3908 | 1.6217 | 0–20              | 20  | 0.812 | n/a   | log  | n/a   | n/a  | New Brunswick                 | MacLean and Wein, 1976   |
|     | 0.0705 | 2.4970 | 4–34              | 60  | 0.986 | 0.175 | ln   | 1.015 | n/a  | Upper Great Lakes             | Perala and Alban, 1994   |
|     | 0.0877 | 2.4017 | 3–51 <sup>a</sup> | 95  | n/a   | n/a   | calc | n/a   | comp | Maine                         | Young et al., 1980       |
| SW: | 0.0625 | 2.2800 | 3–25              | 101 | 0.923 | n/a   | log  | n/a   | n/a  | New Brunswick                 | Baskerville, 1965        |
|     | 0.0444 | 2.3977 | 3–28              | 30  | 0.992 | 0.156 | ln   | 1.012 | n/a  | Nova Scotia                   | Freedman et al., 1982    |
|     | 0.0407 | 2.4228 | 2–32              | 50  | 0.980 | 0.199 | ln   | 1.020 | n/a  | Nova Scotia                   | Ker, 1980b               |
|     | 0.0645 | 2.2962 | 0–36              | 198 | 0.979 | 12.80 | abs  | n/a   | comp | New Brunswick,<br>Nova Scotia | Ker, 1984                |

|   |        |        |                   |      |       |       |       |       |        |                               |                                      |                          |
|---|--------|--------|-------------------|------|-------|-------|-------|-------|--------|-------------------------------|--------------------------------------|--------------------------|
| SB:   | 0.0302 | 2.5231 | 4–34              | 59   | n/a   | n/a   | calc  | n/a   | n/a    | Upper Great Lakes             | Perala and Alban, 1994               |                          |
|   | 0.0055 | 2.4700 | 3–25              | 101  | 0.903 | n/a   | log   | n/a   | n/a    | New Brunswick                 | Baskerville, 1965                    |                          |
|   | 0.0174 | 2.1601 | 3–28              | 30   | 0.982 | 0.219 | ln    | 1.024 | n/a    | Nova Scotia                   | Freedman et al., 1982                |                          |
|   | 0.0160 | 2.1140 | 3–40              | 40   | 0.975 | 0.558 | ln    | 1.168 | n/a    | Ontario                       | Honer, 1971 <sup>c</sup>             |                          |
|   | 0.0120 | 2.2391 | 2–32              | 50   | 0.950 | 0.341 | ln    | 1.060 | n/a    | Nova Scotia                   | Ker, 1980b                           |                          |
| ST:   | 0.0065 | 2.3832 | 4–34              | 60   | n/a   | n/a   | calc  | n/a   | n/a    | Upper Great Lakes             | Perala and Alban, 1994               |                          |
|   | 0.0607 | 2.3524 | 3–28              | 30   | 0.992 | 0.156 | ln    | 1.012 | n/a    | Nova Scotia                   | Freedman et al., 1982                |                          |
|   | 0.0525 | 2.3932 | 2–32              | 50   | 0.980 | 0.199 | ln    | 1.020 | n/a    | Nova Scotia                   | Ker, 1980b                           |                          |
|   | 0.0671 | 2.3381 | 0–36              | 198  | 0.978 | 15.40 | abs   | n/a   | comp   | New Brunswick,<br>Nova Scotia | Ker, 1984                            |                          |
|   | 0.1301 | 1.8728 | 0–20              | 20   | 0.800 | n/a   | log   | n/a   | n/a    | New Brunswick                 | MacLean and Wein, 1976               |                          |
| FL:   | 0.0679 | 2.4117 | 3–51 <sup>a</sup> | 95   | 0.995 | n/a   | ln    | n/a   | comp   | Maine                         | Young et al., 1980                   |                          |
|   | 0.0013 | 3.2100 | 3–25              | 101  | 0.960 | n/a   | log   | n/a   | n/a    | New Brunswick                 | Baskerville, 1965                    |                          |
|   | 0.0153 | 2.3367 | 3–28              | 30   | 0.916 | 0.524 | ln    | 1.147 | n/a    | Nova Scotia                   | Freedman et al., 1982                |                          |
|   | 0.1336 | 1.7853 | 3–40              | 40   | 0.966 | 0.390 | ln    | 1.079 | n/a    | Ontario                       | Honer, 1971 <sup>c</sup>             |                          |
|   | 0.0617 | 1.6737 | 2–32              | 50   | 0.900 | 0.312 | ln    | 1.050 | n/a    | Nova Scotia                   | Ker, 1980b                           |                          |
|   | 0.0998 | 1.6421 | 0–36              | 196  | 0.848 | 0.080 | absw  | n/a   | comp   | New Brunswick,<br>Nova Scotia | Ker, 1984                            |                          |
|   | 0.0230 | 2.2565 | 4–34              | 59   | n/a   | n/a   | calc  | n/a   | n/a    | Upper Great Lakes             | Perala and Alban, 1994               |                          |
| BR:   | 0.0089 | 2.4506 | 3–51 <sup>a</sup> | 95   | 0.945 | n/a   | ln    | n/a   | comp   | Maine                         | Young et al., 1980                   |                          |
|   | 0.0011 | 3.2200 | 3–25              | 101  | 0.903 | n/a   | log   | n/a   | n/a    | New Brunswick                 | Baskerville, 1965                    |                          |
|   | 0.0129 | 2.4263 | 3–28              | 30   | 0.924 | 0.517 | ln    | 1.143 | n/a    | Nova Scotia                   | Freedman et al., 1982                |                          |
|   | 0.0690 | 2.0964 | 3–40              | 40   | 0.979 | 0.385 | ln    | 1.077 | n/a    | Ontario                       | Honer, 1971 <sup>c</sup>             |                          |
|   | 0.0721 | 1.7793 | 2–32              | 50   | 0.890 | 0.312 | ln    | 1.050 | n/a    | Nova Scotia                   | Ker, 1980b                           |                          |
|   | 0.0909 | 1.8405 | 0–36              | 196  | 0.857 | 10.90 | abs   | n/a   | comp   | New Brunswick,<br>Nova Scotia | Ker, 1984                            |                          |
|   | 0.0050 | 2.4605 | 3–51 <sup>a</sup> | 95   | 0.949 | n/a   | ln    | n/a   | comp   | Maine                         | Young et al., 1980                   |                          |
| Fir, Douglas ( <i>Pseudotsuga menziesii</i> (Mirb.) Franco) |        |        |                   |      |       |       |       |       |        |                               |                                      |                          |
| AB:   | 0.0808 | 2.5282 | 5–54              | 60   | 0.972 | 0.279 | ln    | 1.040 | n/a    | British Columbia              | Marshall and Wang, 1995 <sup>b</sup> |                          |
| SW:   | 0.0158 | 2.8950 | 5–56              | 10   | 0.960 | 0.493 | ln    | 1.129 | good   | British Columbia              | Feller, 1992                         |                          |
|   | 0.0181 | 2.9270 | 6–29              | 8    | 0.980 | 0.243 | ln    | 1.030 | poor   | British Columbia              | Feller, 1992                         |                          |
| SB:   | 0.0151 | 2.8270 | 5–64              | 46   | 0.970 | 0.269 | ln    | 1.037 | c.good | British Columbia              | Feller, 1992                         |                          |
|   | 0.0137 | 2.8660 | 5–35              | 42   | 0.960 | 0.280 | ln    | 1.040 | c.poor | British Columbia              | Feller, 1992                         |                          |
|   | 0.0113 | 2.5772 | 5–54              | 60   | 0.958 | 0.350 | ln    | 1.063 | n/a    | British Columbia              | Marshall and Wang, 1995 <sup>b</sup> |                          |
|   | 0.0023 | 2.8530 | 5–56              | 10   | 0.970 | 0.472 | ln    | 1.118 | good   | British Columbia              | Feller, 1992                         |                          |
|   | 0.0045 | 2.8530 | 6–29              | 8    | 0.980 | 0.249 | ln    | 1.031 | poor   | British Columbia              | Feller, 1992                         |                          |
|   | 0.0043 | 2.6590 | 5–64              | 46   | 0.960 | 0.297 | ln    | 1.045 | c.good | British Columbia              | Feller, 1992                         |                          |
|   | 0.0041 | 2.6780 | 5–35              | 42   | 0.940 | 0.308 | ln    | 1.049 | c.poor | British Columbia              | Feller, 1992                         |                          |
|   | 0.0127 | 2.4300 | 2–162             | 99   | 0.990 | 0.322 | ln    | 1.053 | comp   | Oregon, Washington            | Gholz et al., 1979                   |                          |
|   | 0.0336 | 2.6518 | 5–54              | 60   | 0.956 | 0.369 | ln    | 1.070 | n/a    | British Columbia              | Marshall and Wang, 1995 <sup>b</sup> |                          |
|   | ST:    | 0.2168 | 1.7236            | 1–11 | 22    | 0.897 | 0.419 | ln    | 1.092  | comp                          | Idaho, Montana                       | Brown, 1978 <sup>b</sup> |
| 0.0456  |        | 2.5951 | 2–162             | 99   | 0.990 | 0.310 | ln    | 1.049 | comp   | Oregon, Washington            | Gholz et al., 1979                   |                          |
| FI:   | 0.0451 | 2.6343 | 5–54              | 60   | 0.958 | 0.357 | ln    | 1.066 | n/a    | British Columbia              | Marshall and Wang, 1995 <sup>b</sup> |                          |
|   | 0.3021 | 1.3076 | 1–86              | 22   | 0.932 | 0.541 | ln    | 1.158 | comp   | Idaho, Montana                | Brown, 1978 <sup>b</sup>             |                          |
|   | 0.2897 | 1.2850 | 5–56              | 10   | 0.960 | 0.220 | ln    | 1.024 | good   | British Columbia              | Feller, 1992                         |                          |
|   | 0.1315 | 1.4600 | 6–29              | 8    | 0.870 | 0.339 | ln    | 1.059 | poor   | British Columbia              | Feller, 1992                         |                          |
|   | 0.1105 | 1.6360 | 5–64              | 43   | 0.870 | 0.364 | ln    | 1.068 | c.good | British Columbia              | Feller, 1992                         |                          |
|   | 0.0809 | 1.7600 | 5–35              | 39   | 0.850 | 0.331 | ln    | 1.056 | c.poor | British Columbia              | Feller, 1992                         |                          |
|   | 0.0456 | 1.7009 | 2–162             | 123  | 0.860 | 0.695 | ln    | 1.275 | comp   | Oregon, Washington            | Gholz et al., 1979                   |                          |
|   | 0.0423 | 1.8619 | 5–54              | 60   | 0.863 | 0.482 | ln    | 1.123 | n/a    | British Columbia              | Marshall and Wang, 1995 <sup>b</sup> |                          |
|   | BR:    | 0.2624 | 1.5464            | 1–86 | 22    | 0.927 | 0.661 | ln    | 1.244  | comp                          | Idaho, Montana                       | Brown, 1978 <sup>b</sup> |
|   |        | 0.2308 | 1.5660            | 5–56 | 10    | 0.960 | 0.288 | ln    | 1.042  | good                          | British Columbia                     | Feller, 1992             |
| 0.0525  |        | 1.9040 | 6–29              | 8    | 0.780 | 0.590 | ln    | 1.190 | poor   | British Columbia              | Feller, 1992                         |                          |
| 0.0591  |        | 1.9370 | 5–64              | 46   | 0.830 | 0.504 | ln    | 1.135 | c.good | British Columbia              | Feller, 1992                         |                          |
| 0.0543  |        | 1.9700 | 5–35              | 42   | 0.760 | 0.500 | ln    | 1.133 | c.poor | British Columbia              | Feller, 1992                         |                          |
| BR:   | 0.0204 | 2.1382 | 2–162             | 123  | 0.920 | 0.695 | ln    | 1.273 | comp   | Oregon, Washington            | Gholz et al., 1979                   |                          |
|   | 0.0088 | 2.5840 | 5–54              | 60   | 0.910 | 0.528 | ln    | 1.149 | n/a    | British Columbia              | Marshall and Wang, 1995 <sup>b</sup> |                          |

Fir, grand (*Abies grandis* (Dougl.) Lindl.)

|     |        |        |      |    |       |       |    |       |      |                |                          |
|-----|--------|--------|------|----|-------|-------|----|-------|------|----------------|--------------------------|
| ST: | 0.2107 | 1.6149 | 1–11 | 24 | 0.923 | 0.374 | ln | 1.072 | comp | Idaho, Montana | Brown, 1978 <sup>b</sup> |
| FL: | 0.2923 | 1.4177 | 1–40 | 20 | 0.943 | 0.405 | ln | 1.085 | comp | Idaho, Montana | Brown, 1978 <sup>b</sup> |
| BR: | 0.1516 | 1.6481 | 1–40 | 20 | 0.936 | 0.500 | ln | 1.133 | comp | Idaho, Montana | Brown, 1978 <sup>b</sup> |

Fir, noble (*Abies procera* Rehd.)

|     |        |        |        |   |       |       |    |       |     |        |                    |
|-----|--------|--------|--------|---|-------|-------|----|-------|-----|--------|--------------------|
| SW: | 0.0236 | 2.7592 | 19–111 | 6 | 0.990 | 0.251 | ln | 1.032 | n/a | Oregon | Gholz et al., 1979 |
| SB: | 0.0022 | 2.8943 | 19–111 | 6 | 0.990 | 0.243 | ln | 1.030 | n/a | Oregon | Gholz et al., 1979 |
| FL: | 0.0075 | 2.1683 | 19–111 | 6 | 0.990 | 0.184 | ln | 1.017 | n/a | Oregon | Gholz et al., 1979 |
| BR: | 0.0138 | 2.3324 | 19–111 | 6 | 0.940 | 0.446 | ln | 1.105 | n/a | Oregon | Gholz et al., 1979 |

Fir, Pacific silver (*Abies amabilis* (Dougl.) Forbes)

|     |        |        |       |    |       |       |    |       |      |                             |                            |
|-----|--------|--------|-------|----|-------|-------|----|-------|------|-----------------------------|----------------------------|
| AB: | 0.0627 | 2.4921 | 31–90 | 7  | 0.990 | 0.110 | ln | 1.006 | n/a  | British Columbia            | Krumlik, 1974 <sup>b</sup> |
| SW: | 0.0298 | 2.5744 | 12–90 | 14 | 0.990 | 0.134 | ln | 1.009 | comp | British Columbia,<br>Oregon | Gholz et al., 1979         |
|     | 0.0387 | 2.5101 | 31–90 | 12 | 0.982 | 0.143 | ln | 1.010 | n/a  | British Columbia            | Krumlik, 1974 <sup>b</sup> |
| SB: | 0.0022 | 2.8421 | 12–90 | 14 | 0.990 | 0.221 | ln | 1.025 | comp | British Columbia,<br>Oregon | Gholz et al., 1979         |
|     | 0.0035 | 2.7235 | 31–90 | 12 | 0.966 | 0.213 | ln | 1.023 | n/a  | British Columbia            | Krumlik, 1974 <sup>b</sup> |
| ST: | 0.0404 | 2.5482 | 31–90 | 12 | 0.983 | 0.139 | ln | 1.010 | n/a  | British Columbia            | Krumlik, 1974 <sup>b</sup> |
| FL: | 0.0102 | 2.1926 | 12–90 | 9  | 0.970 | 0.277 | ln | 1.039 | n/a  | Oregon                      | Gholz et al., 1979         |
|     | 0.0756 | 1.7892 | 31–90 | 7  | 0.920 | 0.233 | ln | 1.027 | n/a  | British Columbia            | Krumlik, 1974 <sup>b</sup> |
| BR: | 0.0050 | 2.6261 | 12–90 | 9  | 0.960 | 0.404 | ln | 1.085 | comp | British Columbia,<br>Oregon | Gholz et al., 1979         |
|     | 0.0283 | 2.1141 | 31–90 | 7  | 0.746 | 0.543 | ln | 1.159 | n/a  | British Columbia            | Krumlik, 1974 <sup>b</sup> |

Fir, subalpine (*Abies lasiocarpa* (Hook.) Nutt.)

|     |        |        |      |    |       |       |    |       |      |                |                          |
|-----|--------|--------|------|----|-------|-------|----|-------|------|----------------|--------------------------|
| ST: | 0.2513 | 1.5699 | 1–12 | 13 | 0.953 | 0.310 | ln | 1.049 | comp | Idaho, Montana | Brown, 1978 <sup>b</sup> |
| FL: | 0.3894 | 1.2311 | 1–32 | 20 | 0.943 | 0.358 | ln | 1.066 | comp | Idaho, Montana | Brown, 1978 <sup>b</sup> |
| BR: | 0.1926 | 1.5712 | 1–32 | 20 | 0.953 | 0.411 | ln | 1.088 | comp | Idaho, Montana | Brown, 1978 <sup>b</sup> |

Hemlock, eastern (*Tsuga canadensis* (L.) Carr.)

|     |        |        |                   |    |       |       |      |       |      |               |                         |
|-----|--------|--------|-------------------|----|-------|-------|------|-------|------|---------------|-------------------------|
| AB: | 0.0622 | 2.4500 | 5–50              | 21 | 0.960 | n/a   | log  | n/a   | n/a  | West Virginia | Brenneman et al., 1978  |
|     | 0.1617 | 2.1536 | 2–34              | 49 | 0.987 | 0.199 | ln   | 1.020 | n/a  | New Brunswick | Ker, 1980a              |
|     | 0.0991 | 2.3617 | 3–51 <sup>a</sup> | 36 | n/a   | n/a   | calc | n/a   | comp | Maine         | Young et al., 1980      |
| SW: | 0.0545 | 2.3570 | 2–34              | 49 | 0.990 | 0.141 | ln   | 1.010 | n/a  | New Brunswick | Ker, 1980a              |
| SB: | 0.0138 | 2.2660 | 2–34              | 49 | 0.985 | 0.243 | ln   | 1.030 | n/a  | New Brunswick | Ker, 1980a              |
| ST: | 0.1110 | 2.1400 | 1–24              | 4  | 0.995 | 0.263 | ln   | 1.035 | comp | New Hampshire | Hocker and Earley, 1983 |
|     | 0.0682 | 2.3418 | 2–34              | 49 | 0.990 | 0.141 | ln   | 1.010 | n/a  | New Brunswick | Ker, 1980a              |
|     | 0.0649 | 2.3662 | 3–51 <sup>a</sup> | 36 | 0.983 | n/a   | ln   | n/a   | comp | Maine         | Young et al., 1980      |
| FL: | 0.1252 | 1.5400 | 1–24              | 4  | 0.994 | 0.221 | ln   | 1.025 | comp | New Hampshire | Hocker and Earley, 1983 |
|     | 0.0454 | 1.6829 | 2–34              | 49 | 0.928 | 0.280 | ln   | 1.040 | n/a  | New Brunswick | Ker, 1980a              |
|     | 0.0369 | 2.0300 | 3–51 <sup>a</sup> | 36 | 0.937 | n/a   | ln   | n/a   | comp | Maine         | Young et al., 1980      |
| BR: | 0.0848 | 1.9000 | 1–24              | 4  | 0.998 | 0.163 | ln   | 1.013 | comp | New Hampshire | Hocker and Earley, 1983 |
|     | 0.0586 | 1.9157 | 2–34              | 49 | 0.927 | 0.312 | ln   | 1.050 | n/a  | New Brunswick | Ker, 1980a              |
|     | 0.0062 | 2.7033 | 3–51 <sup>a</sup> | 36 | 0.960 | n/a   | ln   | n/a   | comp | Maine         | Young et al., 1980      |

Hemlock, mountain (*Tsuga mertensiana* (Bong.) Carr.)

|     |        |        |       |    |       |       |    |       |      |                             |                            |
|-----|--------|--------|-------|----|-------|-------|----|-------|------|-----------------------------|----------------------------|
| AB: | 0.5038 | 2.0154 | 44–76 | 5  | 0.987 | 0.061 | ln | 1.002 | n/a  | British Columbia            | Krumlik, 1974 <sup>b</sup> |
| SW: | 0.0079 | 2.9308 | 17–76 | 14 | 0.980 | 0.228 | ln | 1.026 | comp | British Columbia,<br>Oregon | Gholz et al., 1979         |
|     | 0.1190 | 2.2709 | 32–76 | 8  | 0.984 | 0.094 | ln | 1.004 | n/a  | British Columbia            | Krumlik, 1974 <sup>b</sup> |
| SB: | 0.0037 | 2.7654 | 17–76 | 14 | 0.970 | 0.226 | ln | 1.026 | comp | British Columbia,<br>Oregon | Gholz et al., 1979         |
|     | 0.0157 | 2.4258 | 32–76 | 8  | 0.965 | 0.153 | ln | 1.012 | n/a  | British Columbia            | Krumlik, 1974 <sup>b</sup> |
| ST: | 0.1314 | 2.3011 | 32–76 | 8  | 0.985 | 0.093 | ln | 1.004 | n/a  | British Columbia            | Krumlik, 1974 <sup>b</sup> |
| FL: | 0.0022 | 1.9756 | 17–76 | 11 | 0.970 | 0.158 | ln | 1.013 | comp | British Columbia,<br>Oregon | Gholz et al., 1979         |

|   |         |        |                   |    |       |       |      |       |          |                             |                                 |
|---|---------|--------|-------------------|----|-------|-------|------|-------|----------|-----------------------------|---------------------------------|
|   | 0.0089  | 2.4701 | 44–76             | 5  | 0.994 | 0.051 | ln   | 1.001 | n/a      | British Columbia            | Krumlik, 1974 <sup>b</sup>      |
| BR:   | 0.0052  | 2.6045 | 17–76             | 11 | 0.990 | 0.122 | ln   | 1.006 | comp     | British Columbia,<br>Oregon | Gholz et al., 1979              |
|   | 0.1575  | 1.4855 | 44–76             | 5  | 0.803 | 0.191 | ln   | 1.018 | n/a      | British Columbia            | Krumlik, 1974 <sup>b</sup>      |
| Hemlock, western ( <i>Tsuga heterophylla</i> (Raf.) Sarg.)        |         |        |                   |    |       |       |      |       |          |                             |                                 |
| AB:   | 0.2570  | 2.1349 | 16–49             | 8  | 0.967 | 0.171 | ln   | 1.015 | n/a      | British Columbia            | Krumlik, 1974 <sup>b</sup>      |
| SW:   | 0.1132  | 2.2570 | 15–78             | 18 | 0.990 | 0.118 | ln   | 1.007 | comp     | British Columbia,<br>Oregon | Gholz et al., 1979              |
|   | 0.1638  | 2.1202 | 16–49             | 8  | 0.983 | 0.121 | ln   | 1.007 | n/a      | British Columbia            | Krumlik, 1974 <sup>b</sup>      |
| SB:   | 0.0125  | 2.2580 | 15–78             | 18 | 0.990 | 0.138 | ln   | 1.010 | comp     | British Columbia,<br>Oregon | Gholz et al., 1979              |
|   | 0.0140  | 2.3940 | 16–49             | 8  | 0.937 | 0.271 | ln   | 1.037 | n/a      | British Columbia            | Krumlik, 1974 <sup>b</sup>      |
| ST:   | 0.4208  | 1.2501 | 0–13              | 13 | 0.922 | 0.434 | ln   | 1.099 | comp     | Idaho, Montana              | Brown, 1978 <sup>b</sup>        |
|   | 0.1695  | 2.1687 | 16–49             | 8  | 0.979 | 0.139 | ln   | 1.010 | n/a      | British Columbia            | Krumlik, 1974 <sup>b</sup>      |
| FL:   | 0.3203  | 1.1343 | 0–18              | 16 | 0.909 | 0.454 | ln   | 1.108 | comp     | Idaho, Montana              | Brown, 1978 <sup>b</sup>        |
|   | 0.0146  | 2.1280 | 15–78             | 18 | 0.960 | 0.435 | ln   | 1.099 | comp     | British Columbia,<br>Oregon | Gholz et al., 1979              |
|   | 0.0040  | 2.4543 | 16–49             | 8  | 0.890 | 0.378 | ln   | 1.074 | n/a      | British Columbia            | Krumlik, 1974 <sup>b</sup>      |
| BR:   | 0.2392  | 1.3060 | 0–18              | 16 | 0.919 | 0.492 | ln   | 1.129 | comp     | Idaho, Montana              | Brown, 1978 <sup>b</sup>        |
|   | 0.0053  | 2.7780 | 15–78             | 18 | 0.980 | 0.421 | ln   | 1.093 | comp     | British Columbia,<br>Oregon | Gholz et al., 1979              |
|   | 0.0948  | 1.9641 | 16–49             | 8  | 0.848 | 0.363 | ln   | 1.068 | n/a      | British Columbia            | Krumlik, 1974 <sup>b</sup>      |
| Hickory, all ( <i>Carya</i> spp.)                                 |         |        |                   |    |       |       |      |       |          |                             |                                 |
| AB:   | 0.0792  | 2.6349 | 5–50              | 14 | 0.990 | n/a   | log  | n/a   | n/a      | West Virginia               | Brenneman et al., 1978          |
|   | 0.0763  | 2.6209 | 5–40 <sup>a</sup> | 19 | 0.987 | 41.28 | abs  | n/a   | 22.3(50) | West Virginia               | Wiant et al., 1977 <sup>d</sup> |
| SW:   | 0.0043  | 3.3743 | 5–40 <sup>a</sup> | 19 | 0.970 | 45.85 | abs  | n/a   | 22.3(50) | West Virginia               | Wiant et al., 1977              |
| ST:   | 0.0066  | 3.2817 | 5–40 <sup>a</sup> | 19 | 0.972 | 48.12 | abs  | n/a   | 22.3(50) | West Virginia               | Wiant et al., 1977              |
| Juniper, western ( <i>Juniperus occidentalis</i> Hooker)          |         |        |                   |    |       |       |      |       |          |                             |                                 |
| SW:   | 0.0002  | 2.6389 | 15–273            | 10 | 0.990 | 0.170 | ln   | 1.015 | n/a      | Oregon                      | Gholz et al., 1979              |
| SB:   | 0.00004 | 2.6333 | 15–273            | 10 | 0.990 | 0.390 | ln   | 1.079 | n/a      | Oregon                      | Gholz et al., 1979              |
| FL:   | 0.0144  | 1.5606 | 15–273            | 10 | 0.990 | 0.155 | ln   | 1.012 | n/a      | Oregon                      | Gholz et al., 1979              |
| BR:   | 0.0007  | 2.3337 | 15–273            | 10 | 0.990 | 0.261 | ln   | 1.035 | n/a      | Oregon                      | Gholz et al., 1979              |
| Larch, eastern (tamarack) ( <i>Larix laricina</i> (Du Roi) Koch.) |         |        |                   |    |       |       |      |       |          |                             |                                 |
| AB:   | 0.1359  | 2.2980 | 7–30              | 53 | 0.978 | 0.058 | log  | 1.004 | n/a      | Minnesota                   | Carpenter, 1983                 |
|   | 0.0946  | 2.3572 | 2–31              | 47 | 0.990 | 0.141 | ln   | 1.010 | n/a      | Nova Scotia                 | Ker, 1980b                      |
|   | 0.1265  | 2.2453 | 3–51 <sup>a</sup> | 23 | n/a   | n/a   | calc | n/a   | comp     | Maine                       | Young et al., 1980              |
| SW:   | 0.0731  | 2.3930 | 7–30              | 53 | 0.963 | 0.079 | log  | 1.007 | n/a      | Minnesota                   | Carpenter, 1983                 |
|   | 0.0464  | 2.5050 | 2–31              | 47 | 0.980 | 0.141 | ln   | 1.010 | n/a      | Nova Scotia                 | Ker, 1980b                      |
| SB:   | 0.0168  | 2.0868 | 2–31              | 47 | 0.990 | 0.141 | ln   | 1.010 | n/a      | Nova Scotia                 | Ker, 1980b                      |
| ST:   | 0.0609  | 2.4472 | 2–31              | 47 | 0.980 | 0.141 | ln   | 1.010 | n/a      | Nova Scotia                 | Ker, 1980b                      |
|   | 0.0762  | 2.3051 | 3–51 <sup>a</sup> | 23 | 0.995 | n/a   | ln   | n/a   | comp     | Maine                       | Young et al., 1980              |
| FL:   | 0.0061  | 1.9790 | 2–31              | 47 | 0.770 | 0.457 | ln   | 1.110 | n/a      | Nova Scotia                 | Ker, 1980b                      |
|   | 0.0466  | 1.7250 | 3–51 <sup>a</sup> | 23 | 0.954 | n/a   | ln   | n/a   | comp     | Maine                       | Young et al., 1980              |
| BR:   | 0.0776  | 2.0550 | 7–30              | 53 | 0.804 | 0.172 | log  | 1.035 | n/a      | Minnesota                   | Carpenter, 1983                 |
|   | 0.0178  | 2.1727 | 2–31              | 47 | 0.800 | 0.341 | ln   | 1.060 | n/a      | Nova Scotia                 | Ker, 1980b                      |
|   | 0.0436  | 1.9810 | 3–51 <sup>a</sup> | 23 | 0.960 | n/a   | ln   | n/a   | comp     | Maine                       | Young et al., 1980              |
| Larch, western ( <i>Larix occidentalis</i> Nutt.)                 |         |        |                   |    |       |       |      |       |          |                             |                                 |
| ST:   | 0.2942  | 1.5593 | 1–12              | 13 | 0.907 | 0.502 | ln   | 1.134 | comp     | Idaho, Montana              | Brown, 1978 <sup>b</sup>        |
| FL:   | 0.1307  | 1.0557 | 1–17              | 14 | 0.923 | 0.324 | ln   | 1.054 | comp     | Idaho, Montana              | Brown, 1978 <sup>b</sup>        |
| BR:   | 0.1821  | 1.2885 | 1–17              | 14 | 0.900 | 0.459 | ln   | 1.111 | comp     | Idaho, Montana              | Brown, 1978 <sup>b</sup>        |

Madrone, Pacific (*Arbutus menziesii* Pursh)

|     |        |        |      |    |       |       |    |       |      |                    |                                     |
|-----|--------|--------|------|----|-------|-------|----|-------|------|--------------------|-------------------------------------|
| FL: | 0.0381 | 1.5274 | 3–63 | 31 | 0.835 | 0.558 | ln | 1.168 | comp | Oregon, California | Snell and Little, 1983 <sup>b</sup> |
| BR: | 0.0093 | 2.6868 | 3–63 | 31 | 0.886 | 0.794 | ln | 1.371 | comp | Oregon, California | Snell and Little, 1983 <sup>b</sup> |

Maple, bigleaf (*Acer macrophyllum* Pursh)

|     |        |        |      |    |       |       |    |       |      |            |                                     |
|-----|--------|--------|------|----|-------|-------|----|-------|------|------------|-------------------------------------|
| SW: | 0.0302 | 2.7230 | 8–35 | 18 | 0.990 | 0.118 | ln | 1.007 | comp | Oregon     | Gholz et al., 1979                  |
| SB: | 0.0100 | 2.5740 | 8–35 | 18 | 0.980 | 0.241 | ln | 1.029 | comp | Oregon     | Gholz et al., 1979                  |
| FL: | 0.0220 | 1.6170 | 8–35 | 18 | 0.870 | 0.318 | ln | 1.052 | comp | Oregon     | Gholz et al., 1979                  |
|     | 0.0324 | 1.3979 | 4–44 | 16 | 0.887 | 0.317 | ln | 1.052 | comp | Washington | Snell and Little, 1983 <sup>b</sup> |
| BR: | 0.0129 | 2.4300 | 8–35 | 18 | 0.880 | 0.474 | ln | 1.119 | comp | Oregon     | Gholz et al., 1979                  |
|     | 0.0195 | 2.4204 | 4–44 | 16 | 0.887 | 0.548 | ln | 1.162 | comp | Washington | Snell and Little, 1983 <sup>b</sup> |

Maple, mountain (*Acer spicatum* Lamb.)

|     |        |        |                   |    |       |       |     |       |      |               |                         |
|-----|--------|--------|-------------------|----|-------|-------|-----|-------|------|---------------|-------------------------|
| AB: | 0.2040 | 2.2524 | 1–20 <sup>a</sup> | 15 | 0.990 | 0.074 | log | 1.006 | comp | New Hampshire | Whittaker et al., 1974  |
| SW: | 0.0754 | 2.3364 | 1–20 <sup>a</sup> | 15 | 0.994 | 0.064 | log | 1.005 | comp | New Hampshire | Whittaker et al., 1974  |
| SB: | 0.0177 | 2.1133 | 1–20 <sup>a</sup> | 15 | 0.988 | 0.078 | log | 1.007 | comp | New Hampshire | Whittaker et al., 1974  |
| ST: | 0.0767 | 2.9400 | 1–3               | 6  | 0.991 | 0.163 | ln  | 1.013 | comp | New Hampshire | Hocker and Earley, 1983 |
|     | 0.0926 | 2.3040 | 1–20 <sup>a</sup> | 15 | 0.994 | 0.063 | log | 1.005 | comp | New Hampshire | Whittaker et al., 1974  |
| BR: | 0.0184 | 2.2400 | 1–3               | 6  | 0.957 | 0.403 | ln  | 1.085 | comp | New Hampshire | Hocker and Earley, 1983 |
|     | 0.0079 | 3.1640 | 1–20 <sup>a</sup> | 15 | 0.964 | 0.200 | log | 1.047 | comp | New Hampshire | Whittaker et al., 1974  |

Maple, red (*Acer rubrum* L.)

|     |        |        |                   |     |       |       |      |       |          |                               |                                   |
|-----|--------|--------|-------------------|-----|-------|-------|------|-------|----------|-------------------------------|-----------------------------------|
| AB: | 0.0910 | 2.5080 | 5–50              | 27  | 0.990 | n/a   | log  | n/a   | n/a      | West Virginia                 | Brenneman et al., 1978            |
|     | 0.1651 | 2.2394 | 8–26              | 22  | 0.965 | 0.152 | ln   | 1.012 | comp     | Rhode Island                  | Bridge, 1979 <sup>b</sup>         |
|     | 0.1789 | 2.3340 | 10–52             | 150 | 0.980 | 0.116 | ln   | 1.007 | comp     | Michigan, Wisconsin           | Crow and Erdmann, 1983            |
|     | 0.1394 | 2.3405 | 1–31              | 37  | 0.992 | 0.176 | ln   | 1.016 | n/a      | Nova Scotia                   | Freedman et al., 1982             |
|     | 0.1317 | 2.3199 | 1–30              | 49  | 0.990 | 0.141 | ln   | 1.010 | n/a      | Nova Scotia                   | Ker, 1980b                        |
|     | 0.1970 | 2.1933 | 0–35              | 198 | 0.965 | 34.00 | abs  | n/a   | comp     | New Brunswick,<br>Nova Scotia | Ker, 1984                         |
|     | 0.2582 | 1.6728 | 0–10              | 30  | 0.877 | n/a   | log  | n/a   | n/a      | New Brunswick                 | MacLean and Wein, 1976            |
|     | 0.1618 | 2.3095 | 4–35              | 45  | n/a   | n/a   | calc | n/a   | n/a      | Upper Great Lakes             | Perala and Alban, 1994            |
|     | 0.0755 | 2.5623 | 5–40 <sup>a</sup> | 19  | 0.981 | 35.38 | abs  | n/a   | 22.3(50) | West Virginia                 | Wiant et al., 1977 <sup>d</sup>   |
|     | 0.1262 | 2.3804 | 3–66 <sup>a</sup> | 62  | n/a   | n/a   | calc | n/a   | comp     | Maine                         | Young et al., 1980                |
| SW: | 0.1599 | 2.2340 | 10–52             | 150 | 0.970 | 0.152 | ln   | 1.012 | comp     | Michigan, Wisconsin           | Crow and Erdmann, 1983            |
|     | 0.0394 | 2.6242 | 1–31              | 26  | 0.960 | 0.196 | ln   | 1.019 | n/a      | Nova Scotia                   | Freedman et al., 1982             |
|     | 0.0783 | 2.3795 | 1–30              | 49  | 0.980 | 0.199 | ln   | 1.020 | n/a      | Nova Scotia                   | Ker, 1980b                        |
|     | 0.1139 | 2.2342 | 0–35              | 198 | 0.961 | 23.90 | abs  | n/a   | comp     | New Brunswick,<br>Nova Scotia | Ker, 1984                         |
|     | 0.0969 | 2.3398 | 4–35              | 45  | n/a   | n/a   | calc | n/a   | n/a      | Upper Great Lakes             | Perala and Alban, 1994            |
| SB: | 0.0405 | 1.9850 | 10–52             | 150 | 0.950 | 0.186 | ln   | 1.017 | comp     | Michigan, Wisconsin           | Crow and Erdmann, 1983            |
|     | 0.0113 | 2.3717 | 1–31              | 26  | 0.945 | 0.208 | ln   | 1.022 | n/a      | Nova Scotia                   | Freedman et al., 1982             |
|     | 0.0219 | 2.1419 | 1–30              | 50  | 0.970 | 0.243 | ln   | 1.030 | n/a      | Nova Scotia                   | Ker, 1980b                        |
|     | 0.0210 | 2.1910 | 4–35              | 44  | 0.976 | n/a   | ln   | n/a   | n/a      | Upper Great Lakes             | Perala and Alban, 1994            |
| ST: | 0.0491 | 2.5932 | 1–31              | 26  | 0.960 | 0.194 | ln   | 1.019 | n/a      | Nova Scotia                   | Freedman et al., 1982             |
|     | 0.1290 | 2.3300 | 0–27              | 33  | 0.992 | 0.222 | ln   | 1.025 | comp     | New Hampshire                 | Hocker and Earley, 1983           |
|     | 0.0996 | 2.3418 | 1–30              | 49  | 0.980 | 0.199 | ln   | 1.020 | n/a      | Nova Scotia                   | Ker, 1980b                        |
|     | 0.1351 | 2.2215 | 0–35              | 198 | 0.962 | 26.90 | abs  | n/a   | comp     | New Brunswick,<br>Nova Scotia | Ker, 1984                         |
|     | 0.1285 | 2.2940 | 3–12              | 7   | 0.891 | 0.421 | ln   | 1.093 | n/a      | New Hampshire                 | Kinerson and<br>Bartholomew, 1977 |
|     | 0.1380 | 1.7963 | 0–10              | 30  | 0.861 | n/a   | log  | n/a   | n/a      | New Brunswick                 | MacLean and Wein, 1976            |
|     | 0.5788 | 2.3151 | 7–24              | n/a | 0.976 | n/a   | log  | n/a   | n/a      | New Jersey                    | Reynolds et al., 1978             |
|     | 0.0595 | 2.6522 | 3–15              | 30  | 0.993 | n/a   | log  | n/a   | comp     | Maine                         | Ribe, 1973                        |
|     | 0.0787 | 2.4898 | 3–66 <sup>a</sup> | 62  | 0.996 | n/a   | ln   | n/a   | comp     | Maine                         | Young et al., 1980                |
| FL: | 0.0373 | 1.5400 | 10–52             | 150 | 0.540 | 0.569 | ln   | 1.173 | comp     | Michigan, Wisconsin           | Crow and Erdmann, 1983            |
|     | 0.0261 | 1.5914 | 1–31              | 37  | 0.908 | 0.420 | ln   | 1.092 | n/a      | Nova Scotia                   | Freedman et al., 1982             |
|     | 0.0153 | 1.9300 | 0–27              | 9   | 0.989 | 0.274 | ln   | 1.038 | comp     | New Hampshire                 | Hocker and Earley, 1983           |
|     | 0.0174 | 1.6529 | 1–30              | 50  | 0.920 | 0.280 | ln   | 1.040 | n/a      | Nova Scotia                   | Ker, 1980b                        |

|  |        |        |                   |     |       |       |      |       |        |                               |                                       |
|--|--------|--------|-------------------|-----|-------|-------|------|-------|--------|-------------------------------|---------------------------------------|
|  | 0.0408 | 1.5518 | 0–35              | 197 | 0.879 | 1.600 | abs  | n/a   | comp   | New Brunswick,<br>Nova Scotia | Ker, 1984                             |
|  | 0.0018 | 2.7770 | 3–12              | 7   | 0.998 | 0.061 | ln   | 1.002 | n/a    | New Hampshire                 | Kinerson and<br>Bartholomew, 1977     |
|  | 0.0191 | 1.8670 | 4–35              | 45  | 0.820 | n/a   | ln   | n/a   | n/a    | Upper Great Lakes             | Perala and Alban, 1994                |
|  | 1.6959 | 1.3100 | 7–24              | n/a | 0.582 | n/a   | log  | n/a   | n/a    | New Jersey                    | Reynolds et al., 1978                 |
|  | 0.0248 | 1.8015 | 3–15              | 30  | 0.852 | n/a   | log  | n/a   | comp   | Maine                         | Ribe, 1973                            |
|  | 0.0249 | 1.8322 | 3–66 <sup>a</sup> | 62  | 0.953 | n/a   | ln   | n/a   | comp   | Maine                         | Young et al., 1980                    |
| BR:  | 0.0075 | 2.8310 | 10–52             | 150 | 0.850 | 0.479 | ln   | 1.122 | comp   | Michigan, Wisconsin           | Crow and Erdmann, 1983                |
|  | 0.3295 | 1.5219 | 1–31              | 37  | 0.916 | 0.381 | ln   | 1.075 | n/a    | Nova Scotia                   | Freedman et al., 1982                 |
|  | 0.0182 | 2.4100 | 0–27              | 33  | 0.952 | 0.614 | ln   | 1.207 | comp   | New Hampshire                 | Hocker and Earley, 1983               |
|  | 0.0180 | 2.3506 | 1–30              | 49  | 0.940 | 0.341 | ln   | 1.060 | n/a    | Nova Scotia                   | Ker, 1980b                            |
|  | 0.0634 | 2.0709 | 0–35              | 197 | 0.868 | 14.80 | abs  | n/a   | comp   | New Brunswick,<br>Nova Scotia | Ker, 1984                             |
|  | 0.0181 | 1.9600 | 3–12              | 7   | 0.845 | 0.443 | ln   | 1.103 | n/a    | New Hampshire                 | Kinerson and<br>Bartholomew, 1977     |
|  | 0.0113 | 1.8989 | 7–24              | n/a | 0.906 | n/a   | log  | n/a   | n/a    | New Jersey                    | Reynolds et al., 1978                 |
|  | 0.0342 | 1.9148 | 3–15              | 30  | 0.896 | n/a   | log  | n/a   | comp   | Maine                         | Ribe, 1973                            |
|  | 0.0223 | 2.2055 | 3–66 <sup>a</sup> | 62  | 0.966 | n/a   | ln   | n/a   | comp   | Maine                         | Young et al., 1980                    |
| Maple, striped ( <i>Acer pensylvanicum</i> L.) |        |        |                   |     |       |       |      |       |        |                               |                                       |
| ST:  | 0.0839 | 2.3200 | 1–8               | 8   | 0.987 | 0.279 | ln   | 1.040 | comp   | New Hampshire                 | Hocker and Earley, 1983               |
| BR:  | 0.0218 | 2.5700 | 1–8               | 8   | 0.994 | 0.210 | ln   | 1.022 | comp   | New Hampshire                 | Hocker and Earley, 1983               |
| Maple, sugar ( <i>Acer saccharum</i> Marsh.)   |        |        |                   |     |       |       |      |       |        |                               |                                       |
| AB:  | 0.2064 | 2.3300 | 2–40              | 5   | 0.998 | n/a   | ln   | n/a   | 22(45) | New York                      | Bickelhaupt et al., 1973 <sup>g</sup> |
|  | 0.1252 | 2.4800 | 2–40              | 5   | 0.984 | n/a   | ln   | n/a   | 22(45) | New York                      | Bickelhaupt et al., 1973 <sup>h</sup> |
|  | 0.1008 | 2.5735 | 5–50              | 119 | 0.980 | n/a   | log  | n/a   | n/a    | West Virginia                 | Brenneman et al., 1978                |
|  | 0.1532 | 2.3924 | 1–34              | 36  | 0.995 | 0.149 | ln   | 1.011 | n/a    | Nova Scotia                   | Freedman et al., 1982                 |
|  | 0.1599 | 2.3376 | 1–41              | 45  | 0.993 | 0.141 | ln   | 1.010 | n/a    | New Brunswick                 | Ker, 1980a                            |
|  | 0.1259 | 2.5200 | 8–24              | 9   | 0.990 | 0.045 | log  | 1.002 | n/a    | Wisconsin                     | Pastor and Bockheim, 1981             |
|  | 0.1676 | 2.3646 | 4–34              | 42  | n/a   | n/a   | calc | n/a   | n/a    | Upper Great Lakes             | Perala and Alban, 1994                |
|  | 0.1641 | 2.4209 | 1–50 <sup>a</sup> | 14  | 0.998 | 0.060 | log  | 1.004 | n/a    | New Hampshire                 | Whittaker et al., 1974                |
|  | 0.1791 | 2.3329 | 3–66 <sup>a</sup> | 42  | n/a   | n/a   | calc | n/a   | comp   | Maine                         | Young et al., 1980                    |
| SW:  | 0.0270 | 2.8318 | 1–34              | 26  | 0.963 | 0.217 | ln   | 1.024 | n/a    | Nova Scotia                   | Freedman et al., 1982                 |
|  | 0.1024 | 2.3869 | 1–41              | 45  | 0.990 | 0.141 | ln   | 1.010 | n/a    | New Brunswick                 | Ker, 1980a                            |
|  | 0.0731 | 2.5630 | 8–24              | 9   | 0.990 | 0.045 | log  | 1.002 | n/a    | Wisconsin                     | Pastor and Bockheim, 1981             |
|  | 0.1179 | 2.3467 | 4–34              | 42  | n/a   | n/a   | calc | n/a   | n/a    | Upper Great Lakes             | Perala and Alban, 1994                |
|  | 0.1039 | 2.3855 | 1–50 <sup>a</sup> | 14  | 0.996 | 0.069 | log  | 1.005 | n/a    | New Hampshire                 | Whittaker et al., 1974                |
| SB:  | 0.0035 | 2.8193 | 1–34              | 26  | 0.960 | 0.222 | ln   | 1.025 | n/a    | Nova Scotia                   | Freedman et al., 1982                 |
|  | 0.0206 | 2.2684 | 1–41              | 45  | 0.976 | 0.243 | ln   | 1.030 | n/a    | New Brunswick                 | Ker, 1980a                            |
|  | 0.0218 | 2.2850 | 8–24              | 9   | 0.984 | 0.049 | log  | 1.003 | n/a    | Wisconsin                     | Pastor and Bockheim, 1981             |
|  | 0.0246 | 2.2401 | 4–34              | 42  | n/a   | n/a   | calc | n/a   | n/a    | Upper Great Lakes             | Perala and Alban, 1994                |
|  | 0.0179 | 2.2838 | 1–50 <sup>a</sup> | 14  | 0.992 | 0.093 | log  | 1.010 | n/a    | New Hampshire                 | Whittaker et al., 1974                |
| ST:  | 0.0305 | 2.8305 | 1–34              | 26  | 0.963 | 0.216 | ln   | 1.024 | n/a    | Nova Scotia                   | Freedman et al., 1982                 |
|  | 0.1657 | 2.2900 | 1–28              | 27  | 0.994 | 0.188 | ln   | 1.018 | comp   | New Hampshire                 | Hocker and Earley, 1983               |
|  | 0.1265 | 2.3603 | 1–41              | 45  | 0.991 | 0.141 | ln   | 1.010 | n/a    | New Brunswick                 | Ker, 1980a                            |
|  | 0.1127 | 2.4927 | 3–15              | 30  | 0.993 | n/a   | log  | n/a   | comp   | Maine                         | Ribe, 1973                            |
|  | 0.1224 | 2.3718 | 1–50 <sup>a</sup> | 14  | 0.996 | 0.065 | log  | 1.005 | n/a    | New Hampshire                 | Whittaker et al., 1974                |
|  | 0.1626 | 2.2894 | 3–66 <sup>a</sup> | 42  | 0.995 | n/a   | ln   | n/a   | comp   | Maine                         | Young et al., 1980                    |
| FL:  | 0.0051 | 2.2200 | 2–40              | 5   | 0.974 | n/a   | ln   | n/a   | 22(45) | New York                      | Bickelhaupt et al., 1973 <sup>g</sup> |
|  | 0.0178 | 1.7600 | 2–40              | 5   | 0.874 | n/a   | ln   | n/a   | 22(45) | New York                      | Bickelhaupt et al., 1973 <sup>h</sup> |
|  | 0.0112 | 1.9557 | 1–34              | 36  | 0.958 | 0.354 | ln   | 1.065 | n/a    | Nova Scotia                   | Freedman et al., 1982                 |
|  | 0.0064 | 2.4200 | 1–28              | 8   | 0.976 | 0.415 | ln   | 1.090 | comp   | New Hampshire                 | Hocker and Earley, 1983               |
|  | 0.0154 | 1.6990 | 1–41              | 45  | 0.928 | 0.280 | ln   | 1.040 | n/a    | New Brunswick                 | Ker, 1980a                            |
|  | 0.0230 | 1.6701 | 3–15              | 30  | 0.827 | n/a   | log  | n/a   | comp   | Maine                         | Ribe, 1973                            |
|  | 0.0060 | 2.2240 | 8–24              | 9   | 0.874 | 0.149 | log  | 1.026 | n/a    | Wisconsin                     | Pastor and Bockheim, 1981             |

|  |        |        |                   |    |       |       |      |       |          |                                     |                                 |
|--|--------|--------|-------------------|----|-------|-------|------|-------|----------|-------------------------------------|---------------------------------|
|  | 0.0370 | 1.6950 | 4–34              | 40 | 0.860 | 0.405 | ln   | 1.085 | n/a      | Upper Great Lakes                   | Perala and Alban, 1994          |
|  | 0.0164 | 1.8901 | 3–66 <sup>a</sup> | 42 | 0.951 | n/a   | ln   | n/a   | comp     | Maine                               | Young et al., 1980              |
| BR:  | 0.3558 | 1.5812 | 1–34              | 36 | 0.913 | 0.424 | ln   | 1.094 | n/a      | Nova Scotia                         | Freedman et al., 1982           |
|  | 0.0297 | 2.2100 | 1–28              | 27 | 0.936 | 0.659 | ln   | 1.243 | comp     | New Hampshire                       | Hocker and Earley, 1983         |
|  | 0.0175 | 2.3841 | 1–41              | 45 | 0.908 | 0.457 | ln   | 1.110 | n/a      | New Brunswick                       | Ker, 1980a                      |
|  | 0.0262 | 2.5070 | 8–24              | 9  | 0.914 | 0.137 | log  | 1.022 | n/a      | Wisconsin                           | Pastor and Bockheim, 1981       |
|  | 0.0589 | 1.5571 | 3–15              | 30 | 0.845 | n/a   | log  | n/a   | comp     | Maine                               | Ribe, 1973                      |
|  | 0.0042 | 2.9740 | 1–50 <sup>a</sup> | 14 | 0.974 | 0.232 | log  | 1.064 | n/a      | New Hampshire                       | Whittaker et al., 1974          |
|  | 0.0104 | 2.5515 | 3–66 <sup>a</sup> | 42 | 0.937 | n/a   | ln   | n/a   | comp     | Maine                               | Young et al., 1980              |
| Oak, black ( <i>Quercus velutina</i> Lam.)         |        |        |                   |    |       |       |      |       |          |                                     |                                 |
| AB:  | 0.0904 | 2.5143 | 7–27              | 27 | 0.983 | 0.121 | ln   | 1.007 | comp     | Rhode Island                        | Bridge, 1979 <sup>b</sup>       |
|  | 0.0945 | 2.5030 | 5–40 <sup>a</sup> | 19 | 0.994 | 22.68 | abs  | n/a   | 22.3(50) | West Virginia                       | Wiant et al., 1977 <sup>d</sup> |
| SW:  | 0.2263 | 2.1285 | 29–88             | 26 | 0.950 | n/a   | log  | n/a   | comp     | Kentucky, North Carolina, Tennessee | King and Schnell, 1972          |
| SB:  | 0.0769 | 1.8481 | 29–88             | 26 | 0.840 | n/a   | log  | n/a   | comp     | Kentucky, North Carolina, Tennessee | King and Schnell, 1972          |
| ST:  | 0.2767 | 2.1081 | 29–88             | 26 | 0.950 | n/a   | log  | n/a   | comp     | Kentucky, North Carolina, Tennessee | King and Schnell, 1972          |
| Oak, chestnut ( <i>Quercus prinus</i> L.)          |        |        |                   |    |       |       |      |       |          |                                     |                                 |
| AB:  | 0.0554 | 2.7276 | 5–50              | 13 | 0.990 | n/a   | log  | n/a   | n/a      | West Virginia                       | Brenneman et al., 1978          |
|  | 0.0907 | 2.5344 | 5–40 <sup>a</sup> | 19 | 0.991 | 29.48 | abs  | n/a   | 22.3(50) | West Virginia                       | Wiant et al., 1977 <sup>d</sup> |
| ST:  | 0.0741 | 2.5226 | 5–40 <sup>a</sup> | 19 | 0.983 | 31.33 | abs  | n/a   | 22.3(50) | West Virginia                       | Wiant et al., 1977              |
| Oak, mossy-cup ( <i>Quercus macrocarpa</i> Michx.) |        |        |                   |    |       |       |      |       |          |                                     |                                 |
| AB:  | 0.1447 | 2.2820 | 6–25              | 9  | 0.978 | 0.205 | ln   | 1.021 | n/a      | Upper Great Lakes                   | Perala and Alban, 1994          |
| SW:  | 0.0636 | 2.3980 | 6–25              | 9  | 0.977 | 0.223 | ln   | 1.025 | n/a      | Upper Great Lakes                   | Perala and Alban, 1994          |
| SB:  | 0.0303 | 2.0640 | 6–25              | 9  | 0.993 | 0.102 | ln   | 1.005 | n/a      | Upper Great Lakes                   | Perala and Alban, 1994          |
| FL:  | 0.3129 | 0.6681 | 6–25              | 9  | 0.392 | 0.559 | ln   | 1.169 | n/a      | Upper Great Lakes                   | Perala and Alban, 1994          |
| Oak, red ( <i>Quercus rubra</i> L.)                |        |        |                   |    |       |       |      |       |          |                                     |                                 |
| AB:  | 0.1130 | 2.4572 | 5–50              | 24 | 0.950 | n/a   | log  | n/a   | n/a      | West Virginia                       | Brenneman et al., 1978          |
|  | 0.1335 | 2.4220 | 5–34              | 16 | 0.993 | 0.134 | ln   | 1.009 | n/a      | Upper Great Lakes                   | Perala and Alban, 1994          |
|  | 0.0643 | 2.6598 | 5–40 <sup>a</sup> | 19 | 0.988 | 35.87 | abs  | n/a   | 22.3(50) | West Virginia                       | Wiant et al., 1977 <sup>d</sup> |
| SW:  | 0.0950 | 2.3628 | 5–34              | 16 | n/a   | n/a   | calc | n/a   | n/a      | Upper Great Lakes                   | Perala and Alban, 1994          |
| SB:  | 0.0130 | 2.4546 | 5–34              | 16 | n/a   | n/a   | calc | n/a   | n/a      | Upper Great Lakes                   | Perala and Alban, 1994          |
| ST:  | 0.1356 | 2.3600 | 1–44              | 39 | 0.992 | 0.217 | ln   | 1.024 | comp     | New Hampshire                       | Hocker and Earley, 1983         |
|  | 0.0973 | 2.4770 | 4–11              | 8  | 0.937 | 0.255 | ln   | 1.033 | n/a      | New Hampshire                       | Kinerson and Bartholomew, 1977  |
| FL:  | 0.0238 | 1.8600 | 1–44              | 14 | 0.957 | 0.556 | ln   | 1.167 | comp     | New Hampshire                       | Hocker and Earley, 1983         |
|  | 0.0102 | 2.1870 | 4–11              | 8  | 0.743 | 0.512 | ln   | 1.140 | n/a      | New Hampshire                       | Kinerson and Bartholomew, 1977  |
|  | 0.0480 | 1.4550 | 5–34              | 16 | 0.835 | 0.426 | ln   | 1.095 | n/a      | Upper Great Lakes                   | Perala and Alban, 1994          |
| BR:  | 0.0122 | 2.6300 | 1–44              | 39 | 0.916 | 0.822 | ln   | 1.402 | comp     | New Hampshire                       | Hocker and Earley, 1983         |
|  | 0.0060 | 2.9090 | 4–11              | 8  | 0.956 | 0.243 | ln   | 1.030 | n/a      | New Hampshire                       | Kinerson and Bartholomew, 1977  |
| Oak, scarlet ( <i>Quercus coccinea</i> Muench.)    |        |        |                   |    |       |       |      |       |          |                                     |                                 |
| AB:  | 0.0536 | 2.7147 | 8–28              | 15 | 0.978 | 0.125 | ln   | 1.008 | comp     | Rhode Island                        | Bridge, 1979 <sup>b</sup>       |
|  | 0.2482 | 2.1900 | 0–23              | 15 | 0.988 | 0.050 | log  | 1.003 | n/a      | New York                            | Whittaker and Woodwell, 1968    |
|  | 0.1241 | 2.4395 | 5–40 <sup>a</sup> | 19 | 0.993 | 27.22 | abs  | n/a   | 22.3(50) | West Virginia                       | Wiant et al., 1977 <sup>d</sup> |
| SW:  | 0.1000 | 2.3025 | 0–23              | 15 | 0.990 | 0.081 | log  | 1.008 | n/a      | New York                            | Whittaker and Woodwell, 1968    |
|  | 0.0405 | 2.6479 | 5–40 <sup>a</sup> | 19 | 0.978 | 30.87 | abs  | n/a   | 22.3(50) | West Virginia                       | Wiant et al., 1977              |
| SB:  | 0.0475 | 1.9909 | 0–23              | 15 | 0.994 | 0.062 | log  | 1.004 | n/a      | New York                            | Whittaker and Woodwell, 1968    |
| ST:  | 0.1434 | 2.2391 | 0–23              | 15 | 0.994 | 0.074 | log  | 1.006 | n/a      | New York                            | Whittaker and Woodwell, 1968    |
|  | 0.0517 | 2.6160 | 5–40 <sup>a</sup> | 19 | 0.979 | 34.50 | abs  | n/a   | 22.3(50) | West Virginia                       | Wiant et al., 1977              |



|  |        |        |                   |     |       |       |      |       |          |                               |                                 |
|--|--------|--------|-------------------|-----|-------|-------|------|-------|----------|-------------------------------|---------------------------------|
| BR:  | 0.0506 | 2.2889 | 0–23              | 15  | 0.945 | 0.202 | log  | 1.048 | n/a      | New York                      | Whittaker and Woodwell, 1968    |
| Oak, white ( <i>Quercus alba</i> L.)           |        |        |                   |     |       |       |      |       |          |                               |                                 |
| AB:  | 0.0579 | 2.6887 | 5–50              | 29  | 0.950 | n/a   | log  | n/a   | n/a      | West Virginia                 | Brenneman et al., 1978          |
|  | 0.0293 | 2.8661 | 8–26              | 22  | 0.937 | 0.285 | ln   | 1.042 | comp     | Rhode Island                  | Bridge, 1979 <sup>b</sup>       |
|  | 0.2022 | 2.1666 | 0–18              | 15  | 0.986 | 0.078 | log  | 1.007 | n/a      | New York                      | Whittaker and Woodwell, 1968    |
|  | 0.0472 | 2.7010 | 5–40 <sup>a</sup> | 19  | 0.988 | 32.66 | abs  | n/a   | 22.3(50) | West Virginia                 | Wiant et al., 1977 <sup>d</sup> |
| SW:  | 0.0914 | 2.2537 | 0–18              | 15  | 0.990 | 0.070 | log  | 1.006 | n/a      | New York                      | Whittaker and Woodwell, 1968    |
|  | 0.0486 | 2.5956 | 5–40 <sup>a</sup> | 19  | 0.989 | 22.25 | abs  | n/a   | 22.3(50) | West Virginia                 | Wiant et al., 1977              |
| SB:  | 0.0510 | 1.9747 | 0–18              | 15  | 0.996 | 0.042 | log  | 1.002 | n/a      | New York                      | Whittaker and Woodwell, 1968    |
| ST:  | 0.1392 | 2.1844 | 0–18              | 15  | 0.994 | 0.061 | log  | 1.004 | n/a      | New York                      | Whittaker and Woodwell, 1968    |
|  | 0.0487 | 2.6279 | 5–40 <sup>a</sup> | 19  | 0.989 | 24.97 | abs  | n/a   | 22.3(50) | West Virginia                 | Wiant et al., 1977              |
| BR:  | 0.0274 | 2.3371 | 0–18              | 15  | 0.916 | 0.211 | log  | 1.053 | n/a      | New York                      | Whittaker and Woodwell, 1968    |
| Pine, eastern white ( <i>Pinus strobus</i> L.) |        |        |                   |     |       |       |      |       |          |                               |                                 |
| AB:  | 0.1617 | 2.1420 | 2–37              | 47  | 0.968 | 0.243 | ln   | 1.030 | n/a      | New Brunswick                 | Ker, 1980a                      |
|  | 0.6298 | 1.3475 | 0–15              | 10  | 0.850 | n/a   | log  | n/a   | n/a      | New Brunswick                 | MacLean and Wein, 1976          |
|  | 0.0755 | 2.3833 | 5–26              | 12  | n/a   | n/a   | calc | n/a   | n/a      | Upper Great Lakes             | Perala and Alban, 1994          |
|  | 0.0696 | 2.4490 | 3–66 <sup>a</sup> | 35  | n/a   | n/a   | calc | n/a   | comp     | Maine                         | Young et al., 1980              |
| SW:  | 0.0298 | 2.5979 | 2–37              | 47  | 0.976 | 0.243 | ln   | 1.030 | n/a      | New Brunswick                 | Ker, 1980a                      |
|  | 0.0394 | 2.2935 | 5–26              | 12  | n/a   | n/a   | calc | n/a   | n/a      | Upper Great Lakes             | Perala and Alban, 1994          |
| SB:  | 0.0152 | 2.1781 | 2–37              | 47  | 0.949 | 0.312 | ln   | 1.050 | n/a      | New Brunswick                 | Ker, 1980a                      |
|  | 0.0079 | 2.2080 | 5–26              | 12  | 0.986 | 0.155 | ln   | 1.012 | n/a      | Upper Great Lakes             | Perala and Alban, 1994          |
| ST:  | 0.0546 | 2.4200 | 2–26              | 33  | 0.979 | 0.235 | ln   | 1.028 | comp     | New Hampshire                 | Hocker and Earley, 1983         |
|  | 0.0414 | 2.5360 | 2–37              | 47  | 0.973 | 0.243 | ln   | 1.030 | n/a      | New Brunswick                 | Ker, 1980a                      |
|  | 0.0718 | 2.2690 | 3–20              | 23  | 0.974 | 0.195 | ln   | 1.019 | n/a      | New Hampshire                 | Kinerson and Bartholomew, 1977  |
|  | 0.1735 | 1.7076 | 0–15              | 10  | 0.949 | n/a   | log  | n/a   | n/a      | New Brunswick                 | MacLean and Wein, 1976          |
|  | 0.0615 | 2.1338 | 1–18              | 20  | 0.988 | 0.144 | ln   | 1.024 | n/a      | North Carolina                | Swank and Schreuder, 1974       |
|  | 0.0404 | 2.5459 | 3–66 <sup>a</sup> | 35  | 0.988 | n/a   | ln   | n/a   | comp     | Maine                         | Young et al., 1980              |
| FL:  | 0.0250 | 1.7500 | 2–26              | 10  | 0.954 | 0.371 | ln   | 1.071 | comp     | New Hampshire                 | Hocker and Earley, 1983         |
|  | 0.0677 | 1.4653 | 2–37              | 47  | 0.781 | 0.312 | ln   | 1.050 | n/a      | New Brunswick                 | Ker, 1980a                      |
|  | 0.0004 | 2.5860 | 3–20              | 23  | 0.767 | 0.745 | ln   | 1.320 | n/a      | New Hampshire                 | Kinerson and Bartholomew, 1977  |
|  | 0.0039 | 1.8170 | 5–26              | 12  | 0.898 | 0.262 | ln   | 1.035 | n/a      | Upper Great Lakes             | Perala and Alban, 1994          |
|  | 0.0211 | 2.1354 | 1–18              | 20  | 0.970 | 0.225 | ln   | 1.026 | n/a      | North Carolina                | Swank and Schreuder, 1974       |
|  | 0.0183 | 1.9674 | 3–66 <sup>a</sup> | 35  | 0.963 | n/a   | ln   | n/a   | comp     | Maine                         | Young et al., 1980              |
| BR:  | 0.0318 | 1.9700 | 2–26              | 10  | 0.976 | 0.301 | ln   | 1.046 | comp     | New Hampshire                 | Hocker and Earley, 1983         |
|  | 0.0709 | 1.7086 | 2–37              | 47  | 0.783 | 0.392 | ln   | 1.080 | n/a      | New Brunswick                 | Ker, 1980a                      |
|  | 0.0057 | 2.6560 | 3–20              | 23  | 0.859 | 0.565 | ln   | 1.173 | n/a      | New Hampshire                 | Kinerson and Bartholomew, 1977  |
|  | 0.0235 | 2.5328 | 1–18              | 20  | 0.980 | 0.173 | ln   | 1.015 | n/a      | North Carolina                | Swank and Schreuder, 1974       |
|  | 0.0030 | 2.4858 | 3–66 <sup>a</sup> | 35  | 0.953 | n/a   | ln   | n/a   | comp     | Maine                         | Young et al., 1980              |
| Pine, jack ( <i>Pinus banksiana</i> Lamb.)     |        |        |                   |     |       |       |      |       |          |                               |                                 |
| AB:  | 0.1520 | 2.2730 | n/a               | 20  | 0.978 | 3.820 | abs  | n/a   | 12.2(50) | Minnesota                     | Crow, 1971                      |
|  | 0.0919 | 2.4206 | 2–32              | 77  | 0.986 | n/a   | log  | n/a   | comp     | Ontario                       | Hegy, 1972                      |
|  | 0.1093 | 2.3291 | 3–34              | 42  | 0.980 | 0.141 | ln   | 1.010 | n/a      | Nova Scotia                   | Ker, 1980b                      |
|  | 0.2131 | 2.1283 | 0–38              | 195 | 0.978 | 23.20 | abs  | n/a   | comp     | New Brunswick,<br>Nova Scotia | Ker, 1984                       |
|  | 0.2186 | 1.9400 | 0–20              | 42  | 0.914 | n/a   | log  | n/a   | n/a      | New Brunswick                 | MacLean and Wein, 1976          |
|  | 0.1747 | 2.2495 | 6–39              | 41  | n/a   | n/a   | calc | n/a   | n/a      | Upper Great Lakes             | Perala and Alban, 1994          |

|   |        |        |       |     |       |       |      |       |          |                               |                                 |
|---|--------|--------|-------|-----|-------|-------|------|-------|----------|-------------------------------|---------------------------------|
| SSW:  | 0.0826 | 2.2860 | n/a   | 40  | 0.950 | 3.141 | abs  | n/a   | 12.2(50) | Minnesota                     | Crow, 1971                      |
|   | 0.0402 | 2.5578 | 3–34  | 42  | 0.970 | 0.141 | ln   | 1.010 | n/a      | Nova Scotia                   | Ker, 1980b                      |
|   | 0.1172 | 2.2116 | 0–38  | 195 | 0.971 | 19.30 | abs  | n/a   | comp     | New Brunswick,<br>Nova Scotia | Ker, 1984                       |
|   | 0.1543 | 2.1839 | 6–39  | 41  | n/a   | n/a   | calc | n/a   | n/a      | Upper Great Lakes             | Perala and Alban, 1994          |
| SW:   | 0.0190 | 1.9916 | 3–34  | 42  | 0.980 | 0.141 | ln   | 1.010 | n/a      | Nova Scotia                   | Ker, 1980b                      |
|   | 0.0321 | 1.9164 | 6–39  | 41  | n/a   | n/a   | calc | n/a   | n/a      | Upper Great Lakes             | Perala and Alban, 1994          |
| ST:   | 0.0283 | 2.7144 | 2–32  | 77  | 0.947 | n/a   | log  | n/a   | comp     | Ontario                       | Hegy, 1972                      |
|   | 0.0538 | 2.4883 | 3–34  | 42  | 0.980 | 0.141 | ln   | 1.010 | n/a      | Nova Scotia                   | Ker, 1980b                      |
|   | 0.1470 | 2.1673 | 0–38  | 195 | 0.972 | 20.50 | abs  | n/a   | comp     | New Brunswick,<br>Nova Scotia | Ker, 1984                       |
|   | 0.1064 | 2.1366 | 0–20  | 42  | 0.950 | n/a   | log  | n/a   | n/a      | New Brunswick                 | MacLean and Wein, 1976          |
| FL:   | 0.0372 | 1.7188 | 2–32  | 77  | 0.947 | n/a   | log  | n/a   | comp     | Ontario                       | Hegy, 1972                      |
|   | 0.0138 | 2.0512 | 3–34  | 42  | 0.870 | 0.392 | ln   | 1.080 | n/a      | Nova Scotia                   | Ker, 1980b                      |
|   | 0.0489 | 1.7140 | 0–38  | 195 | 0.870 | 3.500 | abs  | n/a   | comp     | New Brunswick,<br>Nova Scotia | Ker, 1984                       |
|   | 0.0009 | 2.903  | 6–39  | 40  | 0.829 | 0.510 | ln   | 1.139 | n/a      | Upper Great Lakes             | Perala and Alban, 1994          |
| BR:   | 0.0022 | 2.9810 | n/a   | 40  | 0.955 | 0.671 | abs  | n/a   | 12.2(50) | Minnesota                     | Crow, 1971                      |
|   | 0.0181 | 2.2443 | 3–34  | 42  | 0.820 | 0.341 | ln   | 1.060 | n/a      | Nova Scotia                   | Ker, 1980b                      |
|   | 0.0353 | 2.1113 | 0–38  | 195 | 0.845 | 10.30 | abs  | n/a   | comp     | New Brunswick,<br>Nova Scotia | Ker, 1984                       |
| Pine, loblolly ( <i>Pinus taeda</i> L.)         |        |        |       |     |       |       |      |       |          |                               |                                 |
| ST:   | 0.0420 | 2.5090 | 10–30 | 26  | 0.951 | 0.138 | ln   | 1.010 | n/a      | North Carolina                | Ralston, 1973                   |
| FL:   | 0.0103 | 2.1741 | 13–43 | 112 | n/a   | n/a   | ln   | n/a   | comp     | Louisiana                     | Baldwin, 1989 <sup>i</sup>      |
|   | 0.0012 | 2.8432 | 10–30 | 26  | 0.920 | 0.202 | ln   | 1.021 | n/a      | North Carolina                | Ralston, 1973                   |
| BR:   | 0.0022 | 2.8687 | 13–43 | 112 | n/a   | n/a   | ln   | n/a   | comp     | Louisiana                     | Baldwin, 1989 <sup>i</sup>      |
|   | 0.0003 | 3.4981 | 10–30 | 26  | 0.894 | 0.290 | ln   | 1.043 | n/a      | North Carolina                | Ralston, 1973                   |
| Pine, lodgepole ( <i>Pinus contorta</i> Dougl.) |        |        |       |     |       |       |      |       |          |                               |                                 |
| ST:   | 0.3377 | 0.9774 | 1–5   | 8   | 0.858 | 0.255 | ln   | 1.033 | comp     | Idaho, Montana                | Brown, 1978 <sup>†</sup>        |
|   | 0.0492 | 2.4287 | 3–29  | 19  | 0.980 | 0.228 | ln   | 1.026 | n/a      | Colorado                      | Gholz et al., 1979              |
| FL:   | 0.2508 | 0.6976 | 1–5   | 8   | 0.659 | 0.322 | ln   | 1.053 | comp     | Idaho, Montana                | Brown, 1978 <sup>b</sup>        |
|   | 0.0239 | 1.8362 | 3–29  | 19  | 0.840 | 0.480 | ln   | 1.122 | n/a      | Colorado                      | Gholz et al., 1979              |
| BR:   | 0.2764 | 0.7313 | 1–5   | 8   | 0.626 | 0.362 | ln   | 1.068 | comp     | Idaho, Montana                | Brown, 1978 <sup>b</sup>        |
|   | 0.0089 | 2.3533 | 3–29  | 19  | 0.890 | 0.493 | ln   | 1.129 | n/a      | Colorado                      | Gholz et al., 1979              |
| Pine, pitch ( <i>Pinus rigida</i> Mill.)        |        |        |       |     |       |       |      |       |          |                               |                                 |
| AB:   | 0.1040 | 2.3373 | 0–31  | 15  | 0.996 | 0.045 | log  | 1.002 | n/a      | New York                      | Whittaker and<br>Woodwell, 1968 |
| SW:   | 0.0528 | 2.3779 | 0–31  | 15  | 0.994 | 0.066 | log  | 1.005 | n/a      | New York                      | Whittaker and<br>Woodwell, 1968 |
| SB:   | 0.0242 | 2.1249 | 0–31  | 15  | 0.974 | 0.101 | log  | 1.012 | n/a      | New York                      | Whittaker and<br>Woodwell, 1968 |
| ST:   | 0.0751 | 2.3261 | 0–31  | 15  | 0.994 | 0.062 | log  | 1.004 | n/a      | New York                      | Whittaker and<br>Woodwell, 1968 |
| BR:   | 0.0129 | 2.5516 | 0–31  | 15  | 0.976 | 0.120 | log  | 1.017 | n/a      | New York                      | Whittaker and<br>Woodwell, 1968 |
| Pine, ponderosa ( <i>Pinus ponderosa</i> Laws.) |        |        |       |     |       |       |      |       |          |                               |                                 |
| SW:   | 0.0110 | 2.7587 | 16–80 | 9   | 0.990 | 0.176 | ln   | 1.016 | n/a      | Arizona                       | Gholz et al., 1979              |
| SB:   | 0.0144 | 2.2312 | 16–80 | 9   | 0.970 | 0.251 | ln   | 1.032 | n/a      | Arizona                       | Gholz et al., 1979              |
| ST:   | 0.2679 | 1.4726 | 1–11  | 25  | 0.886 | 0.463 | ln   | 1.113 | comp     | Idaho, Montana                | Brown, 1978 <sup>b</sup>        |
| FL:   | 0.1167 | 1.5774 | 2–86  | 31  | 0.954 | 0.461 | ln   | 1.112 | comp     | Idaho, Montana                | Brown, 1978 <sup>b</sup>        |
|   | 0.0286 | 1.9920 | 5–39  | 23  | 0.972 | 0.209 | ln   | 1.022 | 33.5(50) | Oregon                        | Cochran et al., 1984            |
|   | 0.0119 | 2.0967 | 16–80 | 9   | 0.840 | 0.581 | ln   | 1.184 | n/a      | Arizona                       | Gholz et al., 1979              |

|  |        |        |                   |     |       |       |      |       |          |                               |                                       |
|--|--------|--------|-------------------|-----|-------|-------|------|-------|----------|-------------------------------|---------------------------------------|
| BR:  | 0.0469 | 2.1315 | 2–86              | 31  | 0.962 | 0.563 | ln   | 1.172 | comp     | Idaho, Montana                | Brown, 1978 <sup>b</sup>              |
|  | 0.0096 | 2.4645 | 5–39              | 23  | 0.941 | 0.381 | ln   | 1.075 | 33.5(50) | Oregon                        | Cochran et al., 1984                  |
|  | 0.0045 | 2.7185 | 16–80             | 9   | 0.990 | 0.205 | ln   | 1.021 | n/a      | Arizona                       | Gholz et al., 1979                    |
| Pine, red ( <i>Pinus resinosa</i> Ait.)              |        |        |                   |     |       |       |      |       |          |                               |                                       |
| AB:  | 0.0847 | 2.3503 | 2–34              | 47  | 0.990 | 0.141 | ln   | 1.010 | n/a      | Nova Scotia                   | Ker, 1980b                            |
|  | 0.0778 | 2.4171 | 3–46              | 69  | n/a   | n/a   | calc | n/a   | n/a      | Upper Great Lakes             | Perala and Alban, 1994                |
|  | 0.1003 | 2.3865 | 3–51 <sup>a</sup> | 14  | n/a   | n/a   | calc | n/a   | comp     | Maine                         | Young et al., 1980                    |
| SW:  | 0.0448 | 2.4418 | 2–34              | 47  | 0.990 | n/a   | ln   | 1.00  | n/a      | Nova Scotia                   | Ker, 1980b                            |
|  | 0.0649 | 2.3496 | 3–46              | 69  | n/a   | n/a   | calc | n/a   | n/a      | Upper Great Lakes             | Perala and Alban, 1994                |
| SB:  | 0.0157 | 2.0701 | 2–34              | 47  | 0.990 | 0.141 | ln   | 1.010 | n/a      | Nova Scotia                   | Ker, 1980b                            |
|  | 0.0141 | 2.0900 | 3–46              | 69  | 0.990 | 0.111 | ln   | 1.006 | n/a      | Upper Great Lakes             | Perala and Alban, 1994                |
| ST:  | 0.0586 | 2.3892 | 2–34              | 47  | 0.990 | n/a   | ln   | 1.00  | n/a      | Nova Scotia                   | Ker, 1980b                            |
|  | 0.0631 | 2.4481 | 3–51 <sup>a</sup> | 14  | 0.983 | n/a   | ln   | n/a   | comp     | Maine                         | Young et al., 1980                    |
| FL:  | 0.0120 | 2.1220 | 2–34              | 47  | 0.930 | 0.280 | ln   | 1.040 | n/a      | Nova Scotia                   | Ker, 1980b                            |
|  | 0.0007 | 3.1220 | 3–46              | 69  | 0.895 | 0.553 | ln   | 1.165 | n/a      | Upper Great Lakes             | Perala and Alban, 1994                |
|  | 0.0177 | 2.1803 | 3–51 <sup>a</sup> | 14  | 0.899 | n/a   | ln   | n/a   | comp     | Maine                         | Young et al., 1980                    |
| BR:  | 0.0079 | 2.4631 | 2–34              | 47  | 0.910 | 0.368 | ln   | 1.070 | n/a      | Nova Scotia                   | Ker, 1980b                            |
|  | 0.0098 | 2.5011 | 3–51 <sup>a</sup> | 14  | 0.986 | n/a   | ln   | n/a   | comp     | Maine                         | Young et al., 1980                    |
| Pine, sugar ( <i>Pinus lambertiana</i> Dougl.)       |        |        |                   |     |       |       |      |       |          |                               |                                       |
| SW:  | 0.0183 | 2.6667 | 21–43             | 5   | 0.960 | 0.195 | ln   | 1.019 | comp     | Oregon                        | Gholz et al., 1979                    |
| SB:  | 0.0048 | 2.6186 | 21–43             | 5   | 0.910 | 0.285 | ln   | 1.041 | comp     | Oregon                        | Gholz et al., 1979                    |
| FL:  | 0.0144 | 2.0327 | 21–43             | 5   | 0.520 | 0.662 | ln   | 1.245 | comp     | Oregon                        | Gholz et al., 1979                    |
| BR:  | 0.0004 | 3.3648 | 21–43             | 5   | 0.810 | 0.548 | ln   | 1.162 | comp     | Oregon                        | Gholz et al., 1979                    |
| Pine, western white ( <i>Pinus monticola</i> Dougl.) |        |        |                   |     |       |       |      |       |          |                               |                                       |
| ST:  | 0.2953 | 1.4073 | 1–12              | 14  | 0.905 | 0.373 | ln   | 1.072 | comp     | Idaho, Montana                | Brown, 1978 <sup>b</sup>              |
| FL:  | 0.2761 | 1.0684 | 1–19              | 16  | 0.898 | 0.343 | ln   | 1.061 | comp     | Idaho, Montana                | Brown, 1978 <sup>b</sup>              |
| BR:  | 0.2312 | 1.1825 | 1–19              | 16  | 0.891 | 0.393 | ln   | 1.080 | comp     | Idaho, Montana                | Brown, 1978 <sup>b</sup>              |
| Pine, whitebark ( <i>Pinus albicaulis</i> Engelm.)   |        |        |                   |     |       |       |      |       |          |                               |                                       |
| ST:  | 0.3110 | 1.4603 | 1–12              | 10  | 0.876 | 0.582 | ln   | 1.184 | comp     | Idaho, Montana                | Brown, 1978 <sup>b</sup>              |
| FL:  | 0.1168 | 1.2751 | 1–19              | 13  | 0.884 | 0.525 | ln   | 1.147 | comp     | Idaho, Montana                | Brown, 1978 <sup>b</sup>              |
| BR:  | 0.1164 | 1.3767 | 1–19              | 13  | 0.887 | 0.559 | ln   | 1.169 | comp     | Idaho, Montana                | Brown, 1978 <sup>b</sup>              |
| Poplar, yellow ( <i>Liriodendron tulipifera</i> L.)  |        |        |                   |     |       |       |      |       |          |                               |                                       |
| AB:  | 0.0365 | 2.7324 | 5–50              | 12  | 0.980 | n/a   | log  | n/a   | n/a      | West Virginia                 | Brenneman et al., 1978                |
|  | 0.0687 | 2.5153 | 5–40 <sup>a</sup> | 19  | 0.995 | 16.78 | abs  | n/a   | 22.3(50) | West Virginia                 | Wiant et al., 1977 <sup>d</sup>       |
| Spruce, black ( <i>Picea mariana</i> (Mill.) B.S.P.) |        |        |                   |     |       |       |      |       |          |                               |                                       |
| AB:  | 0.2626 | 2.0707 | 2–30              | 24  | 0.983 | 0.227 | ln   | 1.026 | n/a      | Nova Scotia                   | Freedman et al., 1982                 |
|  | 0.1530 | 2.2480 | 1–23              | 24  | 0.990 | 4.630 | abs  | n/a   | 8.2(50)  | Minnesota                     | Grigal and Kernik, 1984a              |
|  | 0.1683 | 2.1777 | 2–34              | 49  | 0.990 | 0.199 | ln   | 1.020 | n/a      | Nova Scotia                   | Ker, 1980b                            |
|  | 0.1444 | 2.2604 | 0–37              | 195 | 0.978 | 26.20 | abs  | n/a   | comp     | New Brunswick,<br>Nova Scotia | Ker, 1984                             |
|  | 1.3836 | 1.5440 | 2–15              | 12  | 0.831 | 0.178 | log  | 1.037 | comp     | Subarctic Québec              | Moore and Verspoor, 1973 <sup>j</sup> |
|  | 0.0339 | 2.6260 | 2–15              | 10  | 0.902 | 0.143 | log  | 1.024 | comp     | Subarctic Québec              | Moore and Verspoor, 1973 <sup>k</sup> |
|  | 0.0963 | 2.4289 | 3–32              | 734 | 0.960 | 12.66 | absw | n/a   | comp     | Québec                        | Ouellet, 1983                         |
|  | 0.1137 | 2.3160 | 2–25              | 68  | 0.983 | 0.148 | ln   | 1.011 | n/a      | Upper Great Lakes             | Perala and Alban, 1994                |
| SW:  | 0.0659 | 2.3570 | 2–30              | 24  | 0.991 | 0.191 | ln   | 1.018 | n/a      | Nova Scotia                   | Freedman et al., 1982                 |
|  | 0.0888 | 2.3210 | 1–23              | 24  | 0.980 | 4.555 | abs  | n/a   | 8.2(50)  | Minnesota                     | Grigal and Kernik, 1984b              |
|  | 0.0405 | 2.4743 | 2–34              | 49  | 0.980 | 0.141 | ln   | 1.010 | n/a      | Nova Scotia                   | Ker, 1980b                            |
|  | 0.0690 | 2.3387 | 0–37              | 195 | 0.974 | 18.10 | abs  | n/a   | comp     | New Brunswick,<br>Nova Scotia | Ker, 1984                             |
|  | 0.0177 | 2.8657 | 9–32              | 734 | 0.900 | 14.51 | abs  | n/a   | comp     | Québec                        | Ouellet, 1983                         |
|  | 0.0525 | 2.3227 | 2–25              | 68  | n/a   | n/a   | calc | n/a   | n/a      | Upper Great Lakes             | Perala and Alban, 1994                |

|   |        |        |                   |     |       |       |      |       |         |                               |                                      |
|---|--------|--------|-------------------|-----|-------|-------|------|-------|---------|-------------------------------|--------------------------------------|
| SB:   | 0.0257 | 2.0555 | 2–30              | 24  | 0.995 | 0.128 | ln   | 1.008 | n/a     | Nova Scotia                   | Freedman et al., 1982                |
|   | 0.0438 | 1.8220 | 1–23              | 24  | 0.930 | 0.914 | abs  | n/a   | 8.2(50) | Minnesota                     | Grigal and Kernik, 1984b             |
|   | 0.0124 | 2.1815 | 2–34              | 49  | 0.980 | 0.141 | ln   | 1.020 | n/a     | Nova Scotia                   | Ker, 1980b                           |
| ST:   | 0.0035 | 2.7422 | 9–32              | 734 | 0.860 | 2.150 | absw | n/a   | comp    | Québec                        | Ouellet, 1983                        |
|   | 0.0186 | 2.0332 | 2–25              | 68  | n/a   | n/a   | calc | n/a   | n/a     | Upper Great Lakes             | Perala and Alban, 1994               |
|   | 0.0900 | 2.3026 | 2–30              | 24  | 0.993 | 0.165 | ln   | 1.014 | n/a     | Nova Scotia                   | Freedman et al., 1982                |
|   | 0.1183 | 2.2600 | 1–23              | 24  | 0.980 | 4.288 | abs  | n/a   | 8.2(50) | Minnesota                     | Grigal and Kernik, 1984b             |
|   | 0.0518 | 2.4321 | 2–34              | 49  | 0.980 | 0.141 | ln   | 1.010 | n/a     | Nova Scotia                   | Ker, 1980b                           |
|   | 0.0849 | 2.3130 | 0–37              | 195 | 0.976 | 19.30 | abs  | n/a   | comp    | New Brunswick,<br>Nova Scotia | Ker, 1984                            |
|   | 0.0536 | 2.5656 | 3–32              | 734 | 0.940 | 13.16 | absw | n/a   | comp    | Québec                        | Ouellet, 1983                        |
|   | 0.2064 | 2.0370 | 0–16              | 15  | 0.990 | 0.180 | ln   | 1.016 | n/a     | Québec                        | Rencz and Auclair, 1980 <sup>1</sup> |
|   | 0.0932 | 1.5518 | 2–30              | 24  | 0.836 | 0.578 | ln   | 1.182 | n/a     | Nova Scotia                   | Freedman et al., 1982                |
|   | 0.0610 | 1.4110 | 1–23              | 24  | 0.770 | 0.678 | abs  | n/a   | 8.2(50) | Minnesota                     | Grigal and Kernik, 1984b             |
| FL:   | 0.0790 | 1.7206 | 2–34              | 49  | 0.910 | 0.312 | ln   | 1.050 | n/a     | Nova Scotia                   | Ker, 1980b                           |
|   | 0.0495 | 1.8761 | 0–37              | 195 | 0.910 | 5.300 | abs  | n/a   | comp    | New Brunswick,<br>Nova Scotia | Ker, 1984                            |
|   | 0.0179 | 2.3830 | 2–25              | 68  | 0.928 | 0.373 | ln   | 1.072 | n/a     | Upper Great Lakes             | Perala and Alban, 1994               |
|   | 0.2521 | 1.5940 | 0–16              | 15  | 0.960 | 0.300 | ln   | 1.046 | n/a     | Québec                        | Rencz and Auclair, 1980 <sup>1</sup> |
|   | 0.0004 | 3.2377 | 5–18              | 20  | 0.865 | 0.172 | ln   | 1.015 | 17(100) | Québec                        | Weetman and Harland, 1964            |
|   | 0.0881 | 1.7374 | 2–30              | 24  | 0.819 | 0.688 | ln   | 1.267 | n/a     | Nova Scotia                   | Freedman et al., 1982                |
|   | 0.0251 | 2.0000 | 1–23              | 24  | 0.910 | 0.977 | abs  | n/a   | 8.2(50) | Minnesota                     | Grigal and Kernik, 1984b             |
|   | 0.0632 | 1.9421 | 2–34              | 49  | 0.920 | 0.280 | ln   | 1.040 | n/a     | Nova Scotia                   | Ker, 1980b                           |
|   | 0.0287 | 2.2679 | 0–37              | 195 | 0.895 | 12.40 | abs  | n/a   | comp    | New Brunswick,<br>Nova Scotia | Ker, 1984                            |
|   | 0.1529 | 1.9830 | 0–16              | 15  | 0.990 | 0.230 | ln   | 1.027 | n/a     | Québec                        | Rencz and Auclair, 1980 <sup>1</sup> |
| Spruce, Engelmann ( <i>Picea engelmannii</i> Parry) |        |        |                   |     |       |       |      |       |         |                               |                                      |
| ST:   | 0.2844 | 1.3782 | 1–8               | 10  | 0.964 | 0.213 | ln   | 1.023 | comp    | Idaho, Montana                | Brown, 1978 <sup>b</sup>             |
| FL:   | 0.3346 | 1.2765 | 1–23              | 13  | 0.917 | 0.430 | ln   | 1.097 | comp    | Idaho, Montana                | Brown, 1978 <sup>b</sup>             |
| BR:   | 0.1687 | 1.5799 | 1–23              | 13  | 0.932 | 0.479 | ln   | 1.122 | comp    | Idaho, Montana                | Brown, 1978 <sup>b</sup>             |
| Spruce, Norway ( <i>Picea abies</i> (L.) Karst.)    |        |        |                   |     |       |       |      |       |         |                               |                                      |
| AB:   | 0.2722 | 2.1040 | 12–44             | 30  | 0.960 | 0.152 | ln   | 1.012 | n/a     | New York                      | Jokela et al., 1986                  |
| SW:   | 0.3832 | 1.8740 | 12–44             | 30  | 0.920 | 0.188 | ln   | 1.018 | n/a     | New York                      | Jokela et al., 1986                  |
| SB:   | 0.0461 | 1.7800 | 12–44             | 30  | 0.910 | 0.194 | ln   | 1.019 | n/a     | New York                      | Jokela et al., 1986                  |
| FL:   | 0.0031 | 2.8310 | 12–44             | 30  | 0.910 | 0.307 | ln   | 1.048 | n/a     | New York                      | Jokela et al., 1986                  |
| BR:   | 0.0052 | 2.7320 | 12–44             | 30  | 0.900 | 0.308 | ln   | 1.049 | n/a     | New York                      | Jokela et al., 1986                  |
| Spruce, red ( <i>Picea rubens</i> Sarg.)            |        |        |                   |     |       |       |      |       |         |                               |                                      |
| AB:   | 0.1660 | 2.2417 | 1–31              | 37  | 0.972 | 0.300 | ln   | 1.046 | n/a     | Nova Scotia                   | Freedman et al., 1982                |
|   | 0.6149 | 1.5639 | 0–20              | 30  | 0.881 | n/a   | log  | n/a   | n/a     | New Brunswick                 | MacLean and Wein, 1976               |
|   | 0.1444 | 2.2604 | 0–37              | 195 | 0.978 | 26.20 | abs  | n/a   | comp    | New Brunswick,<br>Nova Scotia | Ker, 1984                            |
| SW:   | 0.2066 | 2.1830 | 1–35 <sup>a</sup> | 15  | 0.982 | 0.107 | log  | 1.013 | n/a     | New Hampshire                 | Whittaker et al., 1974               |
|   | 0.0779 | 2.3536 | 1–31              | 37  | 0.983 | 0.249 | ln   | 1.031 | n/a     | Nova Scotia                   | Freedman et al., 1982                |
|   | 0.0690 | 2.3387 | 0–37              | 195 | 0.974 | 18.10 | abs  | n/a   | comp    | New Brunswick,<br>Nova Scotia | Ker, 1984                            |
| SB:   | 0.0774 | 2.2380 | 1–35 <sup>a</sup> | 15  | 0.990 | 0.077 | log  | 1.007 | n/a     | New Hampshire                 | Whittaker et al., 1974               |
|   | 0.0185 | 2.1879 | 1–31              | 37  | 0.975 | 0.280 | ln   | 1.040 | n/a     | Nova Scotia                   | Freedman et al., 1982                |
|   | 0.0226 | 1.9961 | 1–35 <sup>a</sup> | 15  | 0.994 | 0.053 | log  | 1.003 | n/a     | New Hampshire                 | Whittaker et al., 1974               |
| ST:   | 0.0960 | 2.3288 | 1–31              | 37  | 0.982 | 0.251 | ln   | 1.032 | n/a     | Nova Scotia                   | Freedman et al., 1982                |
|   | 0.0849 | 2.3130 | 0–37              | 195 | 0.976 | 19.30 | abs  | n/a   | comp    | New Brunswick,<br>Nova Scotia | Ker, 1984                            |
|   | 0.1875 | 1.7743 | 0–20              | 30  | 0.892 | n/a   | log  | n/a   | n/a     | New Brunswick                 | MacLean and Wein, 1976               |
| FL:   | 0.0979 | 2.2046 | 1–35 <sup>a</sup> | 15  | 0.994 | 0.070 | log  | 1.006 | n/a     | New Hampshire                 | Whittaker et al., 1974               |
|   | 0.0150 | 2.2167 | 1–31              | 37  | 0.884 | 0.637 | ln   | 1.225 | n/a     | Nova Scotia                   | Freedman et al., 1982                |

|   |        |        |                   |     |       |       |      |       |      |                               |                                     |
|---|--------|--------|-------------------|-----|-------|-------|------|-------|------|-------------------------------|-------------------------------------|
|   | 0.0495 | 1.8761 | 0–37              | 195 | 0.910 | 5.300 | abs  | n/a   | comp | New Brunswick,<br>Nova Scotia | Ker, 198                            |
| BR:   | 0.0293 | 2.0955 | 1–31              | 37  | 0.871 | 0.640 | ln   | 1.227 | n/a  | Nova Scotia                   | Freedman et al., 1982               |
|   | 0.0287 | 2.2679 | 0–37              | 195 | 0.895 | 12.40 | abs  | n/a   | comp | New Brunswick,<br>Nova Scotia | Ker, 1984                           |
|   | 0.0082 | 2.5428 | 1–35 <sup>a</sup> | 15  | 0.951 | 0.207 | log  | 1.051 | n/a  | New Hampshire                 | Whittaker et al., 1974              |
| Spruce, Sitka ( <i>Picea sitchensis</i> (Bong.) Carr.)          |        |        |                   |     |       |       |      |       |      |                               |                                     |
| ST:   | 0.0402 | 2.5520 | 3–78              | 21  | 0.970 | 0.050 | ln   | 1.001 | comp | Alaska                        | Bormann, 1990                       |
| FL:   | 0.0030 | 2.7800 | 3–78              | 28  | 0.810 | 0.130 | ln   | 1.008 | comp | Alaska                        | Bormann, 1990                       |
| BR:   | 0.0056 | 2.5180 | 3–78              | 28  | 0.800 | 0.130 | ln   | 1.008 | comp | Alaska                        | Bormann, 1990                       |
| Spruce, white ( <i>Picea glauca</i> (Moench) Voss)              |        |        |                   |     |       |       |      |       |      |                               |                                     |
| AB:   | 0.0635 | 2.4800 | 3–25              | 13  | 0.980 | n/a   | log  | n/a   | n/a  | New Brunswick                 | Baskerville, 1965                   |
|   | 0.1601 | 2.2413 | 2–30              | 24  | 0.987 | 0.213 | ln   | 1.023 | n/a  | Nova Scotia                   | Freedman et al., 1982               |
|   | 0.0777 | 2.4720 | 1–33              | 115 | 0.980 | 12.70 | abs  | n/a   | comp | Minnesota                     | Harding and Grigal, 1985            |
|   | 0.1037 | 2.2907 | 2–32              | 44  | 0.990 | 0.141 | ln   | 1.010 | n/a  | Nova Scotia                   | Ker, 1980b                          |
|   | 0.1077 | 2.3308 | 0–39              | 197 | 0.978 | 27.50 | abs  | n/a   | comp | New Brunswick,<br>Nova Scotia | Ker, 1984                           |
| SW:   | 0.1643 | 2.2480 | 2–25              | 73  | 0.985 | 0.145 | ln   | 1.011 | n/a  | Upper Great Lakes             | Perala and Alban, 1994              |
|   | 0.0537 | 2.3600 | 3–25              | 13  | 0.980 | n/a   | log  | n/a   | n/a  | New Brunswick                 | Baskerville, 1965                   |
|   | 0.0731 | 2.3715 | 2–30              | 24  | 0.990 | 0.201 | ln   | 1.020 | n/a  | Nova Scotia                   | Freedman et al., 1982               |
|   | 0.0296 | 2.5930 | 1–33              | 115 | 0.940 | 10.65 | abs  | n/a   | comp | Minnesota                     | Harding and Grigal, 1985            |
|   | 0.0345 | 2.4847 | 2–32              | 44  | 0.990 | 0.199 | ln   | 1.020 | n/a  | Nova Scotia                   | Ker, 1980b                          |
|   | 0.0376 | 2.4883 | 0–39              | 197 | 0.974 | 17.90 | abs  | n/a   | comp | New Brunswick,<br>Nova Scotia | Ker, 1984                           |
| SB:   | 0.0698 | 2.3526 | 2–25              | 72  | n/a   | n/a   | calc | n/a   | n/a  | Upper Great Lakes             | Perala and Alban, 1994              |
|   | 0.0031 | 2.6100 | 3–25              | 14  | 0.980 | n/a   | log  | n/a   | n/a  | New Brunswick                 | Baskerville, 1965                   |
|   | 0.0246 | 2.0588 | 2–30              | 24  | 0.987 | 0.198 | ln   | 1.020 | n/a  | Nova Scotia                   | Freedman et al., 1982               |
|   | 0.0148 | 2.1390 | 1–33              | 115 | 0.960 | 1.090 | abs  | n/a   | comp | Minnesota                     | Harding and Grigal, 1985            |
|   | 0.0110 | 2.1547 | 2–32              | 44  | 0.980 | 0.243 | ln   | 1.030 | n/a  | Nova Scotia                   | Ker, 1980b                          |
| ST:   | 0.0200 | 1.9906 | 2–25              | 73  | n/a   | n/a   | calc | n/a   | n/a  | Upper Great Lakes             | Perala and Alban, 1994              |
|   | 0.0957 | 2.3226 | 2–30              | 24  | 0.989 | 0.201 | ln   | 1.020 | n/a  | Nova Scotia                   | Freedman et al., 1982               |
|   | 0.0397 | 2.5360 | 1–33              | 115 | 0.950 | 11.26 | abs  | n/a   | comp | Minnesota                     | Harding and Grigal, 1985            |
|   | 0.0445 | 2.4370 | 2–32              | 44  | 0.990 | 0.199 | ln   | 1.020 | n/a  | Nova Scotia                   | Ker, 1980b                          |
|   | 0.0445 | 2.4737 | 0–39              | 197 | 0.974 | 20.10 | abs  | n/a   | comp | New Brunswick,<br>Nova Scotia | Ker, 1984                           |
| FL:   | 0.0037 | 2.8500 | 3–25              | 14  | 0.941 | n/a   | log  | n/a   | n/a  | New Brunswick                 | Baskerville, 1965                   |
|   | 0.0132 | 2.1816 | 2–30              | 24  | 0.896 | 0.619 | ln   | 1.211 | n/a  | Nova Scotia                   | Freedman et al., 1982               |
|   | 0.0162 | 2.2220 | 1–33              | 115 | 0.780 | 3.600 | abs  | n/a   | comp | Minnesota                     | Harding and Grigal, 1985            |
|   | 0.0369 | 1.9103 | 2–32              | 44  | 0.930 | 0.312 | ln   | 1.050 | n/a  | Nova Scotia                   | Ker, 1980b                          |
|   | 0.0610 | 1.8465 | 0–39              | 197 | 0.900 | 6.800 | abs  | n/a   | comp | New Brunswick,<br>Nova Scotia | Ker, 1984                           |
| BR:   | 0.0165 | 2.3474 | 2–25              | 73  | n/a   | n/a   | calc | n/a   | n/a  | Upper Great Lakes             | Perala and Alban, 1994              |
|   | 0.0047 | 2.7800 | 3–25              | 14  | 0.941 | n/a   | log  | n/a   | n/a  | New Brunswick                 | Baskerville, 1965                   |
|   | 0.0166 | 2.1778 | 2–30              | 24  | 0.874 | 0.688 | ln   | 1.267 | n/a  | Nova Scotia                   | Freedman et al., 1982               |
|   | 0.0248 | 2.4300 | 1–33              | 115 | 0.900 | 7.960 | abs  | n/a   | comp | Minnesota                     | Harding and Grigal, 1985            |
|   | 0.0302 | 2.1368 | 2–32              | 44  | 0.940 | 0.341 | ln   | 1.060 | n/a  | Nova Scotia                   | Ker, 1980b                          |
|   | 0.0435 | 2.1490 | 0–39              | 197 | 0.873 | 15.30 | abs  | n/a   | comp | New Brunswick,<br>Nova Scotia | Ker, 1984                           |
| Tanoak ( <i>Lithocarpus densiflorus</i> (Hook. and Arn.) Rehd.) |        |        |                   |     |       |       |      |       |      |                               |                                     |
| FL:   | 0.0261 | 1.8359 | 3–64              | 31  | 0.933 | 0.384 | ln   | 1.077 | comp | Oregon, California            | Snell and Little, 1983 <sup>b</sup> |
| BR:   | 0.0223 | 2.3977 | 3–64              | 31  | 0.938 | 0.481 | ln   | 1.123 | comp | Oregon, California            | Snell and Little, 1983 <sup>b</sup> |
| Willow ( <i>Salicaceae</i> ; willow family, includes poplars)   |        |        |                   |     |       |       |      |       |      |                               |                                     |
| AB:   | 0.0616 | 2.5094 | 4–20              | 180 | n/a   | n/a   | calc | n/a   | n/a  | Upper Great Lakes             | Perala and Alban, 1994              |
|   | 0.1619 | 2.0552 | 3–24 <sup>a</sup> | 30  | n/a   | n/a   | calc | n/a   | comp | Maine                         | Young et al., 1980                  |

|     |        |        |                   |     |       |     |      |     |      |                   |                        |
|-----|--------|--------|-------------------|-----|-------|-----|------|-----|------|-------------------|------------------------|
| SW: | 0.0335 | 2.5259 | 4–20              | 181 | n/a   | n/a | calc | n/a | n/a  | Upper Great Lakes | Perala and Alban, 1994 |
| SB: | 0.0151 | 2.3323 | 4–20              | 181 | n/a   | n/a | calc | n/a | n/a  | Upper Great Lakes | Perala and Alban, 1994 |
| ST: | 0.0652 | 2.3391 | 3–8               | 30  | 0.911 | n/a | log  | n/a | comp | Maine             | Ribe, 1973             |
|     | 0.0661 | 2.3321 | 3–24 <sup>a</sup> | 30  | 0.955 | n/a | ln   | n/a | comp | Maine             | Young et al., 1980     |
| FL: | 0.0091 | 2.0645 | 4–20              | 167 | n/a   | n/a | calc | n/a | n/a  | Upper Great Lakes | Perala and Alban, 1994 |
|     | 0.0333 | 1.6442 | 3–8               | 30  | 0.673 | n/a | log  | n/a | comp | Maine             | Ribe, 1973             |
|     | 0.0299 | 1.6921 | 3–24 <sup>a</sup> | 30  | 0.813 | n/a | ln   | n/a | comp | Maine             | Young et al., 1980     |
| BR: | 0.0644 | 1.6624 | 3–8               | 30  | 0.767 | n/a | log  | n/a | comp | Maine             | Ribe, 1973             |
|     | 0.0659 | 1.6514 | 3–24 <sup>a</sup> | 30  | 0.874 | n/a | ln   | n/a | comp | Maine             | Young et al., 1980     |

<sup>a</sup> DBH sample range uncertain and is estimated from either biomass tables or DBH distribution of the sampled stands.

<sup>b</sup> Equation was fitted by Ter-Mikaelian and Korzukhin using original data published in the reference.

<sup>c</sup> Canada–US included northern Wisconsin, New Hampshire, northcentral Minnesota, northwestern New Brunswick, Maine.

<sup>d</sup> Equations for total aboveground biomass from Wiant et al. (1977) did not account for foliage weight.

<sup>e</sup> Equation was developed for open-grown trees.

<sup>f</sup> Equation was developed for forest-grown trees.

<sup>g</sup> Equation was developed for a “high forking class” that includes trees forking below the base of the live crown.

<sup>h</sup> Equation was developed for a “low forking class” that includes trees where the main stem extends into the live crown.

<sup>i</sup> Baldwin (1989) fitted the equations in logarithmic form but calculated  $R^2$  and SEE after backward conversion of the predictions to arithmetic units; these values were not comparable with those for other equations and, therefore, were not included in the table.

<sup>j</sup> Equation was developed for a spruce–lichen woodland.

<sup>k</sup> Equation was developed for a spruce–moss woodland.

<sup>l</sup> Diameter was measured at 1.2 m aboveground.

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