Forest Ecology and Management

Forest Ecology and Management 97 (1997) 1–24

Biomass equations for sixty-five North American tree species

Michael T. Ter-Mikaelian [a,*], Michael D. Korzukhin [b]

[a] Ontario Forest Research Institute, 1235 Queen Street East, Sault Ste. Marie, Ont. P6A 2E5, Canada
[b] Institute of Global Climate and Ecology, Moscow, 107258, Russia

Received 21 October 1996; accepted 6 January 1997

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

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

* Corresponding author. Tel.: (705) 946-2981; Fax: (705) 946-2030 or (705) 946-2112; E-mail: termikmi@epo.gov.on.ca

0378-1127/97/$17.00
PII S0378-1127(97)00019-4

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:

$$M = aD^b \tag{1}$$

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 committing 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 aboveground 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 aboveground biomass to the predicted total aboveground 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.

Acknowledgements

This publication was supported by VMAP (Vegetation Management Alternatives Program) through the Ontario Ministry of Natural Resources, Sault Ste. Marie, Ontario. We thank Lisa Buse for editing an earlier draft of this manuscript and two anonymous reviewers from the journal for helpful comments.

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 aboveground 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.

M	a	b	D range	N	R^2	SEE	Mtd	C.f.	SI	Region	Author
Alder, red (*Alnus rubra* Bong.)											
FL:	0.0100	1.9398	3–63	53	0.929	0.444	ln	1.104	comp	Oregon, Washington	Snell and Little, 1983 [b]
BR:	0.0069	2.6516	3–63	53	0.936	0.574	ln	1.179	comp	Oregon, Washington	Snell and Little, 1983 [b]
Alder, speckled (*Alnus rugosa* (DuRoi) Spreng.)											
AB:	0.2612	2.2087	3–9 [a]	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 [a]	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 [a]	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 [a]	30	0.879	n/a	ln	n/a	comp	Maine	Young et al., 1980
Ash, black (*Fraxinus nigra* 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 (*Fraxinus americana* 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 (*Populus grandidentata* 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 (*Populus tremuloides* 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 [b]
	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, 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 [a]	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 [b]
	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, 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 [b]
	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
	0.0108	2.5520	3–31	45	0.981	0.235	ln	1.028	comp	Wisconsin	Ruark et al., 1987
ST:	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 [b]
	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, 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
	0.0448	2.6709	3–51 [a]	52	0.995	n/a	ln	n/a	comp	Maine	Young et al., 1980
FL:	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 [b]
	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, 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 [a]	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 [b]
	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, 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 [a]	52	0.958	n/a	ln	n/a	comp	Maine	Young et al., 1980
Basswood (*Tilia americana* L.)											
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
Beech, American (*Fagus grandifolia* Ehrh.)											
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 [a]	14	0.994	0.089	log	1.009	n/a	New Hampshire	Whittaker et al., 1974
	0.2013	2.2988	3–66 [a]	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 [a]	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 [a]	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 [a]	14	0.996	0.079	log	1.007	n/a	New Hampshire	Whittaker et al., 1974
	0.1515	2.2997	3–66 [a]	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 [a]	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 [a]	14	0.980	0.180	log	1.038	n/a	New Hampshire	Whittaker et al., 1974
	0.0265	2.3634	3–66 [a]	29	0.931	n/a	ln	n/a	comp	Maine	Young et al., 1980
Birch, black (*Betula lenta* 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 (*Betula populifolia* 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 [a]	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 [a]	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 [a]	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 [a]	30	0.897	n/a	ln	n/a	comp	Maine	Young et al., 1980
Birch, white (*Betula papyrifera* 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, 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 [c]	Schmitt and Grigal, 1981
	0.0612	2.6634	3–51 [a]	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, 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 [c]	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 [c]	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, Nova Scotia	Ker, 1984
	0.0413	2.8770	5–8	6	0.982	0.099	ln	1.005	n/a	New Hampshire	Kinerson and 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 [c]	Schmitt and Grigal, 1981
	0.0263	2.8968	3–51 [a]	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, 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 [c]	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 [a]	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, Nova Scotia	Ker, 1984
	0.0003	4.3680	5–8	6	0.904	0.362	ln	1.068	n/a	New Hampshire	Kinerson and 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 [c]	Schmitt and Grigal, 1981
	0.0194	2.2494	3–51 [a]	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
Birch, yellow (*Betula alleghaniensis* Britt.)											
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 [a]	14	0.994	0.099	log	1.011	n/a	New Hampshire	Whittaker et al., 1974
	0.1588	2.3376	3–66 [a]	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 [a]	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 [a]	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 [a]	14	0.994	0.087	log	1.009	n/a	New Hampshire	Whittaker et al., 1974
	0.1085	2.3412	3–66 [a]	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 [a]	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 [a]	14	0.955	0.300	log	1.109	n/a	New Hampshire	Whittaker et al., 1974
	0.0216	2.3795	3–66 [a]	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 [a]	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 [a]	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 [a]	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 [a]	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 [b]
FL:	0.2805	1.3313	0–68	22	0.924	0.582	ln	1.184	comp	Idaho, Montana	Brown, 1978 [b]
	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 [b]
	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 [b]
SW:	0.1323	2.1989	18–60	4	0.982	0.197	ln	1.020	n/a	British Columbia	Krumlik, 1974 [b]
SB:	0.0175	2.0829	18–60	4	0.964	0.268	ln	1.037	n/a	British Columbia	Krumlik, 1974 [b]
ST:	0.1492	2.1889	18–60	4	0.982	0.199	ln	1.020	n/a	British Columbia	Krumlik, 1974 [b]
FL:	0.1258	1.6164	18–60	4	0.926	0.304	ln	1.047	n/a	British Columbia	Krumlik, 1974 [b]
BR:	0.0293	2.1168	18–60	4	0.980	0.200	ln	1.020	n/a	British Columbia	Krumlik, 1974 [b]

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 [a]	19	0.994	20.41	abs	n/a	22.3(50)	West Virginia	Wiant et al., 1977 [d]
Cherry, choke (*Prunus virginiana* L.)											
AB:	0.2643	1.7102	3–15 [a]	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 [a]	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 [a]	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 [a]	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 [a]	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 [a]	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 [a]	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 [a]	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 [b]
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 [b]
Elm, 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 [e]
	0.0690	2.4975	3–40	40	0.970	0.123	ln	1.008	n/a	Ontario	Honer, 1971 [f]
	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, 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 [a]	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, Nova Scotia	Ker, 1984

	0.0302	2.5231	4–34	59	n/a	n/a	calc	n/a	n/a	Upper Great Lakes	Perala and Alban, 1994
SB:	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 [e]
	0.0120	2.2391	2–32	50	0.950	0.341	ln	1.060	n/a	Nova Scotia	Ker, 1980b
	0.0065	2.3832	4–34	60	n/a	n/a	calc	n/a	n/a	Upper Great Lakes	Perala and Alban, 1994
ST:	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, 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
	0.0679	2.4117	3–51 [a]	95	0.995	n/a	ln	n/a	comp	Maine	Young et al., 1980
FL:	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 [e]
	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, 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
	0.0089	2.4506	3–51 [a]	95	0.945	n/a	ln	n/a	comp	Maine	Young et al., 1980
BR:	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 [e]
	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, Nova Scotia	Ker, 1984
	0.0050	2.4605	3–51 [a]	95	0.949	n/a	ln	n/a	comp	Maine	Young et al., 1980
Fir, Douglas (*Pseudotsuga menziesii* (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 [b]
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
	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 [b]
SB:	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 [b]
ST:	0.2168	1.7236	1–11	22	0.897	0.419	ln	1.092	comp	Idaho, Montana	Brown, 1978 [b]
	0.0456	2.5951	2–162	99	0.990	0.310	ln	1.049	comp	Oregon, Washington	Gholz et al., 1979
	0.0451	2.6343	5–54	60	0.958	0.357	ln	1.066	n/a	British Columbia	Marshall and Wang, 1995 [b]
FL:	0.3021	1.3076	1–86	22	0.932	0.541	ln	1.158	comp	Idaho, Montana	Brown, 1978 [b]
	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 [b]
BR:	0.2624	1.5464	1–86	22	0.927	0.661	ln	1.244	comp	Idaho, Montana	Brown, 1978 [b]
	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
	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 [b]

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 [b]
FL:	0.2923	1.4177	1–40	20	0.943	0.405	ln	1.085	comp	Idaho, Montana	Brown, 1978 [b]
BR:	0.1516	1.6481	1–40	20	0.936	0.500	ln	1.133	comp	Idaho, Montana	Brown, 1978 [b]
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 [b]
SW:	0.0298	2.5744	12–90	14	0.990	0.134	ln	1.009	comp	British Columbia, 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 [b]
SB:	0.0022	2.8421	12–90	14	0.990	0.221	ln	1.025	comp	British Columbia, 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 [b]
ST:	0.0404	2.5482	31–90	12	0.983	0.139	ln	1.010	n/a	British Columbia	Krumlik, 1974 [b]
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 [b]
BR:	0.0050	2.6261	12–90	9	0.960	0.404	ln	1.085	comp	British Columbia, 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 [b]
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 [b]
FL:	0.3894	1.2311	1–32	20	0.943	0.358	ln	1.066	comp	Idaho, Montana	Brown, 1978 [b]
BR:	0.1926	1.5712	1–32	20	0.953	0.411	ln	1.088	comp	Idaho, Montana	Brown, 1978 [b]
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 [a]	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 [a]	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 [a]	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 [a]	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 [b]
SW:	0.0079	2.9308	17–76	14	0.980	0.228	ln	1.026	comp	British Columbia, 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 [b]
SB:	0.0037	2.7654	17–76	14	0.970	0.226	ln	1.026	comp	British Columbia, 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 [b]
ST:	0.1314	2.3011	32–76	8	0.985	0.093	ln	1.004	n/a	British Columbia	Krumlik, 1974 [b]
FL:	0.0022	1.9756	17–76	11	0.970	0.158	ln	1.013	comp	British Columbia, 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 [b]
BR:	0.0052	2.6045	17–76	11	0.990	0.122	ln	1.006	comp	British Columbia, 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 [b]
Hemlock, western (*Tsuga heterophylla* (Raf.) Sarg.)											
AB:	0.2570	2.1349	16–49	8	0.967	0.171	ln	1.015	n/a	British Columbia	Krumlik, 1974 [b]
SW:	0.1132	2.2570	15–78	18	0.990	0.118	ln	1.007	comp	British Columbia, 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 [b]
SB:	0.0125	2.2580	15–78	18	0.990	0.138	ln	1.010	comp	British Columbia, 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 [b]
ST:	0.4208	1.2501	0–13	13	0.922	0.434	ln	1.099	comp	Idaho, Montana	Brown, 1978 [b]
	0.1695	2.1687	16–49	8	0.979	0.139	ln	1.010	n/a	British Columbia	Krumlik, 1974 [b]
FL:	0.3203	1.1343	0–18	16	0.909	0.454	ln	1.108	comp	Idaho, Montana	Brown, 1978 [b]
	0.0146	2.1280	15–78	18	0.960	0.435	ln	1.099	comp	British Columbia, 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 [b]
BR:	0.2392	1.3060	0–18	16	0.919	0.492	ln	1.129	comp	Idaho, Montana	Brown, 1978 [b]
	0.0053	2.7780	15–78	18	0.980	0.421	ln	1.093	comp	British Columbia, 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 [b]
Hickory, all (*Carya* 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 [a]	19	0.987	41.28	abs	n/a	22.3(50)	West Virginia	Wiant et al., 1977 [d]
SW:	0.0043	3.3743	5–40 [a]	19	0.970	45.85	abs	n/a	22.3(50)	West Virginia	Wiant et al., 1977
ST:	0.0066	3.2817	5–40 [a]	19	0.972	48.12	abs	n/a	22.3(50)	West Virginia	Wiant et al., 1977
Juniper, western (*Juniperus occidentalis* 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) (*Larix laricina* (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 [a]	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 [a]	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 [a]	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 [a]	23	0.960	n/a	ln	n/a	comp	Maine	Young et al., 1980
Larch, western (*Larix occidentalis* Nutt.)											
ST:	0.2942	1.5593	1–12	13	0.907	0.502	ln	1.134	comp	Idaho, Montana	Brown, 1978 [b]
FL:	0.1307	1.0557	1–17	14	0.923	0.324	ln	1.054	comp	Idaho, Montana	Brown, 1978 [b]
BR:	0.1821	1.2885	1–17	14	0.900	0.459	ln	1.111	comp	Idaho, Montana	Brown, 1978 [b]

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 [b]
BR:	0.0093	2.6868	3–63	31	0.886	0.794	ln	1.371	comp	Oregon, California	Snell and Little, 1983 [b]
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 [b]
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 [b]
Maple, mountain (*Acer spicatum* Lamb.)											
AB:	0.2040	2.2524	1–20 [a]	15	0.990	0.074	log	1.006	comp	New Hampshire	Whittaker et al., 1974
SW:	0.0754	2.3364	1–20 [a]	15	0.994	0.064	log	1.005	comp	New Hampshire	Whittaker et al., 1974
SB:	0.0177	2.1133	1–20 [a]	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 [a]	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 [a]	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 [b]
	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, 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 [a]	19	0.981	35.38	abs	n/a	22.3(50)	West Virginia	Wiant et al., 1977 [d]
	0.1262	2.3804	3–66 [a]	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, 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, Nova Scotia	Ker, 1984
	0.1285	2.2940	3–12	7	0.891	0.421	ln	1.093	n/a	New Hampshire	Kinerson and 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 [a]	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, Nova Scotia	Ker, 1984
	0.0018	2.7770	3–12	7	0.998	0.061	ln	1.002	n/a	New Hampshire	Kinerson and 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 [a]	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, Nova Scotia	Ker, 1984
	0.0181	1.9600	3–12	7	0.845	0.443	ln	1.103	n/a	New Hampshire	Kinerson and 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 [a]	62	0.966	n/a	ln	n/a	comp	Maine	Young et al., 1980
Maple, striped (*Acer pensylvanicum* 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 (*Acer saccharum* Marsh.)											
AB:	0.2064	2.3300	2–40	5	0.998	n/a	ln	n/a	22(45)	New York	Bickelhaupt et al., 1973 [g]
	0.1252	2.4800	2–40	5	0.984	n/a	ln	n/a	22(45)	New York	Bickelhaupt et al., 1973 [h]
	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 [a]	14	0.998	0.060	log	1.004	n/a	New Hampshire	Whittaker et al., 1974
	0.1791	2.3329	3–66 [a]	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 [a]	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 [a]	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 [a]	14	0.996	0.065	log	1.005	n/a	New Hampshire	Whittaker et al., 1974
	0.1626	2.2894	3–66 [a]	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 [g]
	0.0178	1.7600	2–40	5	0.874	n/a	ln	n/a	22(45)	New York	Bickelhaupt et al., 1973 [h]
	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 [a]	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 [a]	14	0.974	0.232	log	1.064	n/a	New Hampshire	Whittaker et al., 1974
	0.0104	2.5515	3–66 [a]	42	0.937	n/a	ln	n/a	comp	Maine	Young et al., 1980
Oak, black (*Quercus velutina* Lam.)											
AB:	0.0904	2.5143	7–27	27	0.983	0.121	ln	1.007	comp	Rhode Island	Bridge, 1979 [b]
	0.0945	2.5030	5–40 [a]	19	0.994	22.68	abs	n/a	22.3(50)	West Virginia	Wiant et al., 1977 [d]
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 (*Quercus prinus* 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 [a]	19	0.991	29.48	abs	n/a	22.3(50)	West Virginia	Wiant et al., 1977 [d]
ST:	0.0741	2.5226	5–40 [a]	19	0.983	31.33	abs	n/a	22.3(50)	West Virginia	Wiant et al., 1977
Oak, mossy-cup (*Quercus macrocarpa* 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 (*Quercus rubra* 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 [a]	19	0.988	35.87	abs	n/a	22.3(50)	West Virginia	Wiant et al., 1977 [d]
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 (*Quercus coccinea* Muench.)											
AB:	0.0536	2.7147	8–28	15	0.978	0.125	ln	1.008	comp	Rhode Island	Bridge, 1979 [b]
	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 [a]	19	0.993	27.22	abs	n/a	22.3(50)	West Virginia	Wiant et al., 1977 [d]
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 [a]	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 [a]	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 (*Quercus alba* 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 [b]
	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 [a]	19	0.988	32.66	abs	n/a	22.3(50)	West Virginia	Wiant et al., 1977 [d]
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 [a]	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 [a]	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 (*Pinus strobus* 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 [a]	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 [a]	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 [a]	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 [a]	35	0.953	n/a	ln	n/a	comp	Maine	Young et al., 1980
Pine, jack (*Pinus banksiana* 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	Hegyi, 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, 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, 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	Hegyi, 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, 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	Hegyi, 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, 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, Nova Scotia	Ker, 1984
Pine, loblolly (*Pinus taeda* 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 [i]
	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 [i]
	0.0003	3.4981	10–30	26	0.894	0.290	ln	1.043	n/a	North Carolina	Ralston, 1973
Pine, lodgepole (*Pinus contorta* Dougl.)											
ST:	0.3377	0.9774	1–5	8	0.858	0.255	ln	1.033	comp	Idaho, Montana	Brown, 1978 [b]
	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 [b]
	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 [b]
	0.0089	2.3533	3–29	19	0.890	0.493	ln	1.129	n/a	Colorado	Gholz et al., 1979
Pine, pitch (*Pinus rigida* Mill.)											
AB:	0.1040	2.3373	0–31	15	0.996	0.045	log	1.002	n/a	New York	Whittaker and Woodwell, 1968
SW:	0.0528	2.3779	0–31	15	0.994	0.066	log	1.005	n/a	New York	Whittaker and Woodwell, 1968
SB:	0.0242	2.1249	0–31	15	0.974	0.101	log	1.012	n/a	New York	Whittaker and Woodwell, 1968
ST:	0.0751	2.3261	0–31	15	0.994	0.062	log	1.004	n/a	New York	Whittaker and Woodwell, 1968
BR:	0.0129	2.5516	0–31	15	0.976	0.120	log	1.017	n/a	New York	Whittaker and Woodwell, 1968
Pine, ponderosa (*Pinus ponderosa* 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 [b]
FL:	0.1167	1.5774	2–86	31	0.954	0.461	ln	1.112	comp	Idaho, Montana	Brown, 1978 [b]
	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 [b]
	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 (*Pinus resinosa* 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 [a]	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 [a]	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 [a]	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 [a]	14	0.986	n/a	ln	n/a	comp	Maine	Young et al., 1980
Pine, sugar (*Pinus lambertiana* 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 (*Pinus monticola* Dougl.)											
ST:	0.2953	1.4073	1–12	14	0.905	0.373	ln	1.072	comp	Idaho, Montana	Brown, 1978 [b]
FL:	0.2761	1.0684	1–19	16	0.898	0.343	ln	1.061	comp	Idaho, Montana	Brown, 1978 [b]
BR:	0.2312	1.1825	1–19	16	0.891	0.393	ln	1.080	comp	Idaho, Montana	Brown, 1978 [b]
Pine, whitebark (*Pinus albicaulis* Engelm.)											
ST:	0.3110	1.4603	1–12	10	0.876	0.582	ln	1.184	comp	Idaho, Montana	Brown, 1978 [b]
FL:	0.1168	1.2751	1–19	13	0.884	0.525	ln	1.147	comp	Idaho, Montana	Brown, 1978 [b]
BR:	0.1164	1.3767	1–19	13	0.887	0.559	ln	1.169	comp	Idaho, Montana	Brown, 1978 [b]
Poplar, yellow (*Liriodendron tulipifera* 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 [a]	19	0.995	16.78	abs	n/a	22.3(50)	West Virginia	Wiant et al., 1977 [d]
Spruce, black (*Picea mariana* (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, 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 [j]
	0.0339	2.6260	2–15	10	0.902	0.143	log	1.024	comp	Subarctic Québec	Moore and Verspoor, 1973 [k]
	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, 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
	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
ST:	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, 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 [1]
FL:	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
	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, 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 [1]
	0.0004	3.2377	5–18	20	0.865	0.172	ln	1.015	17(100)	Québec	Weetman and Harland, 1964
BR:	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, 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 [1]
Spruce, Engelmann (*Picea engelmannii* Parry)											
ST:	0.2844	1.3782	1–8	10	0.964	0.213	ln	1.023	comp	Idaho, Montana	Brown, 1978 [b]
FL:	0.3346	1.2765	1–23	13	0.917	0.430	ln	1.097	comp	Idaho, Montana	Brown, 1978 [b]
BR:	0.1687	1.5799	1–23	13	0.932	0.479	ln	1.122	comp	Idaho, Montana	Brown, 1978 [b]
Spruce, Norway (*Picea abies* (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 (*Picea rubens* 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, Nova Scotia	Ker, 1984
	0.2066	2.1830	1–35 [a]	15	0.982	0.107	log	1.013	n/a	New Hampshire	Whittaker et al., 1974
SW:	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, Nova Scotia	Ker, 1984
	0.0774	2.2380	1–35 [a]	15	0.990	0.077	log	1.007	n/a	New Hampshire	Whittaker et al., 1974
SB:	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 [a]	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, 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
	0.0979	2.2046	1–35 [a]	15	0.994	0.070	log	1.006	n/a	New Hampshire	Whittaker et al., 1974
FL:	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, 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, Nova Scotia	Ker, 1984
	0.0082	2.5428	1–35 [a]	15	0.951	0.207	log	1.051	n/a	New Hampshire	Whittaker et al., 1974
Spruce, Sitka (*Picea sitchensis* (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 (*Picea glauca* (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, Nova Scotia	Ker, 1984
	0.1643	2.2480	2–25	73	0.985	0.145	ln	1.011	n/a	Upper Great Lakes	Perala and Alban, 1994
SW:	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, Nova Scotia	Ker, 1984
	0.0698	2.3526	2–25	72	n/a	n/a	calc	n/a	n/a	Upper Great Lakes	Perala and Alban, 1994
SB:	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
	0.0200	1.9906	2–25	73	n/a	n/a	calc	n/a	n/a	Upper Great Lakes	Perala and Alban, 1994
ST:	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, 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, Nova Scotia	Ker, 1984
	0.0165	2.3474	2–25	73	n/a	n/a	calc	n/a	n/a	Upper Great Lakes	Perala and Alban, 1994
BR:	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, Nova Scotia	Ker, 1984
Tanoak (*Lithocarpus densiflorus* (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 [b]
BR:	0.0223	2.3977	3–64	31	0.938	0.481	ln	1.123	comp	Oregon, California	Snell and Little, 1983 [b]
Willow (*Salicaceae*; 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 [a]	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 [a]	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 [a]	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 [a]	30	0.874	n/a	ln	n/a	comp	Maine	Young et al., 1980

[a] DBH sample range uncertain and is estimated from either biomass tables or DBH distribution of the sampled stands.
[b] Equation was fitted by Ter-Mikaelian and Korzukhin using original data published in the reference.
[c] Canada–US included northern Wisconsin, New Hampshire, northcentral Minnesota, northwestern New Brunswick, Maine.
[d] Equations for total aboveground biomass from Wiant et al. (1977) did not account for foliage weight.
[e] Equation was developed for open-grown trees.
[f] Equation was developed for forest-grown trees.
[g] Equation was developed for a "high forking class" that includes trees forking below the base of the live crown.
[h] Equation was developed for a "low forking class" that includes trees where the main stem extends into the live crown.
[i] 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.
[j] Equation was developed for a spruce–lichen woodland.
[k] Equation was developed for a spruce–moss woodland.
[l] Diameter was measured at 1.2 m aboveground.

References

Agee, J.K., 1983. Fuel weights of understory-grown conifers in southern Oregon. Can. J. For. Res., 13: 648–656.

Baldwin, V.C., Jr., 1989. Is sapwood area a better predictor of loblolly pine crown biomass than bole diameter? Biomass, 20: 177–185.

Baskerville, G.L., 1972. Use of logarithmic regression in the estimation of plant biomass. Can. J. For. Res., 2: 49–53.

Baskerville, G.L., 1965. Dry-matter production in immature balsam fir stands. Forest Science Monograph, Society of American Foresters, Washington, DC, 41 pp.

Bickelhaupt, D.H., Leaf, A.L. and Richards, N.A., 1973. Effect of branching habit on aboveground dry weight estimates of *Acer saccharum* stands. In: H.E. Young (Editor), IUFRO Biomass Studies: Nancy, France, and Vancouver, B.C., Canada. University of Maine, College of Life Sciences and Agriculture, Orono, Maine, pp. 219–230.

Bormann, B.T., 1990. Diameter-based biomass regression models ignore large sapwood-related variation in Sitka spruce. Can. J. For. Res., 20: 1098–1104.

Brenneman, B.B., Frederick, D.J., Gardner, W.E., Schoenhofen, L.H. and Marsh, P.L., 1978. Biomass of species and stands of West Virginia hardwoods. In: P.E. Pope (Editor), Proceedings of Central Hardwood Forest Conference II. West LaFayette, Purdue University, pp. 159–178.

Bridge, J.A., 1979. Fuelwood production of mixed hardwoods on mesic sites in Rhode Island. M.S. Thesis. University of Rhode Island, Kingston, Rhode Island, 72 pp.

Brown, J.K., 1978. Weight and density of crowns of Rocky Mountain conifers. U.S. For. Serv. Res. Pap. INT-197: 56.

Campbell, J.S., Lieffers, V.J. and Pielou, E.C., 1985. Regression equations for estimating single tree biomass of trembling aspen: assessing their applicability to more than one population. For. Ecol. Manage., 11: 283–295.

Carpenter, E.M., 1983. Above-ground weights for tamarack in northeastern Minnesota. U.S. For. Serv. Res. Pap. NC-245: 9.

Cochran, P.H., Jennings, J.W. and Youngberg, C.T., 1984. Biomass estimators for thinned second-growth ponderosa pine trees. U.S. For. Serv. Res. Note PNW-415: 6.

Crow, T.R., 1971. Estimation of biomass in even-aged stand-regression and "mean tree" techniques. In: Forest Biomass Studies, 17th IUFRO Congress, Gainsville, Florida, 15–20 March 1971, pp. 35–50.

Crow, T.R. and Erdmann, G.G., 1983. Weight and volume equations and tables for red maple in the Lake States. U.S. For. Serv. Res. Pap. NC-242: 14.

Crow, T.R. and Schlaegel, B.E., 1988. A guide to using regression equations for estimating tree biomass. North. J. Appl. For., 5: 15–22.

Feller, M.C., 1992. Generalized versus site-specific biomass regression equations for *Pseudotsuga menziesii* var. *menziesii* and *Thuja plicata* in coastal British Columbia. Bioresour. Technol., 39: 9–16.

Freedman, B., Duinker, P.N., Barclay, H., Morash, R. and Prager, U., 1982. Forest biomass and nutrient studies in central Nova Scotia. Can. For. Serv. Marit. For. Res. Cent. Inf. Rep., M-X-134: 126.

Gholz, H.L., Grier, C.C., Campbell, A.G. and Brown, A.T., 1979. Equations for estimating biomass and leaf area of plants in the pacific northwest. Oreg. State Univ. Sch. For. Res. Pap., 41: 39.

Grigal, D.F. and Kernik, L.K., 1984a. Generality of black spruce biomass estimation equations. Can. J. For. Res., 14: 468–470.

Grigal, D.F. and Kernik, L.K., 1984b. Biomass estimation for black spruce (*Picea mariana* (Mill.) B.S.P.) trees. Minn. For. Res. Notes, 290: 4.

Harding, R.B. and Grigal, D.F., 1985. Individual tree biomass estimations for plantation-grown white spruce in northern Minnesota. Can. J. For. Res., 15: 738–739.

Hegyi, F., 1972. Dry matter distribution in jack pine stands in northern Ontario. For. Chron., 48: 193–197.

Hocker, H.W., Jr. and Earley, D.J., 1983. Biomass and leaf area equations for northern forest species. N. H. Agric. Exp. Stn. Univ. N. H. Res. Rep., 102: 27.

Honer, T.G., 1971. Weight relationships in open- and forest-grown balsam fir trees. In: Forest Biomass Studies. IUFRO Section 25, Yield and Growth, Working Group on Forest Biomass Studies, Life Sciences and Agriculture, Experimental Station, University of Maine at Orono, Miscellaneous Publication No. 132, pp. 65–78.

Johnston, R.S. and Bartos, D.L., 1977. Summary of nutrient and biomass data from two aspen sites in western United States. U.S. For. Serv. Res. Note INT-227: 15.

Jokela, E.J., Van Gurp, K.P., Briggs, R.D. and White, E.H., 1986. Biomass estimation equations for Norway spruce in New York. Can. J. For. Res., 16: 413–415.

Ker, M.F., 1980a. Tree biomass equations for seven species in southwestern New Brunswick. Can. For. Serv. Marit. For. Res. Cent. Inf. Rep., M-X-114: 18.

Ker, M.F., 1980b. Tree biomass equations for ten major species in Cumberland County, Nova Scotia. Can. For. Serv. Marit. For. Res. Cent. Inf. Rep., M-X-108: 26.

Ker, M.F., 1984. Biomass equations for seven major maritimes tree species. Can. For. Serv. Marit. For. Res. Cent. Inf. Rep., M-X-148: 54.

Kinerson, R.S. and Bartholomew, I., 1977. Biomass estimation equations and nutrient composition of white pine, white birch, red maple, and red oak in New Hampshire. N. H. Agric. Exp. Stn. Res. Rep., 62: 8.

King, W.W. and Schnell, R.L., 1972. Biomass estimates of black oak tree components. Tennessee Valley Authority, Division of Forestry, Fisheries, and Wildlife Development, Technical Note B1. Norris, Tennessee, 24 pp.

Koerper, G.J. and Richardson, C.J., 1980. Biomass and net annual primary production regressions for *Populus grandidentata* on three sites in northern lower Michigan. Can. J. For. Res., 10: 92–101.

Krumlik, J.G., 1974. Biomass and nutrient distribution in two old growth forest ecosystems in south coastal British Columbia. M.Sc. Thesis, University of British Columbia, Vancouver, British Columbia, 180 pp.

MacLean, D.A. and Wein, R.W., 1976. Biomass of jack pine and mixed hardwood stands in northeastern New Brunswick. Can. J. For. Res., 6: 441–447.

Marshall, P.L. and Wang, Y., 1995. Above ground tree biomass of interior uneven-aged Douglas-fir stands. Canada–British Columbia Partnership Agreement on Forest Resource Development: FRDA II, Working Paper WP-1.5-003. University of British Columbia, Vancouver, 23 pp.

Moore, T.R. and Verspoor, E., 1973. Aboveground biomass of black spruce stands in subarctic Quebec. Can. J. For. Res., 3: 596–598.

Ouellet, D., 1983. Biomass equations for black spruce in Quebec. Can. For. Serv. Inf. Rep. LAU-X-60(E): 27.

Pastor, J., Aber, J.D. and Melillo, J.M., 1984. Biomass prediction using generalized allometric regressions for some northeast tree species. For. Ecol. Manage., 7: 265–274.

Pastor, J. and Bockheim, J.G., 1981. Biomass and production of an aspen–mixed hardwood–spodosol ecosystem in northern Wisconsin. Can. J. For. Res., 11: 132–138.

Perala, D.A. and Alban, D.H., 1994. Allometric biomass estimators for aspen-dominated ecosystems in the Upper Great Lakes. U.S. For. Serv. Res. Pap. NC-134: 38.

Peterson, E.B., Chan, Y.B. and Cragg, J.B., 1970. Aboveground standing crop, leaf area, and caloric value in an aspen clone near Calgary, Alberta. Can. J. Bot., 48: 1459–1469.

Ralston, C.W., 1973. Annual productivity in a loblolly pine plantation. In: H.E. Young (Editor), IUFRO Biomass Studies: Nancy, France, and Vancouver, B.C., Canada. University of Maine, College of Life Sciences and Agriculture, Orono, Maine, pp. 107–117.

Rencz, A.W. and Auclair, A.N., 1980. Dimension analysis of various components of black spruce in subarctic lichen woodland. Can. J. For. Res., 10: 491–497.

Reynolds, P.E., Carlson, K.G., Fromm, T.W., Gigliello, K.A. and Kaminski, R.J., 1978. Phytosociology, biomass, productivity, and nutrient budget for the tree stratum of a southern New Jersey hardwood swamp. In: P.E. Pope (Editor), Proceedings of Central Hardwood Forest Conference II. West LaFayette, Purdue University, pp. 123–139.

Ribe, J.H., 1973. Puckerbrush weight tables. Misc. Rep. 152. Life Sciences and Agricultural Experiment Station, University of Maine, Orono, MN, 92 pp.

Ruark, G.A., Martin, G.L. and Bockheim, J.G., 1987. Comparison of constant and variable allometric ratios for estimating *Populus tremuloides* Biomass. For. Sci., 33: 294–300.

Schmitt, M.D.C. and Grigal, D.F., 1981. Generalized biomass estimation equations for *Betula papyrifera* Marsh. Can. J. For. Res., 11: 837–840.

Snell, J.A. Kendall and Little, S.N., 1983. Predicting crown weight and bole volume of five western hardwoods. U.S. For. Serv. Gen. Tech. Rep. PNW-151: 37.

Stanek, W. and State, D., 1978. Equations predicting primary productivity (biomass) of trees, shrubs and lesser vegetation based on current literature. Can. For. Serv. Pac. For. Res. Cent. Inf. Rep., BC-X-183: 58.

Swank, W.T. and Schreuder, H.T., 1974. Comparison of three methods of estimating surface area and biomas for a forest of young eastern white pine. For. Sci., 20: 91–100.

Tritton, L.M. and Hornbeck, J.W., 1982. Biomass equations for major tree species of the Northeast. U.S. For. Serv. Gen. Tech. Rep. NE-69: 46.

Wang, J.R., Zhong, A.L., Simard, S.W. and Kimmins, J.P., 1996. Aboveground biomass and nutrient accumulation in an age sequence of paper birch (Betula Papyrifera) in the Interior Hemlock zone, British Columbia. For. Ecol. Manage., 83: 27–38.

Weetman, G.F. and Harland, R., 1964. Foliage and wood production in unthinned black spruce in northern Québec. For. Sci., 10: 80–88.

Whittaker, R.H., Bormann, F.H., Likens, G.E. and Siccama, T.G., 1974. The Hubbard Brook ecosystem: Forest biomass and production. Ecol. Monogr., 44: 233–252.

Whittaker, R.H. and Woodwell, G.M., 1968. Dimension and production relations of trees and shrubs in the Brookhaven Forest, New York. J. Ecol., 56: 1–25.

Wiant, H.V., Jr., Sheetz, C.E., Colaninno, A., DeMoss, J.C. and Castaneda, F., 1977. Tables and procedures for estimating weights of some Appalachian hardwoods. W. Va. Agric. Exp. Stn. Bull., 659(T): 36.

Young, H.E., Ribe, J.H. and Wainwright, K., 1980. Weight tables for tree and shrub species in Maine. Life Sciences and Agriculture Experiment Station, University of Maine at Orono, Miscellaneous Report 230. 84 pp.