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Methods for Calculating Forest Ecosystem and Harvested Carbon with Standard Estimates for Forest Types of the United States

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Abstract

This study presents techniques for calculating average net annual additions to carbon in forests and in forest products. Forest ecosystem carbon yield tables, representing stand-level merchantable volume and carbon pools as a function of stand age, were developed for 51 forest types within 10 regions of the United States. Separate tables were developed for afforestation and reforestation. Because carbon continues to be sequestered in harvested wood, approaches to calculate carbon sequestered in harvested wood products are included. Although these calculations are simple and inexpensive to use, the uncertainty of results obtained by using representative average values may be high relative to other techniques that use site- or project-specific data. The estimates and methods in this report are consistent with guidelines being updated for the U.S. Voluntary Reporting of Greenhouse Gases Program and with guidelines developed by the Intergovernmental Panel on Climate Change. The CD-ROM included with this publication contains a complete set of tables in spreadsheet format.

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Preface

In 2002, President George W. Bush directed the Department of Energy and the Department of Agriculture to revise the system for reporting and registering reductions in greenhouse gas emissions. Increasing carbon sequestration by forests and harvested products is equivalent to reducing emissions, and represents a significant opportunity for the private sector to voluntarily take action. Rules and guidelines are needed to provide a basis for consistent estimation of the quantity of carbon sequestered and emissions reduced by forestry activities, and can be used to determine the value of tradable credits. The value of registered carbon credits can provide increased income for landowners, support rural development, and facilitate sustainable forest management.

Many prospective reporting entities require information and decision-support software to evaluate prospects and develop plans for implementing forestry activities, and to estimate rates of carbon sequestration for reporting purposes. Estimating the quantity of carbon sequestered could be a difficult and expensive task, possibly requiring the establishment of a monitoring system based on remote sensing, field measurements, and models. However, there are situations for which a simpler estimation process is acceptable, requiring only a basic familiarity with definitions and accounting rules.

In practice, reporters may choose the simplest available methods that provide estimates with a degree of accuracy that meets reporting objectives. The information provided in this publication can be used to estimate carbon emissions, emission reductions, or sequestration about a forestry activity—data on the forest area affected, type of activity, and region of interest. The quality of the results will depend largely on the quality of the activity data and how closely actual activities are reflected in the factors. The intent in providing this information is to provide consistent and reliable estimates and to simplify the reporting process.

The tables in this publication represent significant updates of similar tables used for more than a decade to analyze forest carbon sequestration activities (Birdsey 1996). Since the previous tables were published, advances have been made in methods that estimate how various carbon components of forest ecosystems change over time, and how carbon in harvested products is retained in use or emitted to the atmosphere. This publication further documents the General Guidelines for reporting greenhouse gas information under Section 1605(b) of the Energy Policy Act of 1992.

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Introduction

International agreements recognize forestry activities as one way to sequester carbon, and thus mitigate the increase of carbon dioxide in the atmosphere; this may slow possible climate change effects. The United States initiated a voluntary reporting program in the early 1990's (U.S. Dep. Energy 2005). A system for developing estimates of the quantity of carbon sequestered in forest stands and harvested wood products[1] throughout the United States is a vital part of the voluntary program. This system must be relatively easy to use, transparent, economical, and accurate. In this publication, we present methods and regional average tables that meet these criteria.

Carbon is sequestered in growing trees, principally as wood in the tree bole. However, accrual in forest ecosystems also depends on the accumulation of carbon in dead wood, litter, and soil organic matter. When wood is harvested and removed from the forest, not all of the carbon flows immediately to the atmosphere. In fact, the portion of harvested carbon sequestered in long-lasting wood products may not be released to the atmosphere for years or even decades. If carbon remaining in harvested wood products is not part of the accounting system, calculation of the change in carbon stock for the forest area that is harvested will incorrectly indicate that all the harvested carbon is released to the atmosphere immediately. Failing to account for carbon in wood products significantly overestimates emissions to the atmosphere in the year in which the harvest occurs.

We adopted the approach of Birdsey (1996), who developed tables of forest carbon stocks and carbon in harvested wood to provide basic information on average carbon change per area. The tables are commonly referred to as "look-up tables" because users can identify the appropriate table for their forest, and look up the average regional carbon values for that type of forest. We have updated the tables by using new inventory surveys, forest carbon and timber projection models, and a more precise definition of carbon pools. We also include additional forest types and background information for customizing the tables for a user's specific needs.

The look-up tables are categorized by region, forest type, previous land use, and, in some cases, productivity class and management intensity. Users must identify the categories for their forest, estimate the area of forestland, and, if needed, characterize the amount of wood harvested from the area in a way that is compatible with the format of the look-up tables. The average carbon estimates per area in the look-up tables must be multiplied by the area or, as appropriate, harvested volumes, to obtain estimates in total carbon stock or change in carbon stock.

The estimates in the look-up tables are called "average estimates," indicating that they should be used when it is impractical to use more resource-intensive methods to characterize forest carbon, that is, particularly when more specific information is not available. Because these tables represent averages over large areas, the actual carbon stocks and flows for specific forests, or projects, may differ. The look-up tables should not be used when conditions for a project or site differ greatly from the classifications specified for the tables. Some users may require an alternative to an "all-or-nothing" use of the tables because they may have some information and need to use the tables to supplement, or fill in gaps, in carbon stocks. Alternatively, users may require slight alterations to the tabular data provided. Therefore, we also include the underlying assumptions and appropriate citations so that the tables can be adjusted to data availability and information requirements of individual activities.

The focus of this document is to explain the methodology in a transparent way and present sets of look-up tables for quantifying forest carbon when site-specific information is limited. In the sections that follow, we introduce the tables and provide general guidance for their use. First, tables of forest ecosystem carbon are presented; these are followed by tables to calculate the disposition of carbon in harvested wood products. Additional information on methods and data sources

[1]Traditionally, the phrase "forest products" includes paper, but the phrase "wood products" does not. The literature for forest carbon has not recognized this distinction. Thus, we use the phase "wood products" to include all forest products including paper.

follows these tables. This organization was adopted so that readers interested in using the tables can do so quickly. Both metric and English units are used for measures of area and volume.[2] However, all values for carbon mass are expressed in metric units—tonnes (t)—unless specified otherwise. English units are included because most of the necessary input quantities are commonly expressed in units such as cubic feet/acre (for stand-level growing-stock volume) or thousand square feet of ⅜-inch plywood (a primary wood product), for example. Carbon stocks and stock changes are usually discussed and reported in metric units of carbon mass; this can lead to carbon in forests expressed as tonnes/hectare or in the United States as metric tons/acre. The forest ecosystem carbon tables are in Appendices A, B, and C; ancillary information on carbon in harvested wood is in Appendix D. Spreadsheet versions of the tables are on the CD-ROM that is included with this publication.

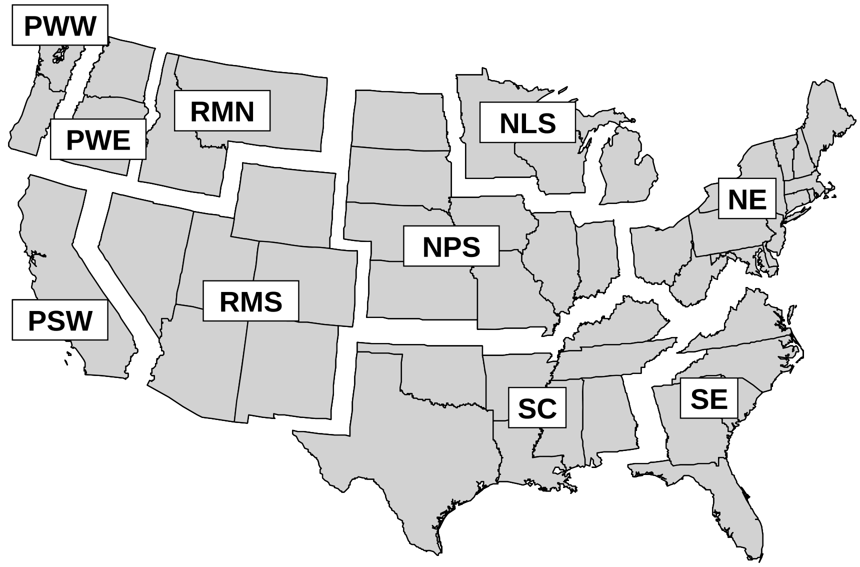

Figure 1.—Definition of regions: Pacific Northwest, West (PWW); Pacific Northwest, East (PWE); Pacific Southwest (PSW); Rocky Mountain, North (RMN); Rocky Mountain, South (RMS); Northern Prairie States (NPS); Northern Lake States (NLS); Northeast (NE); South Central (SC); and Southeast (SE). Note that regions are merged for some tables, these combinations include: NLS and NPS as North Central; PWW, PWE, and PSW as Pacific Coast; RMN and RMS as Rocky Mountain; SC and SE as South; and RMN, RMS, PWE, and PSW as West (except where stated otherwise).

Forest Ecosystem Carbon Tables

Tables of estimates of forest carbon stock are provided for common forest types within each of 10 U.S. regions (Fig. 1). Six distinct forest ecosystem carbon pools are listed: live trees, standing dead trees, understory vegetation, down dead wood, forest floor, and soil organic carbon. These pools are defined in Table 1. An example of the forest ecosystem tables is provided as Table 2, with the complete set in Appendices A and B. The first two columns in each table are age and growing-stock volume; the remaining columns represent carbon stocks for the various carbon pools and are dependent on age or growing-stock volume. Pools are quantified as carbon densities, that is, tonnes per unit area (acres or hectares).

The use of the tables can be summarized in three steps: 1) identify the most appropriate table for the particular carbon sequestration project; 2) extract the tabular information required for estimating carbon sequestration by the project; and 3) complete any necessary custom modifications or post-processing needed to suit data requirements. The information in the tables is based on a national-level, forest carbon accounting model (FORCARB2; Heath and others 2003, Smith and others 2004a), a timber projection model (ATLAS; Mills and Zhou 2003, Mills and Kincaid 1992, updated for Haynes 2003), and the USDA Forest Service, Forest Inventory and Analysis (FIA) Program's database of forest surveys (FIADB; USDA For. Serv. 2005, Alerich and others 2005). Details are provided in the methods section.

The two basic sets of tables in Appendices A and B differ only with respect to assumptions associated with previous land use. The first set displays carbon stocks on forest land remaining forest land, also called "reforestation" or "regrowth" of a stand following a clearcut harvest (Table 2, for example, and Appendix A). The second set displays accumulation of carbon stocks for a stand established

[2]A tonne (t) is defined as 10^6 grams, or 2,204.62 pounds (lb). Other metric and English equivalents include 0.404686 hectare (ha) = 1 acre (ac), 2.54 centimeter (cm) = 1 inch (in), 0.0283168 cubic meter (m^3) = 1 cubic foot (ft^3), and 0.907185 tonne = 1 short ton = 2,000 pounds.

Table 1.—Classification of carbon in forest ecosystems and in harvested wood

Forest ecosystem carbon pools	
Live trees	Live trees with diameter at breast height (d.b.h.) of at least 2.5 cm (1 inch), including carbon mass of coarse roots (greater than 0.2 to 0.5 cm, published distinctions between fine and coarse roots are not always clear), stems, branches, and foliage.
Standing dead trees	Standing dead trees with d.b.h. of at least 2.5 cm, including carbon mass of coarse roots, stems, and branches.
Understory vegetation	Live vegetation that includes the roots, stems, branches, and foliage of seedlings (trees less than 2.5 cm d.b.h.), shrubs, and bushes.
Down dead wood	Woody material that includes logging residue and other coarse dead wood on the ground and larger than 7.5 cm in diameter, and stumps and coarse roots of stumps.
Forest floor	Organic material on the floor of the forest that includes fine woody debris up to 7.5 cm in diameter, tree litter, humus, and fine roots in the organic forest floor layer above mineral soil.
Soil organic carbon	Belowground carbon without coarse roots but including fine roots and all other organic carbon not included in other pools, to a depth of 1 meter.
Categories for disposition of carbon in harvested wood	
Products in use	End-use products that have not been discarded or otherwise destroyed, examples include residential and nonresidential construction, wooden containers, and paper products.
Landfills	Discarded wood and paper placed in landfills where most carbon is stored long-term and only a small portion of the material is assumed to degrade, at a slow rate.
Emitted with energy capture	Combustion of wood products with concomitant energy capture as carbon is emitted to the atmosphere.
Emitted without energy capture	Carbon in harvested wood emitted to the atmosphere through combustion or decay without concomitant energy recapture.

Table 2.—Example reforestation table with regional estimates of timber volume and carbon stocks on forest land after clearcut harvest for maple-beech-birch stands in the Northeast

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m³/ha*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	2.1	32.0	27.7	69.6	61.8
5	0.0	7.4	0.7	2.1	21.7	20.3	69.6	52.2
15	28.0	31.8	3.2	1.9	11.5	16.3	69.6	64.7
25	58.1	53.2	5.3	1.8	7.8	17.6	69.6	85.7
35	89.6	72.8	6.0	1.7	6.9	20.3	69.6	107.8
45	119.1	87.8	6.6	1.7	7.0	23.0	69.6	126.0
55	146.6	101.1	7.0	1.7	7.5	25.3	69.6	142.7
65	172.1	113.1	7.4	1.7	8.2	27.4	69.6	157.7
75	195.6	123.8	7.7	1.7	8.8	29.2	69.6	171.2
85	217.1	133.5	7.9	1.7	9.5	30.7	69.6	183.2
95	236.6	142.1	8.1	1.7	10.1	32.0	69.6	193.9
105	254.1	149.7	8.3	1.6	10.6	33.1	69.6	203.4
115	269.7	156.3	8.5	1.6	11.1	34.2	69.6	211.7
125	283.2	162.1	8.6	1.6	11.5	35.1	69.6	218.8

on land that was not forest, called "afforestation" (Appendix B). The separate set of afforestation tables accounts for lower carbon densities of down dead wood, forest floor, and soil carbon in the initial years after forest establishment on nonforest land. However, as stands mature, the level of carbon stocks in these pools approaches the regional averages represented in the reforestation tables.

The tables in Appendices A and B provide estimates of carbon stock. The net change in carbon stock (sometimes called flux) associated with a growing forest can be determined by dividing the difference between two carbon stocks by the time interval between them. (See Examples 1 and 2 for information on using these tables.)

Example 1.—Obtain values for carbon stock and net stock change for stands of maple-beech-birch in the Northeast.

Use Table 2 to determine values for live tree carbon stock at years 25 and 45 and calculate net stock change over the interval.

Reading directly from the table, live tree carbon stocks are 53.2 and 87.8 t/ha for years 25 and 45, respectively.

Net annual stock change in live tree carbon between year 25 and 45, which is from the difference in stocks divided by the length of the interval between stocks:

Net annual stock change = (87.8 – 53.2) / 20 = 1.7 t/ha/yr

The positive value for stock change indicates a net increase in carbon over the interval; this is consistent with the sign convention used for net stock change in this document. This tabular approach is applicable to all carbon pools in Appendices A, B, and C. Users must first classify the forest of interest and choose the most appropriate table.

Example 2.—Obtain an estimate of carbon stock when the value is not explicitly provided on a table, for stands of maple-beech-birch in the Northeast.

Use Table 2 to calculate live tree carbon stock of a stand with volume of wood (growing-stock volume) of 150 m^3/ha. This value is obtained by linearly interpolating between rows 7 and 8 of Table 2. The estimate of live tree carbon is between rows 7 and 8 because 150 m^3/ha is also between those two rows, and live tree carbon is a function of volume (Fig. 2).

Linear interpolation identifies a value for carbon stock between 101.1 and 113.1 t/ha that is linearly proportional to the position of 150 between 146.6 and 172.1 (from rows 7 and 8 of Table 2).

Live tree carbon (if volume is 150 m^3/ha)

$$= (150.0 - 146.6) / (172.1 - 146.6) \times (113.1 - 101.1) + 101.1$$

$$= 0.133 \times 12.0 + 101.1 \quad = 102.7 \text{ t/ha}$$

The value 0.133 means the carbon stock is 13.3 percent of the distance between the two stocks listed on the table, 101.1 and 113.1 t/ha.

Modifications to Forest Ecosystem Tables

The forest ecosystem tables provide regional averages as scenarios of forest growth and carbon accumulation, but they need not be used as the sole source of information on forest yield or carbon. For instance, a landowner may independently acquire estimates of growth or carbon accumulation that are specific to a particular carbon sequestration project. In this case, an appropriate use of the tables is to combine available data and to selectively use columns of carbon stocks to fill gaps in information.

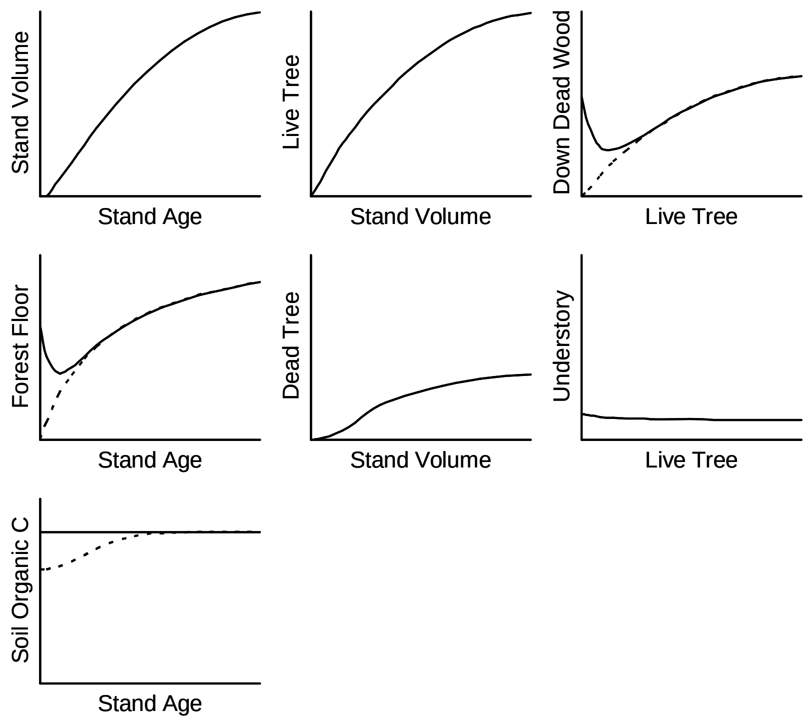

Figure 2.—Graphs indicating the basic relationships between the components of the forest ecosystem carbon tables. Figures are not drawn to scale; numerical representation for each graph is available from the tables. Dashed lines are qualitative representation of where afforestation tables (Appendix B) differ from the reforestation tables (Appendix A). Note that stand volume refers to growing-stock volume of live trees.

Users must have a general understanding of the relationships between the columns of the table to most appropriately substitute site-specific information for a carbon pool. Some columns can be viewed as independent or dependent variables, depending on the carbon pool of interest. If new data are incorporated in a table, any dependent columns (carbon pools) probably will require minor adjustments (recalculations). Figure 2 illustrates the basic relationships underlying calculations of carbon stock. Stand age and growing-stock volume are from the ATLAS model and based on FIA data such that they reflect region, forest type, and typical forest management regimes. Pools of live and standing-dead tree carbon are estimated directly from growing-stock volume. Carbon stocks of understory or down dead wood are estimated directly from live tree carbon and are only indirectly affected by growing-stock volume.

Growing-stock volume (stand volume in Figure 2) is the merchantable volume of wood in live trees as defined by FIA (Smith and others 2004c, Alerich and others 2005). Briefly, trees contributing volume to this stand-level summary value are commercial species that meet specified standards of size and quality or vigor. Users with other volume estimates for their stands must consider how to translate the volumes to be consistent with growing-stock volume. Thus, a landowner interested in applying these carbon estimates to another growth table should link tree carbon from the tables presented here to the new (separately obtained) estimates of growing-stock volume rather than to stand age (see Example 3). The methods section further explains how to use selected carbon pools from the table.

Tables for Harvested Wood Products Carbon

Harvested wood products serve as reservoirs of carbon that are not immediately emitted to the atmosphere at the time of harvest. The amount of carbon sequestered in products depends on how much wood is harvested and removed from the forest, to what products the harvested wood is allocated, and the half-life of wood in these products (Row and Phelps 1996, Skog and others 2004). The central focus of the carbon in harvested wood products estimates is the carbon change from two pools: carbon in products in use and carbon in landfills. Carbon in harvested wood is initially processed or manufactured into primary wood products, such as lumber and paper.

Example 3.—Modify a table to include independently obtained information about a forest carbon project

In this example, assume you have a project with loblolly pine established after clearcut harvest on existing forest land in the South Central region. The volume yields (Wenger, 1984) are:

Age	Mean volume
years	*m³/ha*
0	0.0
10	30.6
15	122.6
20	187.9
25	238.9
30	277.9

The appropriate carbon table is Table A47, which is partially duplicated for this example. The goal is to construct a hybrid table from the new growth and yield estimates (columns 1-2) and the appropriate estimates for each of the carbon pools (columns 3-8).

A47.—Regional estimates of timber volume and carbon stocks for loblolly and shortleaf pine stands on forest land after clearcut harvest in the South Central

Age	Mean Volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m³/ha*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.2	9.2	12.2	41.9	25.6
5	0.0	10.8	0.7	4.7	7.7	6.5	41.9	30.3
10	19.1	23.1	1.3	3.9	6.8	6.4	41.9	41.5
15	36.7	32.4	1.6	3.5	6.2	7.5	41.9	51.2
20	60.4	42.2	1.8	3.3	5.9	8.7	41.9	61.9
25	85.5	52.0	2.0	3.1	5.8	9.8	41.9	72.8
30	108.7	59.6	2.1	3.0	5.8	10.7	41.9	81.2
35	131.2	66.6	2.3	2.9	5.9	11.5	41.9	89.1
40	152.3	73.1	2.3	2.9	6.0	12.2	41.9	96.4

To construct the modified table, copy the first two columns directly from the new yield table and then interpolate some of the carbon pool densities from Table A47. Estimates for live- and standing dead trees are dependent on growing-stock volume (as indicated in Fig. 2). These values can be determined by linear interpolation as described in Example 2. Similarly, understory and down dead wood stocks, which are dependent on the updated live tree carbon stocks (Fig. 2), can be determined by interpolation. For example, the value of down dead wood carbon stock in row two is based on linearly interpolating between rows three and four of Table A47, that is, down dead wood = (29.2 - 23.1) / (32.4 - 23.1) × (6.2 - 6.8) + 6.8 = 6.4 t/ha. Interpolation is not necessary for estimates of forest floor or soil organic carbon. Forest floor is a function of stand age, and soil organic carbon is 41.9 t/ha.

The resulting modified defaults for South Central loblolly pine based on separately obtained growth and yield:

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m³/ha*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.2	9.2	12.2	41.9	25.6
10	30.6	29.2	1.5	3.6	6.4	6.4	41.9	47.1
15	122.6	63.9	2.2	2.9	5.8	7.5	41.9	82.3
20	187.9	83.7	2.5	2.8	6.3	8.7	41.9	104.0
25	238.9	98.2	2.7	2.6	7.0	9.8	41.9	120.3
30	277.9	109.1	2.8	2.6	7.6	10.7	41.9	132.8

These are then incorporated into end-use products, such as houses and newspapers. Intact primary and end-use products are considered “in use” until they are discarded, and a portion of these discarded products go to landfills. Additionally, a portion of carbon initially sequestered as products is eventually returned to the atmosphere through mechanisms such as combustion and decay. This emitted carbon is classified according to whether it occurred through a process of combustion with some concomitant energy recapture. This distinction between the two paths for carbon emitted to the atmosphere is included to assess potential displacement of other fuel sources. The four categories for the disposition of carbon in harvested wood are defined in Table 1. Note that the carbon in the four categories sum to 100 percent of the carbon harvested and removed from the forest.

The path that transforms trees-in-forests to wood-in-products can be described by the diagram in Figure 3. Quantities defined for the first three boxes in the diagram can serve as starting points, or data sources, for determining the disposition of carbon in wood products. Consistent with this, we provide factors for starting calculations of carbon in harvested wood products on the bases of forestland, the amount of industrial roundwood harvested, or the quantity of primary wood products produced by mills, depending on the data available (see definitions and details in the methods section). The forestland, or land-based, estimates are an extension of the forest ecosystem tables presented above. The other two starting points can be classified as product-based calculations, which are based on harvested logs or the output of mills. It is important to note that calculations from all three starting points (Fig. 3) focus on the same quantities of products in use or in landfills, and they all rely on the same model of allocation and longevity of end uses. They differ only in the level of detail available as the principal source of information on harvested wood—the path from input data to final disposition (Fig. 3). In the methods section, we provide the interrelated methods for calculating carbon in harvested wood for each of these starting points. Additionally, Appendix D provides background data and details on these calculations for wood products.

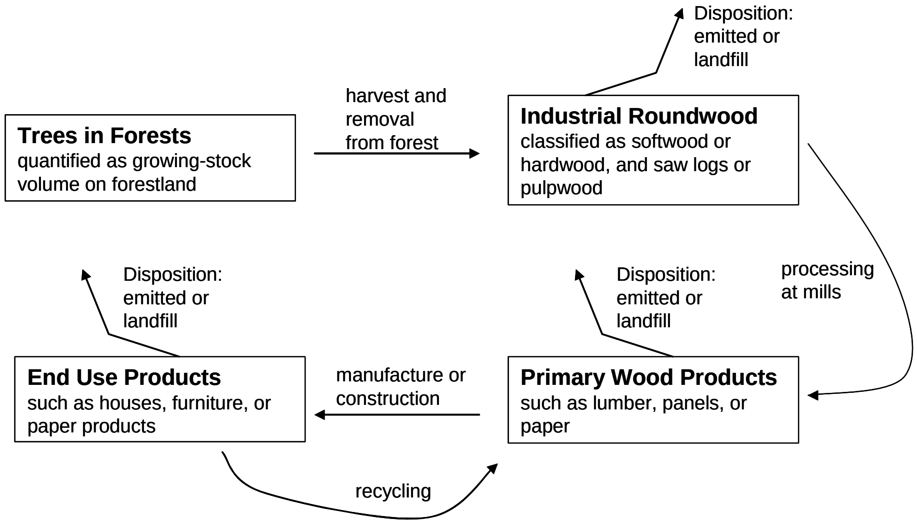

Figure 3.—The transition of carbon in forest trees to end-use products represented by a sequence of distinct pools separated by processes that move carbon between pools. Calculations of carbon in harvested wood products may start with any of the first three pools: trees in forests, industrial roundwood, or primary wood products.

Land-Based Estimates

The land-based estimates are provided as an additional set of forest ecosystem tables with harvest scenarios, which provide carbon estimates for harvested wood products over an interval after harvest (see Table 3 and Appendix C). At harvest, a large portion of carbon in tree biomass is allocated to the harvested wood pools, a second portion is assumed to decay rapidly after harvest (emitted at harvest), and the remainder stays on site in the forest as down dead wood or forest floor. The "emitted at harvest" carbon is assumed emitted at site soon after harvest; this is included to distinguish it from the two products emissions categories, which are emissions associated with processing, use, or disposal of harvested wood after removal from the site. Tree biomass allocated to harvested wood is removed from the site for processing, and it is allocated to the four disposition categories defined in Table 1. Changes in the allocation of this pool of harvested carbon among the categories are tracked over time following harvest (see columns 10, 11, 12, and 13 of Table 3). Note that the harvested products carbon pools are also quantified as carbon densities, that is, tonnes per unit area (acres or hectares), because they are derived from land-based carbon densities.

These land-based estimates of carbon in harvested wood need not be limited to the examples in Table 3 or Appendix C. Similar calculations are possible for other harvest quantities, stand ages, or forest types. Factors for estimating and allocating harvested carbon from the forest ecosystem tables are included in Tables 4, 5, and 6. These are used to calculate the disposition of carbon in harvested wood products (see Example 4). The stand-level volume of growing stock in live trees, such as 172.1 m^3/ha in Table 3, is used as a starting point to estimate total carbon in harvested wood. Growing-stock volume from the ecosystem table is converted to categories of industrial roundwood carbon mass according to factors in Tables 4 and 5. The disposition of this carbon in wood products is then allocated according to Table 6. Additional information on the use or adaptation of the harvest scenario tables can be found in the methods section that follows, Example 4, and Appendix D.

Product-Based Estimates

Harvest information is often available in the form of wood delivered to mills or the output of mills. These product amounts may be used as the starting point for calculating the disposition of carbon. Specifically, these starting points are industrial roundwood logs or primary

Table 3.—Example harvest scenario table with regional estimates of timber volume, carbon stocks, and carbon in harvested wood products on forest land after clearcut harvest for maple-beech-birch stands in the Northeast

	Mean volume		Mean carbon density										
Age	Inventory	Harvested	Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Products in use	In landfills	Emitted with energy capture	Emitted without energy capture	Emitted at harvest
years	------- *m³/hectare* -------		-- *tonnes carbon/hectare* --										
0	0.0		0.0	0.0	2.1	0.0	0.0	52.2					
5	0.0		7.4	0.7	2.1	0.5	4.2	52.3					
15	28.0		31.8	3.2	1.9	2.3	10.8	53.7					
25	58.1		53.2	5.3	1.8	3.8	15.8	56.0					
35	89.6		72.8	6.0	1.7	5.2	19.7	58.9					
45	119.1		87.8	6.6	1.7	6.2	22.7	61.8					
55	146.6		101.1	7.0	1.7	7.2	25.3	64.4					
65	0.0	172.1	0.0	0.0	2.1	32.0	27.7	66.3	34.5	0.0	39.7	14.1	7.5
5	0.0		7.4	0.7	2.1	21.7	20.3	67.1	22.9	4.7	43.1	17.5	
15	28.0		31.8	3.2	1.9	11.5	16.3	68.2	13.2	8.1	46.2	20.7	
25	58.1		53.2	5.3	1.8	7.8	17.6	68.9	10.3	8.8	47.1	22.0	
35	89.6		72.8	6.0	1.7	6.9	20.3	69.2	8.7	9.1	47.5	22.9	
45	119.1		87.8	6.6	1.7	7.0	23.0	69.4	7.6	9.4	47.8	23.5	
55	146.6		101.1	7.0	1.7	7.5	25.3	69.5	6.7	9.6	47.9	24.0	
65	0.0	172.1	0.0	0.0	2.1	32.0	27.7	69.5	40.4	9.8	87.8	38.5	7.7

NOTE: Emitted column is shown as positive values so that all nonsoil columns can be summed to check totals.

wood products (such as lumber, panels, or paper) as indicated in Figure 3. Thus, quantities are of total carbon and not directly linked to forest area. The disposition of carbon in products based on an initial quantity, or carbon mass, of industrial roundwood is allocated according to Table 6. The specific carbon content of primary wood products is calculated from factors in Table 7. The disposition of carbon over time for these primary products is according to factors in Tables 8 and 9, which provide the fractions of carbon from original primary products that remain in use or in landfills, respectively. Again, additional information on the use or adaptation of the tables for product-based calculations can be found in the section that follows, Examples 5 and 6, and Appendix D.

Methods and Data Sources for Tables

The purpose of this section is to provide detailed information on data sources, models, and assumptions used in developing the tables or calculations described earlier. Also, we outline linkages between the carbon calculations. These further illustrate how the tables were developed and updated, how the methods were applied, and provide information needed to further modify or customize the tabular carbon summaries.

In these tables, we provide estimates for as many as ten carbon pools. Forest structure provides a convenient modeling framework for assigning carbon to one of six distinct forest ecosystem pools: live trees, standing dead trees, understory vegetation, down dead wood, forest floor, and soil organic carbon (Table 1). These pools are consistent with guidelines of the Intergovernmental Panel on Climate Change (Penman and others 2003). The disposition of carbon in harvested wood is summarized in four categories that describe the end-fate of the harvested wood: products in use, landfills, emitted with energy capture, and emitted without energy capture (see definitions in Table 1).

Example 4.—Calculate carbon in harvested wood products remaining in use at 15 years after harvest based on volume of growing stock at time of harvest

Starting with an example from the Pacific Northwest, we will calculate the disposition of carbon in harvested wood products that are still in use at 15 years after harvest from the Douglas-fir forest described in Table C12. More specifically, we will show the steps involved to calculate that 53.3 t/ha of harvested carbon are in use at 15 years after harvest, starting from a harvested growing-stock volume of 718.8 m^3/ha (Table C12). We use factors from Tables 4, 5, and 6. These calculations are land-based estimates of carbon in harvested wood products based on the "trees in forests" starting point identified in Figure 3. Additional details on expanding these calculations to other harvested wood categories within the table or to other forest types are in Appendix D.

The sequence of steps required to determine carbon in use at year 15 are: 1) convert growing-stock volume to carbon mass according to four categories; 2) convert carbon in growing-stock volume to carbon in industrial roundwood; and 3) determine carbon remaining in products at the appropriate year.

Step 1: We assume that an average harvest for a forest type group produces roundwood logs that can be classified as softwood or hardwood as well as saw logs and pulpwood. The conversion from volume of wood to carbon mass depends on the specific carbon content of wood. Factors in Table 4 are used to allocate the 718.8 m^3/ha of growing-stock volume to four separate classes of carbon. For example, carbon in the softwood saw log part of growing-stock volume is the product of: growing-stock volume, the softwood fraction of growing-stock volume, the saw log fraction of softwood, softwood specific gravity, and the carbon fraction of wood, which is 50 percent carbon by dry weight. The calculations from Table 4 are:

Softwood saw log carbon in growing-stock volume
$= 718.8 \times 0.959 \times 0.914 \times 0.440 \times 0.5 = 138.61$ t/ha
Softwood pulpwood carbon in growing-stock volume
$= 718.8 \times 0.959 \times (1 - 0.914) \times 0.440 \times 0.5 = 13.04$ t/ha
Hardwood saw log carbon in growing-stock volume
$= 718.8 \times (1 - 0.959) \times 0.415 \times 0.426 \times 0.5 = 2.61$ t/ha
Hardwood pulpwood carbon in growing-stock volume
$= 718.8 \times (1 - 0.959) \times (1 - 0.415) \times 0.426 \times 0.5 = 3.67$ t/ha

Thus, total carbon stock in 718.8 m^3/ha of growing-stock volume is 183.60 t/ha.

Step 2: We need to represent carbon in these four categories in terms of carbon in industrial roundwood, which excludes bark and fuelwood. However, not all growing-stock volume is removed from the site of harvest as roundwood, and some industrial roundwood is from non-growing stock sources. Factors in Table 5 are used to obtain carbon in industrial roundwood. For example, carbon in industrial roundwood is the product of: carbon in growing-stock volume, the fraction of growing-stock volume that is removed as roundwood, and the ratio of industrial roundwood to growing-stock volume removed as roundwood. The calculations from Table 5 are:

Softwood saw log carbon in industrial roundwood $= 138.61 \times 0.929 \times 0.965 = 124.26$ t/ha
Softwood pulpwood carbon in industrial roundwood $= 13.04 \times 0.929 \times 1.099 = 13.31$ t/ha
Hardwood saw log carbon in industrial roundwood $= 2.61 \times 0.947 \times 0.721 = 1.78$ t/ha
Hardwood pulpwood carbon in industrial roundwood $= 3.67 \times 0.947 \times 0.324 = 1.13$ t/ha

Thus, total carbon stock in industrial roundwood is 148.36 t/ha.

Step 3: The disposition of carbon in harvested wood products is described by Table 6, which allocates carbon according to region, industrial roundwood category, and years since harvest and processing. The allocation factors for product in use at year 15 for Pacific Northwest, West apply here. The two hardwood categories are pooled in this region. The calculation for carbon density of products in use is the sum of the products of industrial roundwood carbon and the corresponding allocation factor, these are:

Carbon in products in use at year 15
$= (124.26 \times 0.423) + (13.31 \times 0.020) + ((1.78 + 1.03) \times 0.174) = 53.33$ t/ha.

Example 5.—Calculate the disposition of carbon in harvested wood products at 100 years after harvest and processing from industrial roundwood data

Using Table 6, assume that a harvest in the Northeast produced 2,000 t dry weight of industrial roundwood. This represents 1,000 t of carbon because wood is assumed to be 50 percent carbon. The roundwood was harvested in the following proportions: 79 t carbon as softwood sawtimber, 51 t as softwood pulpwood, 465 t of hardwood sawtimber, and 405 t of hardwood pulpwood. Also assume that these quantities represent industrial roundwood without bark and exclude fuelwood; thus, Table 6 is the correct choice to calculate the disposition of carbon.

The four industrial roundwood categories are allocated to the classifications for the disposition of carbon in wood products by the appropriate factors for 100 years after production from the Northeast portion of Table 6.

Total carbon in use
$= (79 \times 0.095) + (51 \times 0.006) + (465 \times 0.035) + (405 \times 0.103) = 65.80$ t
Total carbon in landfills
$= (79 \times 0.223) + (51 \times 0.084) + (465 \times 0.281) + (405 \times 0.158) = 216.56$ t
Total carbon emitted with energy recapture
$= (79 \times 0.338) + (51 \times 0.510) + (465 \times 0.387) + (405 \times 0.336) = 368.75$ t
Total carbon emitted without energy recapture
$= (79 \times 0.344) + (51 \times 0.400) + (465 \times 0.296) + (405 \times 0.403) = 348.43$ t

Total carbon in industrial roundwood after 100 years is the sum of the four pools. Note that the total in this example is 999.5 t and not the 1,000 t we started with; this is due to rounding.

Forest Ecosystem Carbon

Forest ecosystem carbon is significantly affected by the following factors: region of the United States, forest type, previous land use, management, and productivity. The development and format of the tables are based on Birdsey (1996): current stand-level carbon and growth-and-yield models were compiled as forest carbon yield tables. Forest types correspond to definitions in the FIADB and represent common productive forests within each region.

The first two columns in each forest ecosystem table represent an age-volume relationship (also known as a yield curve) based on information from the timber projection model ATLAS (Mills and Kincaid 1992 with updates for Haynes 2003). ATLAS uses data on timber growth and yield and FIA data to develop a set of tables of growing-stock volume for projecting large-scale forest inventories representing U.S. forests for various policy scenarios. The yields (age-volume) represented in Appendices A, B, and C are broad averages; the basic set is from the appendix tables in Mills and Zhou (2003). Stand ages included in the tables are from the ATLAS yields, and these were limited to 90 years in the South and 125 years elsewhere. We assume all age-volume relationships are based on an average level of planting or stand establishment, that is, after clearcut harvest (reforestation) or as a part of stand establishment (afforestation). Additional tables are included for Southern pines and some Pacific Northwest forests to reflect stands with relatively higher productivity or more intensive management practices (see specific tables in Appendices A through C). These yields are based on ATLAS and timber projections prepared for Haynes (2003).

Example 6.—Calculate stocks of carbon in harvested wood products based on having primary wood products data such as products from a mill

Given the information on softwood lumber and softwood plywood produced from 2000 to 2003 (in the following tabulation) we use Tables 7, 8, and 9 to calculate: 1) carbon in the primary products, 2) the accumulation of carbon stocks over a period of 4 years, and 3) total carbon stocks after 100 years. Note that Tables 8 and 9 provide the fraction of primary product remaining for a given number of years after processing; this example assumes that harvest and processing are at the beginning of each year (2000-2003) and estimates for the amount remaining apply to the end of each year. This is an application of calculating the disposition of carbon in harvested wood based on quantities of primary wood products, as described in Figure 3.

Step 1: Determine initial carbon stocks for two primary products based on given quantities produced each year over the 4-year period by using factors from Table 7. For example, 93,000 thousand board feet softwood lumber × 0.443 = 41,199 t carbon.

The initial carbon stocks for two primary products, softwood lumber and softwood plywood:

Year	Quantity of primary product		Carbon stock	
	Softwood lumber	Softwood plywood	Softwood lumber	Softwood plywood
	thousand board feet	*thousand square feet, 3/8-inch basis*	*tonnes carbon*	*tonnes carbon*
2000	93,000	183,000	41,199	43,188
2001	85,000	175,000	37,655	41,300
2002	95,000	170,000	42,085	40,120
2003	100,000	173,000	44,300	40,828

Step 2: Calculate carbon stocks in end uses and landfills for each product for each year after production for the period 2000-2003 based on inputs of wood harvested and processed in each year. Use Tables 8 and 9 to determine stocks for each year since processing. Note that each of the 20 intermediate values in the following tabulation is based on the sum of carbon contributed from softwood lumber and softwood plywood. For example, the carbon stocks of primary products produced in 2001 are 37,655 t of softwood lumber and 41,300 t of softwood plywood. From this, a total of 3,820 t are in landfills at the end of 2003 (after 3 years). The quantity is calculated as: 3,820 t = (37,655 × 0.051) + (41,300 × 0.046).

Disposition of carbon in primary wood products over four years:

Year of production	Carbon in end uses at end of:				Carbon in landfills at end of:			
	2000	2001	2002	2003	2000	2001	2002	2003
2000	82,238	80,130	78,150	76,255	1,433	2,824	4,088	5,352
2001		76,947	74,977	73,127		1,339	2,640	3,820
2002			80,106	78,049			1,399	2,757
2003				82,952				1,451
Total	82,238	157,078	233,233	310,382	1,433	4,163	8,127	13,379

Thus, total carbon stocks for the end of 2002 are 241,360 t, with 233,233 t in end uses and 8,127 t in landfills. The balance of the cumulative total carbon in products from 2000 through 2002 has been emitted to the atmosphere, that is, 245,547 t initially in primary products minus the 241,360 t sequestered equals 4,187 t emitted from the primary products by 2002.

Step 3: Calculate carbon remaining in end uses or in landfills at 100 years after each of the harvest years. The estimates are based on initial stocks of carbon in each primary product multiplied by the respective fraction remaining as obtained from Tables 8 and 9. For example, carbon in primary product from harvest and processing in 2000 and in use at 100 years is 20,222 t = (41,199 × 0.234) + (43,188 × 0.245).

Year of production	Carbon in: End uses	Carbon in: Landfills
	tonnes carbon	
2000	20,222	33,961
2001	18,930	31,770
2002	19,677	33,092
2003	20,369	34,273
Total	79,198	133,096

Thus, of the 245,547 t of carbon in primary products produced from 2000 through 2002, 24 percent remain sequestered in products in use, 40 percent in landfills, and 36 percent emitted to the atmosphere.

Carbon estimates are derived from the individual carbon-pool estimators in FORCARB2 (Heath and others 2003, Smith and others 2004a, Smith and Heath 2005). FORCARB2 is essentially a national empirical simulation and carbon-accounting model that produces stand-level, inventory-based estimates of carbon stocks for forest ecosystems and regional estimates of carbon in harvested wood. Estimates of carbon in live and standing dead trees are based on the methods of Jenkins and others (2003) and Smith and others (2003). A new set of stand level volume-to-biomass equations[3] was calibrated to the FIADB available on the Internet as of July 29, 2005 (USDA For. Serv. 2005). These are the bases for the carbon values for live and standing dead trees provided here. However the volume-based estimates of tree carbon from FORCARB2 required minor modification for the tables because many yield curves specify zero volume at both 0 and 5 years. This produced discontinuities over time in the estimates of tree carbon, usually in the second and third age classes. Carbon in tree biomass is accruing even if sapling trees remain below the threshold for classification of growing-stock volume[4] but above the classification size where trees are considered part of the understory. Therefore, tree carbon at the first row of the table is set to zero, and carbon for year 5 (and occasionally the third age class) is based on a modification of the volume-based estimates. Briefly, a subset of the FIADB with younger stands was used to develop age-based regressions with biomass from tree data (Jenkins and others 2003); these regressions converged with the volume-based estimates, usually by age 10 to 15. We used a ratio of the two estimates to smooth estimates between the second and third age classes.

Estimates in carbon density in understory vegetation are based on Birdsey (1996); estimates of carbon density in down dead wood were developed by FORCARB2 simulations. Estimates of these two pools are based on region, forest type, and live-tree biomass. (For additional discussion or example values, see Smith and others (2004b) and Smith and Heath (2005)). The carbon density of forest floor is a function of region, forest type, and stand age (Smith and Heath 2002). Estimates of soil organic carbon are based on the national STATSGO spatial database (USDA Soil Conserv. Serv. 1991) and the general approach described by Amichev and Galbraith (2004). These represent average soil organic carbon by region and forest type in the Forest Service's Renewable Resources Planning Act (RPA) 2002 Forest Resource Assessment database. For additional information, see USDA For. Serv. (2005) and Smith and others (2004c).

[3]Contact the authors for additional information on the volume-to-biomass equations updated from Smith and others (2003).

[4]The minimum tree size for growing stock is 5 inches d.b.h.; significant tree carbon can accumulate in a stand before trees reach this threshold.

Slight modifications to the direct application of FORCARB2 estimators were incorporated to develop the reforestation (Table 2 and Appendix A) and afforestation (Appendix B) tables. The reforestation tables are based on the assumption that at harvest, a portion of slash becomes down dead wood or forest floor at the start of the next rotation; these additional components then decay with time in the new stand (Smith and Heath 2002). The initial carbon densities for down dead wood and forest floor are listed in the first row of the Appendix A tables. Values for down dead wood are proportional to levels at the time of harvest and added logging residue (based on Johnson (2001)). Decay rates for down dead wood and forest floor are calculated from Turner and others (1995) and Smith and Heath (2002). The afforestation tables are based on the reforestation tables with the assumption that the residual carbon of down dead wood and forest floor material remaining after harvest does not exist at the start of the afforested stands. Thus, these pools are set to zero at the first row of the table. Accumulation of soil organic carbon in previously nonforest land (the afforestation tables) is based on the accumulation function described in West and others (2004) with the assumption that soil carbon density is initially at 75 percent of the average forest value, which is within the range of values associated with soil organic carbon after deforestation (Lal 2005). Users with more specific data about soil organic carbon or effects of previous land use can easily modify the tables to reflect this information.

The tables are designed to accommodate modification or replacement of selected data. Estimates for years or stand volumes not defined explicitly can be determined with linear interpolation (Example 2). The separate carbon pools, according to column, allow the user to extract or substitute values as needed to complement separately obtained site-specific information. However, users should be aware of the relationships between the parts as described in Figure 2 to substitute columns.

Figure 2 can be used as a guide in customizing tables. As an example, a user with a model of stand growth for a particular project but still wishing to use the carbon estimates from a table should: 1) choose an appropriate carbon table by matching forest type, 2) make the appropriate substitutions of new data, and 3) then recalculate the carbon columns affected by the substitution. After the age and volume columns are replaced, recalculations based on interpolation are required for carbon pools of live and standing dead trees, understory vegetation, and down dead wood. Forest floor is determined by stand age, and values of soil carbon depend on assumptions that apply to reforestation or afforestation (Fig. 2). The substitutions and recalculations can be made by using a spreadsheet. Example 3 expands on this discussion and provides a numerical example.

As illustrated in Figure 2, most of the relationships between columns of the tables are nonlinear. As a consequence, small errors are possible when interpolating between two points, such as in the volume to tree carbon pairs. However, these errors likely will be minimal. The nonlinearity can produce more significant errors if the tables are applied to aggregate summaries of large forest areas, that is, substantially greater than 10,000 ha (Smith and others 2003). As a result, it is best to apply the tables to relatively smaller forest areas versus calculating large aggregate volume and area.

Harvested Wood Carbon

The basic information required for calculating the disposition of carbon in harvested wood products based on each of the three starting points (Fig. 3) are in Tables 4 through 9. The purpose of this section is to provide sufficient background so that a user can apply these tables. However, some users may want to modify the estimates to incorporate alternate data or assumptions, so we also provide background data and detailed explanations in Appendix D of how these tables are generated.

Methods for calculating the disposition of carbon in harvested wood and the starting points for making such calculations are organized according to the diagram in Figure 3. These starting points, which correspond to possible sources of data (independent variables) are: 1) the volume of wood in a forest available for harvest and subsequent processing (for example, growing-stock volumes in Tables 2 and 3); 2) industrial roundwood harvest from a forest in the form of saw logs and pulpwood, which is a measure of wood available for processing at mills; and 3) primary wood products, that is products produced at mills, such as lumber, panels, or paper. We discuss methods and application of each of these, beginning with estimates based on primary wood products as inputs.

The model that allocates carbon over time since harvest is the same for all three starting points, and this model is based on primary wood products (see Appendix D for details). Thus, the disposition is a function of primary wood product and time. Any of the additional calculations necessary for the "upstream" (see Figure 3) starting points are essentially required to translate input carbon to primary wood product equivalents. Conversely, calculations at "downstream" starting points do not quantify all pools of harvested carbon. For example, a portion of the wood harvested from a forest ecosystem is processed into primary wood products, but carbon in other biomass remains on site as logging residue or is removed from site as fuelwood or what ultimately becomes waste in the production of primary products. Thus, identifying pools such as fuelwood is necessary for starting from the forest ecosystem to partition carbon and obtain the quantity going to primary products. Quantifying fuelwood is not possible, and unnecessary, for starting from data on a quantity of primary wood products.

Before applying tables to calculate carbon in harvested wood, users should identify: 1) the starting point most appropriate for the data available, and 2) the type of summary values or results that are appropriate to the carbon accounting method and the forest carbon project. Each starting point requires slightly different input data and each accounts for somewhat different pools of carbon. Compatibility between available data and the appropriate starting point depends on identifying these differences. In addition to having different starting points to compute carbon stocks or stock change, there may be differences in information needs, such as for carbon reporting. Carbon accounting requirements may specify tracking carbon harvested in one or more years and reporting carbon sequestered at one or more later years. For example, one may be interested in tracking products associated with a particular year or may be interested in the cumulative effects of successive harvests. Alternatively, an accounting method that focuses on the long-term effects of current rates of harvest and processing on future stocks of carbon in harvested wood products requires estimates of carbon in use or in landfills at 100 years after harvest (Miner, in press). Thus, all of our projection tables extend through 100 years.

Consideration of imports or exports of harvested wood can complicate the calculations. The effect of considering the movement of harvested wood or wood products over boundaries depends on the approach used to account for carbon. Basic carbon accounting approaches, as presented by the Intergovernmental Panel on Climate Change (Penman and others 2003) are: stock-change, atmospheric-flow, and production. The accounting method presented here is a production approach: the disposition of carbon is estimated for all wood produced, including exports. Imports are excluded from accounting under the production approach. Currently, the IPCC does not provide guidelines on accounting methods for trade in harvested carbon. However, the additional information required to account for imports or exports is essentially the long-term disposition of the specific quantities of carbon imported or exported. For example, applying the calculations described in this document to exports explicitly assumes that the disposition of carbon is identical to that in products retained in the United States.

Primary Wood Products

Primary wood products such as lumber, plywood, panels, and paper are the products of mills; they provide a product-based starting point for calculating the disposition of carbon in harvested wood products (Fig. 3). Specific primary products are identified in Table 7. Manufacturing or construction incorporates these primary products into end-use products such as houses, furniture, or books. Each end-use product has an expected lifespan, and after use the primary products may be recovered for additional use, burned, or otherwise disposed of. After disposal, carbon in products is allocated to disposal pools, which ultimately leads to long-term storage in landfills or to emission to the atmosphere. Thus, the disposition of primary wood products are modeled through partitioning and residence times of a succession of intermediate pools to the final disposition categories as defined in Table 1.

Table 7 includes factors for converting primary wood products into total mass of carbon. For example, 1,000 ft^2 of ⅜-inch softwood plywood averages 0.236 tonne of carbon. Tables 8 and 9 indicate the fraction of each primary product that remains in use or in landfills, respectively, for a given number of years after harvest and production, with the assumption that harvest and production are at time zero. The tables represent national averages. Table 8 indicates the fraction of each primary product remaining in an end use product for up to 100 years after harvest and processing. For example, column 2 of Table 8 indicates that after 10 years, 77.7 percent of softwood lumber remains in an end-use product; end uses include residential or other construction, furniture, and wood containers. The change in carbon between the initial quantity of primary products and the amount specified in later years in Table 8 represents products taken out of use; these are then either sequestered in landfills or emitted to the atmosphere. Table 9 indicates the fraction of each primary product sequestered in landfills for up to 100 years after harvest and processing. In the example of softwood lumber at 10 years, the fraction is 14.1 percent (column 2 of Table 9). Thus, the remaining 8.2 percent of carbon (100-77.7-14.1) in softwood lumber has been emitted to the atmosphere by year 10.

Recycling of paper products is an assumption built into Tables 8 and 9. (See Appendix D for details on paper recycling.) The value of including the effect of recycling on the disposition of carbon in harvested wood products can depend on the carbon accounting information needed. For example, recycling can affect quantities in use or in landfills if calculations are focused on a single cohort of carbon such as paper originally produced in a specific year. That is, accounting for effects of recycling can matter if tracking carbon from a single year or owner is important. We include recycling of paper because recycling is relatively common, its effects may be important, and statistics are available to include recycling in the calculations.

Tables 8 and 9 can be used to calculate net annual change of carbon in harvested wood products, the cumulative effect of successive annual harvests, and carbon remaining at 100 years. The change in carbon stocks between successive years is net annual flux. The tables are based on the assumption that harvest and processing occur in the same year (year set to zero); they provide annual steps for 50 years. Values can be interpolated for annualized estimates between years 50 and 100. Cumulative effects of annual harvests are obtained by repeating calculations for each harvest and summing stock or stock change estimates for each year of interest. A numerical application for calculating the disposition of carbon in primary wood products is provided in Example 6, in which the cumulative effect of annual production at a mill is calculated. See Appendix D for additional information on model assumptions, values used to describe allocation and longevity, and calculations of the factors in Tables 7 through 9.

Industrial Roundwood

Roundwood[5] is logs, bolts or other round sections cut from trees for industrial manufacture or consumer use (Johnson 2001). Most roundwood is processed by mills, and it is this quantity of harvested wood that provides the industrial roundwood starting point in Figure 3. Classification of harvested wood as roundwood is commonly a part of regional or State-wide statistics on timber harvesting or processing (Johnson 2001, Smith and others 2004c). A regional linkage between industrial roundwood and the primary wood products model (discussed earlier) is the basis for establishing the disposition of carbon from roundwood. The allocation of industrial roundwood to domestically produced primary wood products was constructed from Adams and others (2006). The resulting model of the allocation of carbon in industrial roundwood according to region and roundwood category is represented as Table 6.

Table 6 was developed in the style of similar tables in Birdsey (1996), which are based on Row and Phelps

[5]The definition and classification of roundwood as it is used here is important to quantifying and allocating carbon in harvested wood products. Calculations are based on wood in logs for industrial manufacture. This is the majority of roundwood. The definition of roundwood can also include fuelwood, but fuelwood and bark on industrial roundwood are specifically excluded from “industrial roundwood” as used in this document. Roundwood can be classified as sawtimber versus pulpwood (for example, Birdsey 1996, Row and Phelps 1996) but the more common usage is sawtimber versus poletimber (for example, Johnson 2001) or saw logs versus pulpwood.

(1996). Inputs are carbon mass in industrial roundwood according to region and roundwood category. Total industrial roundwood is allocated to the four disposition categories (see definitions in Table 1), and changes in allocation are tracked as fractions over years 1 through 100 after manufacture or processing. Industrial roundwood is classified by region (Fig. 1) and category: softwood saw logs, softwood pulpwood, hardwood saw logs, and hardwood pulpwood. Saw logs come from larger diameter trees and generally are utilized for solid wood products; pulpwood comes from smaller diameter trees and usually is used for pulpwood products. Some industrial roundwood classifications are pooled across regions for Table 6; this is done where production of a particular type is relatively low. Industrial roundwood, as classified for Table 6, excludes bark on logs and wood used as fuelwood. The allocation of emitted carbon to the fraction associated with energy capture is based on the allocation patterns in Birdsey (1996). A numerical application of Table 6 is provided in Example 5. See Appendix D for additional background information and sample calculations used to generate Table 6.

Growing-Stock Volumes of Forest Ecosystems

The land-based starting point for calculating the disposition of carbon in harvested wood products is from the forest ecosystem carbon tables (for example, Table 3), as described in Figure 3 (trees in forests). Calculations starting with wood in forests are distinctly different from starting with products in two respects: 1) inputs are land-based measures of merchantable wood in a forest (growing-stock volume), and 2) estimates of carbon in harvested wood also include the portion of roundwood identified as fuelwood as well as bark on all logs (industrial roundwood and fuelwood). The bases for linking forest ecosystems to roundwood, and thus the disposition of carbon in products, are compilations of summary values from harvest statistics (Johnson 2001) and estimates of tree biomass (Jenkins and others 2004) applied to current FIADB survey data.

Converting growing-stock volume to carbon mass in industrial roundwood is based on factors in Tables 4 and 5. Table 4 is used to partition growing-stock volume according to species type (softwood or hardwood) and size of logs. This is followed by converting volume to carbon mass according to the carbon content of wood. These values for carbon in growing-stock volume are extended to estimates of carbon in industrial roundwood according to factors in Table 5. The disposition of carbon is then based on Table 6.

The harvest scenario tables were constructed from the ecosystem tables by appending a reforestation table (from Appendix B) to an afforestation table (from Appendix A) at a stand age designated as a clearcut harvest. Carbon in harvested wood products was added by applying factors in Tables 4 through 6. The Appendix C tables are examples of how forest carbon stocks can include carbon in harvested wood; these are not recommendations for rotation length or timing of harvest. Assumptions and background data for compiling Tables 4, 5, and 6 (as well as the other starting points for calculating carbon in harvested wood products) are included in Appendix D. Despite differences in input data and extent of harvested carbon included, all three starting points rely on the same model of allocation and longevity of end uses. They differ only in the level of detail available as the principal source of information on harvested wood (Fig. 3).

Uncertainty

Estimates of carbon stocks and stock changes are based on regional averages and reflect the current best available data for developing regional estimates. Quantitative expressions of uncertainty are not available for most data summaries, coefficients, or model results presented in the tables. However, uncertainty analyses were developed for previous similar estimates of carbon, from which our tables were developed (Heath and Smith 2000, Skog and others 2004, Smith and Heath 2005). Similar quantitative uncertainty analyses are being developed for these estimates of carbon stocks and stock changes in forests and harvested wood products.

Precision is partly dependent on the scale of the forest carbon sequestration project of interest. Overall, precision is expected to be lower as these methods are applied to smaller scale projects rather than regional summaries. That is, precision depends on the degree of specificity in information about a particular forest or project. It may be useful to distinguish between two basic components of uncertainty in the application of these tables. Uncertainty about the regional averages, which are based on data summaries or models, can influence estimates for specific projects, which generally are small subsets of a region. However, variability within region likely will have a much greater influence on uncertainty than regional values. This is shown in Figure 4, which is an example of the volume-to-biomass relationships used to estimate tree carbon from merchantable volume (columns 2 and 3 in Table 2). Each point represents an individual permanent FIA inventory plot where the 95-percent confidence interval about the mean of carbon in live trees is generally less than 5 percent of the mean. The regression line represents the regional average; the 95-percent confidence intervals about this mean are indicated in Table 10. These two relative intervals reflect regional variability in biomass relative to volume. For example, the 99th percentile of stand growing-stock volumes for this forest in the FIADB is 361 m^3/ha and the mean carbon density for these plots is likely between 192 and 197 t/ha (Fig. 4, ±1.4 percent of the expected 194 t/ha). The distinction between uncertainty about coefficients and regional or temporal variability may also apply to calculating the disposition of carbon in harvested wood products as well. Uncertainty about the actual allocation of industrial roundwood to primary products may not be as important as year-to-year change or how activity at a single mill compares with the region as a whole.

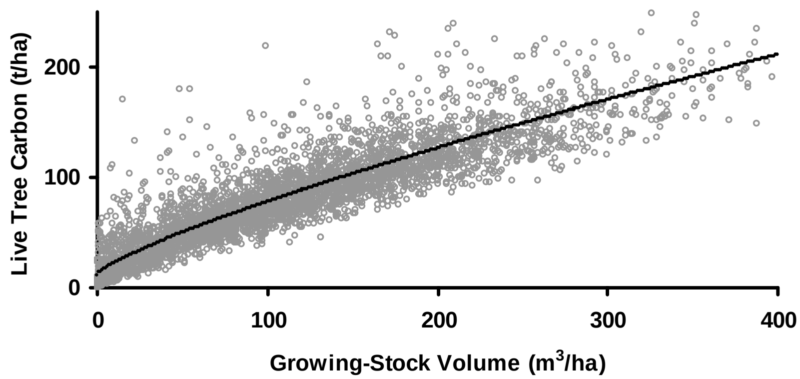

Figure 4.—A component of uncertainty associated with representing an average forest stand in the ecosystem tables. Individual points represent live tree carbon density for FIA permanent inventory plots for maple-beech-birch forests for the Northeast; the line represents carbon in tree biomass as predicted by growing-stock volume as used in Tables 2 and 3.

Conclusions

Summing the two estimates, forest ecosystem carbon and carbon in harvested wood products, gives the total effect of forest carbon sequestration for an activity. To assure accuracy, conducting modest inventories will help show the adequacy of the tables in characterizing carbon sequestration.

Carbon estimates depend on available data. Tables of average values cannot perfectly replicate each individual stand. Growth and yield information applicable to a particular stand can provide greater precision than regional averages. Similarly, carbon stocks in wood products that are calculated from quantities of primary wood products are likely to be more precise than products calculations starting simply from area of forest. However, the link between forest and sequestration in products may be less clear when starting from primary wood products. Forest composition, site conditions, and climate differ by regions, and climate, timber markets, and forest management priorities are subject to change from year to year. The methods described in this publication are most useful in identifying a general expected magnitude of carbon in forests, and to help plan carbon sequestration projects to achieve a certain goal.

Table 4.—Factors to calculate carbon in growing stock volume: softwood fraction, sawtimber-size fraction, and specific gravity by region and forest type group[a]

Region	Forest type	Fraction of growing-stock volume that is softwood[b]	Fraction of softwood growing-stock volume that is sawtimber-size[c]	Fraction of hardwood growing-stock volume that is sawtimber-size[c]	Specific gravity[d] of softwoods	Specific gravity[d] of hardwoods
Northeast	Aspen-birch	0.247	0.439	0.330	0.353	0.428
	Elm-ash-cottonwood	0.047	0.471	0.586	0.358	0.470
	Maple-beech-birch	0.132	0.604	0.526	0.369	0.518
	Oak-hickory	0.039	0.706	0.667	0.388	0.534
	Oak-pine	0.511	0.777	0.545	0.371	0.516
	Spruce-fir	0.870	0.508	0.301	0.353	0.481
	White-red-jack pine	0.794	0.720	0.429	0.361	0.510
Northern Lake States	Aspen-birch	0.157	0.514	0.336	0.351	0.397
	Elm-ash-cottonwood	0.107	0.468	0.405	0.335	0.460
	Maple-beech-birch	0.094	0.669	0.422	0.356	0.496
	Oak-hickory	0.042	0.605	0.473	0.369	0.534
	Spruce-fir	0.876	0.425	0.276	0.344	0.444
	White-red-jack pine	0.902	0.646	0.296	0.389	0.473
Northern Prairie States	Elm-ash-cottonwood	0.004	0.443	0.563	0.424	0.453
	Loblolly-shortleaf pine	0.843	0.686	0.352	0.468	0.544
	Maple-beech-birch	0.010	0.470	0.538	0.437	0.508
	Oak-hickory	0.020	0.497	0.501	0.448	0.565
	Oak-pine	0.463	0.605	0.314	0.451	0.566
	Ponderosa pine	0.982	0.715	0.169	0.381	0.473
Pacific Northwest, East	Douglas-fir	0.989	0.896	0.494	0.429	0.391
	Fir-spruce-m.hemlock	0.994	0.864	0.605	0.370	0.361
	Lodgepole pine	0.992	0.642	0.537	0.380	0.345
	Ponderosa pine	0.996	0.906	0.254	0.385	0.513
Pacific Northwest, West	Alder-maple	0.365	0.895	0.635	0.402	0.385
	Douglas-fir	0.959	0.914	0.415	0.440	0.426
	Fir-spruce-m.hemlock	0.992	0.905	0.296	0.399	0.417
	Hemlock-Sitka spruce	0.956	0.909	0.628	0.405	0.380
Pacific Southwest	Mixed conifer	0.943	0.924	0.252	0.394	0.521
	Douglas-fir	0.857	0.919	0.320	0.429	0.483
	Fir-spruce-m.hemlock	1.000	0.946	0.000	0.372	0.510
	Ponderosa Pine	0.997	0.895	0.169	0.380	0.510
	Redwood	0.925	0.964	0.468	0.376	0.449
Rocky Mountain, North	Douglas-fir	0.993	0.785	0.353	0.428	0.370
	Fir-spruce-m.hemlock	0.999	0.753	0.000	0.355	0.457
	Hemlock-Sitka spruce	0.972	0.735	0.596	0.375	0.441
	Lodgepole pine	0.999	0.540	0.219	0.383	0.391
	Ponderosa pine	0.999	0.816	0.000	0.391	0.374

Continued

Table 4.—continued

Region	Forest type	Fraction of growing-stock volume that is softwood[b]	Fraction of softwood growing-stock volume that is sawtimber-size[c]	Fraction of hardwood growing-stock volume that is sawtimber-size[c]	Specific gravity[d] of softwoods	Specific gravity[d] of hardwoods
Rocky Mountain, South	Aspen-birch	0.297	0.766	0.349	0.355	0.350
	Douglas-fir	0.962	0.758	0.230	0.431	0.350
	Fir-spruce-m.hemlock	0.958	0.770	0.367	0.342	0.350
	Lodgepole pine	0.981	0.607	0.121	0.377	0.350
	Ponderosa pine	0.993	0.773	0.071	0.383	0.386
Southeast	Elm-ash-cottonwood	0.030	0.817	0.551	0.433	0.499
	Loblolly-shortleaf pine	0.889	0.556	0.326	0.469	0.494
	Longleaf-slash pine	0.963	0.557	0.209	0.536	0.503
	Oak-gum-cypress	0.184	0.789	0.500	0.441	0.484
	Oak-hickory	0.070	0.721	0.551	0.438	0.524
	Oak-pine	0.508	0.746	0.425	0.462	0.516
South Central	Elm-ash-cottonwood	0.044	0.787	0.532	0.427	0.494
	Loblolly-shortleaf pine	0.880	0.653	0.358	0.470	0.516
	Longleaf-slash pine	0.929	0.723	0.269	0.531	0.504
	Oak-gum-cypress	0.179	0.830	0.589	0.440	0.513
	Oak-hickory	0.057	0.706	0.534	0.451	0.544
	Oak-pine	0.512	0.767	0.432	0.467	0.537
West[e]	Pinyon-juniper	0.986	0.783	0.042	0.422	0.620
	Tanoak-laurel	0.484	0.909	0.468	0.430	0.459
	Western larch	0.989	0.781	0.401	0.433	0.430
	Western oak	0.419	0.899	0.206	0.416	0.590
	Western white pine	1.000	0.838	0.000	0.376	--

-- = no hardwood trees in this type in this region.

[a]Estimates based on survey data for the conterminous United States from USDA Forest Service, Forest Inventory and Analysis Program's database of forest surveys (FIADB; USDA For. Serv. 2005) and include growing stock on timberland stands classified as medium- or large-diameter stands. Proportions are based on volume of growing-stock trees.

[b]To calculate fraction in hardwood, subtract fraction in softwood from 1.

[c]Softwood sawtimber are trees at least 22.9 cm (9 in) d.b.h., hardwood sawtimber is at least 27.9 cm (11 in) d.b.h. To calculate fraction in less-than-sawtimber-size trees, subtract fraction in sawtimber from 1. Trees less than sawtimber-size are at least 12.7 cm (5 in) d.b.h.

[d]Average wood specific gravity is the density of wood divided by the density of water based on wood dry mass associated with green tree volume.

[e]West represents an average over all western regions for these forest types.

Table 5.—Regional factors to estimate carbon in industrial roundwood logs, bark on logs, and fuelwood

Region[a]	Timber type	Industrial roundwood category	Ratio of industrial roundwood to growing-stock volume removed as roundwood[b]	Ratio of carbon in bark to carbon in wood[c]	Fraction of growing-stock volume removed as roundwood[d]	Ratio of fuelwood to growing-stock volume removed as roundwood[b]
Northeast	SW	Saw log	0.991	0.182	0.948	0.136
		Pulpwood	3.079	0.185		
	HW	Saw log	0.927	0.199	0.879	0.547
		Pulpwood	2.177	0.218		
North Central	SW	Saw log	0.985	0.182	0.931	0.066
		Pulpwood	1.285	0.185		
	HW	Saw log	0.960	0.199	0.831	0.348
		Pulpwood	1.387	0.218		
Pacific Coast	SW	Saw log	0.965	0.181	0.929	0.096
		Pulpwood	1.099	0.185		
	HW	Saw log	0.721	0.197	0.947	0.957
		Pulpwood	0.324	0.219		
Rocky Mountain	SW	Saw log	0.994	0.181	0.907	0.217
		Pulpwood	2.413	0.185		
	HW	Saw log	0.832	0.201	0.755	3.165
		Pulpwood	1.336	0.219		
South	SW	Saw log	0.990	0.182	0.891	0.019
		Pulpwood	1.246	0.185		
	HW	Saw log	0.832	0.198	0.752	0.301
		Pulpwood	1.191	0.218		

SW=Softwood, HW=Hardwood.

[a]North Central includes the Northern Prairie States and the Northern Lake States; Pacific Coast includes the Pacific Northwest (West and East) and the Pacific Southwest; Rocky Mountain includes Rocky Mountain, North and South; and South includes the Southeast and South Central.

[b]Values and classifications are based on data in Tables 2.2, 3.2, 4.2, 5.2, and 6.2 of Johnson (2001).

[c]Ratios are calculated from carbon mass based on biomass component equations in Jenkins and others (2003) applied to all live trees identified as growing stock on timberland stands classified as medium- or large-diameter stands in the survey data for the conterminous United States from USDA Forest Service, Forest Inventory and Analysis Program's database of forest surveys (FIADB; USDA For. Serv. 2005, Alerich and others 2005). Carbon mass is calculated for boles from stump to 4-inch top, outside diameter.

[d]Values and classifications are based on data in Tables 2.9, 3.9, 4.9, 5.9, and 6.9 of Johnson (2001).

Table 6.—Average disposition patterns of carbon as fractions in industrial roundwood by region and roundwood category; factors assume no bark on industrial roundwood, which also excludes fuelwood

	Northeast, Softwood							
	Saw log				Pulpwood			
Year after production	In use	Landfill	Energy	Emitted without energy	In use	Landfill	Energy	Emitted without energy
0	0.569	0.000	0.240	0.190	0.513	0.000	0.306	0.181
1	0.542	0.014	0.246	0.197	0.436	0.025	0.334	0.204
2	0.517	0.027	0.252	0.203	0.372	0.046	0.359	0.223
3	0.495	0.039	0.257	0.209	0.317	0.063	0.381	0.239
4	0.474	0.050	0.262	0.214	0.271	0.077	0.399	0.253
5	0.455	0.060	0.266	0.219	0.232	0.088	0.415	0.265
6	0.438	0.069	0.270	0.223	0.197	0.098	0.429	0.276
7	0.422	0.078	0.274	0.227	0.167	0.106	0.441	0.286
8	0.406	0.085	0.277	0.231	0.139	0.113	0.452	0.296
9	0.392	0.093	0.281	0.235	0.114	0.118	0.463	0.305
10	0.379	0.099	0.284	0.238	0.093	0.123	0.472	0.313
15	0.326	0.126	0.296	0.252	0.037	0.128	0.497	0.338
20	0.288	0.144	0.304	0.264	0.021	0.122	0.505	0.352
25	0.259	0.158	0.311	0.273	0.016	0.114	0.509	0.362
30	0.234	0.168	0.316	0.281	0.014	0.107	0.510	0.369
35	0.214	0.176	0.321	0.289	0.013	0.102	0.510	0.376
40	0.197	0.183	0.324	0.296	0.012	0.098	0.510	0.381
45	0.182	0.189	0.327	0.302	0.011	0.094	0.510	0.385
50	0.169	0.194	0.330	0.307	0.010	0.092	0.510	0.388
55	0.158	0.198	0.332	0.312	0.009	0.090	0.510	0.391
60	0.148	0.202	0.333	0.317	0.009	0.088	0.510	0.393
65	0.139	0.205	0.335	0.321	0.008	0.087	0.510	0.395
70	0.131	0.208	0.336	0.325	0.008	0.086	0.510	0.396
75	0.124	0.211	0.337	0.328	0.007	0.086	0.510	0.397
80	0.117	0.214	0.337	0.332	0.007	0.085	0.510	0.398
85	0.111	0.216	0.338	0.335	0.007	0.085	0.510	0.399
90	0.106	0.219	0.338	0.338	0.006	0.085	0.510	0.399
95	0.100	0.221	0.338	0.341	0.006	0.084	0.510	0.400
100	0.095	0.223	0.338	0.344	0.006	0.084	0.510	0.400

Continued

Table 6.—continued

Year after production	Northeast, Hardwood							
	Saw log				Pulpwood			
	In use	Landfill	Energy	Emitted without energy	In use	Landfill	Energy	Emitted without energy
0	0.614	0.000	0.237	0.149	0.650	0.000	0.185	0.166
1	0.572	0.025	0.246	0.157	0.590	0.021	0.202	0.186
2	0.534	0.048	0.255	0.163	0.539	0.039	0.218	0.203
3	0.500	0.067	0.263	0.170	0.496	0.054	0.232	0.218
4	0.469	0.085	0.271	0.175	0.459	0.067	0.244	0.231
5	0.440	0.102	0.278	0.180	0.426	0.078	0.254	0.242
6	0.415	0.116	0.284	0.185	0.398	0.087	0.263	0.253
7	0.391	0.129	0.290	0.190	0.372	0.095	0.271	0.262
8	0.369	0.141	0.295	0.194	0.349	0.102	0.279	0.271
9	0.349	0.152	0.300	0.198	0.327	0.108	0.286	0.279
10	0.331	0.162	0.305	0.202	0.308	0.114	0.292	0.286
15	0.260	0.198	0.324	0.218	0.252	0.127	0.310	0.311
20	0.212	0.221	0.338	0.229	0.226	0.130	0.319	0.325
25	0.178	0.235	0.348	0.239	0.211	0.131	0.323	0.335
30	0.152	0.245	0.356	0.247	0.198	0.132	0.327	0.343
35	0.131	0.253	0.362	0.254	0.187	0.133	0.329	0.351
40	0.115	0.258	0.368	0.260	0.178	0.134	0.331	0.357
45	0.102	0.262	0.372	0.265	0.169	0.136	0.333	0.363
50	0.090	0.265	0.375	0.269	0.160	0.138	0.334	0.368
55	0.081	0.268	0.378	0.273	0.153	0.140	0.335	0.373
60	0.073	0.270	0.380	0.277	0.146	0.142	0.335	0.377
65	0.066	0.272	0.382	0.280	0.139	0.144	0.336	0.381
70	0.059	0.274	0.384	0.283	0.133	0.146	0.336	0.385
75	0.054	0.275	0.385	0.286	0.127	0.148	0.336	0.388
80	0.049	0.277	0.386	0.288	0.122	0.150	0.336	0.392
85	0.045	0.278	0.386	0.290	0.117	0.152	0.336	0.395
90	0.041	0.279	0.387	0.293	0.112	0.154	0.336	0.398
95	0.038	0.280	0.387	0.294	0.108	0.156	0.336	0.400
100	0.035	0.281	0.387	0.296	0.103	0.158	0.336	0.403

Continued

Table 6.—continued

Year after production	North Central, Softwood							
	Saw log				Pulpwood			
	In use	Landfill	Energy	Emitted without energy	In use	Landfill	Energy	Emitted without energy
0	0.630	0.000	0.249	0.121	0.514	0.000	0.305	0.180
1	0.599	0.016	0.257	0.127	0.438	0.025	0.332	0.204
2	0.570	0.032	0.265	0.133	0.374	0.046	0.356	0.223
3	0.544	0.045	0.272	0.138	0.320	0.063	0.377	0.240
4	0.520	0.058	0.279	0.143	0.274	0.077	0.396	0.254
5	0.499	0.069	0.285	0.147	0.235	0.088	0.411	0.266
6	0.478	0.080	0.291	0.151	0.200	0.097	0.425	0.278
7	0.459	0.090	0.296	0.154	0.170	0.105	0.437	0.288
8	0.442	0.099	0.301	0.158	0.143	0.112	0.448	0.297
9	0.425	0.107	0.306	0.162	0.118	0.118	0.458	0.306
10	0.410	0.115	0.310	0.165	0.096	0.122	0.467	0.314
15	0.349	0.145	0.327	0.178	0.041	0.127	0.491	0.340
20	0.306	0.166	0.339	0.189	0.024	0.121	0.500	0.354
25	0.272	0.181	0.348	0.198	0.020	0.113	0.503	0.364
30	0.245	0.193	0.356	0.206	0.018	0.107	0.504	0.372
35	0.222	0.202	0.362	0.213	0.016	0.101	0.504	0.378
40	0.203	0.210	0.367	0.220	0.015	0.097	0.504	0.383
45	0.187	0.216	0.371	0.226	0.014	0.094	0.504	0.387
50	0.173	0.221	0.374	0.231	0.014	0.091	0.504	0.391
55	0.161	0.225	0.377	0.236	0.013	0.089	0.504	0.393
60	0.151	0.229	0.379	0.241	0.012	0.088	0.504	0.395
65	0.141	0.233	0.381	0.245	0.012	0.087	0.504	0.397
70	0.133	0.236	0.382	0.249	0.011	0.086	0.504	0.399
75	0.125	0.239	0.383	0.253	0.010	0.086	0.504	0.400
80	0.118	0.241	0.384	0.257	0.010	0.085	0.504	0.401
85	0.112	0.244	0.385	0.260	0.009	0.085	0.504	0.401
90	0.106	0.246	0.385	0.263	0.009	0.085	0.504	0.402
95	0.101	0.248	0.385	0.266	0.009	0.085	0.504	0.402
100	0.096	0.250	0.385	0.269	0.008	0.084	0.504	0.403

Continued

Table 6.—continued

Year after production	North Central, Hardwood							
	Saw log				Pulpwood			
	In use	Landfill	Energy	Emitted without energy	In use	Landfill	Energy	Emitted without energy
0	0.585	0.000	0.253	0.162	0.685	0.000	0.165	0.150
1	0.544	0.024	0.262	0.170	0.630	0.020	0.181	0.169
2	0.507	0.046	0.271	0.177	0.582	0.038	0.196	0.184
3	0.473	0.065	0.279	0.183	0.541	0.052	0.209	0.198
4	0.443	0.082	0.286	0.189	0.506	0.064	0.219	0.210
5	0.416	0.097	0.293	0.194	0.476	0.075	0.229	0.220
6	0.391	0.111	0.299	0.199	0.448	0.084	0.237	0.230
7	0.368	0.124	0.305	0.203	0.424	0.092	0.245	0.239
8	0.347	0.135	0.310	0.208	0.401	0.099	0.252	0.247
9	0.328	0.146	0.315	0.212	0.381	0.106	0.259	0.255
10	0.310	0.155	0.320	0.216	0.362	0.111	0.265	0.262
15	0.242	0.189	0.338	0.231	0.306	0.127	0.282	0.285
20	0.197	0.210	0.350	0.243	0.278	0.132	0.291	0.299
25	0.165	0.224	0.360	0.252	0.259	0.136	0.296	0.309
30	0.140	0.233	0.367	0.260	0.244	0.138	0.300	0.317
35	0.121	0.239	0.373	0.267	0.231	0.141	0.303	0.325
40	0.106	0.244	0.378	0.272	0.219	0.144	0.306	0.331
45	0.093	0.248	0.381	0.278	0.208	0.147	0.308	0.337
50	0.083	0.251	0.384	0.282	0.198	0.150	0.309	0.343
55	0.074	0.253	0.387	0.286	0.189	0.153	0.311	0.348
60	0.066	0.255	0.389	0.290	0.180	0.156	0.312	0.353
65	0.060	0.257	0.390	0.293	0.172	0.159	0.313	0.357
70	0.054	0.259	0.391	0.296	0.164	0.161	0.313	0.361
75	0.049	0.260	0.392	0.299	0.157	0.164	0.314	0.365
80	0.045	0.261	0.393	0.301	0.150	0.167	0.314	0.368
85	0.041	0.262	0.393	0.304	0.144	0.170	0.315	0.372
90	0.038	0.263	0.393	0.306	0.138	0.172	0.315	0.375
95	0.035	0.264	0.393	0.308	0.133	0.175	0.315	0.378
100	0.032	0.265	0.393	0.309	0.127	0.177	0.315	0.381

Continued

Table 6.—continued

Year after production	Pacific Northwest, East, Softwood			
	All			
	In use	Landfill	Energy	Emitted without energy
0	0.637	0.000	0.197	0.166
1	0.601	0.016	0.207	0.176
2	0.569	0.031	0.215	0.185
3	0.541	0.043	0.223	0.192
4	0.516	0.055	0.230	0.199
5	0.494	0.065	0.236	0.205
6	0.473	0.074	0.242	0.211
7	0.454	0.083	0.247	0.216
8	0.437	0.090	0.251	0.221
9	0.420	0.098	0.256	0.226
10	0.405	0.104	0.260	0.231
15	0.351	0.127	0.274	0.248
20	0.315	0.143	0.283	0.260
25	0.287	0.154	0.289	0.270
30	0.264	0.163	0.294	0.279
35	0.245	0.170	0.298	0.287
40	0.228	0.177	0.301	0.294
45	0.213	0.182	0.304	0.301
50	0.199	0.188	0.306	0.307
55	0.187	0.192	0.308	0.313
60	0.176	0.196	0.309	0.318
65	0.166	0.200	0.310	0.323
70	0.157	0.204	0.311	0.328
75	0.149	0.207	0.311	0.333
80	0.141	0.210	0.312	0.337
85	0.134	0.213	0.312	0.341
90	0.128	0.216	0.312	0.345
95	0.121	0.219	0.312	0.348
100	0.116	0.221	0.312	0.351

Continued

Table 6.—continued

Year after production	Pacific Northwest, West, Softwoods							
	Saw log				Pulpwood			
	In use	Landfill	Energy	Emitted without energy	In use	Landfill	Energy	Emitted without energy
0	0.740	0.000	0.125	0.135	0.500	0.000	0.352	0.148
1	0.703	0.018	0.134	0.144	0.422	0.026	0.382	0.170
2	0.670	0.035	0.141	0.153	0.357	0.047	0.409	0.187
3	0.640	0.050	0.148	0.161	0.301	0.064	0.433	0.202
4	0.613	0.064	0.154	0.169	0.254	0.078	0.453	0.215
5	0.589	0.076	0.160	0.176	0.215	0.089	0.471	0.226
6	0.566	0.088	0.165	0.182	0.180	0.098	0.486	0.236
7	0.545	0.098	0.169	0.188	0.150	0.106	0.499	0.245
8	0.525	0.108	0.174	0.194	0.121	0.112	0.512	0.254
9	0.506	0.117	0.178	0.199	0.096	0.118	0.523	0.262
10	0.489	0.125	0.182	0.204	0.075	0.122	0.533	0.270
15	0.423	0.157	0.196	0.224	0.020	0.127	0.559	0.295
20	0.376	0.179	0.206	0.239	0.004	0.119	0.567	0.309
25	0.340	0.195	0.213	0.252	0.001	0.110	0.569	0.319
30	0.310	0.208	0.219	0.263	0.000	0.103	0.569	0.327
35	0.284	0.218	0.224	0.273	0.000	0.097	0.569	0.334
40	0.263	0.227	0.228	0.282	0.000	0.092	0.569	0.339
45	0.244	0.234	0.232	0.290	0.000	0.088	0.569	0.342
50	0.228	0.240	0.234	0.298	0.000	0.085	0.569	0.345
55	0.213	0.246	0.237	0.305	0.000	0.083	0.569	0.348
60	0.200	0.251	0.238	0.311	0.000	0.081	0.569	0.349
65	0.188	0.255	0.240	0.317	0.000	0.080	0.569	0.351
70	0.178	0.259	0.240	0.322	0.000	0.079	0.569	0.352
75	0.168	0.263	0.241	0.328	0.000	0.078	0.569	0.353
80	0.159	0.267	0.242	0.332	0.000	0.077	0.569	0.353
85	0.151	0.270	0.242	0.337	0.000	0.077	0.569	0.354
90	0.143	0.273	0.242	0.341	0.000	0.076	0.569	0.354
95	0.136	0.276	0.242	0.345	0.000	0.076	0.569	0.355
100	0.130	0.279	0.242	0.349	0.000	0.076	0.569	0.355

Continued

Table 6.—continued

Year after production	Pacific Northwest, West, Hardwood				Pacific Southwest, Softwood			
	All				All			
	In use	Landfill	Energy	Emitted without energy	In use	Landfill	Energy	Emitted without energy
0	0.531	0.000	0.288	0.181	0.675	0.000	0.170	0.156
1	0.481	0.021	0.305	0.193	0.637	0.018	0.180	0.166
2	0.438	0.040	0.319	0.204	0.602	0.034	0.189	0.175
3	0.400	0.055	0.332	0.213	0.572	0.048	0.197	0.183
4	0.367	0.069	0.343	0.221	0.545	0.061	0.204	0.191
5	0.338	0.081	0.352	0.229	0.521	0.072	0.210	0.197
6	0.312	0.091	0.361	0.235	0.498	0.082	0.216	0.204
7	0.289	0.100	0.369	0.241	0.478	0.092	0.221	0.209
8	0.268	0.109	0.377	0.247	0.458	0.101	0.226	0.215
9	0.248	0.116	0.383	0.252	0.440	0.109	0.231	0.220
10	0.231	0.122	0.390	0.257	0.424	0.116	0.235	0.225
15	0.174	0.142	0.409	0.275	0.363	0.143	0.250	0.243
20	0.143	0.152	0.420	0.285	0.323	0.161	0.260	0.257
25	0.122	0.157	0.427	0.294	0.292	0.173	0.268	0.267
30	0.107	0.160	0.432	0.301	0.266	0.183	0.273	0.277
35	0.095	0.162	0.436	0.306	0.245	0.192	0.278	0.285
40	0.085	0.164	0.440	0.312	0.226	0.198	0.282	0.293
45	0.076	0.166	0.442	0.316	0.210	0.204	0.285	0.300
50	0.069	0.167	0.444	0.320	0.196	0.210	0.288	0.306
55	0.062	0.169	0.445	0.324	0.184	0.214	0.290	0.312
60	0.057	0.170	0.446	0.327	0.173	0.218	0.292	0.317
65	0.052	0.171	0.447	0.330	0.162	0.222	0.293	0.322
70	0.048	0.172	0.447	0.333	0.153	0.226	0.294	0.327
75	0.044	0.173	0.447	0.336	0.145	0.229	0.295	0.331
80	0.040	0.174	0.448	0.338	0.137	0.232	0.296	0.335
85	0.037	0.175	0.448	0.340	0.130	0.235	0.296	0.339
90	0.035	0.176	0.448	0.342	0.124	0.238	0.296	0.343
95	0.032	0.177	0.448	0.344	0.117	0.240	0.296	0.346
100	0.030	0.177	0.448	0.345	0.112	0.243	0.296	0.349

Continued

Table 6.—continued

Year after production	Rocky Mountain, Softwood			
	All			
	In use	Landfill	Energy	Emitted without energy
0	0.704	0.000	0.209	0.087
1	0.664	0.019	0.223	0.094
2	0.628	0.036	0.235	0.101
3	0.595	0.051	0.247	0.107
4	0.567	0.065	0.256	0.112
5	0.541	0.077	0.265	0.118
6	0.517	0.088	0.273	0.122
7	0.495	0.098	0.280	0.127
8	0.474	0.107	0.287	0.131
9	0.455	0.116	0.294	0.135
10	0.438	0.124	0.300	0.139
15	0.373	0.152	0.320	0.154
20	0.330	0.171	0.333	0.165
25	0.297	0.185	0.343	0.175
30	0.271	0.195	0.350	0.184
35	0.248	0.204	0.356	0.192
40	0.229	0.211	0.360	0.200
45	0.213	0.217	0.364	0.207
50	0.198	0.222	0.367	0.213
55	0.185	0.227	0.369	0.219
60	0.174	0.231	0.371	0.225
65	0.163	0.235	0.372	0.230
70	0.154	0.238	0.373	0.235
75	0.146	0.241	0.373	0.240
80	0.138	0.244	0.373	0.244
85	0.131	0.247	0.373	0.249
90	0.124	0.250	0.373	0.253
95	0.118	0.253	0.373	0.256
100	0.112	0.255	0.373	0.260

Continued

Table 6.—continued

Year after production	Southeast, Softwood							
	Saw log				Pulpwood			
	In use	Landfill	Energy	Emitted without energy	In use	Landfill	Energy	Emitted without energy
0	0.636	0.000	0.260	0.104	0.553	0.000	0.276	0.171
1	0.601	0.017	0.270	0.112	0.482	0.024	0.300	0.193
2	0.570	0.032	0.279	0.119	0.422	0.044	0.323	0.211
3	0.541	0.045	0.288	0.125	0.370	0.061	0.342	0.227
4	0.516	0.057	0.296	0.131	0.327	0.074	0.359	0.241
5	0.493	0.068	0.303	0.136	0.290	0.085	0.373	0.252
6	0.472	0.078	0.310	0.140	0.257	0.094	0.385	0.263
7	0.453	0.087	0.315	0.145	0.229	0.102	0.396	0.273
8	0.435	0.095	0.321	0.149	0.202	0.109	0.407	0.282
9	0.418	0.103	0.326	0.153	0.178	0.115	0.416	0.291
10	0.402	0.110	0.331	0.157	0.158	0.119	0.425	0.298
15	0.345	0.136	0.347	0.172	0.102	0.127	0.448	0.323
20	0.306	0.153	0.357	0.184	0.083	0.123	0.456	0.337
25	0.276	0.166	0.364	0.194	0.075	0.118	0.460	0.347
30	0.251	0.176	0.370	0.203	0.070	0.113	0.462	0.355
35	0.231	0.184	0.374	0.211	0.066	0.110	0.463	0.361
40	0.213	0.190	0.378	0.219	0.063	0.107	0.463	0.367
45	0.198	0.196	0.381	0.226	0.060	0.105	0.463	0.372
50	0.184	0.201	0.383	0.232	0.057	0.104	0.463	0.376
55	0.172	0.206	0.384	0.238	0.054	0.103	0.463	0.380
60	0.162	0.209	0.385	0.244	0.052	0.103	0.463	0.383
65	0.152	0.213	0.386	0.249	0.049	0.103	0.463	0.385
70	0.144	0.216	0.386	0.254	0.047	0.103	0.463	0.387
75	0.136	0.219	0.386	0.259	0.045	0.103	0.463	0.389
80	0.128	0.222	0.386	0.263	0.043	0.103	0.463	0.391
85	0.122	0.225	0.386	0.267	0.041	0.104	0.463	0.392
90	0.116	0.227	0.386	0.271	0.040	0.104	0.463	0.393
95	0.110	0.230	0.386	0.274	0.038	0.105	0.463	0.395
100	0.104	0.232	0.386	0.277	0.036	0.105	0.463	0.396

Continued

Table 6.—continued

Year after production	Southeast, Hardwood							
	Saw log				Pulpwood			
	In use	Landfill	Energy	Emitted without energy	In use	Landfill	Energy	Emitted without energy
0	0.609	0.000	0.225	0.166	0.591	0.000	0.225	0.185
1	0.565	0.025	0.234	0.176	0.524	0.023	0.245	0.208
2	0.526	0.047	0.243	0.184	0.467	0.042	0.263	0.227
3	0.491	0.066	0.252	0.192	0.419	0.058	0.279	0.244
4	0.459	0.083	0.259	0.198	0.378	0.071	0.293	0.258
5	0.431	0.099	0.266	0.205	0.343	0.082	0.305	0.271
6	0.405	0.113	0.272	0.210	0.312	0.091	0.315	0.282
7	0.381	0.126	0.278	0.216	0.285	0.099	0.324	0.292
8	0.359	0.137	0.283	0.221	0.259	0.106	0.333	0.302
9	0.339	0.147	0.288	0.225	0.236	0.112	0.341	0.311
10	0.321	0.157	0.293	0.230	0.216	0.117	0.348	0.319
15	0.252	0.190	0.310	0.248	0.161	0.126	0.368	0.345
20	0.207	0.211	0.322	0.261	0.139	0.125	0.376	0.360
25	0.175	0.224	0.331	0.271	0.128	0.123	0.379	0.370
30	0.150	0.233	0.337	0.280	0.121	0.120	0.382	0.378
35	0.131	0.239	0.343	0.287	0.114	0.118	0.383	0.385
40	0.115	0.244	0.347	0.294	0.108	0.117	0.384	0.391
45	0.102	0.248	0.351	0.299	0.103	0.117	0.384	0.396
50	0.091	0.251	0.353	0.304	0.098	0.117	0.385	0.401
55	0.082	0.254	0.355	0.309	0.093	0.117	0.385	0.405
60	0.074	0.256	0.357	0.313	0.089	0.117	0.385	0.409
65	0.067	0.258	0.358	0.317	0.085	0.118	0.385	0.412
70	0.061	0.260	0.359	0.320	0.081	0.119	0.385	0.415
75	0.056	0.261	0.360	0.323	0.078	0.120	0.385	0.418
80	0.051	0.263	0.361	0.326	0.074	0.121	0.385	0.420
85	0.047	0.264	0.361	0.328	0.071	0.122	0.385	0.422
90	0.043	0.265	0.361	0.331	0.068	0.123	0.385	0.424
95	0.040	0.266	0.361	0.333	0.066	0.124	0.385	0.426
100	0.037	0.267	0.361	0.335	0.063	0.125	0.385	0.427

Continued

Table 6.—continued

Year after production	South Central, Softwood							
	Saw log				Pulpwood			
	In use	Landfill	Energy	Emitted without energy	In use	Landfill	Energy	Emitted without energy
0	0.629	0.000	0.228	0.143	0.570	0.000	0.266	0.164
1	0.594	0.016	0.237	0.153	0.501	0.024	0.290	0.185
2	0.563	0.030	0.246	0.160	0.442	0.043	0.312	0.203
3	0.536	0.043	0.254	0.167	0.393	0.059	0.330	0.218
4	0.511	0.055	0.261	0.174	0.350	0.073	0.346	0.231
5	0.489	0.065	0.267	0.179	0.314	0.084	0.360	0.242
6	0.469	0.074	0.272	0.184	0.282	0.093	0.373	0.253
7	0.451	0.083	0.277	0.189	0.254	0.101	0.383	0.262
8	0.433	0.090	0.282	0.194	0.228	0.108	0.394	0.271
9	0.417	0.098	0.287	0.199	0.204	0.114	0.403	0.279
10	0.402	0.104	0.291	0.203	0.184	0.118	0.411	0.287
15	0.347	0.129	0.305	0.219	0.129	0.127	0.434	0.311
20	0.310	0.145	0.314	0.231	0.108	0.125	0.443	0.325
25	0.282	0.156	0.320	0.242	0.099	0.120	0.447	0.334
30	0.258	0.166	0.325	0.251	0.093	0.117	0.449	0.342
35	0.238	0.173	0.329	0.259	0.087	0.114	0.450	0.349
40	0.221	0.180	0.332	0.267	0.083	0.112	0.451	0.354
45	0.206	0.186	0.334	0.274	0.079	0.111	0.451	0.360
50	0.193	0.191	0.336	0.280	0.075	0.110	0.451	0.364
55	0.181	0.195	0.338	0.286	0.071	0.110	0.451	0.368
60	0.170	0.200	0.339	0.292	0.068	0.110	0.451	0.371
65	0.160	0.203	0.340	0.297	0.065	0.110	0.451	0.374
70	0.151	0.207	0.340	0.302	0.062	0.110	0.451	0.377
75	0.143	0.210	0.340	0.307	0.059	0.111	0.451	0.379
80	0.135	0.213	0.340	0.311	0.057	0.112	0.451	0.381
85	0.128	0.216	0.340	0.315	0.054	0.112	0.451	0.383
90	0.122	0.219	0.340	0.319	0.052	0.113	0.451	0.384
95	0.116	0.221	0.340	0.322	0.050	0.114	0.451	0.386
100	0.110	0.224	0.340	0.325	0.048	0.114	0.451	0.387

Continued

Table 6.—continued

Year after production	South Central, Hardwood							
	Saw log				Pulpwood			
	In use	Landfill	Energy	Emitted without energy	In use	Landfill	Energy	Emitted without energy
0	0.587	0.000	0.237	0.176	0.581	0.000	0.228	0.191
1	0.543	0.024	0.247	0.186	0.513	0.023	0.249	0.214
2	0.503	0.046	0.257	0.194	0.455	0.043	0.268	0.234
3	0.468	0.064	0.265	0.202	0.406	0.059	0.285	0.250
4	0.437	0.081	0.273	0.209	0.365	0.072	0.298	0.265
5	0.409	0.096	0.280	0.215	0.329	0.083	0.310	0.278
6	0.383	0.109	0.286	0.221	0.298	0.092	0.321	0.289
7	0.360	0.121	0.292	0.227	0.270	0.100	0.331	0.300
8	0.338	0.132	0.298	0.232	0.244	0.107	0.340	0.310
9	0.319	0.142	0.303	0.237	0.221	0.113	0.348	0.319
10	0.301	0.151	0.307	0.241	0.201	0.117	0.355	0.327
15	0.235	0.182	0.325	0.258	0.146	0.126	0.375	0.353
20	0.192	0.201	0.336	0.271	0.125	0.125	0.383	0.368
25	0.162	0.213	0.344	0.281	0.115	0.121	0.386	0.378
30	0.140	0.221	0.351	0.289	0.108	0.118	0.388	0.386
35	0.122	0.226	0.356	0.297	0.102	0.116	0.390	0.393
40	0.107	0.230	0.360	0.303	0.096	0.114	0.391	0.399
45	0.095	0.234	0.363	0.308	0.092	0.114	0.391	0.404
50	0.085	0.237	0.365	0.313	0.087	0.113	0.391	0.409
55	0.077	0.239	0.367	0.317	0.083	0.113	0.391	0.413
60	0.069	0.241	0.369	0.321	0.079	0.113	0.391	0.416
65	0.063	0.243	0.370	0.325	0.076	0.114	0.391	0.419
70	0.057	0.244	0.371	0.328	0.072	0.115	0.391	0.422
75	0.052	0.246	0.371	0.331	0.069	0.115	0.391	0.424
80	0.048	0.247	0.372	0.334	0.066	0.116	0.391	0.427
85	0.044	0.248	0.372	0.336	0.064	0.117	0.391	0.428
90	0.040	0.249	0.372	0.338	0.061	0.118	0.391	0.430
95	0.037	0.250	0.372	0.341	0.059	0.119	0.391	0.432
100	0.034	0.251	0.372	0.342	0.056	0.120	0.391	0.433

Continued

Table 6.—continued

	West, Hardwood			
	All			
Year after production	In use	Landfill	Energy	Emitted without energy
0	0.568	0.000	0.256	0.177
1	0.529	0.018	0.267	0.186
2	0.494	0.034	0.277	0.195
3	0.464	0.048	0.286	0.202
4	0.437	0.061	0.294	0.208
5	0.412	0.073	0.301	0.214
6	0.390	0.083	0.308	0.220
7	0.369	0.092	0.314	0.225
8	0.350	0.101	0.319	0.230
9	0.332	0.109	0.325	0.234
10	0.316	0.116	0.330	0.239
15	0.256	0.143	0.347	0.255
20	0.217	0.159	0.358	0.266
25	0.188	0.171	0.367	0.275
30	0.165	0.179	0.373	0.283
35	0.146	0.186	0.379	0.289
40	0.130	0.192	0.383	0.295
45	0.116	0.196	0.387	0.300
50	0.105	0.200	0.390	0.305
55	0.095	0.203	0.393	0.309
60	0.087	0.205	0.395	0.313
65	0.079	0.208	0.396	0.316
70	0.073	0.210	0.398	0.319
75	0.067	0.212	0.399	0.322
80	0.062	0.213	0.400	0.325
85	0.058	0.215	0.400	0.327
90	0.053	0.216	0.401	0.330
95	0.050	0.218	0.401	0.332
100	0.046	0.219	0.401	0.334

Table 7.—Factors to convert primary wood products to carbon mass from the units characteristic of each product

Solidwood product or paper	Unit	Factor to convert units to tons (2000 lb) carbon	Factor to convert units to tonnes carbon
Softwood lumber/laminated veneer lumber/glulam lumber/ I-joists	thousand board feet	0.488	0.443
Hardwood lumber	thousand board feet	0.844	0.765
Softwood plywood	thousand square feet, 3/8-inch basis	0.260	0.236
Oriented strandboard	thousand square feet, 3/8-inch basis	0.303	0.275
Non structural panels (average)	thousand square feet, 3/8-inch basis	0.319	0.289
Hardwood veneer/plywood	thousand square feet, 3/8-inch basis	0.315	0.286
Particleboard/medium density fiberboard	thousand square feet, 3/4-inch basis	0.647	0.587
Hardboard	thousand square feet,1/8-inch basis	0.152	0.138
Insulation board	thousand square feet, 1/2-inch basis	0.242	0.220
Other industrial products	thousand cubic feet	8.250	7.484
Paper	tons, air dry	0.450	0.496

Table 8.—Fraction of carbon in primary wood products remaining in end uses up to 100 years after production (year 0 indicates fraction at time of production, with fraction for year 1 the allocation after 1 year)

Year after production	Softwood lumber	Hardwood lumber	Softwood plywood	Oriented strandboard	Non-structural panels	Miscel-laneous products	Paper
0	1	1	1	1	1	1	1
1	0.973	0.938	0.976	0.983	0.969	0.944	0.845
2	0.947	0.882	0.952	0.967	0.939	0.891	0.713
3	0.922	0.831	0.930	0.952	0.911	0.841	0.603
4	0.898	0.784	0.909	0.937	0.883	0.794	0.509
5	0.875	0.741	0.888	0.922	0.857	0.749	0.430
6	0.854	0.701	0.869	0.908	0.832	0.707	0.360
7	0.833	0.665	0.850	0.895	0.808	0.667	0.299
8	0.813	0.631	0.832	0.881	0.785	0.630	0.243
9	0.795	0.600	0.815	0.869	0.763	0.595	0.192
10	0.777	0.571	0.798	0.856	0.741	0.561	0.149
11	0.760	0.545	0.782	0.844	0.721	0.530	0.115
12	0.743	0.520	0.767	0.832	0.701	0.500	0.088
13	0.728	0.497	0.752	0.821	0.683	0.472	0.068
14	0.712	0.476	0.738	0.810	0.665	0.445	0.052
15	0.698	0.456	0.724	0.799	0.647	0.420	0.040
16	0.684	0.438	0.711	0.789	0.630	0.397	0.030
17	0.671	0.421	0.698	0.778	0.614	0.375	0.023
18	0.658	0.405	0.685	0.768	0.599	0.354	0.018
19	0.645	0.389	0.673	0.759	0.584	0.334	0.013
20	0.633	0.375	0.662	0.749	0.569	0.315	0.009
21	0.622	0.362	0.650	0.740	0.555	0.297	0.006
22	0.611	0.349	0.639	0.731	0.542	0.281	0.005
23	0.600	0.337	0.629	0.722	0.529	0.265	0.004
24	0.589	0.326	0.619	0.713	0.517	0.250	0.003
25	0.579	0.316	0.609	0.705	0.505	0.236	0.002
26	0.569	0.306	0.599	0.697	0.493	0.223	0.002
27	0.560	0.296	0.589	0.689	0.482	0.210	0.001
28	0.551	0.287	0.580	0.681	0.471	0.198	0.001
29	0.542	0.278	0.571	0.673	0.460	0.187	0.001
30	0.533	0.270	0.563	0.666	0.450	0.177	0.001
31	0.525	0.263	0.554	0.658	0.440	0.167	0.000
32	0.517	0.255	0.546	0.651	0.431	0.157	0.000
33	0.509	0.248	0.538	0.644	0.421	0.149	0.000
34	0.501	0.241	0.530	0.637	0.412	0.140	0.000
35	0.494	0.235	0.522	0.630	0.404	0.132	0.000
36	0.487	0.229	0.515	0.623	0.395	0.125	0.000
37	0.480	0.223	0.508	0.617	0.387	0.118	0.000
38	0.473	0.217	0.500	0.610	0.379	0.111	0.000
39	0.466	0.211	0.493	0.604	0.372	0.105	0.000
40	0.459	0.206	0.487	0.598	0.364	0.099	0.000

Continued

Table 8.—continued

Year after production	Softwood lumber	Hardwood lumber	Softwood plywood	Oriented strandboard	Non-structural panels	Miscel-laneous products	Paper
41	0.453	0.201	0.480	0.592	0.357	0.094	0.000
42	0.447	0.196	0.474	0.586	0.350	0.088	0.000
43	0.441	0.191	0.467	0.580	0.343	0.083	0.000
44	0.435	0.187	0.461	0.574	0.337	0.079	0.000
45	0.429	0.183	0.455	0.568	0.330	0.074	0.000
46	0.423	0.178	0.449	0.563	0.324	0.070	0.000
47	0.418	0.174	0.443	0.557	0.318	0.066	0.000
48	0.413	0.170	0.437	0.552	0.312	0.063	0.000
49	0.407	0.166	0.432	0.546	0.306	0.059	0.000
50	0.402	0.163	0.426	0.541	0.301	0.056	0.000
55	0.378	0.146	0.401	0.516	0.275	0.042	0.000
60	0.356	0.131	0.377	0.493	0.252	0.031	0.000
65	0.336	0.119	0.356	0.471	0.232	0.023	0.000
70	0.318	0.108	0.336	0.450	0.214	0.018	0.000
75	0.301	0.098	0.318	0.431	0.198	0.013	0.000
80	0.286	0.090	0.301	0.413	0.183	0.010	0.000
85	0.271	0.082	0.286	0.395	0.170	0.007	0.000
90	0.258	0.075	0.271	0.379	0.159	0.006	0.000
95	0.246	0.069	0.258	0.364	0.148	0.004	0.000
100	0.234	0.064	0.245	0.349	0.138	0.003	0.000

Table 9.—Fraction of carbon in primary wood products remaining in landfills up to 100 years after production (year 0 indicates fraction at time of production, with fraction for year 1 the allocation after 1 year)

Year after production	Softwood lumber	Hardwood lumber	Softwood plywood	Oriented strandboard	Non-structural panels	Miscel-laneous products	Paper
0	0	0	0	0	0	0	0
1	0.018	0.041	0.016	0.011	0.021	0.037	0.051
2	0.035	0.078	0.032	0.021	0.040	0.072	0.093
3	0.051	0.111	0.046	0.032	0.059	0.104	0.128
4	0.067	0.141	0.060	0.041	0.076	0.134	0.155
5	0.081	0.168	0.073	0.050	0.093	0.163	0.178
6	0.094	0.193	0.085	0.059	0.108	0.189	0.196
7	0.107	0.215	0.096	0.068	0.123	0.213	0.211
8	0.119	0.235	0.107	0.076	0.137	0.236	0.225
9	0.130	0.254	0.118	0.084	0.151	0.257	0.236
10	0.141	0.270	0.128	0.091	0.163	0.277	0.245
11	0.151	0.285	0.137	0.098	0.176	0.296	0.251
12	0.161	0.299	0.146	0.105	0.187	0.313	0.254
13	0.170	0.312	0.155	0.112	0.198	0.329	0.255
14	0.178	0.323	0.163	0.118	0.208	0.344	0.255
15	0.187	0.334	0.171	0.124	0.218	0.357	0.253
16	0.194	0.344	0.178	0.130	0.227	0.370	0.251
17	0.202	0.352	0.185	0.136	0.236	0.382	0.248
18	0.209	0.361	0.192	0.142	0.245	0.393	0.245
19	0.215	0.368	0.199	0.147	0.253	0.403	0.242
20	0.222	0.375	0.205	0.152	0.261	0.413	0.239
21	0.228	0.381	0.211	0.157	0.268	0.422	0.235
22	0.234	0.387	0.217	0.162	0.275	0.430	0.232
23	0.239	0.392	0.222	0.167	0.282	0.438	0.228
24	0.245	0.397	0.227	0.171	0.288	0.445	0.224
25	0.250	0.402	0.233	0.176	0.294	0.451	0.221
26	0.255	0.406	0.238	0.180	0.300	0.457	0.218
27	0.259	0.410	0.242	0.184	0.306	0.463	0.214
28	0.264	0.414	0.247	0.188	0.311	0.468	0.211
29	0.268	0.417	0.251	0.192	0.316	0.473	0.209
30	0.272	0.421	0.256	0.196	0.321	0.477	0.206
31	0.276	0.424	0.260	0.200	0.326	0.481	0.203
32	0.280	0.426	0.264	0.204	0.330	0.485	0.200
33	0.284	0.429	0.268	0.207	0.335	0.488	0.198
34	0.287	0.432	0.272	0.211	0.339	0.491	0.196
35	0.291	0.434	0.275	0.214	0.343	0.494	0.194
36	0.294	0.436	0.279	0.217	0.347	0.497	0.191
37	0.298	0.438	0.282	0.221	0.350	0.499	0.189
38	0.301	0.440	0.286	0.224	0.354	0.502	0.187
39	0.304	0.442	0.289	0.227	0.357	0.504	0.186
40	0.307	0.444	0.292	0.230	0.361	0.506	0.184

Continued

Table 9.—continued

Year after production	Softwood lumber	Hardwood lumber	Softwood plywood	Oriented strandboard	Non-structural panels	Miscel-laneous products	Paper
41	0.310	0.446	0.295	0.233	0.364	0.507	0.182
42	0.312	0.447	0.298	0.236	0.367	0.509	0.181
43	0.315	0.449	0.301	0.239	0.370	0.510	0.179
44	0.318	0.450	0.304	0.241	0.373	0.512	0.178
45	0.320	0.452	0.307	0.244	0.376	0.513	0.176
46	0.323	0.453	0.309	0.247	0.378	0.514	0.175
47	0.325	0.454	0.312	0.249	0.381	0.515	0.174
48	0.328	0.456	0.315	0.252	0.384	0.516	0.173
49	0.330	0.457	0.317	0.255	0.386	0.516	0.172
50	0.332	0.458	0.320	0.257	0.388	0.517	0.171
55	0.343	0.463	0.331	0.269	0.399	0.520	0.166
60	0.352	0.468	0.342	0.280	0.408	0.521	0.162
65	0.361	0.472	0.351	0.290	0.417	0.521	0.160
70	0.369	0.475	0.360	0.300	0.424	0.521	0.157
75	0.376	0.478	0.368	0.309	0.430	0.521	0.156
80	0.382	0.481	0.375	0.317	0.436	0.521	0.154
85	0.389	0.483	0.382	0.325	0.441	0.520	0.153
90	0.395	0.486	0.388	0.333	0.446	0.519	0.152
95	0.400	0.488	0.394	0.340	0.450	0.519	0.152
100	0.405	0.490	0.400	0.347	0.454	0.518	0.151

Table 10.—Confidence intervals for the estimates of carbon density for live and standing dead trees at the 50th and 99th percentiles of volume. The percentiles reflect the distribution of stand-level volume in survey data for the conterminous United States.[a] The 95-percent intervals about the expected carbon density are represented as the percentage of the carbon density; thus, the interval is ± the percentage.

Forest type-region[b]	Volume at the 50th percentile					Volume at the 99th percentile				
	Growing stock volume	Live tree carbon density	Live tree confidence interval	Standing dead tree carbon density	Standing dead tree confidence interval	Growing stock volume	Live tree carbon density	Live tree confidence interval	Standing dead tree carbon density	Standing dead tree confidence interval
	m³/ha	*t C/ha*	*± percent*	*t C/ha*	*± percent*	*m³/ha*	*t C/ha*	*± percent*	*t C/ha*	*± percent*
Aspen-birch, Northeast	52	47	3.3	7	7.7	279	140	3.0	17	11.0
Maple-beech-birch, Northeast	118	87	1.0	13	4.3	361	194	1.4	18	7.6
Oak-hickory, Northeast	120	90	1.0	8	5.7	392	226	1.3	10	10.6
Oak-pine, Northeast	124	85	3.1	8	15.8	430	216	3.5	11	29.5
Spruce-balsam fir, Northeast	82	60	2.0	14	6.4	374	170	2.5	18	11.3
White-red-jack pine, Northeast	182	103	2.0	11	12.6	572	241	3.2	14	25.5
Aspen-birch, Northern Lake States	54	44	1.2	10	5.6	311	153	1.2	20	7.7
Elm-ash-cottonwood, Northern Lake States	60	54	2.3	11	9.2	514	270	2.2	18	16.3
Maple-beech-birch, Northern Lake States	108	84	0.8	10	4.8	348	207	1.0	12	9.1
Oak-hickory, Northern Lake States	84	80	1.0	8	5.4	343	230	1.3	12	10.4
Spruce-balsam fir, Northern Lake States	54	44	1.8	9	8.5	329	163	1.7	20	9.8
White-red-jack pine, Northern Lake States	101	61	2.4	10	12.0	725	267	2.6	16	24.2
Elm-ash-cottonwood, Northern Prairie States	76	66	3.7	9	17.5	514	271	2.2	18	16.3
Maple-beech-birch, Northern Prairie States	93	75	1.1	12	4.8	348	194	1.4	18	7.6
Oak-hickory, Northern Prairie States	77	76	1.0	8	5.5	343	202	1.1	10	9.7
Oak-pine, Northern Prairie States	59	52	3.4	7	15.3	355	159	2.8	10	22.6

Continued

Table 10.—Continued

Forest type-region[b]	Volume at the 50th percentile					Volume at the 99th percentile				
	Growing stock volume	Live tree carbon density	Live tree confidence interval	Standing dead tree carbon density	Standing dead tree confidence interval	Growing stock volume	Live tree carbon density	Live tree confidence interval	Standing dead tree carbon density	Standing dead tree confidence interval
	m^3/ha	*t C/ha*	*± percent*	*t C/ha*	*± percent*	*m^3/ha*	*t C/ha*	*± percent*	*t C/ha*	*± percent*
Douglas-fir, Pacific Northwest, East	138	84	1.5	18	8.8	627	264	1.9	29	16.1
Fir-spruce-mountain hemlock, Pacific Northwest, East	216	98	1.5	31	6.3	746	268	1.4	48	11.1
Lodgepole pine, Pacific Northwest, East	65	36	4.1	10	22.6	528	123	2.3	23	15.9
Ponderosa pine, Pacific Northwest, East	100	51	1.9	8	13.8	508	187	1.7	17	18.7
Alder-maple, Pacific Northwest, West	190	88	4.4	25	25.5	1,005	352	4.2	55	38.3
Douglas-fir, Pacific Northwest, West	308	150	1.3	30	17.1	1,876	727	1.7	84	18.5
Douglas-fir, high productivity and high management intensity, Pacific Northwest, West	147	79	3.4	18	24.3	822	319	2.2	21	38.4
Fir-spruce-mountain hemlock, Pacific Northwest, West	360	179	3.1	49	12.6	1,342	527	3.2	84	20.4
Hemlock-Sitka spruce, Pacific Northwest, West	503	203	2.7	51	17.2	1,795	602	3.2	104	27.4
Hemlock-Sitka spruce, high productivity, Pacific Northwest, West	420	174	2.6	46	20.1	1,795	602	3.2	104	27.4
California mixed conifer, Pacific Southwest	241	121	1.9	28	7.5	983	397	1.8	66	9.4

Continued

Table 10.—Continued

Forest type-region[b]	Volume at the 50th percentile: Growing stock volume	Live tree carbon density	Live tree confidence interval	Standing dead tree carbon density	Standing dead tree confidence interval	Volume at the 99th percentile: Growing stock volume	Live tree carbon density	Live tree confidence interval	Standing dead tree carbon density	Standing dead tree confidence interval
	m³/ha	*t C/ha*	*± percent*	*t C/ha*	*± percent*	*m³/ha*	*t C/ha*	*± percent*	*t C/ha*	*± percent*
Fir-spruce-mountain hemlock, Pacific Southwest	352	175	3.1	48	12.7	1,342	475	2.7	80	18.8
Western oak, Pacific Southwest	66	61	3.9	9	21.8	570	310	3.5	18	33.5
Douglas-fir, Rocky Mountain, North	128	79	1.6	18	9.1	627	264	1.9	29	16.1
Fir-spruce-mountain hemlock, Rocky Mountain, North	170	81	1.5	29	6.9	746	271	1.4	49	11.2
Lodgepole pine, Rocky Mountain, North	135	58	2.4	14	12.9	528	152	3.2	27	20.1
Ponderosa pine, Rocky Mountain, North	51	30	3.7	6	11.8	508	183	1.7	17	18.6
Aspen-birch, Rocky Mountain, South	89	61	2.9	17	10.1	498	202	3.2	32	16.2
Douglas-fir, Rocky Mountain, South	115	83	2.9	20	13.2	546	270	3.6	40	21.0
Fir-spruce-mountain hemlock, Rocky Mountain, South	188	96	1.7	32	7.0	736	265	2.3	48	13.4
Lodgepole pine, Rocky Mountain, South	150	63	2.5	20	10.6	521	153	3.2	20	10.6
Ponderosa pine, Rocky Mountain, South	83	53	1.7	7	13.7	353	141	2.3	11	26.9
Loblolly-shortleaf pine, Southeast	75	47	2.1	4	10.5	636	210	1.6	8	15.7

Continued

Table 10.—Continued

Forest type-region[b]	Volume at the 50th percentile: Growing stock volume	Live tree carbon density	Live tree confidence interval	Standing dead tree carbon density	Standing dead tree confidence interval	Volume at the 99th percentile: Growing stock volume	Live tree carbon density	Live tree confidence interval	Standing dead tree carbon density	Standing dead tree confidence interval
	m^3/ha	*t C/ha*	*± percent*	*t C/ha*	*± percent*	*m^3/ha*	*t C/ha*	*± percent*	*t C/ha*	*± percent*
Loblolly-shortleaf pine, high productivity and management intensity, Southeast	91	53	1.8	3	13.8	385	144	1.8	5	18.3
Longleaf-slash pine, Southeast	46	25	3.6	2	13.7	429	145	2.0	3	21.7
Longleaf-slash pine, high productivity and management intensity, Southeast	82	44	1.5	2	16.4	249	91	2.3	2	20.5
Oak-gum-cypress, Southeast	98	75	2.1	8	10.2	527	237	2.0	14	14.8
Oak-hickory, Southeast	104	81	1.3	7	7.5	536	263	1.4	11	13.1
Oak- pine, Southeast	61	48	2.5	4	9.3	462	201	2.0	9	13.9
Elm-ash-cottonwood, South Central	69	64	3.4	8	17.2	461	245	3.8	14	32.5
Loblolly-shortleaf pine, South Central	71	47	2.3	4	16.0	506	167	2.2	6	24.5
Loblolly-shortleaf pine, high productivity and management intensity, South Central	61	42	1.8	2	17.4	309	116	2.3	2	24.2
Oak-gum-cypress, South Central	100	81	2.0	7	10.9	534	244	2.5	9	21.4
Oak-hickory, South Central	79	69	1.0	5	6.5	390	206	1.2	7	11.9
Oak-pine, South Central	64	53	2.2	5	11.6	436	190	2.5	9	19.2

[a] Data from USDA Forest Service, Forest Inventory and Analysis Program's database of forest surveys (FIADB; USDA For. Serv. 2005).
[b] These correspond to the table identifiers in Appendix A, B, and C.

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APPENDIX A

Forest Ecosystem Yield Tables for Reforestation[1]

Carbon Stocks on Forest Land After Clearcut Harvest

A1. Aspen-birch, Northeast
A2. Maple-beech-birch, Northeast
A3. Oak-hickory, Northeast
A4. Oak-pine, Northeast
A5. Spruce-balsam fir, Northeast
A6. White-red-jack pine, Northeast
A7. Aspen-birch, Northern Lake States
A8. Elm-ash-cottonwood, Northern Lake States
A9. Maple-beech-birch, Northern Lake States
A10. Oak-hickory, Northern Lake States
A11. Spruce-balsam fir, Northern Lake States
A12. White-red-jack pine, Northern Lake States
A13. Elm-ash-cottonwood, Northern Prairie States
A14. Maple-beech-birch, Northern Prairie States
A15. Oak-hickory, Northern Prairie States
A16. Oak-pine, Northern Prairie States
A17. Douglas-fir, Pacific Northwest, East
A18. Fir-spruce-mountain hemlock, Pacific Northwest, East
A19. Lodgepole pine, Pacific Northwest, East
A20. Ponderosa pine, Pacific Northwest, East
A21. Alder-maple, Pacific Northwest, West
A22. Douglas-fir, Pacific Northwest, West
A23. Douglas-fir, high productivity and high management intensity, Pacific Northwest, West
A24. Fir-spruce-mountain hemlock, Pacific Northwest, West
A25. Hemlock-Sitka spruce, Pacific Northwest, West
A26. Hemlock-Sitka spruce, high productivity, Pacific Northwest, West
A27. Mixed conifer, Pacific Southwest
A28. Fir-spruce-mountain hemlock, Pacific Southwest
A29. Western oak, Pacific Southwest
A30. Douglas-fir, Rocky Mountain, North
A31. Fir-spruce-mountain hemlock, Rocky Mountain, North
A32. Lodgepole pine, Rocky Mountain, North
A33. Ponderosa pine, Rocky Mountain, North
A34. Aspen-birch, Rocky Mountain, South
A35. Douglas-fir, Rocky Mountain, South
A36. Fir-spruce-mountain hemlock, Rocky Mountain, South
A37. Lodgepole pine, Rocky Mountain, South
A38. Ponderosa pine, Rocky Mountain, South
A39. Loblolly-shortleaf pine, Southeast
A40. Loblolly-shortleaf pine, high productivity and management intensity, Southeast
A41. Longleaf-slash pine, Southeast
A42. Longleaf-slash pine, high productivity and management intensity, Southeast
A43. Oak-gum-cypress, Southeast
A44. Oak-hickory, Southeast
A45. Oak-pine, Southeast
A46. Elm-ash-cottonwood, South Central
A47. Loblolly-shortleaf pine, South Central
A48. Loblolly-shortleaf pine, high productivity and management intensity, South Central
A49. Oak-gum-cypress, South Central
A50. Oak-hickory, South Central
A51. Oak-pine, South Central

[1] Note carbon mass is in metric tons (tonnes) in all tables.

A1.— Regional estimates of timber volume and carbon stocks for aspen-birch stands on forest land after clearcut harvest in the Northeast

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m³/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	2.0	18.7	10.2	87.4	31.0
5	0.0	6.6	0.6	2.2	12.9	7.5	87.4	29.8
15	12.9	21.3	1.8	2.1	7.1	6.0	87.4	38.4
25	33.8	36.0	2.9	2.1	5.2	6.5	87.4	52.7
35	58.4	50.1	3.8	2.1	4.9	7.5	87.4	68.4
45	84.7	62.7	4.6	2.1	5.3	8.5	87.4	83.1
55	112.4	75.1	5.3	2.0	6.0	9.3	87.4	97.8
65	141.7	87.5	5.9	2.0	6.9	10.1	87.4	112.4
75	172.6	100.0	6.5	2.0	7.8	10.7	87.4	127.1
85	205.0	112.7	7.1	2.0	8.8	11.3	87.4	141.9
95	238.9	125.5	7.7	2.0	9.8	11.8	87.4	156.7
105	274.4	138.5	8.2	2.0	10.8	12.2	87.4	171.7
115	311.4	151.7	8.8	2.0	11.8	12.5	87.4	186.8
125	349.9	165.0	9.3	2.0	12.8	12.9	87.4	202.0
years	*ft³/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	0.8	7.6	4.1	35.4	12.5
5	0	2.7	0.2	0.9	5.2	3.0	35.4	12.1
15	184	8.6	0.7	0.9	2.9	2.4	35.4	15.5
25	483	14.6	1.2	0.8	2.1	2.6	35.4	21.3
35	835	20.3	1.5	0.8	2.0	3.0	35.4	27.7
45	1,210	25.4	1.9	0.8	2.2	3.4	35.4	33.6
55	1,607	30.4	2.1	0.8	2.4	3.8	35.4	39.6
65	2,025	35.4	2.4	0.8	2.8	4.1	35.4	45.5
75	2,466	40.5	2.6	0.8	3.2	4.3	35.4	51.4
85	2,929	45.6	2.9	0.8	3.6	4.6	35.4	57.4
95	3,414	50.8	3.1	0.8	4.0	4.8	35.4	63.4
105	3,921	56.0	3.3	0.8	4.4	4.9	35.4	69.5
115	4,450	61.4	3.5	0.8	4.8	5.1	35.4	75.6
125	5,001	66.8	3.8	0.8	5.2	5.2	35.4	81.8

A2.— Regional estimates of timber volume and carbon stocks for maple-beech-birch stands on forest land after clearcut harvest in the Northeast

Age	Mean Volume	Mean carbon density						
		Live Tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	---------- *tonnes carbon/hectare* ----------						
0	0.0	0.0	0.0	2.1	32.0	27.7	69.6	61.8
5	0.0	7.4	0.7	2.1	21.7	20.3	69.6	52.2
15	28.0	31.8	3.2	1.9	11.5	16.3	69.6	64.7
25	58.1	53.2	5.3	1.8	7.8	17.6	69.6	85.7
35	89.6	72.8	6.0	1.7	6.9	20.3	69.6	107.8
45	119.1	87.8	6.6	1.7	7.0	23.0	69.6	126.0
55	146.6	101.1	7.0	1.7	7.5	25.3	69.6	142.7
65	172.1	113.1	7.4	1.7	8.2	27.4	69.6	157.7
75	195.6	123.8	7.7	1.7	8.8	29.2	69.6	171.2
85	217.1	133.5	7.9	1.7	9.5	30.7	69.6	183.2
95	236.6	142.1	8.1	1.7	10.1	32.0	69.6	193.9
105	254.1	149.7	8.3	1.6	10.6	33.1	69.6	203.4
115	269.7	156.3	8.5	1.6	11.1	34.2	69.6	211.7
125	283.2	162.1	8.6	1.6	11.5	35.1	69.6	218.8
years	*ft^3/acre*	---------- *tonnes carbon/acre* ----------						
0	0	0.0	0.0	0.8	13.0	11.2	28.1	25.0
5	0	3.0	0.3	0.8	8.8	8.2	28.1	21.1
15	400	12.9	1.3	0.8	4.7	6.6	28.1	26.2
25	830	21.5	2.1	0.7	3.2	7.1	28.1	34.7
35	1,280	29.5	2.4	0.7	2.8	8.2	28.1	43.6
45	1,702	35.5	2.7	0.7	2.8	9.3	28.1	51.0
55	2,095	40.9	2.8	0.7	3.0	10.3	28.1	57.7
65	2,460	45.8	3.0	0.7	3.3	11.1	28.1	63.8
75	2,796	50.1	3.1	0.7	3.6	11.8	28.1	69.3
85	3,103	54.0	3.2	0.7	3.8	12.4	28.1	74.1
95	3,382	57.5	3.3	0.7	4.1	12.9	28.1	78.5
105	3,632	60.6	3.4	0.7	4.3	13.4	28.1	82.3
115	3,854	63.3	3.4	0.7	4.5	13.8	28.1	85.7
125	4,047	65.6	3.5	0.7	4.6	14.2	28.1	88.6

A3.— Regional estimates of timber volume and carbon stocks for oak-hickory stands on forest land after clearcut harvest in the Northeast

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	2.1	46.7	8.2	53.1	56.9
5	0.0	6.9	0.7	2.1	31.4	5.7	53.1	46.7
15	54.5	43.0	3.6	1.9	16.5	4.1	53.1	69.1
25	95.7	71.9	4.0	1.9	10.8	4.5	53.1	93.0
35	135.3	96.2	4.2	1.8	9.2	5.3	53.1	116.8
45	173.3	118.2	4.5	1.8	9.2	6.3	53.1	139.9
55	209.6	136.8	4.6	1.8	9.9	7.3	53.1	160.3
65	244.3	154.3	4.8	1.8	10.8	8.1	53.1	179.7
75	277.4	170.6	4.9	1.8	11.8	8.9	53.1	198.0
85	308.9	186.0	5.0	1.8	12.8	9.7	53.1	215.2
95	338.8	200.4	5.1	1.8	13.7	10.3	53.1	231.3
105	367.1	213.9	5.1	1.7	14.6	10.9	53.1	246.4
115	393.7	226.5	5.2	1.7	15.5	11.5	53.1	260.5
125	418.6	238.2	5.3	1.7	16.3	12.0	53.1	273.6
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	0.8	18.9	3.3	21.5	23.0
5	0	2.8	0.3	0.8	12.7	2.3	21.5	18.9
15	779	17.4	1.4	0.8	6.7	1.7	21.5	28.0
25	1,368	29.1	1.6	0.7	4.4	1.8	21.5	37.7
35	1,934	38.9	1.7	0.7	3.7	2.2	21.5	47.3
45	2,477	47.8	1.8	0.7	3.7	2.6	21.5	56.6
55	2,996	55.4	1.9	0.7	4.0	2.9	21.5	64.9
65	3,492	62.4	1.9	0.7	4.4	3.3	21.5	72.7
75	3,965	69.1	2.0	0.7	4.8	3.6	21.5	80.1
85	4,415	75.3	2.0	0.7	5.2	3.9	21.5	87.1
95	4,842	81.1	2.0	0.7	5.6	4.2	21.5	93.6
105	5,246	86.6	2.1	0.7	5.9	4.4	21.5	99.7
115	5,626	91.7	2.1	0.7	6.3	4.7	21.5	105.4
125	5,983	96.4	2.1	0.7	6.6	4.9	21.5	110.7

A4.— Regional estimates of timber volume and carbon stocks for oak-pine stands on forest land after clearcut harvest in the Northeast

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.2	30.0	29.7	66.9	63.9
5	0.0	6.2	0.6	4.2	23.0	20.2	66.9	54.3
15	36.5	27.0	2.6	3.3	14.6	15.3	66.9	62.9
25	70.9	48.6	3.2	2.9	10.4	17.1	66.9	82.2
35	103.1	67.9	3.7	2.6	8.4	20.3	66.9	102.9
45	133.1	84.7	4.0	2.5	7.6	23.6	66.9	122.3
55	160.9	99.1	4.2	2.4	7.4	26.6	66.9	139.8
65	186.7	113.0	4.4	2.3	7.7	29.3	66.9	156.6
75	210.2	123.6	4.6	2.3	8.0	31.6	66.9	170.0
85	231.5	133.1	4.7	2.3	8.4	33.6	66.9	182.1
95	250.8	141.7	4.8	2.2	8.8	35.4	66.9	192.9
105	267.9	149.2	4.9	2.2	9.2	37.0	66.9	202.5
115	282.7	155.7	5.0	2.2	9.6	38.4	66.9	210.9
125	295.4	161.3	5.1	2.2	9.9	39.7	66.9	218.2
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.7	12.1	12.0	27.1	25.9
5	0	2.5	0.3	1.7	9.3	8.2	27.1	22.0
15	522	10.9	1.1	1.3	5.9	6.2	27.1	25.4
25	1,013	19.7	1.3	1.2	4.2	6.9	27.1	33.3
35	1,473	27.5	1.5	1.1	3.4	8.2	27.1	41.7
45	1,902	34.3	1.6	1.0	3.1	9.6	27.1	49.5
55	2,300	40.1	1.7	1.0	3.0	10.8	27.1	56.6
65	2,668	45.7	1.8	0.9	3.1	11.8	27.1	63.4
75	3,004	50.0	1.8	0.9	3.2	12.8	27.1	68.8
85	3,309	53.9	1.9	0.9	3.4	13.6	27.1	73.7
95	3,584	57.3	1.9	0.9	3.6	14.3	27.1	78.1
105	3,828	60.4	2.0	0.9	3.7	15.0	27.1	82.0
115	4,040	63.0	2.0	0.9	3.9	15.6	27.1	85.4
125	4,222	65.3	2.1	0.9	4.0	16.1	27.1	88.3

A5.— Regional estimates of timber volume and carbon stocks for spruce-balsam fir stands on forest land after clearcut harvest in the Northeast

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	2.1	20.3	33.7	98.0	56.2
5	0.0	7.0	0.7	1.8	16.0	23.6	98.0	49.1
15	11.5	20.1	2.0	1.6	10.6	18.6	98.0	53.0
25	29.1	32.5	3.3	1.5	8.0	20.7	98.0	66.0
35	51.6	45.7	4.6	1.4	7.1	24.2	98.0	83.1
45	76.9	57.4	5.7	1.4	6.9	27.7	98.0	99.2
55	102.6	68.7	6.9	1.4	7.3	30.7	98.0	114.9
65	126.4	78.6	7.4	1.3	7.8	33.3	98.0	128.5
75	149.3	87.9	7.6	1.3	8.4	35.5	98.0	140.8
85	170.9	96.5	7.8	1.3	9.1	37.4	98.0	152.2
95	191.6	104.5	8.0	1.3	9.7	39.1	98.0	162.6
105	211.1	111.9	8.2	1.3	10.4	40.6	98.0	172.3
115	229.6	118.8	8.3	1.3	11.0	41.9	98.0	181.2
125	247.1	125.3	8.4	1.3	11.6	43.0	98.0	189.6
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	0.9	8.2	13.6	39.7	22.7
5	0	2.8	0.3	0.7	6.5	9.5	39.7	19.9
15	164	8.1	0.8	0.6	4.3	7.5	39.7	21.4
25	416	13.2	1.3	0.6	3.2	8.4	39.7	26.7
35	738	18.5	1.9	0.6	2.9	9.8	39.7	33.6
45	1,099	23.2	2.3	0.6	2.8	11.2	39.7	40.1
55	1,466	27.8	2.8	0.6	2.9	12.4	39.7	46.5
65	1,807	31.8	3.0	0.5	3.2	13.5	39.7	52.0
75	2,133	35.6	3.1	0.5	3.4	14.4	39.7	57.0
85	2,443	39.0	3.2	0.5	3.7	15.2	39.7	61.6
95	2,738	42.3	3.2	0.5	3.9	15.8	39.7	65.8
105	3,017	45.3	3.3	0.5	4.2	16.4	39.7	69.7
115	3,281	48.1	3.4	0.5	4.4	16.9	39.7	73.3
125	3,532	50.7	3.4	0.5	4.7	17.4	39.7	76.7

A6.— Regional estimates of timber volume and carbon stocks for white-red-jack pine stands on forest land after clearcut harvest in the Northeast

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	2.1	20.4	13.8	78.1	36.3
5	0.0	7.3	0.7	2.2	15.8	10.7	78.1	36.8
15	30.0	28.6	2.9	1.8	10.4	9.4	78.1	53.1
25	54.4	44.7	3.9	1.8	7.5	10.1	78.1	68.1
35	77.9	57.7	4.3	1.7	6.1	11.2	78.1	81.0
45	100.6	69.4	4.6	1.7	5.5	12.2	78.1	93.4
55	122.5	78.7	4.8	1.6	5.3	13.1	78.1	103.4
65	142.3	86.8	5.0	1.6	5.3	13.7	78.1	112.5
75	160.9	94.3	5.2	1.6	5.5	14.2	78.1	120.8
85	178.4	101.2	5.3	1.6	5.8	14.7	78.1	128.6
95	194.7	107.6	5.4	1.6	6.0	15.0	78.1	135.7
105	210.0	113.5	5.5	1.6	6.3	15.4	78.1	142.3
115	224.1	118.9	5.6	1.6	6.6	15.6	78.1	148.3
125	237.1	123.8	5.7	1.6	6.8	15.9	78.1	153.8
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	0.8	8.3	5.6	31.6	14.7
5	0	3.0	0.3	0.9	6.4	4.3	31.6	14.9
15	429	11.6	1.2	0.7	4.2	3.8	31.6	21.5
25	777	18.1	1.6	0.7	3.0	4.1	31.6	27.5
35	1,113	23.3	1.7	0.7	2.5	4.6	31.6	32.8
45	1,438	28.1	1.9	0.7	2.2	5.0	31.6	37.8
55	1,751	31.8	2.0	0.7	2.1	5.3	31.6	41.9
65	2,034	35.1	2.0	0.7	2.2	5.5	31.6	45.5
75	2,300	38.2	2.1	0.7	2.2	5.8	31.6	48.9
85	2,550	41.0	2.1	0.6	2.3	5.9	31.6	52.0
95	2,783	43.5	2.2	0.6	2.4	6.1	31.6	54.9
105	3,001	45.9	2.2	0.6	2.6	6.2	31.6	57.6
115	3,202	48.1	2.3	0.6	2.7	6.3	31.6	60.0
125	3,389	50.1	2.3	0.6	2.8	6.4	31.6	62.2

A7.— Regional estimates of timber volume and carbon stocks for aspen-birch stands on forest land after clearcut harvest in the Northern Lake States

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	2.0	13.4	10.2	146.1	25.6
5	0.0	7.3	0.5	2.1	9.5	7.5	146.1	26.8
15	2.9	13.9	1.4	2.1	5.0	6.0	146.1	28.4
25	21.5	26.8	2.7	2.1	3.9	6.5	146.1	42.0
35	47.2	40.8	4.1	2.0	4.0	7.5	146.1	58.4
45	72.8	53.5	5.3	2.0	4.6	8.5	146.1	74.0
55	97.1	64.9	6.1	2.0	5.4	9.3	146.1	87.7
65	119.5	75.0	6.7	2.0	6.1	10.1	146.1	99.8
75	139.7	83.8	7.1	2.0	6.8	10.7	146.1	110.4
85	157.5	91.5	7.4	2.0	7.4	11.3	146.1	119.6
95	173.0	98.0	7.7	2.0	7.9	11.8	146.1	127.4
105	186.0	103.4	7.9	2.0	8.4	12.2	146.1	133.9
115	196.4	107.7	8.1	2.0	8.7	12.5	146.1	139.1
125	204.3	110.9	8.3	2.0	9.0	12.9	146.1	143.0
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	0.8	5.4	4.1	59.1	10.4
5	0	3.0	0.2	0.8	3.8	3.0	59.1	10.9
15	42	5.6	0.6	0.8	2.0	2.4	59.1	11.5
25	307	10.9	1.1	0.8	1.6	2.6	59.1	17.0
35	674	16.5	1.6	0.8	1.6	3.0	59.1	23.6
45	1,041	21.6	2.2	0.8	1.9	3.4	59.1	29.9
55	1,388	26.2	2.5	0.8	2.2	3.8	59.1	35.5
65	1,708	30.3	2.7	0.8	2.5	4.1	59.1	40.4
75	1,996	33.9	2.9	0.8	2.8	4.3	59.1	44.7
85	2,251	37.0	3.0	0.8	3.0	4.6	59.1	48.4
95	2,472	39.7	3.1	0.8	3.2	4.8	59.1	51.6
105	2,658	41.8	3.2	0.8	3.4	4.9	59.1	54.2
115	2,807	43.6	3.3	0.8	3.5	5.1	59.1	56.3
125	2,920	44.9	3.3	0.8	3.6	5.2	59.1	57.9

A8.— Regional estimates of timber volume and carbon stocks for elm-ash-cottonwood stands on forest land after clearcut harvest in the Northern Lake States

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m³/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	2.0	9.4	27.7	179.9	39.2
5	0.0	3.9	0.4	1.9	6.5	20.3	179.9	33.0
15	2.4	10.3	1.0	1.9	3.4	16.3	179.9	32.9
25	13.2	20.1	2.0	1.9	2.4	17.6	179.9	44.1
35	25.2	29.8	3.0	1.9	2.4	20.3	179.9	57.3
45	37.4	38.7	3.9	1.9	2.6	23.0	179.9	70.1
55	49.8	47.1	4.7	1.9	3.0	25.3	179.9	82.1
65	62.3	55.6	5.3	1.9	3.5	27.4	179.9	93.8
75	74.9	62.8	5.6	1.9	3.9	29.2	179.9	103.4
85	87.5	69.9	5.8	1.9	4.3	30.7	179.9	112.6
95	100.1	76.8	6.0	1.9	4.7	32.0	179.9	121.4
105	112.9	83.6	6.2	1.9	5.1	33.1	179.9	130.0
115	125.8	90.4	6.4	1.9	5.6	34.2	179.9	138.5
125	139.2	97.4	6.5	1.9	6.0	35.1	179.9	147.0
years	*ft³/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	0.8	3.8	11.2	72.8	15.8
5	0	1.6	0.2	0.8	2.6	8.2	72.8	13.3
15	35	4.2	0.4	0.8	1.4	6.6	72.8	13.3
25	189	8.1	0.8	0.8	1.0	7.1	72.8	17.8
35	360	12.0	1.2	0.8	1.0	8.2	72.8	23.2
45	535	15.7	1.6	0.8	1.1	9.3	72.8	28.4
55	712	19.1	1.9	0.8	1.2	10.3	72.8	33.2
65	890	22.5	2.2	0.8	1.4	11.1	72.8	38.0
75	1,070	25.4	2.3	0.8	1.6	11.8	72.8	41.8
85	1,250	28.3	2.4	0.8	1.7	12.4	72.8	45.6
95	1,431	31.1	2.4	0.8	1.9	12.9	72.8	49.1
105	1,613	33.8	2.5	0.8	2.1	13.4	72.8	52.6
115	1,798	36.6	2.6	0.8	2.2	13.8	72.8	56.0
125	1,990	39.4	2.7	0.8	2.4	14.2	72.8	59.5

A9.— Regional estimates of timber volume and carbon stocks for maple-beech-birch stands on forest land after clearcut harvest in the Northern Lake States

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	2.1	19.5	27.7	134.3	49.4
5	0.0	5.1	0.5	2.0	13.3	20.3	134.3	41.2
15	4.3	13.4	1.3	1.7	6.7	16.3	134.3	39.4
25	24.6	30.3	3.0	1.6	4.8	17.6	134.3	57.3
35	48.1	47.7	4.0	1.5	4.7	20.3	134.3	78.2
45	72.5	62.9	4.4	1.4	5.2	23.0	134.3	96.9
55	96.9	77.3	4.7	1.4	6.1	25.3	134.3	114.8
65	121.3	91.1	4.9	1.4	7.0	27.4	134.3	131.8
75	145.3	104.4	5.1	1.4	8.0	29.2	134.3	148.0
85	168.9	117.1	5.3	1.3	8.9	30.7	134.3	163.3
95	191.9	129.3	5.4	1.3	9.8	32.0	134.3	177.8
105	214.4	140.9	5.6	1.3	10.7	33.1	134.3	191.6
115	236.0	151.9	5.7	1.3	11.5	34.2	134.3	204.6
125	256.9	162.4	5.8	1.3	12.3	35.1	134.3	216.9
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	0.9	7.9	11.2	54.3	20.0
5	0	2.1	0.2	0.8	5.4	8.2	54.3	16.7
15	62	5.4	0.5	0.7	2.7	6.6	54.3	16.0
25	351	12.2	1.2	0.6	1.9	7.1	54.3	23.2
35	688	19.3	1.6	0.6	1.9	8.2	54.3	31.7
45	1,036	25.4	1.8	0.6	2.1	9.3	54.3	39.2
55	1,385	31.3	1.9	0.6	2.5	10.3	54.3	46.5
65	1,733	36.9	2.0	0.6	2.8	11.1	54.3	53.4
75	2,076	42.2	2.1	0.6	3.2	11.8	54.3	59.9
85	2,414	47.4	2.1	0.5	3.6	12.4	54.3	66.1
95	2,743	52.3	2.2	0.5	4.0	12.9	54.3	72.0
105	3,064	57.0	2.3	0.5	4.3	13.4	54.3	77.5
115	3,373	61.5	2.3	0.5	4.7	13.8	54.3	82.8
125	3,671	65.7	2.3	0.5	5.0	14.2	54.3	87.8

A10.— Regional estimates of timber volume and carbon stocks for oak-hickory stands on forest land after clearcut harvest in the Northern Lake States

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	2.1	20.5	8.2	97.1	30.8
5	0.0	6.7	0.7	2.2	14.1	5.7	97.1	29.3
15	4.1	17.0	1.7	2.0	7.3	4.1	97.1	32.1
25	21.9	33.6	3.1	1.9	5.2	4.5	97.1	48.2
35	42.5	50.3	3.6	1.8	5.0	5.3	97.1	66.1
45	64.9	66.7	3.9	1.8	5.7	6.3	97.1	84.4
55	88.7	83.6	4.2	1.8	6.7	7.3	97.1	103.5
65	113.4	99.1	4.5	1.7	7.8	8.1	97.1	121.2
75	139.0	114.7	4.7	1.7	8.9	8.9	97.1	139.0
85	165.2	130.3	4.9	1.7	10.1	9.7	97.1	156.7
95	192.1	146.0	5.1	1.7	11.3	10.3	97.1	174.4
105	219.2	161.6	5.3	1.7	12.5	10.9	97.1	192.0
115	246.4	177.0	5.4	1.6	13.7	11.5	97.1	209.2
125	272.5	191.6	5.5	1.6	14.8	12.0	97.1	225.6
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	0.8	8.3	3.3	39.3	12.5
5	0	2.7	0.3	0.9	5.7	2.3	39.3	11.9
15	58	6.9	0.7	0.8	2.9	1.7	39.3	13.0
25	313	13.6	1.2	0.8	2.1	1.8	39.3	19.5
35	608	20.4	1.4	0.7	2.0	2.2	39.3	26.7
45	928	27.0	1.6	0.7	2.3	2.6	39.3	34.2
55	1,267	33.8	1.7	0.7	2.7	2.9	39.3	41.9
65	1,620	40.1	1.8	0.7	3.1	3.3	39.3	49.0
75	1,986	46.4	1.9	0.7	3.6	3.6	39.3	56.2
85	2,361	52.7	2.0	0.7	4.1	3.9	39.3	63.4
95	2,745	59.1	2.1	0.7	4.6	4.2	39.3	70.6
105	3,133	65.4	2.1	0.7	5.1	4.4	39.3	77.7
115	3,521	71.6	2.2	0.7	5.5	4.7	39.3	84.7
125	3,895	77.5	2.2	0.7	6.0	4.9	39.3	91.3

A11.— Regional estimates of timber volume and carbon stocks for spruce-balsam fir stands on forest land after clearcut harvest in the Northern Lake States

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	2.1	16.0	33.7	261.8	51.9
5	0.0	3.4	0.3	2.1	12.4	23.6	261.8	41.8
15	3.0	9.3	0.9	2.6	7.7	18.6	261.8	39.1
25	23.2	24.3	2.4	1.9	6.1	20.7	261.8	55.3
35	51.1	41.2	4.1	1.6	5.8	24.2	261.8	77.0
45	77.2	56.0	5.1	1.5	6.1	27.7	261.8	96.4
55	100.7	67.4	5.8	1.4	6.6	30.7	261.8	111.9
65	121.6	77.2	6.4	1.3	7.1	33.3	261.8	125.2
75	140.2	85.5	6.8	1.3	7.6	35.5	261.8	136.8
85	156.5	92.8	7.2	1.2	8.2	37.4	261.8	146.8
95	170.9	99.0	7.5	1.2	8.6	39.1	261.8	155.4
105	183.5	104.3	7.7	1.2	9.1	40.6	261.8	162.9
115	194.4	109.0	7.9	1.2	9.5	41.9	261.8	169.4
125	203.8	112.9	8.1	1.2	9.8	43.0	261.8	174.9
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	0.9	6.5	13.6	105.9	21.0
5	0	1.4	0.1	0.9	5.0	9.5	105.9	16.9
15	43	3.7	0.4	1.0	3.1	7.5	105.9	15.8
25	332	9.8	1.0	0.8	2.5	8.4	105.9	22.4
35	730	16.7	1.7	0.7	2.4	9.8	105.9	31.2
45	1,103	22.7	2.1	0.6	2.5	11.2	105.9	39.0
55	1,439	27.3	2.4	0.6	2.7	12.4	105.9	45.3
65	1,738	31.2	2.6	0.5	2.9	13.5	105.9	50.7
75	2,003	34.6	2.7	0.5	3.1	14.4	105.9	55.4
85	2,237	37.5	2.9	0.5	3.3	15.2	105.9	59.4
95	2,442	40.1	3.0	0.5	3.5	15.8	105.9	62.9
105	2,622	42.2	3.1	0.5	3.7	16.4	105.9	65.9
115	2,778	44.1	3.2	0.5	3.8	16.9	105.9	68.5
125	2,912	45.7	3.3	0.5	4.0	17.4	105.9	70.8

A12.— Regional estimates of timber volume and carbon stocks for white-red-jack pine stands on forest land after clearcut harvest in the Northern Lake States

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	2.0	25.5	13.8	120.8	41.3
5	0.0	0.4	0.0	2.0	19.3	10.7	120.8	32.5
15	6.6	8.0	0.8	2.0	11.6	9.4	120.8	31.8
25	48.1	35.4	3.5	2.0	8.8	10.1	120.8	59.9
35	104.7	62.9	4.9	2.0	8.1	11.2	120.8	89.1
45	158.9	85.8	5.5	2.0	8.2	12.2	120.8	113.7
55	209.1	105.3	5.9	2.0	8.8	13.1	120.8	135.0
65	255.1	122.2	6.2	2.0	9.5	13.7	120.8	153.6
75	297.4	137.1	6.5	2.0	10.3	14.2	120.8	170.0
85	336.1	150.3	6.7	2.0	11.0	14.7	120.8	184.6
95	371.7	162.0	6.9	2.0	11.8	15.0	120.8	197.7
105	404.2	172.5	7.0	2.0	12.5	15.4	120.8	209.3
115	434.0	182.0	7.2	2.0	13.1	15.6	120.8	219.8
125	461.3	190.5	7.3	1.9	13.7	15.9	120.8	229.3
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	0.8	10.3	5.6	48.9	16.7
5	0	0.2	0.0	0.8	7.8	4.3	48.9	13.2
15	94	3.3	0.3	0.8	4.7	3.8	48.9	12.9
25	688	14.3	1.4	0.8	3.6	4.1	48.9	24.2
35	1,496	25.5	2.0	0.8	3.3	4.6	48.9	36.1
45	2,271	34.7	2.2	0.8	3.3	5.0	48.9	46.0
55	2,988	42.6	2.4	0.8	3.5	5.3	48.9	54.6
65	3,646	49.5	2.5	0.8	3.8	5.5	48.9	62.2
75	4,250	55.5	2.6	0.8	4.1	5.8	48.9	68.8
85	4,804	60.8	2.7	0.8	4.5	5.9	48.9	74.7
95	5,312	65.6	2.8	0.8	4.8	6.1	48.9	80.0
105	5,777	69.8	2.8	0.8	5.1	6.2	48.9	84.7
115	6,203	73.6	2.9	0.8	5.3	6.3	48.9	89.0
125	6,593	77.1	2.9	0.8	5.6	6.4	48.9	92.8

A13.— Regional estimates of timber volume and carbon stocks for elm-ash-cottonwood stands on forest land after clearcut harvest in the Northern Prairie States

Age	Mean volume	Mean carbon density: Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m³/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	2.1	11.3	27.7	84.8	41.0
5	0.0	3.9	0.4	2.1	7.7	20.3	84.8	34.4
15	0.0	8.7	0.9	2.7	3.9	16.3	84.8	32.4
25	5.8	15.5	1.6	2.4	2.5	17.6	84.8	39.7
35	21.8	27.7	2.8	2.2	2.5	20.3	84.8	55.5
45	45.1	43.2	4.3	2.0	3.3	23.0	84.8	75.7
55	73.0	60.2	5.6	1.9	4.3	25.3	84.8	97.2
65	104.1	78.9	6.1	1.8	5.5	27.4	84.8	119.7
75	137.4	96.5	6.5	1.8	6.7	29.2	84.8	140.6
85	171.9	114.0	6.9	1.7	7.9	30.7	84.8	161.2
95	206.8	131.3	7.2	1.7	9.1	32.0	84.8	181.3
105	241.7	148.2	7.5	1.6	10.3	33.1	84.8	200.7
115	275.8	164.3	7.8	1.6	11.4	34.2	84.8	219.2
125	308.6	179.6	8.0	1.6	12.4	35.1	84.8	236.6
years	*ft³/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	0.8	4.6	11.2	34.3	16.6
5	0	1.6	0.2	0.8	3.1	8.2	34.3	13.9
15	0	3.5	0.4	1.1	1.6	6.6	34.3	13.1
25	83	6.3	0.6	1.0	1.0	7.1	34.3	16.1
35	312	11.2	1.1	0.9	1.0	8.2	34.3	22.5
45	644	17.5	1.7	0.8	1.3	9.3	34.3	30.6
55	1,043	24.3	2.3	0.8	1.7	10.3	34.3	39.4
65	1,488	31.9	2.5	0.7	2.2	11.1	34.3	48.5
75	1,964	39.0	2.6	0.7	2.7	11.8	34.3	56.9
85	2,456	46.1	2.8	0.7	3.2	12.4	34.3	65.2
95	2,956	53.1	2.9	0.7	3.7	12.9	34.3	73.4
105	3,454	60.0	3.0	0.7	4.2	13.4	34.3	81.2
115	3,941	66.5	3.2	0.6	4.6	13.8	34.3	88.7
125	4,410	72.7	3.2	0.6	5.0	14.2	34.3	95.8

A14.— Regional estimates of timber volume and carbon stocks for maple-beech-birch stands on forest land after clearcut harvest in the Northern Prairie States

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	2.1	12.8	27.7	64.9	42.6
5	0.0	5.1	0.5	2.2	8.8	20.3	64.9	37.0
15	0.9	10.5	1.1	1.9	4.4	16.3	64.9	34.2
25	8.2	18.5	1.8	1.7	2.8	17.6	64.9	42.5
35	21.4	29.7	3.0	1.6	2.6	20.3	64.9	57.1
45	38.2	41.3	3.8	1.5	2.9	23.0	64.9	72.4
55	57.4	53.6	4.2	1.4	3.5	25.3	64.9	88.1
65	78.6	66.5	4.5	1.3	4.3	27.4	64.9	104.0
75	101.0	79.6	4.7	1.3	5.1	29.2	64.9	119.9
85	124.4	92.9	4.9	1.2	5.9	30.7	64.9	135.7
95	148.6	106.2	5.1	1.2	6.7	32.0	64.9	151.3
105	173.1	119.4	5.3	1.2	7.6	33.1	64.9	166.6
115	197.4	132.1	5.5	1.2	8.4	34.2	64.9	181.3
125	220.5	144.0	5.6	1.1	9.1	35.1	64.9	195.0
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	0.9	5.2	11.2	26.2	17.3
5	0	2.1	0.2	0.9	3.6	8.2	26.2	15.0
15	13	4.3	0.4	0.8	1.8	6.6	26.2	13.8
25	117	7.5	0.7	0.7	1.1	7.1	26.2	17.2
35	306	12.0	1.2	0.6	1.0	8.2	26.2	23.1
45	546	16.7	1.5	0.6	1.2	9.3	26.2	29.3
55	821	21.7	1.7	0.6	1.4	10.3	26.2	35.6
65	1,123	26.9	1.8	0.5	1.7	11.1	26.2	42.1
75	1,443	32.2	1.9	0.5	2.1	11.8	26.2	48.5
85	1,778	37.6	2.0	0.5	2.4	12.4	26.2	54.9
95	2,123	43.0	2.1	0.5	2.7	12.9	26.2	61.2
105	2,474	48.3	2.2	0.5	3.1	13.4	26.2	67.4
115	2,821	53.5	2.2	0.5	3.4	13.8	26.2	73.4
125	3,151	58.3	2.3	0.5	3.7	14.2	26.2	78.9

A15.— Regional estimates of timber volume and carbon stocks for oak-hickory stands on forest land after clearcut harvest in the Northern Prairie States

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m³/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	2.1	14.1	8.2	45.9	24.4
5	0.0	6.7	0.6	2.4	9.8	5.7	45.9	25.1
15	2.1	15.6	1.6	2.1	5.2	4.1	45.9	28.6
25	13.0	27.5	2.7	2.0	3.7	4.5	45.9	40.3
35	27.4	40.0	3.2	1.9	3.5	5.3	45.9	53.9
45	43.0	52.2	3.6	1.8	3.9	6.3	45.9	67.8
55	59.1	64.3	3.9	1.8	4.5	7.3	45.9	81.7
65	74.9	74.7	4.1	1.7	5.1	8.1	45.9	93.8
75	90.2	84.6	4.3	1.7	5.7	8.9	45.9	105.2
85	104.7	93.7	4.4	1.7	6.3	9.7	45.9	115.8
95	118.3	102.1	4.5	1.6	6.9	10.3	45.9	125.6
105	130.8	109.7	4.7	1.6	7.4	10.9	45.9	134.4
115	142.0	116.5	4.7	1.6	7.9	11.5	45.9	142.3
125	151.9	122.5	4.8	1.6	8.3	12.0	45.9	149.2
years	*ft³/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	0.8	5.7	3.3	18.6	9.9
5	0	2.7	0.2	1.0	4.0	2.3	18.6	10.2
15	30	6.3	0.6	0.9	2.1	1.7	18.6	11.6
25	186	11.1	1.1	0.8	1.5	1.8	18.6	16.3
35	391	16.2	1.3	0.8	1.4	2.2	18.6	21.8
45	615	21.1	1.4	0.7	1.6	2.6	18.6	27.4
55	844	26.0	1.6	0.7	1.8	2.9	18.6	33.0
65	1,070	30.2	1.7	0.7	2.1	3.3	18.6	37.9
75	1,289	34.2	1.7	0.7	2.3	3.6	18.6	42.6
85	1,497	37.9	1.8	0.7	2.6	3.9	18.6	46.9
95	1,691	41.3	1.8	0.7	2.8	4.2	18.6	50.8
105	1,869	44.4	1.9	0.7	3.0	4.4	18.6	54.4
115	2,030	47.2	1.9	0.7	3.2	4.7	18.6	57.6
125	2,171	49.6	2.0	0.7	3.3	4.9	18.6	60.4

A16.— Regional estimates of timber volume and carbon stocks for oak-pine stands on forest land after clearcut harvest in the Northern Prairie States

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m³/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.2	17.8	29.7	36.2	51.7
5	0.0	5.1	0.4	4.2	13.8	20.2	36.2	43.8
15	4.5	13.8	1.2	4.3	8.7	15.3	36.2	43.2
25	28.4	29.8	2.6	3.6	6.5	17.1	36.2	59.5
35	57.9	47.4	3.4	3.3	5.8	20.3	36.2	80.2
45	86.7	63.3	4.0	3.1	5.8	23.6	36.2	99.8
55	113.2	77.0	4.4	2.9	6.2	26.6	36.2	117.1
65	137.1	89.4	4.7	2.9	6.7	29.3	36.2	132.9
75	158.1	98.9	5.0	2.8	7.1	31.6	36.2	145.4
85	176.0	106.8	5.2	2.7	7.5	33.6	36.2	155.9
95	190.8	113.3	5.4	2.7	7.9	35.4	36.2	164.7
105	202.4	118.3	5.5	2.7	8.2	37.0	36.2	171.7
115	210.9	121.9	5.6	2.7	8.5	38.4	36.2	177.1
125	216.1	124.1	5.7	2.7	8.6	39.7	36.2	180.8
years	*ft³/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.7	7.2	12.0	14.6	20.9
5	0	2.1	0.2	1.7	5.6	8.2	14.6	17.7
15	65	5.6	0.5	1.7	3.5	6.2	14.6	17.5
25	406	12.1	1.0	1.5	2.6	6.9	14.6	24.1
35	828	19.2	1.4	1.3	2.3	8.2	14.6	32.5
45	1,239	25.6	1.6	1.2	2.4	9.6	14.6	40.4
55	1,618	31.2	1.8	1.2	2.5	10.8	14.6	47.4
65	1,959	36.2	1.9	1.2	2.7	11.8	14.6	53.8
75	2,259	40.0	2.0	1.1	2.9	12.8	14.6	58.8
85	2,515	43.2	2.1	1.1	3.1	13.6	14.6	63.1
95	2,727	45.8	2.2	1.1	3.2	14.3	14.6	66.6
105	2,893	47.9	2.2	1.1	3.3	15.0	14.6	69.5
115	3,014	49.3	2.3	1.1	3.4	15.6	14.6	71.7
125	3,088	50.2	2.3	1.1	3.5	16.1	14.6	73.2

A17.— Regional estimates of timber volume and carbon stocks for Douglas-fir stands on forest land after clearcut harvest in the Pacific Northwest, East

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.6	26.0	37.2	94.8	67.8
5	0.0	2.7	0.3	4.4	22.5	35.4	94.8	65.2
15	3.8	8.7	0.9	4.1	17.2	32.9	94.8	63.7
25	47.7	38.3	3.8	3.7	15.9	31.8	94.8	93.5
35	119.0	75.1	7.5	3.6	16.5	31.6	94.8	134.2
45	184.7	104.0	10.0	3.5	17.1	32.0	94.8	166.5
55	241.8	127.3	10.9	3.4	17.8	32.7	94.8	192.1
65	290.9	146.4	11.5	3.4	18.5	33.6	94.8	213.5
75	332.7	162.2	12.0	3.4	19.2	34.6	94.8	231.4
85	368.3	175.3	12.4	3.4	19.8	35.6	94.8	246.5
95	398.6	186.2	12.7	3.4	20.5	36.6	94.8	259.3
105	424.4	195.4	13.0	3.3	21.0	37.5	94.8	270.2
115	446.4	203.1	13.2	3.3	21.6	38.4	94.8	279.5
125	465.2	209.6	13.3	3.3	22.0	39.2	94.8	287.5
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.9	10.5	15.1	38.3	27.4
5	0	1.1	0.1	1.8	9.1	14.3	38.3	26.4
15	54	3.5	0.4	1.7	7.0	13.3	38.3	25.8
25	682	15.5	1.5	1.5	6.4	12.9	38.3	37.8
35	1,701	30.4	3.0	1.4	6.7	12.8	38.3	54.3
45	2,639	42.1	4.1	1.4	6.9	12.9	38.3	67.4
55	3,456	51.5	4.4	1.4	7.2	13.2	38.3	77.8
65	4,157	59.3	4.7	1.4	7.5	13.6	38.3	86.4
75	4,755	65.6	4.9	1.4	7.8	14.0	38.3	93.6
85	5,264	70.9	5.0	1.4	8.0	14.4	38.3	99.8
95	5,697	75.4	5.1	1.4	8.3	14.8	38.3	104.9
105	6,065	79.1	5.2	1.4	8.5	15.2	38.3	109.4
115	6,379	82.2	5.3	1.4	8.7	15.5	38.3	113.1
125	6,648	84.8	5.4	1.3	8.9	15.8	38.3	116.3

A18.— Regional estimates of timber volume and carbon stocks for fir-spruce-mountain hemlock stands on forest land after clearcut harvest in the Pacific Northwest, East

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.8	16.6	37.2	62.1	58.6
5	0.0	3.1	0.3	4.1	14.5	35.4	62.1	57.4
15	0.0	5.8	0.6	3.7	11.0	32.9	62.1	54.0
25	15.2	15.5	1.6	3.2	9.3	31.8	62.1	61.3
35	52.1	33.9	3.4	2.8	9.2	31.6	62.1	80.9
45	97.4	53.0	5.3	2.6	9.7	32.0	62.1	102.6
55	144.4	71.3	7.1	2.5	10.6	32.7	62.1	124.3
65	189.7	88.3	8.8	2.4	11.6	33.6	62.1	144.7
75	231.5	103.3	10.3	2.4	12.6	34.6	62.1	163.2
85	268.7	116.4	11.6	2.3	13.6	35.6	62.1	179.6
95	301.0	127.6	12.8	2.3	14.4	36.6	62.1	193.6
105	328.2	136.9	13.7	2.3	15.2	37.5	62.1	205.5
115	350.6	144.4	14.4	2.2	15.8	38.4	62.1	215.2
125	368.3	150.3	15.0	2.2	16.3	39.2	62.1	223.0
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.9	6.7	15.1	25.1	23.7
5	0	1.3	0.1	1.7	5.9	14.3	25.1	23.2
15	0	2.3	0.2	1.5	4.5	13.3	25.1	21.9
25	217	6.3	0.6	1.3	3.8	12.9	25.1	24.8
35	745	13.7	1.4	1.1	3.7	12.8	25.1	32.8
45	1,392	21.4	2.1	1.1	3.9	12.9	25.1	41.5
55	2,063	28.9	2.9	1.0	4.3	13.2	25.1	50.3
65	2,711	35.7	3.6	1.0	4.7	13.6	25.1	58.6
75	3,308	41.8	4.2	1.0	5.1	14.0	25.1	66.1
85	3,840	47.1	4.7	0.9	5.5	14.4	25.1	72.7
95	4,302	51.6	5.2	0.9	5.8	14.8	25.1	78.4
105	4,691	55.4	5.5	0.9	6.1	15.2	25.1	83.2
115	5,010	58.4	5.8	0.9	6.4	15.5	25.1	87.1
125	5,264	60.8	6.1	0.9	6.6	15.8	25.1	90.3

A19.— Regional estimates of timber volume and carbon stocks for lodgepole pine stands on forest land after clearcut harvest in the Pacific Northwest, East

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.8	13.1	24.1	52.0	42.0
5	0.0	1.9	0.2	4.8	11.4	22.0	52.0	40.2
15	6.6	8.1	0.8	3.5	9.0	19.4	52.0	40.7
25	40.8	24.3	2.4	2.6	8.3	18.3	52.0	56.0
35	81.7	40.1	4.0	2.3	8.2	18.2	52.0	72.8
45	120.5	54.0	5.4	2.2	8.3	18.7	52.0	88.5
55	156.3	64.5	6.4	2.1	8.4	19.4	52.0	100.8
65	189.3	73.6	7.4	2.0	8.6	20.4	52.0	111.9
75	219.9	81.7	8.2	1.9	8.9	21.4	52.0	122.0
85	248.0	88.9	8.9	1.9	9.2	22.4	52.0	131.2
95	274.0	95.4	9.5	1.9	9.6	23.3	52.0	139.7
105	298.2	101.2	10.1	1.8	9.9	24.3	52.0	147.4
115	320.5	106.5	10.6	1.8	10.3	25.2	52.0	154.4
125	341.2	111.4	10.9	1.8	10.6	26.0	52.0	160.7
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	2.0	5.3	9.8	21.1	17.0
5	0	0.8	0.1	2.0	4.6	8.9	21.1	16.3
15	95	3.3	0.3	1.4	3.6	7.8	21.1	16.5
25	583	9.8	1.0	1.1	3.4	7.4	21.1	22.7
35	1,168	16.2	1.6	0.9	3.3	7.4	21.1	29.5
45	1,722	21.8	2.2	0.9	3.3	7.6	21.1	35.8
55	2,234	26.1	2.6	0.8	3.4	7.9	21.1	40.8
65	2,706	29.8	3.0	0.8	3.5	8.2	21.1	45.3
75	3,142	33.1	3.3	0.8	3.6	8.6	21.1	49.4
85	3,544	36.0	3.6	0.8	3.7	9.1	21.1	53.1
95	3,916	38.6	3.9	0.8	3.9	9.4	21.1	56.5
105	4,261	41.0	4.1	0.7	4.0	9.8	21.1	59.6
115	4,580	43.1	4.3	0.7	4.2	10.2	21.1	62.5
125	4,876	45.1	4.4	0.7	4.3	10.5	21.1	65.0

A20.— Regional estimates of timber volume and carbon stocks for ponderosa pine stands on forest land after clearcut harvest in the Pacific Northwest, East

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m³/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.8	9.6	24.1	50.7	38.5
5	0.0	3.3	0.3	4.6	8.5	22.0	50.7	38.6
15	4.1	7.9	0.8	3.8	6.8	19.4	50.7	38.7
25	21.6	17.3	1.7	3.2	6.2	18.3	50.7	46.7
35	40.8	26.2	2.6	2.9	5.9	18.2	50.7	55.9
45	61.4	34.9	3.3	2.8	6.0	18.7	50.7	65.5
55	83.3	43.6	3.7	2.6	6.3	19.4	50.7	75.7
65	106.0	52.5	4.2	2.5	6.7	20.4	50.7	86.2
75	129.3	61.3	4.6	2.4	7.3	21.4	50.7	96.9
85	153.0	70.0	4.9	2.4	7.9	22.4	50.7	107.6
95	176.8	78.6	5.3	2.3	8.6	23.3	50.7	118.1
105	200.4	87.0	5.6	2.3	9.4	24.3	50.7	128.4
115	223.6	95.1	5.9	2.2	10.1	25.2	50.7	138.4
125	246.0	102.8	6.1	2.2	10.8	26.0	50.7	147.9
years	*ft³/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.9	3.9	9.8	20.5	15.6
5	0	1.3	0.1	1.8	3.5	8.9	20.5	15.6
15	59	3.2	0.3	1.5	2.8	7.8	20.5	15.6
25	309	7.0	0.7	1.3	2.5	7.4	20.5	18.9
35	583	10.6	1.1	1.2	2.4	7.4	20.5	22.6
45	878	14.1	1.3	1.1	2.4	7.6	20.5	26.5
55	1,190	17.7	1.5	1.1	2.5	7.9	20.5	30.6
65	1,515	21.2	1.7	1.0	2.7	8.2	20.5	34.9
75	1,848	24.8	1.8	1.0	2.9	8.6	20.5	39.2
85	2,187	28.3	2.0	1.0	3.2	9.1	20.5	43.5
95	2,527	31.8	2.1	0.9	3.5	9.4	20.5	47.8
105	2,864	35.2	2.3	0.9	3.8	9.8	20.5	52.0
115	3,195	38.5	2.4	0.9	4.1	10.2	20.5	56.0
125	3,515	41.6	2.5	0.9	4.4	10.5	20.5	59.8

A21.— Regional estimates of timber volume and carbon stocks for alder-maple stands on forest land after clearcut harvest in the Pacific Northwest, West

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.7	32.2	9.3	115.2	46.2
5	0.0	8.0	0.8	4.7	22.0	3.9	115.2	39.5
15	49.5	31.0	3.1	3.7	12.3	4.5	115.2	54.6
25	229.7	99.4	9.9	2.8	13.5	6.2	115.2	131.9
35	380.8	153.8	15.4	2.5	16.4	7.6	115.2	195.7
45	513.7	200.8	20.1	2.4	19.8	8.6	115.2	251.7
55	633.3	242.5	22.2	2.3	23.3	9.4	115.2	299.7
65	742.1	280.1	23.9	2.2	26.7	10.1	115.2	343.0
75	842.1	314.4	25.3	2.2	29.9	10.7	115.2	382.4
85	934.5	346.0	26.6	2.1	32.8	11.1	115.2	418.6
95	1,020.3	375.2	27.7	2.1	35.6	11.5	115.2	452.0
105	1,100.3	402.2	28.7	2.0	38.1	11.9	115.2	483.0
115	1,175.0	427.4	29.6	2.1	40.5	12.2	115.2	511.8
125	1,244.9	450.9	30.4	2.3	42.7	12.4	115.2	538.7
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.9	13.0	3.8	46.6	18.7
5	0	3.2	0.3	1.9	8.9	1.6	46.6	16.0
15	708	12.6	1.3	1.5	5.0	1.8	46.6	22.1
25	3,282	40.2	4.0	1.1	5.5	2.5	46.6	53.4
35	5,442	62.3	6.2	1.0	6.6	3.1	46.6	79.2
45	7,342	81.3	8.1	1.0	8.0	3.5	46.6	101.9
55	9,050	98.1	9.0	0.9	9.4	3.8	46.6	121.3
65	10,605	113.3	9.7	0.9	10.8	4.1	46.6	138.8
75	12,034	127.2	10.3	0.9	12.1	4.3	46.6	154.8
85	13,355	140.0	10.8	0.9	13.3	4.5	46.6	169.4
95	14,582	151.8	11.2	0.8	14.4	4.7	46.6	182.9
105	15,725	162.8	11.6	0.8	15.4	4.8	46.6	195.4
115	16,792	173.0	12.0	0.9	16.4	4.9	46.6	207.1
125	17,791	182.5	12.3	0.9	17.3	5.0	46.6	218.0

A22.— Regional estimates of timber volume and carbon stocks for Douglas-fir stands on forest land after clearcut harvest in the Pacific Northwest, West

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.6	50.3	27.5	94.8	82.4
5	0.0	8.4	0.8	4.5	43.9	23.7	94.8	81.3
15	37.4	30.3	3.0	3.9	34.6	20.7	94.8	92.6
25	208.9	107.1	10.7	3.4	33.9	21.2	94.8	176.3
35	391.8	181.6	17.4	3.2	35.2	23.3	94.8	260.7
45	554.7	246.1	21.2	3.1	37.1	26.0	94.8	333.5
55	698.4	302.2	24.1	3.0	39.4	28.9	94.8	397.6
65	826.0	351.4	26.4	3.0	41.8	31.8	94.8	454.4
75	939.9	394.9	28.4	2.9	44.4	34.5	94.8	505.1
85	1,042.1	433.7	30.1	2.9	47.0	37.0	94.8	550.7
95	1,134.5	468.6	31.6	2.9	49.5	39.3	94.8	591.9
105	1,218.3	500.1	32.9	2.9	51.9	41.5	94.8	629.2
115	1,294.7	528.7	34.0	2.9	54.3	43.4	94.8	663.3
125	1,364.7	554.8	35.0	2.8	56.5	45.3	94.8	694.4
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.9	20.3	11.1	38.3	33.3
5	0	3.4	0.3	1.8	17.8	9.6	38.3	32.9
15	535	12.3	1.2	1.6	14.0	8.4	38.3	37.5
25	2,985	43.3	4.3	1.4	13.7	8.6	38.3	71.3
35	5,600	73.5	7.1	1.3	14.2	9.4	38.3	105.5
45	7,927	99.6	8.6	1.3	15.0	10.5	38.3	135.0
55	9,981	122.3	9.7	1.2	15.9	11.7	38.3	160.9
65	11,804	142.2	10.7	1.2	16.9	12.9	38.3	183.9
75	13,432	159.8	11.5	1.2	18.0	14.0	38.3	204.4
85	14,893	175.5	12.2	1.2	19.0	15.0	38.3	222.9
95	16,213	189.6	12.8	1.2	20.0	15.9	38.3	239.5
105	17,411	202.4	13.3	1.2	21.0	16.8	38.3	254.6
115	18,503	213.9	13.8	1.2	22.0	17.6	38.3	268.4
125	19,503	224.5	14.2	1.1	22.9	18.3	38.3	281.0

A23.— Regional estimates of timber volume and carbon stocks for Douglas-fir stands on forest land after clearcut harvest in the Pacific Northwest, West; volumes are for high-productivity sites (growth rate greater than 165 cubic feet wood per acre per year) with high-intensity management (replanting with genetically improved stock, fertilization, and precommercial thinning)

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.6	49.3	27.5	94.8	81.4
5	0.0	9.5	0.9	4.4	43.1	23.7	94.8	81.7
15	19.8	23.4	2.3	4.0	33.3	20.7	94.8	83.8
25	169.7	84.6	8.5	3.5	31.2	21.2	94.8	148.9
35	445.7	187.4	10.0	3.2	35.4	23.3	94.8	259.3
45	718.8	286.2	10.6	3.0	40.8	26.0	94.8	366.7
55	924.1	359.4	10.9	3.0	44.9	28.9	94.8	447.0
65	1,086.5	416.7	11.1	2.9	48.2	31.8	94.8	510.7
75	1,225.8	465.6	11.2	2.9	51.4	34.5	94.8	565.5
85	1,346.8	507.8	11.3	2.9	54.3	37.0	94.8	613.4
95	1,452.4	544.6	11.4	2.8	57.0	39.3	94.8	655.2
105	1,544.4	576.5	11.5	2.9	59.6	41.5	94.8	691.9
115	1,544.4	576.5	11.5	2.9	59.0	43.4	94.8	693.4
125	1,544.4	576.5	11.5	2.9	58.7	45.3	94.8	694.8
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.9	19.9	11.1	38.3	32.9
5	0	3.8	0.4	1.8	17.5	9.6	38.3	33.0
15	283	9.5	0.9	1.6	13.5	8.4	38.3	33.9
25	2,425	34.2	3.4	1.4	12.6	8.6	38.3	60.3
35	6,370	75.9	4.1	1.3	14.3	9.4	38.3	104.9
45	10,272	115.8	4.3	1.2	16.5	10.5	38.3	148.4
55	13,207	145.4	4.4	1.2	18.2	11.7	38.3	180.9
65	15,527	168.6	4.5	1.2	19.5	12.9	38.3	206.7
75	17,518	188.4	4.5	1.2	20.8	14.0	38.3	228.9
85	19,248	205.5	4.6	1.2	22.0	15.0	38.3	248.2
95	20,756	220.4	4.6	1.2	23.1	15.9	38.3	265.2
105	22,072	233.3	4.7	1.2	24.1	16.8	38.3	280.0
115	22,072	233.3	4.7	1.2	23.9	17.6	38.3	280.6
125	22,072	233.3	4.7	1.2	23.7	18.3	38.3	281.2

A24.— Regional estimates of timber volume and carbon stocks for fir-spruce-mountain hemlock stands on forest land after clearcut harvest in the Pacific Northwest, West

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.8	23.8	29.5	62.1	58.1
5	0.0	3.2	0.3	4.8	20.7	27.0	62.1	56.0
15	8.2	11.6	1.2	3.9	16.0	25.2	62.1	57.9
25	62.3	42.5	4.3	3.2	14.8	25.6	62.1	90.3
35	145.5	84.3	8.4	2.8	15.6	27.1	62.1	138.2
45	238.7	128.7	12.9	2.6	17.4	28.9	62.1	190.6
55	333.9	168.2	16.8	2.5	19.4	30.8	62.1	237.8
65	427.0	205.1	20.5	2.5	21.6	32.6	62.1	282.2
75	515.8	239.2	23.9	2.4	23.8	34.2	62.1	323.4
85	599.0	270.3	27.0	2.3	25.9	35.6	62.1	361.2
95	676.0	298.5	29.8	2.3	28.0	36.8	62.1	395.5
105	746.6	323.9	32.4	2.3	29.9	37.9	62.1	426.5
115	810.8	346.7	34.1	2.3	31.7	38.9	62.1	453.7
125	869.1	367.2	35.1	2.2	33.4	39.8	62.1	477.7
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.9	9.6	11.9	25.1	23.5
5	0	1.3	0.1	1.9	8.4	10.9	25.1	22.7
15	117	4.7	0.5	1.6	6.5	10.2	25.1	23.4
25	890	17.2	1.7	1.3	6.0	10.4	25.1	36.6
35	2,080	34.1	3.4	1.1	6.3	11.0	25.1	55.9
45	3,412	52.1	5.2	1.1	7.1	11.7	25.1	77.1
55	4,772	68.1	6.8	1.0	7.9	12.5	25.1	96.2
65	6,103	83.0	8.3	1.0	8.7	13.2	25.1	114.2
75	7,371	96.8	9.7	1.0	9.6	13.8	25.1	130.9
85	8,560	109.4	10.9	0.9	10.5	14.4	25.1	146.2
95	9,661	120.8	12.1	0.9	11.3	14.9	25.1	160.0
105	10,670	131.1	13.1	0.9	12.1	15.4	25.1	172.6
115	11,588	140.3	13.8	0.9	12.8	15.8	25.1	183.6
125	12,421	148.6	14.2	0.9	13.5	16.1	25.1	193.3

A25.— Regional estimates of timber volume and carbon stocks for hemlock-Sitka spruce stands on forest land after clearcut harvest in the Pacific Northwest, West

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.7	43.2	27.5	116.3	75.4
5	0.0	5.9	0.6	4.7	37.6	23.7	116.3	72.5
15	33.7	22.5	2.2	4.1	29.4	20.7	116.3	78.9
25	184.1	78.0	7.8	3.1	27.6	21.2	116.3	137.7
35	350.8	139.8	14.0	2.7	28.4	23.3	116.3	208.2
45	516.7	201.6	20.2	2.5	30.6	26.0	116.3	280.9
55	678.7	256.6	25.7	2.4	33.2	28.9	116.3	346.8
65	835.1	309.1	30.9	2.3	36.2	31.8	116.3	410.4
75	985.6	359.2	35.9	2.2	39.6	34.5	116.3	471.5
85	1,129.8	406.7	40.1	2.2	43.2	37.0	116.3	529.2
95	1,267.4	451.8	42.8	2.3	46.8	39.3	116.3	583.0
105	1,398.3	494.4	45.2	2.5	50.4	41.5	116.3	634.0
115	1,522.4	534.7	47.4	2.7	53.9	43.4	116.3	682.2
125	1,639.6	572.6	49.4	2.9	57.3	45.3	116.3	727.5
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.9	17.5	11.1	47.1	30.5
5	0	2.4	0.2	1.9	15.2	9.6	47.1	29.3
15	482	9.1	0.9	1.6	11.9	8.4	47.1	31.9
25	2,631	31.6	3.2	1.3	11.2	8.6	47.1	55.7
35	5,013	56.6	5.7	1.1	11.5	9.4	47.1	84.2
45	7,385	81.6	8.2	1.0	12.4	10.5	47.1	113.7
55	9,699	103.9	10.4	1.0	13.4	11.7	47.1	140.3
65	11,935	125.1	12.5	0.9	14.7	12.9	47.1	166.1
75	14,086	145.4	14.5	0.9	16.0	14.0	47.1	190.8
85	16,146	164.6	16.2	0.9	17.5	15.0	47.1	214.2
95	18,113	182.8	17.3	0.9	18.9	15.9	47.1	235.9
105	19,983	200.1	18.3	1.0	20.4	16.8	47.1	256.6
115	21,757	216.4	19.2	1.1	21.8	17.6	47.1	276.1
125	23,432	231.7	20.0	1.2	23.2	18.3	47.1	294.4

A26.— Regional estimates of timber volume and carbon stocks for hemlock-Sitka spruce stands on forest land after clearcut harvest in the Pacific Northwest, West; volumes are for high-productivity sites (growth rate greater than 225 cubic feet wood/acre/year)

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.7	42.7	27.5	116.3	74.9
5	0.0	5.9	0.6	4.7	37.1	23.7	116.3	72.0
15	80.3	36.4	3.6	3.7	30.4	20.7	116.3	94.8
25	221.7	90.4	9.0	3.0	28.6	21.2	116.3	152.3
35	413.7	161.0	16.1	2.7	30.3	23.3	116.3	233.3
45	669.6	253.6	25.4	2.4	35.6	26.0	116.3	342.9
55	903.9	332.1	33.2	2.3	40.5	28.9	116.3	437.0
65	1,119.3	403.3	39.9	2.2	45.5	31.8	116.3	522.6
75	1,318.1	468.3	43.7	2.3	50.4	34.5	116.3	599.3
85	1,502.0	528.1	47.1	2.6	55.1	37.0	116.3	669.9
95	1,672.1	583.0	50.0	2.9	59.7	39.3	116.3	735.0
105	1,829.1	633.5	52.6	3.2	64.1	41.5	116.3	794.8
115	1,973.0	679.5	54.9	3.4	68.2	43.4	116.3	849.4
125	2,103.3	721.0	56.9	3.6	72.0	45.3	116.3	898.7
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.9	17.3	11.1	47.1	30.3
5	0	2.4	0.2	1.9	15.0	9.6	47.1	29.1
15	1,148	14.7	1.5	1.5	12.3	8.4	47.1	38.4
25	3,169	36.6	3.7	1.2	11.6	8.6	47.1	61.6
35	5,912	65.1	6.5	1.1	12.3	9.4	47.1	94.4
45	9,570	102.6	10.3	1.0	14.4	10.5	47.1	138.8
55	12,918	134.4	13.4	0.9	16.4	11.7	47.1	176.8
65	15,996	163.2	16.1	0.9	18.4	12.9	47.1	211.5
75	18,837	189.5	17.7	0.9	20.4	14.0	47.1	242.5
85	21,465	213.7	19.0	1.1	22.3	15.0	47.1	271.1
95	23,896	235.9	20.2	1.2	24.2	15.9	47.1	297.4
105	26,140	256.4	21.3	1.3	25.9	16.8	47.1	321.6
115	28,197	275.0	22.2	1.4	27.6	17.6	47.1	343.7
125	30,059	291.8	23.0	1.5	29.1	18.3	47.1	363.7

A27.— Regional estimates of timber volume and carbon stocks for mixed conifer stands on forest land after clearcut harvest in the Pacific Southwest

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m³/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.8	12.0	37.2	49.8	54.0
5	0.0	4.2	0.3	4.8	10.7	35.4	49.8	55.4
15	2.0	8.1	0.8	4.8	8.4	32.9	49.8	54.9
25	11.1	14.6	1.5	6.9	7.0	31.8	49.8	61.7
35	24.4	22.3	2.2	4.9	6.3	31.6	49.8	67.3
45	44.5	32.9	3.3	3.6	6.3	32.0	49.8	78.1
55	71.9	46.5	4.7	2.8	6.9	32.7	49.8	93.5
65	106.6	62.8	6.3	2.2	7.9	33.6	49.8	112.8
75	147.9	81.4	8.1	1.8	9.3	34.6	49.8	135.3
85	195.4	102.0	10.2	1.5	11.1	35.6	49.8	160.4
95	248.3	124.2	12.4	1.3	13.1	36.6	49.8	187.5
105	305.6	147.5	14.8	1.1	15.3	37.5	49.8	216.2
115	366.7	171.8	17.2	1.0	17.6	38.4	49.8	245.9
125	430.5	196.6	19.7	1.0	20.0	39.2	49.8	276.4
years	*ft³/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.9	4.9	15.1	20.2	21.9
5	0	1.7	0.1	1.9	4.3	14.3	20.2	22.4
15	29	3.3	0.3	1.9	3.4	13.3	20.2	22.2
25	159	5.9	0.6	2.8	2.8	12.9	20.2	25.0
35	349	9.0	0.9	2.0	2.6	12.8	20.2	27.2
45	636	13.3	1.3	1.5	2.5	12.9	20.2	31.6
55	1,028	18.8	1.9	1.1	2.8	13.2	20.2	37.9
65	1,523	25.4	2.5	0.9	3.2	13.6	20.2	45.7
75	2,114	33.0	3.3	0.7	3.8	14.0	20.2	54.8
85	2,793	41.3	4.1	0.6	4.5	14.4	20.2	64.9
95	3,548	50.2	5.0	0.5	5.3	14.8	20.2	75.9
105	4,368	59.7	6.0	0.5	6.2	15.2	20.2	87.5
115	5,240	69.5	7.0	0.4	7.1	15.5	20.2	99.5
125	6,152	79.6	8.0	0.4	8.1	15.8	20.2	111.9

A28.— Regional estimates of timber volume and carbon stocks for fir-spruce-mountain hemlock stands on forest land after clearcut harvest in the Pacific Southwest

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.8	16.0	37.2	51.9	58.0
5	0.0	3.2	0.3	4.8	14.0	35.4	51.9	57.7
15	2.0	7.9	0.8	4.2	10.9	32.9	51.9	56.8
25	13.7	17.3	1.7	3.4	9.3	31.8	51.9	63.5
35	32.4	29.5	3.0	2.9	8.6	31.6	51.9	75.6
45	58.8	45.2	4.5	2.6	8.9	32.0	51.9	93.2
55	94.0	63.1	6.3	2.4	9.8	32.7	51.9	114.3
65	136.7	83.5	8.4	2.2	11.2	33.6	51.9	138.9
75	185.6	105.7	10.6	2.1	13.1	34.6	51.9	166.0
85	239.2	128.9	12.9	2.0	15.2	35.6	51.9	194.6
95	296.6	153.0	15.3	1.9	17.5	36.6	51.9	224.2
105	356.8	177.4	17.7	1.8	19.9	37.5	51.9	254.4
115	419.1	202.0	20.2	1.8	22.4	38.4	51.9	284.8
125	482.7	226.6	22.7	1.7	25.0	39.2	51.9	315.1
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.9	6.5	15.1	21.0	23.5
5	0	1.3	0.1	1.9	5.7	14.3	21.0	23.4
15	28	3.2	0.3	1.7	4.4	13.3	21.0	23.0
25	196	7.0	0.7	1.4	3.7	12.9	21.0	25.7
35	463	11.9	1.2	1.2	3.5	12.8	21.0	30.6
45	840	18.3	1.8	1.1	3.6	12.9	21.0	37.7
55	1,343	25.5	2.6	1.0	4.0	13.2	21.0	46.3
65	1,954	33.8	3.4	0.9	4.5	13.6	21.0	56.2
75	2,652	42.8	4.3	0.8	5.3	14.0	21.0	67.2
85	3,419	52.2	5.2	0.8	6.1	14.4	21.0	78.8
95	4,239	61.9	6.2	0.8	7.1	14.8	21.0	90.7
105	5,099	71.8	7.2	0.7	8.1	15.2	21.0	102.9
115	5,989	81.8	8.2	0.7	9.1	15.5	21.0	115.2
125	6,899	91.7	9.2	0.7	10.1	15.8	21.0	127.5

A29.— Regional estimates of timber volume and carbon stocks for western oak stands on forest land after clearcut harvest in the Pacific Southwest

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.7	13.3	31.7	27.6	49.7
5	0.0	2.6	0.2	4.6	8.9	28.4	27.6	44.8
15	0.0	5.7	0.6	4.5	4.1	24.6	27.6	39.5
25	1.0	8.8	0.9	4.4	2.1	23.4	27.6	39.5
35	25.9	30.6	3.1	4.2	2.0	23.5	27.6	63.4
45	76.3	65.1	4.5	4.1	3.0	24.3	27.6	101.1
55	127.8	98.3	5.4	4.0	4.2	25.5	27.6	137.5
65	174.4	124.0	6.0	4.0	5.2	26.8	27.6	166.1
75	215.0	145.3	6.5	4.0	6.1	28.1	27.6	189.9
85	249.4	162.7	6.8	4.0	6.8	29.4	27.6	209.7
95	278.4	177.1	7.1	4.0	7.4	30.6	27.6	226.1
105	302.8	189.0	7.3	3.9	7.9	31.7	27.6	239.7
115	323.3	198.8	7.4	3.9	8.3	32.6	27.6	251.1
125	340.6	207.0	7.6	3.9	8.6	33.5	27.6	260.7
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.9	5.4	12.8	11.2	20.1
5	0	1.1	0.1	1.9	3.6	11.5	11.2	18.1
15	0	2.3	0.2	1.8	1.7	10.0	11.2	16.0
25	15	3.6	0.4	1.8	0.8	9.5	11.2	16.0
35	370	12.4	1.2	1.7	0.8	9.5	11.2	25.7
45	1,090	26.3	1.8	1.7	1.2	9.8	11.2	40.9
55	1,826	39.8	2.2	1.6	1.7	10.3	11.2	55.6
65	2,493	50.2	2.4	1.6	2.1	10.9	11.2	67.2
75	3,072	58.8	2.6	1.6	2.5	11.4	11.2	76.9
85	3,564	65.9	2.8	1.6	2.7	11.9	11.2	84.9
95	3,979	71.7	2.9	1.6	3.0	12.4	11.2	91.5
105	4,328	76.5	2.9	1.6	3.2	12.8	11.2	97.0
115	4,620	80.5	3.0	1.6	3.3	13.2	11.2	101.6
125	4,868	83.8	3.1	1.6	3.5	13.6	11.2	105.5

A30.— Regional estimates of timber volume and carbon stocks for Douglas-fir stands on forest land after clearcut harvest in the Rocky Mountain, North

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.7	22.4	37.2	38.8	64.4
5	0.0	2.7	0.3	4.7	20.2	35.4	38.8	63.2
15	1.1	6.1	0.6	4.7	16.3	32.9	38.8	60.6
25	19.7	21.5	2.2	3.4	14.0	31.8	38.8	72.8
35	57.1	44.3	4.4	2.7	12.8	31.6	38.8	95.8
45	100.9	66.5	6.7	2.3	12.1	32.0	38.8	119.5
55	145.9	87.2	8.7	2.1	11.8	32.7	38.8	142.5
65	189.3	105.9	10.1	1.9	11.6	33.6	38.8	163.1
75	229.7	122.5	10.7	1.8	11.6	34.6	38.8	181.3
85	266.3	137.0	11.2	1.8	11.7	35.6	38.8	197.3
95	298.6	149.4	11.6	1.7	11.8	36.6	38.8	211.1
105	326.6	159.9	12.0	1.7	12.0	37.5	38.8	223.0
115	350.1	168.6	12.2	1.6	12.1	38.4	38.8	232.9
125	369.5	175.7	12.4	1.6	12.2	39.2	38.8	241.1
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.9	9.1	15.1	15.7	26.0
5	0	1.1	0.1	1.9	8.2	14.3	15.7	25.6
15	16	2.5	0.2	1.9	6.6	13.3	15.7	24.5
25	281	8.7	0.9	1.4	5.6	12.9	15.7	29.5
35	816	17.9	1.8	1.1	5.2	12.8	15.7	38.8
45	1,442	26.9	2.7	0.9	4.9	12.9	15.7	48.4
55	2,085	35.3	3.5	0.8	4.8	13.2	15.7	57.7
65	2,705	42.9	4.1	0.8	4.7	13.6	15.7	66.0
75	3,283	49.6	4.3	0.7	4.7	14.0	15.7	73.4
85	3,806	55.4	4.5	0.7	4.7	14.4	15.7	79.8
95	4,268	60.5	4.7	0.7	4.8	14.8	15.7	85.4
105	4,667	64.7	4.8	0.7	4.8	15.2	15.7	90.2
115	5,003	68.2	4.9	0.7	4.9	15.5	15.7	94.3
125	5,280	71.1	5.0	0.7	4.9	15.8	15.7	97.6

A31.— Regional estimates of timber volume and carbon stocks for fir-spruce-mountain hemlock stands on forest land after clearcut harvest in the Rocky Mountain, North

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.7	25.7	37.2	44.1	67.7
5	0.0	3.1	0.3	4.7	23.2	35.4	44.1	66.8
15	0.0	5.8	0.6	4.7	18.8	32.9	44.1	62.8
25	18.2	17.0	1.7	3.4	16.2	31.8	44.1	70.1
35	61.6	38.1	3.8	2.7	15.3	31.6	44.1	91.4
45	113.8	59.5	5.9	2.3	15.1	32.0	44.1	114.8
55	167.2	80.0	8.0	2.1	15.3	32.7	44.1	138.1
65	218.2	98.6	9.9	2.0	15.7	33.6	44.1	159.7
75	264.6	115.0	11.5	1.9	16.1	34.6	44.1	179.1
85	305.4	129.1	12.9	1.8	16.6	35.6	44.1	196.0
95	340.2	140.9	14.1	1.8	17.0	36.6	44.1	210.4
105	368.8	150.5	15.0	1.7	17.4	37.5	44.1	222.2
115	391.6	158.0	15.8	1.7	17.7	38.4	44.1	231.6
125	408.8	163.7	16.4	1.7	17.9	39.2	44.1	238.8
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.9	10.4	15.1	17.9	27.4
5	0	1.3	0.1	1.9	9.4	14.3	17.9	27.0
15	0	2.3	0.2	1.9	7.6	13.3	17.9	25.4
25	260	6.9	0.7	1.4	6.5	12.9	17.9	28.4
35	880	15.4	1.5	1.1	6.2	12.8	17.9	37.0
45	1,626	24.1	2.4	0.9	6.1	12.9	17.9	46.5
55	2,390	32.4	3.2	0.9	6.2	13.2	17.9	55.9
65	3,118	39.9	4.0	0.8	6.3	13.6	17.9	64.6
75	3,782	46.5	4.7	0.8	6.5	14.0	17.9	72.5
85	4,365	52.2	5.2	0.7	6.7	14.4	17.9	79.3
95	4,862	57.0	5.7	0.7	6.9	14.8	17.9	85.1
105	5,271	60.9	6.1	0.7	7.0	15.2	17.9	89.9
115	5,596	63.9	6.4	0.7	7.2	15.5	17.9	93.7
125	5,842	66.2	6.6	0.7	7.2	15.8	17.9	96.6

A32.— Regional estimates of timber volume and carbon stocks for lodgepole pine stands on forest land after clearcut harvest in the Rocky Mountain, North

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m³/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.8	17.7	24.1	37.2	46.5
5	0.0	1.9	0.1	4.8	15.9	22.0	37.2	44.6
15	0.2	4.1	0.3	4.8	12.8	19.4	37.2	41.3
25	15.9	14.3	1.4	3.5	10.8	18.3	37.2	48.3
35	51.6	29.9	3.0	2.4	9.6	18.2	37.2	63.1
45	94.3	45.8	4.6	1.9	8.9	18.7	37.2	79.9
55	138.8	59.4	5.9	1.7	8.4	19.4	37.2	94.9
65	182.1	71.6	7.2	1.5	8.1	20.4	37.2	108.8
75	223.1	82.5	8.3	1.4	7.9	21.4	37.2	121.5
85	261.0	92.1	9.2	1.4	7.8	22.4	37.2	132.9
95	295.3	100.5	10.1	1.3	7.8	23.3	37.2	143.1
105	325.9	107.8	10.7	1.3	7.8	24.3	37.2	151.9
115	353.2	114.2	11.1	1.2	7.9	25.2	37.2	159.6
125	377.3	119.7	11.5	1.2	7.9	26.0	37.2	166.3
years	*ft³/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.9	7.2	9.8	15.0	18.8
5	0	0.8	0.0	1.9	6.4	8.9	15.0	18.0
15	3	1.7	0.1	1.9	5.2	7.8	15.0	16.7
25	227	5.8	0.6	1.4	4.4	7.4	15.0	19.6
35	737	12.1	1.2	1.0	3.9	7.4	15.0	25.5
45	1,348	18.5	1.9	0.8	3.6	7.6	15.0	32.3
55	1,983	24.0	2.4	0.7	3.4	7.9	15.0	38.4
65	2,603	29.0	2.9	0.6	3.3	8.2	15.0	44.0
75	3,189	33.4	3.3	0.6	3.2	8.6	15.0	49.2
85	3,730	37.3	3.7	0.6	3.2	9.1	15.0	53.8
95	4,220	40.7	4.1	0.5	3.2	9.4	15.0	57.9
105	4,658	43.6	4.3	0.5	3.2	9.8	15.0	61.5
115	5,048	46.2	4.5	0.5	3.2	10.2	15.0	64.6
125	5,392	48.4	4.6	0.5	3.2	10.5	15.0	67.3

A33.— Regional estimates of timber volume and carbon stocks for ponderosa pine stands on forest land after clearcut harvest in the Rocky Mountain, North

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.8	18.8	24.1	34.3	47.7
5	0.0	3.3	0.2	4.8	17.0	22.0	34.3	47.2
15	1.3	6.3	0.6	4.3	13.9	19.4	34.3	44.5
25	18.6	15.9	1.6	3.2	12.0	18.3	34.3	50.9
35	51.8	30.9	3.0	2.5	11.1	18.2	34.3	65.7
45	89.4	46.1	3.9	2.2	10.7	18.7	34.3	81.5
55	127.1	60.4	4.5	2.0	10.6	19.4	34.3	96.9
65	162.2	73.3	5.1	1.9	10.6	20.4	34.3	111.2
75	193.8	84.6	5.5	1.8	10.7	21.4	34.3	124.0
85	221.0	94.2	5.8	1.7	10.9	22.4	34.3	135.0
95	243.7	102.0	6.1	1.7	11.0	23.3	34.3	144.1
105	261.8	108.2	6.3	1.6	11.1	24.3	34.3	151.6
115	275.6	112.9	6.4	1.6	11.2	25.2	34.3	157.3
125	285.1	116.1	6.5	1.6	11.2	26.0	34.3	161.4
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.9	7.6	9.8	13.9	19.3
5	0	1.3	0.1	1.9	6.9	8.9	13.9	19.1
15	19	2.6	0.2	1.8	5.6	7.8	13.9	18.0
25	266	6.4	0.6	1.3	4.8	7.4	13.9	20.6
35	740	12.5	1.2	1.0	4.5	7.4	13.9	26.6
45	1,278	18.6	1.6	0.9	4.3	7.6	13.9	33.0
55	1,816	24.5	1.8	0.8	4.3	7.9	13.9	39.2
65	2,318	29.7	2.0	0.8	4.3	8.2	13.9	45.0
75	2,769	34.2	2.2	0.7	4.3	8.6	13.9	50.2
85	3,159	38.1	2.4	0.7	4.4	9.1	13.9	54.6
95	3,483	41.3	2.5	0.7	4.5	9.4	13.9	58.3
105	3,742	43.8	2.5	0.7	4.5	9.8	13.9	61.3
115	3,938	45.7	2.6	0.6	4.5	10.2	13.9	63.6
125	4,075	47.0	2.6	0.6	4.5	10.5	13.9	65.3

A34.— Regional estimates of timber volume and carbon stocks for aspen-birch stands on forest land after clearcut harvest in the Rocky Mountain, South

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.7	11.6	31.7	58.8	48.1
5	0.0	3.1	0.3	4.7	9.0	28.4	58.8	45.5
15	0.0	6.4	0.6	4.7	5.5	24.6	58.8	41.9
25	6.3	13.9	1.4	4.8	3.8	23.4	58.8	47.2
35	22.7	25.7	2.6	4.5	3.3	23.5	58.8	59.6
45	45.0	38.8	3.9	4.3	3.5	24.3	58.8	74.7
55	70.7	52.3	5.2	4.2	3.9	25.5	58.8	91.1
65	98.1	64.7	6.5	4.1	4.5	26.8	58.8	106.5
75	126.5	76.6	7.7	4.0	5.1	28.1	58.8	121.5
85	155.0	88.0	8.8	3.9	5.8	29.4	58.8	135.9
95	183.1	98.8	9.9	3.9	6.4	30.6	58.8	149.5
105	210.5	108.8	10.9	3.8	7.0	31.7	58.8	162.2
115	236.8	118.3	11.8	3.8	7.6	32.6	58.8	174.1
125	261.8	127.0	12.4	3.8	8.2	33.5	58.8	184.9
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.9	4.7	12.8	23.8	19.5
5	0	1.2	0.1	1.9	3.6	11.5	23.8	18.4
15	0	2.6	0.3	1.9	2.2	10.0	23.8	17.0
25	90	5.6	0.6	1.9	1.5	9.5	23.8	19.1
35	324	10.4	1.0	1.8	1.4	9.5	23.8	24.1
45	643	15.7	1.6	1.7	1.4	9.8	23.8	30.2
55	1,010	21.2	2.1	1.7	1.6	10.3	23.8	36.9
65	1,402	26.2	2.6	1.6	1.8	10.9	23.8	43.1
75	1,808	31.0	3.1	1.6	2.1	11.4	23.8	49.2
85	2,215	35.6	3.6	1.6	2.3	11.9	23.8	55.0
95	2,617	40.0	4.0	1.6	2.6	12.4	23.8	60.5
105	3,008	44.0	4.4	1.6	2.8	12.8	23.8	65.7
115	3,384	47.9	4.8	1.5	3.1	13.2	23.8	70.5
125	3,741	51.4	5.0	1.5	3.3	13.6	23.8	74.8

A35.— Regional estimates of timber volume and carbon stocks for Douglas-fir stands on forest land after clearcut harvest in the Rocky Mountain, South

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.8	17.0	37.2	30.9	59.0
5	0.0	2.6	0.3	4.8	15.3	35.4	30.9	58.4
15	1.6	7.2	0.7	4.8	12.6	32.9	30.9	58.3
25	15.3	19.8	2.0	4.4	11.1	31.8	30.9	68.9
35	39.1	37.2	3.7	2.0	10.4	31.6	30.9	84.9
45	66.2	54.6	5.5	1.2	10.2	32.0	30.9	103.5
55	93.9	71.6	7.2	0.9	10.3	32.7	30.9	122.7
65	120.8	85.9	8.6	0.7	10.4	33.6	30.9	139.2
75	146.1	98.8	9.9	0.6	10.6	34.6	30.9	154.5
85	169.5	110.3	11.0	0.6	10.9	35.6	30.9	168.4
95	190.7	120.6	12.1	0.6	11.1	36.6	30.9	180.9
105	209.8	129.5	12.9	0.6	11.4	37.5	30.9	192.0
115	227.0	137.5	13.3	0.7	11.7	38.4	30.9	201.6
125	242.3	144.4	13.8	0.7	12.0	39.2	30.9	210.1
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	2.0	6.9	15.1	12.5	23.9
5	0	1.1	0.1	2.0	6.2	14.3	12.5	23.6
15	23	2.9	0.3	2.0	5.1	13.3	12.5	23.6
25	219	8.0	0.8	1.8	4.5	12.9	12.5	27.9
35	559	15.0	1.5	0.8	4.2	12.8	12.5	34.4
45	946	22.1	2.2	0.5	4.1	12.9	12.5	41.9
55	1,342	29.0	2.9	0.4	4.2	13.2	12.5	49.6
65	1,726	34.8	3.5	0.3	4.2	13.6	12.5	56.3
75	2,088	40.0	4.0	0.2	4.3	14.0	12.5	62.5
85	2,422	44.7	4.5	0.2	4.4	14.4	12.5	68.1
95	2,726	48.8	4.9	0.2	4.5	14.8	12.5	73.2
105	2,999	52.4	5.2	0.3	4.6	15.2	12.5	77.7
115	3,244	55.6	5.4	0.3	4.7	15.5	12.5	81.6
125	3,463	58.5	5.6	0.3	4.9	15.8	12.5	85.0

A36.— Regional estimates of timber volume and carbon stocks for fir-spruce-mountain hemlock stands on forest land after clearcut harvest in the Rocky Mountain, South

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.8	11.3	37.2	31.5	53.3
5	0.0	1.8	0.2	4.8	10.2	35.4	31.5	52.4
15	0.0	4.0	0.4	4.8	8.3	32.9	31.5	50.4
25	8.5	12.0	1.2	4.3	7.3	31.8	31.5	56.5
35	27.7	24.4	2.4	2.8	7.0	31.6	31.5	68.3
45	49.5	36.7	3.7	2.3	6.9	32.0	31.5	81.5
55	71.9	48.7	4.9	1.9	7.0	32.7	31.5	95.2
65	94.1	58.6	5.9	1.7	7.1	33.6	31.5	107.0
75	115.7	67.8	6.8	1.6	7.3	34.6	31.5	118.1
85	136.5	76.2	7.6	1.5	7.6	35.6	31.5	128.5
95	156.4	84.0	8.4	1.4	7.9	36.6	31.5	138.2
105	175.2	91.2	9.1	1.3	8.2	37.5	31.5	147.3
115	193.0	97.8	9.8	1.3	8.5	38.4	31.5	155.7
125	209.6	103.8	10.4	1.2	8.8	39.2	31.5	163.4
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	2.0	4.6	15.1	12.7	21.6
5	0	0.7	0.1	2.0	4.1	14.3	12.7	21.2
15	0	1.6	0.2	2.0	3.4	13.3	12.7	20.4
25	122	4.8	0.5	1.7	3.0	12.9	12.7	22.9
35	396	9.9	1.0	1.1	2.8	12.8	12.7	27.6
45	708	14.8	1.5	0.9	2.8	12.9	12.7	33.0
55	1,028	19.7	2.0	0.8	2.8	13.2	12.7	38.5
65	1,345	23.7	2.4	0.7	2.9	13.6	12.7	43.3
75	1,654	27.4	2.7	0.6	3.0	14.0	12.7	47.8
85	1,951	30.8	3.1	0.6	3.1	14.4	12.7	52.0
95	2,235	34.0	3.4	0.6	3.2	14.8	12.7	55.9
105	2,504	36.9	3.7	0.5	3.3	15.2	12.7	59.6
115	2,758	39.6	4.0	0.5	3.4	15.5	12.7	63.0
125	2,995	42.0	4.2	0.5	3.6	15.8	12.7	66.1

A37.— Regional estimates of timber volume and carbon stocks for lodgepole pine stands on forest land after clearcut harvest in the Rocky Mountain, South

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m³/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.8	10.8	24.1	27.0	39.7
5	0.0	2.1	0.2	4.8	9.8	22.0	27.0	38.9
15	0.0	4.3	0.4	4.8	8.1	19.4	27.0	37.0
25	5.0	9.2	0.9	4.8	7.0	18.3	27.0	40.1
35	18.3	16.9	1.7	3.4	6.5	18.2	27.0	46.6
45	37.0	25.9	2.6	2.5	6.4	18.7	27.0	56.0
55	58.5	34.1	3.4	2.0	6.4	19.4	27.0	65.4
65	81.2	42.0	4.2	1.7	6.6	20.4	27.0	74.9
75	104.1	49.5	4.9	1.5	6.8	21.4	27.0	84.1
85	126.7	56.4	5.6	1.4	7.1	22.4	27.0	92.9
95	148.3	62.8	6.3	1.3	7.4	23.3	27.0	101.1
105	168.6	68.6	6.9	1.2	7.7	24.3	27.0	108.6
115	187.3	73.8	7.4	1.1	8.0	25.2	27.0	115.5
125	204.1	78.3	7.8	1.1	8.3	26.0	27.0	121.5
years	*ft³/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.9	4.4	9.8	10.9	16.1
5	0	0.9	0.1	1.9	4.0	8.9	10.9	15.7
15	0	1.7	0.2	1.9	3.3	7.8	10.9	15.0
25	71	3.7	0.4	1.9	2.8	7.4	10.9	16.2
35	262	6.8	0.7	1.4	2.6	7.4	10.9	18.9
45	529	10.5	1.0	1.0	2.6	7.6	10.9	22.7
55	836	13.8	1.4	0.8	2.6	7.9	10.9	26.5
65	1,160	17.0	1.7	0.7	2.7	8.2	10.9	30.3
75	1,488	20.0	2.0	0.6	2.7	8.6	10.9	34.0
85	1,810	22.8	2.3	0.6	2.9	9.1	10.9	37.6
95	2,120	25.4	2.5	0.5	3.0	9.4	10.9	40.9
105	2,410	27.8	2.8	0.5	3.1	9.8	10.9	44.0
115	2,677	29.8	3.0	0.5	3.2	10.2	10.9	46.7
125	2,917	31.7	3.2	0.4	3.4	10.5	10.9	49.2

A38.— Regional estimates of timber volume and carbon stocks for ponderosa pine stands on forest land after clearcut harvest in the Rocky Mountain, South

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.8	9.7	24.1	24.1	38.6
5	0.0	1.8	0.2	4.8	8.8	22.0	24.1	37.6
15	0.0	3.7	0.4	4.8	7.1	19.4	24.1	35.4
25	4.4	9.4	0.9	4.8	6.2	18.3	24.1	39.7
35	16.2	18.6	1.9	2.9	5.8	18.2	24.1	47.4
45	32.2	28.8	2.7	2.1	5.8	18.7	24.1	58.1
55	50.3	38.2	3.0	1.7	5.9	19.4	24.1	68.3
65	69.3	47.1	3.3	1.5	6.0	20.4	24.1	78.3
75	88.4	55.5	3.6	1.3	6.3	21.4	24.1	88.0
85	107.2	63.2	3.8	1.2	6.6	22.4	24.1	97.1
95	125.5	70.4	4.0	1.1	6.9	23.3	24.1	105.7
105	143.0	77.1	4.1	1.0	7.2	24.3	24.1	113.7
115	159.5	83.2	4.3	1.0	7.5	25.2	24.1	121.1
125	175.1	88.8	4.4	0.9	7.8	26.0	24.1	127.9
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	2.0	3.9	9.8	9.8	15.6
5	0	0.7	0.1	2.0	3.5	8.9	9.8	15.2
15	0	1.5	0.1	2.0	2.9	7.8	9.8	14.3
25	63	3.8	0.4	2.0	2.5	7.4	9.8	16.1
35	231	7.5	0.8	1.2	2.4	7.4	9.8	19.2
45	460	11.7	1.1	0.9	2.3	7.6	9.8	23.5
55	719	15.5	1.2	0.7	2.4	7.9	9.8	27.6
65	990	19.1	1.4	0.6	2.4	8.2	9.8	31.7
75	1,263	22.4	1.5	0.5	2.5	8.6	9.8	35.6
85	1,532	25.6	1.5	0.5	2.7	9.1	9.8	39.3
95	1,793	28.5	1.6	0.4	2.8	9.4	9.8	42.8
105	2,043	31.2	1.7	0.4	2.9	9.8	9.8	46.0
115	2,280	33.7	1.7	0.4	3.0	10.2	9.8	49.0
125	2,503	35.9	1.8	0.4	3.2	10.5	9.8	51.8

A39.— Regional estimates of timber volume and carbon stocks for loblolly-shortleaf pine stands on forest land after clearcut harvest in the Southeast

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.2	9.9	12.2	72.9	26.3
5	0.0	11.1	0.7	4.0	8.4	6.5	72.9	30.6
10	19.1	22.6	1.3	3.6	7.5	6.4	72.9	41.4
15	36.7	31.3	1.6	3.4	6.8	7.5	72.9	50.7
20	60.4	40.8	1.9	3.2	6.6	8.7	72.9	61.2
25	85.5	50.3	2.1	3.1	6.5	9.8	72.9	71.9
30	108.7	58.2	2.3	3.1	6.6	10.7	72.9	80.8
35	131.2	65.6	2.4	3.0	6.7	11.5	72.9	89.3
40	152.3	72.5	2.5	3.0	6.9	12.2	72.9	97.1
45	172.3	78.9	2.7	2.9	7.2	12.7	72.9	104.4
50	191.4	85.0	2.7	2.9	7.5	13.2	72.9	111.3
55	208.4	90.3	2.8	2.9	7.8	13.7	72.9	117.4
60	223.9	95.1	2.9	2.8	8.1	14.1	72.9	122.9
65	238.4	99.6	2.9	2.8	8.3	14.4	72.9	128.1
70	252.9	104.0	3.0	2.8	8.6	14.7	72.9	133.2
75	264.6	107.6	3.0	2.8	8.9	15.0	72.9	137.3
80	277.1	111.4	3.1	2.8	9.1	15.2	72.9	141.6
85	289.5	115.1	3.1	2.8	9.4	15.5	72.9	145.9
90	299.6	118.2	3.2	2.7	9.6	15.7	72.9	149.4
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.7	4.0	4.9	29.5	10.7
5	0	4.5	0.3	1.6	3.4	2.6	29.5	12.4
10	273	9.2	0.5	1.4	3.0	2.6	29.5	16.8
15	525	12.7	0.7	1.4	2.8	3.0	29.5	20.5
20	863	16.5	0.8	1.3	2.7	3.5	29.5	24.8
25	1,222	20.4	0.9	1.3	2.6	4.0	29.5	29.1
30	1,554	23.5	0.9	1.2	2.7	4.3	29.5	32.7
35	1,875	26.6	1.0	1.2	2.7	4.7	29.5	36.1
40	2,177	29.3	1.0	1.2	2.8	4.9	29.5	39.3
45	2,462	31.9	1.1	1.2	2.9	5.2	29.5	42.3
50	2,736	34.4	1.1	1.2	3.0	5.4	29.5	45.1
55	2,978	36.5	1.1	1.2	3.1	5.5	29.5	47.5
60	3,200	38.5	1.2	1.1	3.3	5.7	29.5	49.8
65	3,407	40.3	1.2	1.1	3.4	5.8	29.5	51.8
70	3,614	42.1	1.2	1.1	3.5	6.0	29.5	53.9
75	3,782	43.5	1.2	1.1	3.6	6.1	29.5	55.6
80	3,960	45.1	1.3	1.1	3.7	6.2	29.5	57.3
85	4,138	46.6	1.3	1.1	3.8	6.3	29.5	59.1
90	4,281	47.8	1.3	1.1	3.9	6.3	29.5	60.5

A40.— Regional estimates of timber volume and carbon stocks for loblolly-shortleaf pine stands on forest land after clearcut harvest in the Southeast; volumes are for high-productivity sites (growth rate greater than 85 cubic feet wood/acre/year) with high-intensity management (replanting with genetically improved stock)

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m³/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.1	20.4	12.2	72.9	36.8
5	0.0	11.0	0.7	4.0	15.9	6.5	72.9	38.0
10	47.7	31.9	1.4	3.8	12.9	6.4	72.9	56.3
15	146.5	67.4	1.9	3.7	11.4	7.5	72.9	91.9
20	244.8	102.3	2.1	3.7	10.5	8.7	72.9	127.3
25	315.2	124.2	2.3	3.7	9.7	9.8	72.9	149.7
30	347.3	134.1	2.4	3.7	8.8	10.7	72.9	159.7
35	351.5	135.4	2.4	3.7	8.0	11.5	72.9	160.9
40	355.0	136.5	2.4	3.7	7.3	12.2	72.9	161.9
45	358.5	137.5	2.4	3.6	6.8	12.7	72.9	163.1
50	362.0	138.6	2.4	3.6	6.4	13.2	72.9	164.3
55	362.0	138.6	2.4	3.6	6.1	13.7	72.9	164.4
60	362.0	138.6	2.4	3.6	5.9	14.1	72.9	164.6
65	362.0	138.6	2.4	3.6	5.7	14.4	72.9	164.8
70	362.0	138.6	2.4	3.6	5.6	14.7	72.9	164.9
75	362.0	138.6	2.4	3.6	5.5	15.0	72.9	165.1
80	362.0	138.6	2.4	3.6	5.4	15.2	72.9	165.3
85	362.0	138.6	2.4	3.6	5.4	15.5	72.9	165.5
90	362.0	138.6	2.4	3.6	5.3	15.7	72.9	165.6
years	*ft³/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.7	8.3	4.9	29.5	14.9
5	0	4.5	0.3	1.6	6.4	2.6	29.5	15.4
10	682	12.9	0.6	1.6	5.2	2.6	29.5	22.8
15	2,094	27.3	0.8	1.5	4.6	3.0	29.5	37.2
20	3,498	41.4	0.9	1.5	4.3	3.5	29.5	51.5
25	4,504	50.3	0.9	1.5	3.9	4.0	29.5	60.6
30	4,963	54.3	1.0	1.5	3.6	4.3	29.5	64.6
35	5,024	54.8	1.0	1.5	3.2	4.7	29.5	65.1
40	5,074	55.2	1.0	1.5	3.0	4.9	29.5	65.5
45	5,124	55.7	1.0	1.5	2.8	5.2	29.5	66.0
50	5,174	56.1	1.0	1.5	2.6	5.4	29.5	66.5
55	5,174	56.1	1.0	1.5	2.5	5.5	29.5	66.5
60	5,174	56.1	1.0	1.5	2.4	5.7	29.5	66.6
65	5,174	56.1	1.0	1.5	2.3	5.8	29.5	66.7
70	5,174	56.1	1.0	1.5	2.3	6.0	29.5	66.8
75	5,174	56.1	1.0	1.5	2.2	6.1	29.5	66.8
80	5,174	56.1	1.0	1.5	2.2	6.2	29.5	66.9
85	5,174	56.1	1.0	1.5	2.2	6.3	29.5	67.0
90	5,174	56.1	1.0	1.5	2.2	6.3	29.5	67.0

A41.— Regional estimates of timber volume and carbon stocks for longleaf-slash pine stands on forest land after clearcut harvest in the Southeast

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m³/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.2	9.7	12.2	110.0	26.1
5	0.0	5.3	0.4	4.2	7.8	6.5	110.0	24.1
10	19.1	14.1	0.9	3.8	6.7	6.4	110.0	31.8
15	36.7	21.4	1.0	3.6	5.9	7.5	110.0	39.4
20	60.4	30.4	1.1	3.4	5.6	8.7	110.0	49.2
25	85.5	39.2	1.1	3.3	5.6	9.8	110.0	59.0
30	108.7	47.2	1.2	3.2	5.6	10.7	110.0	67.9
35	131.2	54.8	1.2	3.1	5.8	11.5	110.0	76.4
40	152.3	61.9	1.3	3.0	6.0	12.2	110.0	84.4
45	172.3	68.5	1.3	3.0	6.3	12.7	110.0	91.9
50	191.4	74.8	1.3	2.9	6.7	13.2	110.0	99.0
55	208.4	80.4	1.3	2.9	7.0	13.7	110.0	105.2
60	223.9	85.4	1.3	2.9	7.3	14.1	110.0	111.0
65	238.4	90.1	1.4	2.9	7.6	14.4	110.0	116.3
70	252.9	94.8	1.4	2.8	7.9	14.7	110.0	121.6
75	264.6	98.6	1.4	2.8	8.1	15.0	110.0	125.9
80	277.1	102.6	1.4	2.8	8.4	15.2	110.0	130.5
85	289.5	106.6	1.4	2.8	8.7	15.5	110.0	135.0
90	299.6	109.8	1.4	2.8	9.0	15.7	110.0	138.6
years	*ft³/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.7	3.9	4.9	44.5	10.5
5	0	2.2	0.2	1.7	3.1	2.6	44.5	9.8
10	273	5.7	0.3	1.5	2.7	2.6	44.5	12.9
15	525	8.7	0.4	1.4	2.4	3.0	44.5	15.9
20	863	12.3	0.4	1.4	2.3	3.5	44.5	19.9
25	1,222	15.9	0.5	1.3	2.3	4.0	44.5	23.9
30	1,554	19.1	0.5	1.3	2.3	4.3	44.5	27.5
35	1,875	22.2	0.5	1.3	2.4	4.7	44.5	30.9
40	2,177	25.0	0.5	1.2	2.4	4.9	44.5	34.2
45	2,462	27.7	0.5	1.2	2.6	5.2	44.5	37.2
50	2,736	30.3	0.5	1.2	2.7	5.4	44.5	40.1
55	2,978	32.5	0.5	1.2	2.8	5.5	44.5	42.6
60	3,200	34.6	0.5	1.2	2.9	5.7	44.5	44.9
65	3,407	36.5	0.6	1.2	3.1	5.8	44.5	47.1
70	3,614	38.4	0.6	1.1	3.2	6.0	44.5	49.2
75	3,782	39.9	0.6	1.1	3.3	6.1	44.5	51.0
80	3,960	41.5	0.6	1.1	3.4	6.2	44.5	52.8
85	4,138	43.1	0.6	1.1	3.5	6.3	44.5	54.6
90	4,281	44.4	0.6	1.1	3.6	6.3	44.5	56.1

A42.— Regional estimates of timber volume and carbon stocks for longleaf-slash pine stands on forest land after clearcut harvest in the Southeast; volumes are for high-productivity sites (growth rate greater than 85 cubic feet wood/acre/year) with high-intensity management (replanting with genetically improved stock)

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.1	21.1	12.2	110.0	37.4
5	0.0	8.8	0.4	4.0	16.3	6.5	110.0	36.0
10	47.7	27.2	0.8	3.9	13.1	6.4	110.0	51.3
15	146.5	60.1	0.8	3.8	11.4	7.5	110.0	83.5
20	244.8	91.2	0.9	3.7	10.3	8.7	110.0	114.8
25	315.2	113.5	0.9	3.7	9.5	9.8	110.0	137.3
30	347.3	122.8	0.9	3.7	8.5	10.7	110.0	146.6
35	351.5	124.0	0.9	3.7	7.6	11.5	110.0	147.7
40	355.0	125.0	0.9	3.7	6.9	12.2	110.0	148.7
45	358.5	126.0	0.9	3.7	6.4	12.7	110.0	149.8
50	362.0	127.0	0.9	3.7	6.0	13.2	110.0	150.9
55	362.0	127.0	0.9	3.7	5.7	13.7	110.0	151.0
60	362.0	127.0	0.9	3.7	5.5	14.1	110.0	151.2
65	362.0	127.0	0.9	3.7	5.3	14.4	110.0	151.3
70	362.0	127.0	0.9	3.7	5.2	14.7	110.0	151.5
75	362.0	127.0	0.9	3.7	5.1	15.0	110.0	151.7
80	362.0	127.0	0.9	3.7	5.0	15.2	110.0	151.9
85	362.0	127.0	0.9	3.7	4.9	15.5	110.0	152.0
90	362.0	127.0	0.9	3.7	4.9	15.7	110.0	152.2
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.7	8.5	4.9	44.5	15.2
5	0	3.6	0.2	1.6	6.6	2.6	44.5	14.6
10	682	11.0	0.3	1.6	5.3	2.6	44.5	20.8
15	2,094	24.3	0.3	1.5	4.6	3.0	44.5	33.8
20	3,498	36.9	0.4	1.5	4.2	3.5	44.5	46.5
25	4,504	45.9	0.4	1.5	3.8	4.0	44.5	55.6
30	4,963	49.7	0.4	1.5	3.5	4.3	44.5	59.3
35	5,024	50.2	0.4	1.5	3.1	4.7	44.5	59.8
40	5,074	50.6	0.4	1.5	2.8	4.9	44.5	60.2
45	5,124	51.0	0.4	1.5	2.6	5.2	44.5	60.6
50	5,174	51.4	0.4	1.5	2.4	5.4	44.5	61.1
55	5,174	51.4	0.4	1.5	2.3	5.5	44.5	61.1
60	5,174	51.4	0.4	1.5	2.2	5.7	44.5	61.2
65	5,174	51.4	0.4	1.5	2.2	5.8	44.5	61.2
70	5,174	51.4	0.4	1.5	2.1	6.0	44.5	61.3
75	5,174	51.4	0.4	1.5	2.1	6.1	44.5	61.4
80	5,174	51.4	0.4	1.5	2.0	6.2	44.5	61.5
85	5,174	51.4	0.4	1.5	2.0	6.3	44.5	61.5
90	5,174	51.4	0.4	1.5	2.0	6.3	44.5	61.6

A43.— Regional estimates of timber volume and carbon stocks for oak-gum-cypress stands on forest land after clearcut harvest in the Southeast

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	1.8	10.2	6.0	158.0	18.1
5	0.0	6.7	0.7	1.9	6.2	2.4	158.0	17.9
10	9.8	18.8	1.9	1.8	4.5	2.4	158.0	29.3
15	19.9	28.3	2.4	1.7	3.7	3.0	158.0	39.1
20	32.7	38.0	2.8	1.7	3.5	3.8	158.0	49.7
25	45.4	46.8	3.1	1.6	3.6	4.4	158.0	59.5
30	58.1	54.0	3.4	1.6	3.8	5.0	158.0	67.8
35	73.4	62.3	3.6	1.6	4.2	5.5	158.0	77.2
40	92.2	71.9	3.9	1.6	4.7	6.0	158.0	88.1
45	110.7	80.9	4.2	1.6	5.2	6.4	158.0	98.3
50	128.1	89.0	4.4	1.5	5.7	6.8	158.0	107.5
55	146.3	97.3	4.6	1.5	6.2	7.2	158.0	116.7
60	166.1	105.9	4.7	1.5	6.7	7.5	158.0	126.5
65	186.4	114.5	4.9	1.5	7.3	7.8	158.0	136.1
70	205.7	122.5	5.1	1.5	7.8	8.1	158.0	145.0
75	222.5	129.3	5.2	1.5	8.2	8.4	158.0	152.6
80	237.9	135.4	5.3	1.5	8.6	8.6	158.0	159.4
85	257.3	142.9	5.5	1.5	9.1	8.9	158.0	167.8
90	278.9	151.2	5.6	1.5	9.6	9.1	158.0	177.0
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	0.7	4.1	2.4	63.9	7.3
5	0	2.7	0.3	0.8	2.5	1.0	63.9	7.3
10	140	7.6	0.8	0.7	1.8	1.0	63.9	11.9
15	284	11.5	1.0	0.7	1.5	1.2	63.9	15.8
20	467	15.4	1.1	0.7	1.4	1.5	63.9	20.1
25	649	18.9	1.3	0.7	1.5	1.8	63.9	24.1
30	830	21.9	1.4	0.7	1.5	2.0	63.9	27.4
35	1,049	25.2	1.5	0.6	1.7	2.2	63.9	31.3
40	1,318	29.1	1.6	0.6	1.9	2.4	63.9	35.7
45	1,582	32.7	1.7	0.6	2.1	2.6	63.9	39.8
50	1,830	36.0	1.8	0.6	2.3	2.8	63.9	43.5
55	2,091	39.4	1.8	0.6	2.5	2.9	63.9	47.2
60	2,374	42.9	1.9	0.6	2.7	3.1	63.9	51.2
65	2,664	46.3	2.0	0.6	2.9	3.2	63.9	55.1
70	2,940	49.6	2.1	0.6	3.2	3.3	63.9	58.7
75	3,180	52.3	2.1	0.6	3.3	3.4	63.9	61.8
80	3,400	54.8	2.2	0.6	3.5	3.5	63.9	64.5
85	3,677	57.8	2.2	0.6	3.7	3.6	63.9	67.9
90	3,986	61.2	2.3	0.6	3.9	3.7	63.9	71.6

A44.— Regional estimates of timber volume and carbon stocks for oak-hickory stands on forest land after clearcut harvest in the Southeast

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m³/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.2	10.8	6.0	45.3	21.0
5	0.0	8.1	0.8	4.2	6.7	2.4	45.3	22.1
10	11.7	21.0	2.1	3.8	4.8	2.4	45.3	34.0
15	21.2	30.3	2.5	3.5	3.8	3.0	45.3	43.1
20	33.8	40.0	2.8	3.3	3.5	3.8	45.3	53.4
25	46.6	49.5	3.0	3.2	3.6	4.4	45.3	63.8
30	60.2	57.5	3.2	3.1	3.8	5.0	45.3	72.6
35	76.3	66.6	3.4	3.0	4.2	5.5	45.3	82.7
40	94.3	76.2	3.6	2.9	4.6	6.0	45.3	93.5
45	114.1	86.4	3.8	2.9	5.2	6.4	45.3	104.7
50	133.0	95.8	4.0	2.8	5.7	6.8	45.3	115.2
55	151.4	104.8	4.1	2.8	6.2	7.2	45.3	125.1
60	168.9	113.0	4.2	2.7	6.7	7.5	45.3	134.2
65	185.6	120.8	4.3	2.7	7.2	7.8	45.3	142.8
70	201.5	128.0	4.4	2.7	7.6	8.1	45.3	150.8
75	215.7	134.4	4.5	2.6	8.0	8.4	45.3	157.9
80	229.4	140.5	4.6	2.6	8.3	8.6	45.3	164.6
85	242.5	146.2	4.6	2.6	8.7	8.9	45.3	171.0
90	254.1	151.3	4.7	2.6	9.0	9.1	45.3	176.6
years	*ft³/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.7	4.4	2.4	18.3	8.5
5	0	3.3	0.3	1.7	2.7	1.0	18.3	9.0
10	167	8.5	0.8	1.5	1.9	1.0	18.3	13.8
15	303	12.3	1.0	1.4	1.5	1.2	18.3	17.4
20	483	16.2	1.1	1.3	1.4	1.5	18.3	21.6
25	666	20.1	1.2	1.3	1.5	1.8	18.3	25.8
30	860	23.3	1.3	1.3	1.5	2.0	18.3	29.4
35	1,091	26.9	1.4	1.2	1.7	2.2	18.3	33.5
40	1,348	30.8	1.5	1.2	1.9	2.4	18.3	37.8
45	1,630	35.0	1.5	1.2	2.1	2.6	18.3	42.4
50	1,901	38.8	1.6	1.1	2.3	2.8	18.3	46.6
55	2,164	42.4	1.7	1.1	2.5	2.9	18.3	50.6
60	2,414	45.7	1.7	1.1	2.7	3.1	18.3	54.3
65	2,652	48.9	1.7	1.1	2.9	3.2	18.3	57.8
70	2,880	51.8	1.8	1.1	3.1	3.3	18.3	61.0
75	3,082	54.4	1.8	1.1	3.2	3.4	18.3	63.9
80	3,278	56.8	1.8	1.1	3.4	3.5	18.3	66.6
85	3,465	59.2	1.9	1.0	3.5	3.6	18.3	69.2
90	3,632	61.2	1.9	1.0	3.6	3.7	18.3	71.5

A45.— Regional estimates of timber volume and carbon stocks for oak-pine stands on forest land after clearcut harvest in the Southeast

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m³/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.2	11.3	10.3	61.4	25.8
5	0.0	7.4	0.6	4.1	9.0	5.8	61.4	26.9
10	13.6	19.6	1.2	3.6	7.7	5.9	61.4	38.0
15	27.8	29.3	1.6	3.5	6.7	6.8	61.4	47.9
20	43.9	39.0	1.9	3.4	6.2	7.7	61.4	58.2
25	59.3	46.8	2.1	3.3	5.8	8.6	61.4	66.5
30	77.2	55.4	2.3	3.2	5.6	9.2	61.4	75.8
35	96.8	64.4	2.5	3.2	5.7	9.8	61.4	85.5
40	117.2	73.4	2.7	3.1	5.9	10.2	61.4	95.3
45	136.4	81.6	2.8	3.1	6.1	10.6	61.4	104.2
50	154.1	88.9	2.9	3.1	6.3	11.0	61.4	112.2
55	171.4	96.0	3.0	3.0	6.6	11.3	61.4	119.9
60	189.6	103.2	3.1	3.0	6.9	11.5	61.4	127.8
65	204.5	109.1	3.2	3.0	7.2	11.8	61.4	134.3
70	218.8	114.6	3.3	3.0	7.5	12.0	61.4	140.3
75	234.5	120.6	3.4	2.9	7.8	12.1	61.4	146.9
80	247.6	125.5	3.5	2.9	8.1	12.3	61.4	152.3
85	259.4	129.9	3.5	2.9	8.3	12.5	61.4	157.2
90	272.3	134.7	3.6	2.9	8.6	12.6	61.4	162.4
years	*ft³/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.7	4.6	4.2	24.9	10.4
5	0	3.0	0.3	1.7	3.6	2.4	24.9	10.9
10	195	7.9	0.5	1.5	3.1	2.4	24.9	15.4
15	397	11.9	0.6	1.4	2.7	2.7	24.9	19.4
20	628	15.8	0.8	1.4	2.5	3.1	24.9	23.5
25	848	19.0	0.8	1.3	2.3	3.5	24.9	26.9
30	1,104	22.4	0.9	1.3	2.3	3.7	24.9	30.7
35	1,384	26.1	1.0	1.3	2.3	4.0	24.9	34.6
40	1,675	29.7	1.1	1.3	2.4	4.1	24.9	38.5
45	1,950	33.0	1.1	1.2	2.5	4.3	24.9	42.2
50	2,202	36.0	1.2	1.2	2.6	4.4	24.9	45.4
55	2,450	38.8	1.2	1.2	2.7	4.6	24.9	48.5
60	2,710	41.8	1.3	1.2	2.8	4.7	24.9	51.7
65	2,923	44.1	1.3	1.2	2.9	4.8	24.9	54.3
70	3,127	46.4	1.3	1.2	3.0	4.8	24.9	56.8
75	3,352	48.8	1.4	1.2	3.2	4.9	24.9	59.5
80	3,539	50.8	1.4	1.2	3.3	5.0	24.9	61.6
85	3,707	52.6	1.4	1.2	3.4	5.0	24.9	63.6
90	3,891	54.5	1.4	1.2	3.5	5.1	24.9	65.7

A46.— Regional estimates of timber volume and carbon stocks for elm-ash-cottonwood stands on forest land after clearcut harvest in the South Central

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	-------------	-------------	-------------	*tonnes carbon/hectare*	-------------	-------------	-------------
0	0.0	0.0	0.0	4.2	11.2	6.0	49.9	21.4
5	0.0	8.6	0.9	4.9	7.0	2.4	49.9	23.7
10	11.7	18.3	1.8	4.1	4.9	2.4	49.9	31.5
15	21.2	27.0	2.7	3.7	3.9	3.0	49.9	40.3
20	33.8	36.3	3.3	3.5	3.6	3.8	49.9	50.3
25	46.6	45.1	3.6	3.3	3.7	4.4	49.9	60.0
30	60.2	53.8	3.8	3.2	4.0	5.0	49.9	69.7
35	76.3	63.3	4.1	3.1	4.4	5.5	49.9	80.4
40	94.3	73.3	4.4	2.9	5.0	6.0	49.9	91.6
45	114.1	83.8	4.6	2.9	5.6	6.4	49.9	103.4
50	133.0	95.1	4.8	2.8	6.4	6.8	49.9	115.9
55	151.4	104.2	5.0	2.7	7.0	7.2	49.9	126.0
60	168.9	112.7	5.1	2.7	7.5	7.5	49.9	135.5
65	185.6	120.7	5.3	2.6	8.0	7.8	49.9	144.5
70	201.5	128.4	5.4	2.6	8.5	8.1	49.9	153.0
75	215.7	135.1	5.5	2.6	9.0	8.4	49.9	160.6
80	229.4	141.6	5.6	2.5	9.4	8.6	49.9	167.8
85	242.5	147.8	5.7	2.5	9.8	8.9	49.9	174.7
90	254.1	153.4	5.8	2.5	10.2	9.1	49.9	180.9
years	*ft^3/acre*	-------------	-------------	-------------	*tonnes carbon/acre*	-------------	-------------	-------------
0	0	0.0	0.0	1.7	4.5	2.4	20.2	8.7
5	0	3.5	0.3	2.0	2.8	1.0	20.2	9.6
10	167	7.4	0.7	1.7	2.0	1.0	20.2	12.7
15	303	10.9	1.1	1.5	1.6	1.2	20.2	16.3
20	483	14.7	1.3	1.4	1.5	1.5	20.2	20.4
25	666	18.3	1.4	1.3	1.5	1.8	20.2	24.3
30	860	21.8	1.6	1.3	1.6	2.0	20.2	28.2
35	1,091	25.6	1.7	1.2	1.8	2.2	20.2	32.5
40	1,348	29.7	1.8	1.2	2.0	2.4	20.2	37.1
45	1,630	33.9	1.9	1.2	2.3	2.6	20.2	41.8
50	1,901	38.5	1.9	1.1	2.6	2.8	20.2	46.9
55	2,164	42.2	2.0	1.1	2.8	2.9	20.2	51.0
60	2,414	45.6	2.1	1.1	3.0	3.1	20.2	54.8
65	2,652	48.9	2.1	1.1	3.3	3.2	20.2	58.5
70	2,880	52.0	2.2	1.0	3.5	3.3	20.2	61.9
75	3,082	54.7	2.2	1.0	3.6	3.4	20.2	65.0
80	3,278	57.3	2.3	1.0	3.8	3.5	20.2	67.9
85	3,465	59.8	2.3	1.0	4.0	3.6	20.2	70.7
90	3,632	62.1	2.3	1.0	4.1	3.7	20.2	73.2

A47.— Regional estimates of timber volume and carbon stocks for loblolly-shortleaf pine stands on forest land after clearcut harvest in the South Central

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.2	9.2	12.2	41.9	25.6
5	0.0	10.8	0.7	4.7	7.7	6.5	41.9	30.3
10	19.1	23.1	1.3	3.9	6.8	6.4	41.9	41.5
15	36.7	32.4	1.6	3.5	6.2	7.5	41.9	51.2
20	60.4	42.2	1.8	3.3	5.9	8.7	41.9	61.9
25	85.5	52.0	2.0	3.1	5.8	9.8	41.9	72.8
30	108.7	59.6	2.1	3.0	5.8	10.7	41.9	81.2
35	131.2	66.6	2.3	2.9	5.9	11.5	41.9	89.1
40	152.3	73.1	2.3	2.9	6.0	12.2	41.9	96.4
45	172.3	79.0	2.4	2.8	6.1	12.7	41.9	103.1
50	191.4	84.7	2.5	2.8	6.4	13.2	41.9	109.5
55	208.4	89.6	2.6	2.7	6.5	13.7	41.9	115.1
60	223.9	94.0	2.6	2.7	6.7	14.1	41.9	120.1
65	238.4	98.1	2.7	2.6	7.0	14.4	41.9	124.8
70	252.9	102.2	2.7	2.6	7.2	14.7	41.9	129.4
75	264.6	105.5	2.7	2.6	7.3	15.0	41.9	133.1
80	277.1	108.9	2.8	2.6	7.6	15.2	41.9	137.0
85	289.5	112.3	2.8	2.6	7.8	15.5	41.9	140.9
90	299.6	115.1	2.8	2.5	7.9	15.7	41.9	144.0
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.7	3.7	4.9	17.0	10.4
5	0	4.4	0.3	1.9	3.1	2.6	17.0	12.3
10	273	9.4	0.5	1.6	2.8	2.6	17.0	16.8
15	525	13.1	0.6	1.4	2.5	3.0	17.0	20.7
20	863	17.1	0.7	1.3	2.4	3.5	17.0	25.1
25	1,222	21.1	0.8	1.3	2.4	4.0	17.0	29.5
30	1,554	24.1	0.9	1.2	2.3	4.3	17.0	32.9
35	1,875	27.0	0.9	1.2	2.4	4.7	17.0	36.1
40	2,177	29.6	0.9	1.2	2.4	4.9	17.0	39.0
45	2,462	32.0	1.0	1.1	2.5	5.2	17.0	41.7
50	2,736	34.3	1.0	1.1	2.6	5.4	17.0	44.3
55	2,978	36.3	1.0	1.1	2.7	5.5	17.0	46.6
60	3,200	38.1	1.1	1.1	2.7	5.7	17.0	48.6
65	3,407	39.7	1.1	1.1	2.8	5.8	17.0	50.5
70	3,614	41.4	1.1	1.1	2.9	6.0	17.0	52.4
75	3,782	42.7	1.1	1.1	3.0	6.1	17.0	53.9
80	3,960	44.1	1.1	1.0	3.1	6.2	17.0	55.5
85	4,138	45.5	1.1	1.0	3.1	6.3	17.0	57.0
90	4,281	46.6	1.1	1.0	3.2	6.3	17.0	58.3

A48.— Regional estimates of timber volume and carbon stocks for loblolly-shortleaf pine stands on forest land after clearcut harvest in the South Central; volumes are for high-productivity sites (growth rate greater than 120 cubic feet wood/acre/year) with high-intensity management (replanting with genetically improved stock)

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.1	20.4	12.2	41.9	36.7
5	0.0	10.8	0.4	4.1	15.8	6.5	41.9	37.6
10	47.7	34.2	0.9	3.9	13.0	6.4	41.9	58.3
15	146.5	68.7	1.0	3.8	11.5	7.5	41.9	92.5
20	244.8	99.2	1.1	3.7	10.5	8.7	41.9	123.2
25	315.2	118.3	1.1	3.7	9.6	9.8	41.9	142.6
30	347.3	126.8	1.1	3.7	8.7	10.7	41.9	151.1
35	351.5	127.9	1.1	3.7	7.8	11.5	41.9	152.1
40	355.0	128.8	1.1	3.7	7.2	12.2	41.9	153.0
45	358.5	129.8	1.1	3.7	6.7	12.7	41.9	154.0
50	362.0	130.7	1.1	3.7	6.3	13.2	41.9	155.0
55	362.0	130.7	1.1	3.7	6.0	13.7	41.9	155.2
60	362.0	130.7	1.1	3.7	5.8	14.1	41.9	155.3
65	362.0	130.7	1.1	3.7	5.6	14.4	41.9	155.5
70	362.0	130.7	1.1	3.7	5.5	14.7	41.9	155.7
75	362.0	130.7	1.1	3.7	5.4	15.0	41.9	155.9
80	362.0	130.7	1.1	3.7	5.3	15.2	41.9	156.0
85	362.0	130.7	1.1	3.7	5.2	15.5	41.9	156.2
90	362.0	130.7	1.1	3.7	5.2	15.7	41.9	156.4
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.7	8.2	4.9	17.0	14.9
5	0	4.4	0.2	1.6	6.4	2.6	17.0	15.2
10	682	13.8	0.3	1.6	5.2	2.6	17.0	23.6
15	2,094	27.8	0.4	1.5	4.6	3.0	17.0	37.4
20	3,498	40.1	0.4	1.5	4.2	3.5	17.0	49.9
25	4,504	47.9	0.4	1.5	3.9	4.0	17.0	57.7
30	4,963	51.3	0.5	1.5	3.5	4.3	17.0	61.1
35	5,024	51.8	0.5	1.5	3.2	4.7	17.0	61.6
40	5,074	52.1	0.5	1.5	2.9	4.9	17.0	61.9
45	5,124	52.5	0.5	1.5	2.7	5.2	17.0	62.3
50	5,174	52.9	0.5	1.5	2.6	5.4	17.0	62.7
55	5,174	52.9	0.5	1.5	2.4	5.5	17.0	62.8
60	5,174	52.9	0.5	1.5	2.3	5.7	17.0	62.9
65	5,174	52.9	0.5	1.5	2.3	5.8	17.0	62.9
70	5,174	52.9	0.5	1.5	2.2	6.0	17.0	63.0
75	5,174	52.9	0.5	1.5	2.2	6.1	17.0	63.1
80	5,174	52.9	0.5	1.5	2.1	6.2	17.0	63.1
85	5,174	52.9	0.5	1.5	2.1	6.3	17.0	63.2
90	5,174	52.9	0.5	1.5	2.1	6.3	17.0	63.3

A49.— Regional estimates of timber volume and carbon stocks for oak-gum-cypress stands on forest land after clearcut harvest in the South Central

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	1.8	10.8	6.0	52.8	18.6
5	0.0	5.4	0.5	2.1	6.5	2.4	52.8	16.9
10	9.8	17.8	1.8	1.8	4.6	2.4	52.8	28.4
15	19.9	28.4	2.8	1.7	3.8	3.0	52.8	39.8
20	32.7	39.3	3.2	1.7	3.6	3.8	52.8	51.6
25	45.4	48.8	3.4	1.6	3.7	4.4	52.8	61.9
30	58.1	57.2	3.5	1.6	4.0	5.0	52.8	71.2
35	73.4	66.9	3.6	1.6	4.4	5.5	52.8	82.1
40	92.2	76.9	3.7	1.6	5.0	6.0	52.8	93.1
45	110.7	86.1	3.7	1.5	5.5	6.4	52.8	103.4
50	128.1	94.4	3.8	1.5	6.0	6.8	52.8	112.6
55	146.3	102.8	3.9	1.5	6.5	7.2	52.8	121.9
60	166.1	111.6	3.9	1.5	7.1	7.5	52.8	131.6
65	186.4	120.3	4.0	1.5	7.6	7.8	52.8	141.2
70	205.7	128.3	4.0	1.5	8.1	8.1	52.8	150.1
75	222.5	135.1	4.1	1.5	8.5	8.4	52.8	157.6
80	237.9	141.2	4.1	1.5	8.9	8.6	52.8	164.4
85	257.3	148.8	4.1	1.5	9.4	8.9	52.8	172.6
90	278.9	157.0	4.2	1.4	9.9	9.1	52.8	181.6
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	0.7	4.4	2.4	21.4	7.5
5	0	2.2	0.2	0.8	2.6	1.0	21.4	6.9
10	140	7.2	0.7	0.7	1.9	1.0	21.4	11.5
15	284	11.5	1.1	0.7	1.5	1.2	21.4	16.1
20	467	15.9	1.3	0.7	1.5	1.5	21.4	20.9
25	649	19.7	1.4	0.7	1.5	1.8	21.4	25.1
30	830	23.1	1.4	0.7	1.6	2.0	21.4	28.8
35	1,049	27.1	1.4	0.6	1.8	2.2	21.4	33.2
40	1,318	31.1	1.5	0.6	2.0	2.4	21.4	37.7
45	1,582	34.9	1.5	0.6	2.2	2.6	21.4	41.8
50	1,830	38.2	1.5	0.6	2.4	2.8	21.4	45.6
55	2,091	41.6	1.6	0.6	2.6	2.9	21.4	49.3
60	2,374	45.2	1.6	0.6	2.9	3.1	21.4	53.3
65	2,664	48.7	1.6	0.6	3.1	3.2	21.4	57.1
70	2,940	51.9	1.6	0.6	3.3	3.3	21.4	60.7
75	3,180	54.7	1.6	0.6	3.5	3.4	21.4	63.8
80	3,400	57.2	1.7	0.6	3.6	3.5	21.4	66.5
85	3,677	60.2	1.7	0.6	3.8	3.6	21.4	69.9
90	3,986	63.5	1.7	0.6	4.0	3.7	21.4	73.5

A50.— Regional estimates of timber volume and carbon stocks for oak-hickory stands on forest land after clearcut harvest in the South Central

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.2	11.7	6.0	38.6	21.8
5	0.0	9.7	0.9	4.7	7.3	2.4	38.6	25.0
10	11.7	20.9	1.9	4.0	5.2	2.4	38.6	34.3
15	21.2	30.1	2.1	3.6	4.2	3.0	38.6	43.0
20	33.8	39.5	2.3	3.4	3.9	3.8	38.6	52.9
25	46.6	48.2	2.4	3.3	3.9	4.4	38.6	62.2
30	60.2	56.6	2.6	3.1	4.2	5.0	38.6	71.4
35	76.3	65.6	2.7	3.0	4.6	5.5	38.6	81.4
40	94.3	76.2	2.8	2.9	5.2	6.0	38.6	93.1
45	114.1	85.7	2.9	2.8	5.8	6.4	38.6	103.7
50	133.0	94.7	3.0	2.8	6.3	6.8	38.6	113.6
55	151.4	103.3	3.0	2.7	6.9	7.2	38.6	123.1
60	168.9	111.3	3.1	2.7	7.4	7.5	38.6	132.0
65	185.6	118.8	3.2	2.6	7.9	7.8	38.6	140.4
70	201.5	126.0	3.2	2.6	8.4	8.1	38.6	148.3
75	215.7	132.3	3.2	2.6	8.8	8.4	38.6	155.3
80	229.4	138.3	3.3	2.5	9.2	8.6	38.6	162.0
85	242.5	144.0	3.3	2.5	9.6	8.9	38.6	168.3
90	254.1	149.1	3.3	2.5	9.9	9.1	38.6	174.0
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.7	4.7	2.4	15.6	8.8
5	0	3.9	0.4	1.9	2.9	1.0	15.6	10.1
10	167	8.5	0.8	1.6	2.1	1.0	15.6	13.9
15	303	12.2	0.9	1.5	1.7	1.2	15.6	17.4
20	483	16.0	0.9	1.4	1.6	1.5	15.6	21.4
25	666	19.5	1.0	1.3	1.6	1.8	15.6	25.2
30	860	22.9	1.0	1.3	1.7	2.0	15.6	28.9
35	1,091	26.6	1.1	1.2	1.9	2.2	15.6	33.0
40	1,348	30.8	1.1	1.2	2.1	2.4	15.6	37.7
45	1,630	34.7	1.2	1.2	2.3	2.6	15.6	41.9
50	1,901	38.3	1.2	1.1	2.6	2.8	15.6	46.0
55	2,164	41.8	1.2	1.1	2.8	2.9	15.6	49.8
60	2,414	45.0	1.3	1.1	3.0	3.1	15.6	53.4
65	2,652	48.1	1.3	1.1	3.2	3.2	15.6	56.8
70	2,880	51.0	1.3	1.1	3.4	3.3	15.6	60.0
75	3,082	53.5	1.3	1.0	3.6	3.4	15.6	62.8
80	3,278	56.0	1.3	1.0	3.7	3.5	15.6	65.6
85	3,465	58.3	1.3	1.0	3.9	3.6	15.6	68.1
90	3,632	60.3	1.4	1.0	4.0	3.7	15.6	70.4

A51.— Regional estimates of timber volume and carbon stocks for oak-pine stands on forest land after clearcut harvest in the South Central

Age	Mean volume	Mean carbon density: Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.2	12.4	10.3	41.7	26.9
5	0.0	8.7	0.7	4.4	10.0	5.8	41.7	29.6
10	13.6	21.4	1.4	3.7	8.6	5.9	41.7	41.0
15	27.8	31.9	1.7	3.5	7.7	6.8	41.7	51.5
20	43.9	41.8	2.0	3.3	7.1	7.7	41.7	61.9
25	59.3	50.9	2.2	3.2	6.7	8.6	41.7	71.6
30	77.2	59.2	2.5	3.1	6.6	9.2	41.7	80.6
35	96.8	67.9	2.6	3.0	6.7	9.8	41.7	90.0
40	117.2	76.5	2.8	2.9	6.9	10.2	41.7	99.4
45	136.4	84.4	3.0	2.9	7.1	10.6	41.7	108.0
50	154.1	91.4	3.1	2.8	7.4	11.0	41.7	115.7
55	171.4	98.2	3.2	2.8	7.7	11.3	41.7	123.2
60	189.6	105.2	3.3	2.8	8.0	11.5	41.7	130.8
65	204.5	110.7	3.4	2.7	8.3	11.8	41.7	137.0
70	218.8	116.0	3.5	2.7	8.6	12.0	41.7	142.8
75	234.5	121.8	3.6	2.7	9.0	12.1	41.7	149.2
80	247.6	126.5	3.6	2.7	9.3	12.3	41.7	154.4
85	259.4	130.7	3.7	2.7	9.6	12.5	41.7	159.0
90	272.3	135.2	3.8	2.6	9.9	12.6	41.7	164.1
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.7	5.0	4.2	16.9	10.9
5	0	3.5	0.3	1.8	4.0	2.4	16.9	12.0
10	195	8.6	0.6	1.5	3.5	2.4	16.9	16.6
15	397	12.9	0.7	1.4	3.1	2.7	16.9	20.9
20	628	16.9	0.8	1.3	2.9	3.1	16.9	25.0
25	848	20.6	0.9	1.3	2.7	3.5	16.9	29.0
30	1,104	24.0	1.0	1.2	2.7	3.7	16.9	32.6
35	1,384	27.5	1.1	1.2	2.7	4.0	16.9	36.4
40	1,675	31.0	1.1	1.2	2.8	4.1	16.9	40.2
45	1,950	34.2	1.2	1.2	2.9	4.3	16.9	43.7
50	2,202	37.0	1.3	1.2	3.0	4.4	16.9	46.8
55	2,450	39.7	1.3	1.1	3.1	4.6	16.9	49.9
60	2,710	42.6	1.3	1.1	3.3	4.7	16.9	52.9
65	2,923	44.8	1.4	1.1	3.4	4.8	16.9	55.4
70	3,127	47.0	1.4	1.1	3.5	4.8	16.9	57.8
75	3,352	49.3	1.4	1.1	3.6	4.9	16.9	60.4
80	3,539	51.2	1.5	1.1	3.8	5.0	16.9	62.5
85	3,707	52.9	1.5	1.1	3.9	5.0	16.9	64.4
90	3,891	54.7	1.5	1.1	4.0	5.1	16.9	66.4

APPENDIX B

Forest Ecosystem Yield Tables for Afforestation (Establishment on Nonforest Land)[2]

Carbon Stocks with Afforestation of Land

B1. Aspen-birch, Northeast
B2. Maple-beech-birch, Northeast
B3. Oak-hickory, Northeast
B4. Oak-pine, Northeast
B5. Spruce-balsam fir, Northeast
B6. White-red-jack pine, Northeast
B7. Aspen-birch, Northern Lake States
B8. Elm-ash-cottonwood, Northern Lake States
B9. Maple-beech-birch, Northern Lake States
B10. Oak-hickory, Northern Lake States
B11. Spruce-balsam fir, Northern Lake States
B12. White-red-jack pine, Northern Lake States
B13. Elm-ash-cottonwood, Northern Prairie States
B14. Maple-beech-birch, Northern Prairie States
B15. Oak-hickory, Northern Prairie States
B16. Oak-pine, Northern Prairie States
B17. Douglas-fir, Pacific Northwest, East
B18. Fir-spruce-mountain hemlock, Pacific Northwest, East
B19. Lodgepole pine, Pacific Northwest, East
B20. Ponderosa pine, Pacific Northwest, East
B21. Alder-maple, Pacific Northwest, West
B22. Douglas-fir, Pacific Northwest, West
B23. Douglas-fir, high productivity and management intensity, Pacific Northwest, West
B24. Fir-spruce-mountain hemlock, Pacific Northwest, West
B25. Hemlock-Sitka spruce, Pacific Northwest, West
B26. Hemlock-Sitka spruce, high productivity and management intensity, Pacific Northwest, West
B27. Mixed conifer, Pacific Southwest
B28. Fir-spruce-mountain hemlock, Pacific Southwest
B29. Western oak, Pacific Southwest
B30. Douglas-fir, Rocky Mountain, North
B31. Fir-spruce-mountain hemlock, Rocky Mountain, North
B32. Lodgepole pine, Rocky Mountain, North
B33. Ponderosa pine, Rocky Mountain, North
B34. Aspen-birch, Rocky Mountain, South
B35. Douglas-fir, Rocky Mountain, South
B36. Fir-spruce-mountain hemlock, Rocky Mountain, South
B37. Lodgepole pine, Rocky Mountain, South
B38. Ponderosa pine, Rocky Mountain, South
B39. Loblolly-shortleaf pine, Southeast
B40. Loblolly-shortleaf pine, high productivity and management intensity, Southeast
B41. Longleaf-slash pine, Southeast
B42. Longleaf-slash pine, high productivity and management intensity, Southeast
B43. Oak-gum-cypress, Southeast
B44. Oak-hickory, Southeast
B45. Oak-pine, Southeast
B46. Elm-ash-cottonwood, South Central
B47. Loblolly-shortleaf pine, South Central
B48. Loblolly-shortleaf pine, high productivity and management intensity, South Central
B49. Oak-gum-cypress, South Central
B50. Oak-hickory, South Central
B51. Oak-pine, South Central

[2] Note carbon mass is in metric tons (tonnes) in all tables.

B1.— Regional estimates of timber volume and carbon stocks for aspen-birch stands with afforestation of land in the Northeast

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	2.0	0.0	0.0	65.6	2.0
5	0.0	6.6	0.6	2.2	0.5	1.6	65.8	11.5
15	12.9	21.3	1.8	2.1	1.7	4.0	67.4	30.9
25	33.8	36.0	2.9	2.1	2.8	5.8	70.4	49.6
35	58.4	50.1	3.8	2.1	3.9	7.3	74.0	67.1
45	84.7	62.7	4.6	2.1	4.9	8.4	77.7	82.6
55	112.4	75.1	5.3	2.0	5.8	9.3	80.9	97.6
65	141.7	87.5	5.9	2.0	6.8	10.1	83.4	112.3
75	172.6	100.0	6.5	2.0	7.8	10.7	85.1	127.1
85	205.0	112.7	7.1	2.0	8.8	11.3	86.2	141.9
95	238.9	125.5	7.7	2.0	9.8	11.8	86.8	156.7
105	274.4	138.5	8.2	2.0	10.8	12.2	87.1	171.7
115	311.4	151.7	8.8	2.0	11.8	12.5	87.3	186.8
125	349.9	165.0	9.3	2.0	12.8	12.9	87.4	202.0
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	0.8	0.0	0.0	26.5	0.8
5	0	2.7	0.2	0.9	0.2	0.6	26.6	4.7
15	184	8.6	0.7	0.9	0.7	1.6	27.3	12.5
25	483	14.6	1.2	0.8	1.1	2.4	28.5	20.1
35	835	20.3	1.5	0.8	1.6	2.9	30.0	27.2
45	1,210	25.4	1.9	0.8	2.0	3.4	31.4	33.4
55	1,607	30.4	2.1	0.8	2.4	3.8	32.7	39.5
65	2,025	35.4	2.4	0.8	2.8	4.1	33.7	45.5
75	2,466	40.5	2.6	0.8	3.1	4.3	34.4	51.4
85	2,929	45.6	2.9	0.8	3.5	4.6	34.9	57.4
95	3,414	50.8	3.1	0.8	3.9	4.8	35.1	63.4
105	3,921	56.0	3.3	0.8	4.4	4.9	35.3	69.5
115	4,450	61.4	3.5	0.8	4.8	5.1	35.3	75.6
125	5,001	66.8	3.8	0.8	5.2	5.2	35.4	81.8

B2.— Regional estimates of timber volume and carbon stocks for maple-beech-birch stands with afforestation of land in the Northeast

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	2.1	0.0	0.0	52.2	2.1
5	0.0	7.4	0.7	2.1	0.5	4.2	52.3	15.0
15	28.0	31.8	3.2	1.9	2.3	10.8	53.7	50.0
25	58.1	53.2	5.3	1.8	3.8	15.8	56.0	79.8
35	89.6	72.8	6.0	1.7	5.2	19.7	58.9	105.4
45	119.1	87.8	6.6	1.7	6.2	22.7	61.8	125.0
55	146.6	101.1	7.0	1.7	7.2	25.3	64.4	142.3
65	172.1	113.1	7.4	1.7	8.0	27.4	66.3	157.5
75	195.6	123.8	7.7	1.7	8.8	29.1	67.7	171.1
85	217.1	133.5	7.9	1.7	9.5	30.7	68.6	183.2
95	236.6	142.1	8.1	1.7	10.1	32.0	69.1	193.9
105	254.1	149.7	8.3	1.6	10.6	33.1	69.3	203.4
115	269.7	156.3	8.5	1.6	11.1	34.2	69.5	211.7
125	283.2	162.1	8.6	1.6	11.5	35.1	69.5	218.8
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	0.8	0.0	0.0	21.1	0.8
5	0	3.0	0.3	0.8	0.2	1.7	21.2	6.1
15	400	12.9	1.3	0.8	0.9	4.4	21.7	20.2
25	830	21.5	2.1	0.7	1.5	6.4	22.7	32.3
35	1,280	29.5	2.4	0.7	2.1	8.0	23.8	42.7
45	1,702	35.5	2.7	0.7	2.5	9.2	25.0	50.6
55	2,095	40.9	2.8	0.7	2.9	10.2	26.0	57.6
65	2,460	45.8	3.0	0.7	3.2	11.1	26.8	63.7
75	2,796	50.1	3.1	0.7	3.5	11.8	27.4	69.2
85	3,103	54.0	3.2	0.7	3.8	12.4	27.8	74.1
95	3,382	57.5	3.3	0.7	4.1	12.9	28.0	78.5
105	3,632	60.6	3.4	0.7	4.3	13.4	28.1	82.3
115	3,854	63.3	3.4	0.7	4.5	13.8	28.1	85.7
125	4,047	65.6	3.5	0.7	4.6	14.2	28.1	88.6

B3.— Regional estimates of timber volume and carbon stocks for oak-hickory stands with afforestation of land in the Northeast

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	m^3*/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	2.1	0.0	0.0	39.8	2.1
5	0.0	6.9	0.7	2.1	0.5	0.9	39.9	11.0
15	54.5	43.0	3.6	1.9	2.9	2.5	40.9	54.0
25	95.7	71.9	4.0	1.9	4.9	3.9	42.7	86.6
35	135.3	96.2	4.2	1.8	6.6	5.2	44.9	114.0
45	173.3	118.2	4.5	1.8	8.1	6.3	47.2	138.8
55	209.6	136.8	4.6	1.8	9.4	7.2	49.1	159.8
65	244.3	154.3	4.8	1.8	10.6	8.1	50.6	179.5
75	277.4	170.6	4.9	1.8	11.7	8.9	51.7	197.9
85	308.9	186.0	5.0	1.8	12.7	9.7	52.3	215.1
95	338.8	200.4	5.1	1.8	13.7	10.3	52.7	231.3
105	367.1	213.9	5.1	1.7	14.6	10.9	52.9	246.4
115	393.7	226.5	5.2	1.7	15.5	11.5	53.0	260.5
125	418.6	238.2	5.3	1.7	16.3	12.0	53.1	273.6
years	ft^3*/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	0.8	0.0	0.0	16.1	0.8
5	0	2.8	0.3	0.8	0.2	0.4	16.2	4.5
15	779	17.4	1.4	0.8	1.2	1.0	16.6	21.8
25	1,904	29.1	1.6	0.7	2.0	1.6	17.3	35.0
35	1,934	38.9	1.7	0.7	2.7	2.1	18.2	46.1
45	2,477	47.8	1.8	0.7	3.3	2.5	19.1	56.2
55	2,996	55.4	1.9	0.7	3.8	2.9	19.9	64.7
65	3,492	62.4	1.9	0.7	4.3	3.3	20.5	72.6
75	3,965	69.1	2.0	0.7	4.7	3.6	20.9	80.1
85	4,415	75.3	2.0	0.7	5.1	3.9	21.2	87.1
95	4,842	81.1	2.0	0.7	5.5	4.2	21.3	93.6
105	5,246	86.6	2.1	0.7	5.9	4.4	21.4	99.7
115	5,626	91.7	2.1	0.7	6.3	4.7	21.5	105.4
125	5,983	96.4	2.1	0.7	6.6	4.9	21.5	110.7

B4.— Regional estimates of timber volume and carbon stocks for oak-pine stands with afforestation of land in the Northeast

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m³/hectare*	------------------------------------- *tonnes carbon/hectare* -------------------------------------						
0	0.0	0.0	0.0	4.2	0.0	0.0	50.2	4.2
5	0.0	6.2	0.6	4.2	0.4	3.8	50.3	15.2
15	36.5	27.0	2.6	3.3	1.7	10.3	51.6	44.9
25	70.9	48.6	3.2	2.9	3.0	15.6	53.9	73.3
35	103.1	67.9	3.7	2.6	4.2	19.9	56.6	98.3
45	133.1	84.7	4.0	2.5	5.2	23.5	59.5	119.8
55	160.9	99.1	4.2	2.4	6.1	26.6	61.9	138.4
65	186.7	113.0	4.4	2.3	6.9	29.2	63.8	155.8
75	210.2	123.6	4.6	2.3	7.6	31.6	65.1	169.5
85	231.5	133.1	4.7	2.3	8.1	33.6	66.0	181.8
95	250.8	141.7	4.8	2.2	8.7	35.4	66.4	192.8
105	267.9	149.2	4.9	2.2	9.1	37.0	66.7	202.4
115	282.7	155.7	5.0	2.2	9.5	38.4	66.8	210.9
125	295.4	161.3	5.1	2.2	9.9	39.7	66.9	218.1
years	*ft³/acre*	--------------------------------------- *tonnes carbon/acre* ---------------------------------------						
0	0	0.0	0.0	1.7	0.0	0.0	20.3	1.7
5	0	2.5	0.3	1.7	0.2	1.6	20.4	6.2
15	522	10.9	1.1	1.3	0.7	4.2	20.9	18.2
25	1,013	19.7	1.3	1.2	1.2	6.3	21.8	29.6
35	1,473	27.5	1.5	1.1	1.7	8.0	22.9	39.8
45	1,902	34.3	1.6	1.0	2.1	9.5	24.1	48.5
55	2,300	40.1	1.7	1.0	2.5	10.8	25.1	56.0
65	2,668	45.7	1.8	0.9	2.8	11.8	25.8	63.1
75	3,004	50.0	1.8	0.9	3.1	12.8	26.4	68.6
85	3,309	53.9	1.9	0.9	3.3	13.6	26.7	73.6
95	3,584	57.3	1.9	0.9	3.5	14.3	26.9	78.0
105	3,828	60.4	2.0	0.9	3.7	15.0	27.0	81.9
115	4,040	63.0	2.0	0.9	3.9	15.6	27.0	85.3
125	4,222	65.3	2.1	0.9	4.0	16.1	27.1	88.3

B5.— Regional estimates of timber volume and carbon stocks for spruce-balsam fir stands with afforestation of land in the Northeast

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	2.1	0.0	0.0	73.5	2.1
5	0.0	7.0	0.7	1.8	0.6	5.0	73.7	15.1
15	11.5	20.1	2.0	1.6	1.9	13.0	75.6	38.5
25	29.1	32.5	3.3	1.5	3.0	19.0	78.9	59.3
35	51.6	45.7	4.6	1.4	4.2	23.7	83.0	79.7
45	76.9	57.4	5.7	1.4	5.3	27.5	87.1	97.4
55	102.6	68.7	6.9	1.4	6.3	30.7	90.7	113.9
65	126.4	78.6	7.4	1.3	7.3	33.3	93.5	127.9
75	149.3	87.9	7.6	1.3	8.1	35.5	95.4	140.5
85	170.9	96.5	7.8	1.3	8.9	37.4	96.6	152.0
95	191.6	104.5	8.0	1.3	9.6	39.1	97.3	162.5
105	211.1	111.9	8.2	1.3	10.3	40.6	97.7	172.2
115	229.6	118.8	8.3	1.3	11.0	41.9	97.9	181.2
125	247.1	125.3	8.4	1.3	11.6	43.0	97.9	189.6
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	0.9	0.0	0.0	29.7	0.9
5	0	2.8	0.3	0.7	0.3	2.0	29.8	6.1
15	164	8.1	0.8	0.6	0.8	5.2	30.6	15.6
25	416	13.2	1.3	0.6	1.2	7.7	31.9	24.0
35	738	18.5	1.9	0.6	1.7	9.6	33.6	32.2
45	1,099	23.2	2.3	0.6	2.1	11.1	35.2	39.4
55	1,466	27.8	2.8	0.6	2.6	12.4	36.7	46.1
65	1,807	31.8	3.0	0.5	2.9	13.5	37.8	51.8
75	2,133	35.6	3.1	0.5	3.3	14.4	38.6	56.9
85	2,443	39.0	3.2	0.5	3.6	15.2	39.1	61.5
95	2,738	42.3	3.2	0.5	3.9	15.8	39.4	65.8
105	3,017	45.3	3.3	0.5	4.2	16.4	39.5	69.7
115	3,281	48.1	3.4	0.5	4.4	16.9	39.6	73.3
125	3,532	50.7	3.4	0.5	4.7	17.4	39.6	76.7

B6.— Regional estimates of timber volume and carbon stocks for white-red-jack pine stands with afforestation of land in the Northeast

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m³/hectare*	-------------------------------------			*tonnes carbon/hectare*			-------------------------------------
0	0.0	0.0	0.0	2.1	0.0	0.0	58.6	2.1
5	0.0	7.3	0.7	2.2	0.4	3.1	58.8	13.8
15	30.0	28.6	2.9	1.8	1.6	7.1	60.3	41.9
25	54.4	44.7	3.9	1.8	2.5	9.4	62.9	62.3
35	77.9	57.7	4.3	1.7	3.2	11.0	66.2	77.9
45	100.6	69.4	4.6	1.7	3.8	12.2	69.4	91.7
55	122.5	78.7	4.8	1.6	4.3	13.0	72.3	102.5
65	142.3	86.8	5.0	1.6	4.8	13.7	74.5	111.9
75	160.9	94.3	5.2	1.6	5.2	14.2	76.1	120.5
85	178.4	101.2	5.3	1.6	5.6	14.7	77.0	128.4
95	194.7	107.6	5.4	1.6	5.9	15.0	77.6	135.6
105	210.0	113.5	5.5	1.6	6.3	15.4	77.9	142.2
115	224.1	118.9	5.6	1.6	6.6	15.6	78.0	148.2
125	237.1	123.8	5.7	1.6	6.8	15.9	78.1	153.8
years	*ft³/acre*	-------------------------------------			*tonnes carbon/acre*			-------------------------------------
0	0	0.0	0.0	0.8	0.0	0.0	23.7	0.8
5	0	3.0	0.3	0.9	0.2	1.3	23.8	5.6
15	429	11.6	1.2	0.7	0.6	2.9	24.4	17.0
25	777	18.1	1.6	0.7	1.0	3.8	25.5	25.2
35	1,113	23.3	1.7	0.7	1.3	4.5	26.8	31.5
45	1,438	28.1	1.9	0.7	1.5	4.9	28.1	37.1
55	1,751	31.8	2.0	0.7	1.8	5.3	29.3	41.5
65	2,034	35.1	2.0	0.7	1.9	5.5	30.2	45.3
75	2,300	38.2	2.1	0.7	2.1	5.8	30.8	48.8
85	2,550	41.0	2.1	0.6	2.3	5.9	31.2	52.0
95	2,783	43.5	2.2	0.6	2.4	6.1	31.4	54.9
105	3,001	45.9	2.2	0.6	2.5	6.2	31.5	57.6
115	3,202	48.1	2.3	0.6	2.7	6.3	31.6	60.0
125	3,389	50.1	2.3	0.6	2.8	6.4	31.6	62.2

B7.— Regional estimates of timber volume and carbon stocks for aspen-birch stands with afforestation of land in the Northern Lake States

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m³/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	2.0	0.0	0.0	109.6	2.0
5	0.0	7.3	0.5	2.1	0.6	1.6	109.9	12.1
15	2.9	13.9	1.4	2.1	1.1	4.0	112.7	22.5
25	21.5	26.8	2.7	2.1	2.2	5.8	117.6	39.6
35	47.2	40.8	4.1	2.0	3.3	7.3	123.7	57.4
45	72.8	53.5	5.3	2.0	4.3	8.4	129.8	73.6
55	97.1	64.9	6.1	2.0	5.2	9.3	135.2	87.6
65	119.5	75.0	6.7	2.0	6.1	10.1	139.4	99.8
75	139.7	83.8	7.1	2.0	6.8	10.7	142.2	110.4
85	157.5	91.5	7.4	2.0	7.4	11.3	144.1	119.6
95	173.0	98.0	7.7	2.0	7.9	11.8	145.1	127.4
105	186.0	103.4	7.9	2.0	8.4	12.2	145.6	133.9
115	196.4	107.7	8.1	2.0	8.7	12.5	145.9	139.1
125	204.3	110.9	8.3	2.0	9.0	12.9	146.0	143.0
years	*ft³/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	0.8	0.0	0.0	44.3	0.8
5	0	3.0	0.2	0.8	0.2	0.6	44.5	4.9
15	42	5.6	0.6	0.8	0.5	1.6	45.6	9.1
25	307	10.9	1.1	0.8	0.9	2.4	47.6	16.0
35	674	16.5	1.6	0.8	1.3	2.9	50.1	23.2
45	1,041	21.6	2.2	0.8	1.7	3.4	52.5	29.8
55	1,388	26.2	2.5	0.8	2.1	3.8	54.7	35.4
65	1,708	30.3	2.7	0.8	2.5	4.1	56.4	40.4
75	1,996	33.9	2.9	0.8	2.7	4.3	57.6	44.7
85	2,251	37.0	3.0	0.8	3.0	4.6	58.3	48.4
95	2,472	39.7	3.1	0.8	3.2	4.8	58.7	51.5
105	2,658	41.8	3.2	0.8	3.4	4.9	58.9	54.2
115	2,807	43.6	3.3	0.8	3.5	5.1	59.0	56.3
125	2,920	44.9	3.3	0.8	3.6	5.2	59.1	57.9

B8.— Regional estimates of timber volume and carbon stocks for elm-ash-cottonwood stands with afforestation of land in the Northern Lake States

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	m^3*/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	2.0	0.0	0.0	134.9	2.0
5	0.0	3.9	0.4	1.9	0.2	4.2	135.4	10.7
15	2.4	10.3	1.0	1.9	0.6	10.8	138.8	24.7
25	13.2	20.1	2.0	1.9	1.2	15.8	144.9	41.1
35	25.2	29.8	3.0	1.9	1.8	19.7	152.4	56.2
45	37.4	38.7	3.9	1.9	2.4	22.7	159.9	69.7
55	49.8	47.1	4.7	1.9	2.9	25.3	166.5	81.9
65	62.3	55.6	5.3	1.9	3.4	27.4	171.6	93.7
75	74.9	62.8	5.6	1.9	3.9	29.1	175.2	103.4
85	87.5	69.9	5.8	1.9	4.3	30.7	177.4	112.6
95	100.1	76.8	6.0	1.9	4.7	32.0	178.7	121.4
105	112.9	83.6	6.2	1.9	5.1	33.1	179.4	130.0
115	125.8	90.4	6.4	1.9	5.6	34.2	179.7	138.5
125	139.2	97.4	6.5	1.9	6.0	35.1	179.8	147.0
years	ft^3*/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	0.8	0.0	0.0	54.6	0.8
5	0	1.6	0.2	0.8	0.1	1.7	54.8	4.3
15	35	4.2	0.4	0.8	0.3	4.4	56.2	10.0
25	189	8.1	0.8	0.8	0.5	6.4	58.6	16.6
35	360	12.0	1.2	0.8	0.7	8.0	61.7	22.7
45	535	15.7	1.6	0.8	1.0	9.2	64.7	28.2
55	712	19.1	1.9	0.8	1.2	10.2	67.4	33.1
65	890	22.5	2.2	0.8	1.4	11.1	69.5	37.9
75	1,070	25.4	2.3	0.8	1.6	11.8	70.9	41.8
85	1,250	28.3	2.4	0.8	1.7	12.4	71.8	45.6
95	1,431	31.1	2.4	0.8	1.9	12.9	72.3	49.1
105	1,613	33.8	2.5	0.8	2.1	13.4	72.6	52.6
115	1,798	36.6	2.6	0.8	2.2	13.8	72.7	56.0
125	1,990	39.4	2.7	0.8	2.4	14.2	72.8	59.5

B9.— Regional estimates of timber volume and carbon stocks for maple-beech-birch stands with afforestation of land in the Northern Lake States

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m³/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	2.1	0.0	0.0	100.7	2.1
5	0.0	5.1	0.5	2.0	0.4	4.2	101.0	12.2
15	4.3	13.4	1.3	1.7	1.0	10.8	103.6	28.3
25	24.6	30.3	3.0	1.6	2.3	15.8	108.1	53.0
35	48.1	47.7	4.0	1.5	3.6	19.7	113.7	76.5
45	72.5	62.9	4.4	1.4	4.8	22.7	119.3	96.2
55	96.9	77.3	4.7	1.4	5.9	25.3	124.3	114.5
65	121.3	91.1	4.9	1.4	6.9	27.4	128.1	131.7
75	145.3	104.4	5.1	1.4	7.9	29.1	130.7	147.9
85	168.9	117.1	5.3	1.3	8.9	30.7	132.4	163.3
95	191.9	129.3	5.4	1.3	9.8	32.0	133.4	177.8
105	214.4	140.9	5.6	1.3	10.7	33.1	133.9	191.6
115	236.0	151.9	5.7	1.3	11.5	34.2	134.1	204.6
125	256.9	162.4	5.8	1.3	12.3	35.1	134.2	216.9
years	*ft³/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	0.9	0.0	0.0	40.8	0.9
5	0	2.1	0.2	0.8	0.2	1.7	40.9	4.9
15	62	5.4	0.5	0.7	0.4	4.4	41.9	11.5
25	351	12.2	1.2	0.6	0.9	6.4	43.8	21.4
35	688	19.3	1.6	0.6	1.5	8.0	46.0	31.0
45	1,036	25.4	1.8	0.6	1.9	9.2	48.3	38.9
55	1,385	31.3	1.9	0.6	2.4	10.2	50.3	46.3
65	1,733	36.9	2.0	0.6	2.8	11.1	51.8	53.3
75	2,076	42.2	2.1	0.6	3.2	11.8	52.9	59.9
85	2,414	47.4	2.1	0.5	3.6	12.4	53.6	66.1
95	2,743	52.3	2.2	0.5	4.0	12.9	54.0	72.0
105	3,064	57.0	2.3	0.5	4.3	13.4	54.2	77.5
115	3,373	61.5	2.3	0.5	4.7	13.8	54.3	82.8
125	3,671	65.7	2.3	0.5	5.0	14.2	54.3	87.8

B10.— Regional estimates of timber volume and carbon stocks for oak-hickory stands with afforestation of land in the Northern Lake States

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	2.1	0.0	0.0	72.8	2.1
5	0.0	6.7	0.7	2.2	0.5	0.9	73.1	11.0
15	4.1	17.0	1.7	2.0	1.3	2.5	74.9	24.5
25	21.9	33.6	3.1	1.9	2.6	3.9	78.2	45.0
35	42.5	50.3	3.6	1.8	3.9	5.2	82.2	64.8
45	64.9	66.7	3.9	1.8	5.2	6.3	86.3	83.9
55	88.7	83.6	4.2	1.8	6.5	7.2	89.9	103.3
65	113.4	99.1	4.5	1.7	7.7	8.1	92.6	121.1
75	139.0	114.7	4.7	1.7	8.9	8.9	94.5	138.9
85	165.2	130.3	4.9	1.7	10.1	9.7	95.8	156.7
95	192.1	146.0	5.1	1.7	11.3	10.3	96.4	174.4
105	219.2	161.6	5.3	1.7	12.5	10.9	96.8	192.0
115	246.4	177.0	5.4	1.6	13.7	11.5	97.0	209.2
125	272.5	191.6	5.5	1.6	14.8	12.0	97.1	225.6
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	0.8	0.0	0.0	29.5	0.8
5	0	2.7	0.3	0.9	0.2	0.4	29.6	4.4
15	58	6.9	0.7	0.8	0.5	1.0	30.3	9.9
25	313	13.6	1.2	0.8	1.0	1.6	31.6	18.2
35	608	20.4	1.4	0.7	1.6	2.1	33.3	26.2
45	928	27.0	1.6	0.7	2.1	2.5	34.9	33.9
55	1,267	33.8	1.7	0.7	2.6	2.9	36.4	41.8
65	1,620	40.1	1.8	0.7	3.1	3.3	37.5	49.0
75	1,986	46.4	1.9	0.7	3.6	3.6	38.3	56.2
85	2,361	52.7	2.0	0.7	4.1	3.9	38.7	63.4
95	2,745	59.1	2.1	0.7	4.6	4.2	39.0	70.6
105	3,133	65.4	2.1	0.7	5.1	4.4	39.2	77.7
115	3,521	71.6	2.2	0.7	5.5	4.7	39.2	84.7
125	3,895	77.5	2.2	0.7	6.0	4.9	39.3	91.3

B11.— Regional estimates of timber volume and carbon stocks for spruce-balsam fir stands with afforestation of land in the Northern Lake States

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	2.1	0.0	0.0	196.4	2.1
5	0.0	3.4	0.3	2.1	0.3	5.0	197.0	11.1
15	3.0	9.3	0.9	2.6	0.8	13.0	202.0	26.5
25	23.2	24.3	2.4	1.9	2.1	19.0	210.8	49.7
35	51.1	41.2	4.1	1.6	3.6	23.7	221.7	74.2
45	77.2	56.0	5.1	1.5	4.8	27.5	232.7	94.9
55	100.7	67.4	5.8	1.4	5.8	30.7	242.3	111.1
65	121.6	77.2	6.4	1.3	6.7	33.3	249.7	124.8
75	140.2	85.5	6.8	1.3	7.4	35.5	254.9	136.5
85	156.5	92.8	7.2	1.2	8.0	37.4	258.2	146.6
95	170.9	99.0	7.5	1.2	8.6	39.1	260.0	155.3
105	183.5	104.3	7.7	1.2	9.0	40.6	261.0	162.9
115	194.4	109.0	7.9	1.2	9.4	41.9	261.5	169.3
125	203.8	112.9	8.1	1.2	9.8	43.0	261.7	174.9
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	0.9	0.0	0.0	79.5	0.9
5	0	1.4	0.1	0.9	0.1	2.0	79.7	4.5
15	43	3.7	0.4	1.0	0.3	5.2	81.7	10.7
25	332	9.8	1.0	0.8	0.8	7.7	85.3	20.1
35	730	16.7	1.7	0.7	1.4	9.6	89.7	30.0
45	1,103	22.7	2.1	0.6	2.0	11.1	94.2	38.4
55	1,439	27.3	2.4	0.6	2.4	12.4	98.0	45.0
65	1,738	31.2	2.6	0.5	2.7	13.5	101.1	50.5
75	2,003	34.6	2.7	0.5	3.0	14.4	103.2	55.3
85	2,237	37.5	2.9	0.5	3.2	15.2	104.5	59.3
95	2,442	40.1	3.0	0.5	3.5	15.8	105.2	62.9
105	2,622	42.2	3.1	0.5	3.7	16.4	105.6	65.9
115	2,778	44.1	3.2	0.5	3.8	16.9	105.8	68.5
125	2,912	45.7	3.3	0.5	4.0	17.4	105.9	70.8

B12.— Regional estimates of timber volume and carbon stocks for white-red-jack pine stands with afforestation of land in the Northern Lake States

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	2.0	0.0	0.0	90.6	2.0
5	0.0	0.4	0.0	2.0	0.0	3.1	90.9	5.7
15	6.6	8.0	0.8	2.0	0.6	7.1	93.2	18.5
25	48.1	35.4	3.5	2.0	2.5	9.4	97.3	52.9
35	104.7	62.9	4.9	2.0	4.5	11.0	102.3	85.3
45	158.9	85.8	5.5	2.0	6.2	12.2	107.4	111.6
55	209.1	105.3	5.9	2.0	7.6	13.0	111.8	133.8
65	255.1	122.2	6.2	2.0	8.8	13.7	115.2	152.9
75	297.4	137.1	6.5	2.0	9.9	14.2	117.6	169.6
85	336.1	150.3	6.7	2.0	10.8	14.7	119.1	184.4
95	371.7	162.0	6.9	2.0	11.7	15.0	120.0	197.5
105	404.2	172.5	7.0	2.0	12.4	15.4	120.5	209.3
115	434.0	182.0	7.2	2.0	13.1	15.6	120.7	219.8
125	461.3	190.5	7.3	1.9	13.7	15.9	120.8	229.2
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	0.8	0.0	0.0	36.7	0.8
5	0	0.2	0.0	0.8	0.0	1.3	36.8	2.3
15	94	3.3	0.3	0.8	0.2	2.9	37.7	7.5
25	688	14.3	1.4	0.8	1.0	3.8	39.4	21.4
35	1,496	25.5	2.0	0.8	1.8	4.5	41.4	34.5
45	2,271	34.7	2.2	0.8	2.5	4.9	43.5	45.2
55	2,988	42.6	2.4	0.8	3.1	5.3	45.3	54.2
65	3,646	49.5	2.5	0.8	3.6	5.5	46.6	61.9
75	4,250	55.5	2.6	0.8	4.0	5.8	47.6	68.6
85	4,804	60.8	2.7	0.8	4.4	5.9	48.2	74.6
95	5,312	65.6	2.8	0.8	4.7	6.1	48.6	79.9
105	5,777	69.8	2.8	0.8	5.0	6.2	48.7	84.7
115	6,203	73.6	2.9	0.8	5.3	6.3	48.8	88.9
125	6,593	77.1	2.9	0.8	5.5	6.4	48.9	92.8

B13.— Regional estimates of timber volume and carbon stocks for elm-ash-cottonwood stands with afforestation of land in the Northern Prairie States

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	------ *tonnes carbon/hectare* ------						
0	0.0	0.0	0.0	2.1	0.0	0.0	63.6	2.1
5	0.0	3.9	0.4	2.1	0.3	4.2	63.8	10.8
15	0.0	8.7	0.9	2.7	0.6	10.8	65.4	23.7
25	5.8	15.5	1.6	2.4	1.1	15.8	68.3	36.4
35	21.8	27.7	2.8	2.2	1.9	19.7	71.8	54.3
45	45.1	43.2	4.3	2.0	3.0	22.7	75.4	75.3
55	73.0	60.2	5.6	1.9	4.2	25.3	78.5	97.1
65	104.1	78.9	6.1	1.8	5.5	27.4	80.9	119.7
75	137.4	96.5	6.5	1.8	6.7	29.1	82.6	140.6
85	171.9	114.0	6.9	1.7	7.9	30.7	83.6	161.2
95	206.8	131.3	7.2	1.7	9.1	32.0	84.2	181.3
105	241.7	148.2	7.5	1.6	10.3	33.1	84.5	200.7
115	275.8	164.3	7.8	1.6	11.4	34.2	84.7	219.2
125	308.6	179.6	8.0	1.6	12.4	35.1	84.7	236.6
years	*ft^3/acre*	------ *tonnes carbon/acre* ------						
0	0	0.0	0.0	0.8	0.0	0.0	25.7	0.8
5	0	1.6	0.2	0.8	0.1	1.7	25.8	4.4
15	0	3.5	0.4	1.1	0.2	4.4	26.5	9.6
25	83	6.3	0.6	1.0	0.4	6.4	27.6	14.7
35	312	11.2	1.1	0.9	0.8	8.0	29.1	22.0
45	644	17.5	1.7	0.8	1.2	9.2	30.5	30.5
55	1,043	24.3	2.3	0.8	1.7	10.2	31.8	39.3
65	1,488	31.9	2.5	0.7	2.2	11.1	32.7	48.4
75	1,964	39.0	2.6	0.7	2.7	11.8	33.4	56.9
85	2,456	46.1	2.8	0.7	3.2	12.4	33.8	65.2
95	2,956	53.1	2.9	0.7	3.7	12.9	34.1	73.4
105	3,454	60.0	3.0	0.7	4.2	13.4	34.2	81.2
115	3,941	66.5	3.2	0.6	4.6	13.8	34.3	88.7
125	4,410	72.7	3.2	0.6	5.0	14.2	34.3	95.8

B14.— Regional estimates of timber volume and carbon stocks for maple-beech-birch stands with afforestation of land in the Northern Prairie States

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	------------------------------------ *tonnes carbon/hectare* ------------------------------------						
0	0.0	0.0	0.0	2.1	0.0	0.0	48.6	2.1
5	0.0	5.1	0.5	2.2	0.3	4.2	48.8	12.4
15	0.9	10.5	1.1	1.9	0.7	10.8	50.0	25.0
25	8.2	18.5	1.8	1.7	1.2	15.8	52.2	39.0
35	21.4	29.7	3.0	1.6	1.9	19.7	54.9	55.7
45	38.2	41.3	3.8	1.5	2.6	22.7	57.7	71.9
55	57.4	53.6	4.2	1.4	3.4	25.3	60.0	87.9
65	78.6	66.5	4.5	1.3	4.2	27.4	61.9	103.9
75	101.0	79.6	4.7	1.3	5.1	29.1	63.2	119.8
85	124.4	92.9	4.9	1.2	5.9	30.7	64.0	135.7
95	148.6	106.2	5.1	1.2	6.7	32.0	64.4	151.2
105	173.1	119.4	5.3	1.2	7.6	33.1	64.7	166.6
115	197.4	132.1	5.5	1.2	8.4	34.2	64.8	181.3
125	220.5	144.0	5.6	1.1	9.1	35.1	64.8	195.0
years	*ft^3/acre*	--------------------------------------- *tonnes carbon/acre* ---------------------------------------						
0	0	0.0	0.0	0.9	0.0	0.0	19.7	0.9
5	0	2.1	0.2	0.9	0.1	1.7	19.8	5.0
15	13	4.3	0.4	0.8	0.3	4.4	20.3	10.1
25	117	7.5	0.7	0.7	0.5	6.4	21.1	15.8
35	306	12.0	1.2	0.6	0.8	8.0	22.2	22.6
45	546	16.7	1.5	0.6	1.1	9.2	23.3	29.1
55	821	21.7	1.7	0.6	1.4	10.2	24.3	35.6
65	1,123	26.9	1.8	0.5	1.7	11.1	25.0	42.1
75	1,443	32.2	1.9	0.5	2.0	11.8	25.6	48.5
85	1,778	37.6	2.0	0.5	2.4	12.4	25.9	54.9
95	2,123	43.0	2.1	0.5	2.7	12.9	26.1	61.2
105	2,474	48.3	2.2	0.5	3.1	13.4	26.2	67.4
115	2,821	53.5	2.2	0.5	3.4	13.8	26.2	73.4
125	3,151	58.3	2.3	0.5	3.7	14.2	26.2	78.9

B15.— Regional estimates of timber volume and carbon stocks for oak-hickory stands with afforestation of land in the Northern Prairie States

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	------- *tonnes carbon/hectare* -------						
0	0.0	0.0	0.0	2.1	0.0	0.0	34.5	2.1
5	0.0	6.7	0.6	2.4	0.5	0.9	34.6	11.0
15	2.1	15.6	1.6	2.1	1.1	2.5	35.4	22.9
25	13.0	27.5	2.7	2.0	1.9	3.9	37.0	37.9
35	27.4	40.0	3.2	1.9	2.7	5.2	38.9	53.0
45	43.0	52.2	3.6	1.8	3.5	6.3	40.8	67.4
55	59.1	64.3	3.9	1.8	4.3	7.2	42.5	81.5
65	74.9	74.7	4.1	1.7	5.0	8.1	43.8	93.7
75	90.2	84.6	4.3	1.7	5.7	8.9	44.7	105.2
85	104.7	93.7	4.4	1.7	6.3	9.7	45.3	115.8
95	118.3	102.1	4.5	1.6	6.9	10.3	45.6	125.5
105	130.8	109.7	4.7	1.6	7.4	10.9	45.8	134.4
115	142.0	116.5	4.7	1.6	7.9	11.5	45.9	142.3
125	151.9	122.5	4.8	1.6	8.3	12.0	45.9	149.2
years	*ft^3/acre*	------- *tonnes carbon/acre* -------						
0	0	0.0	0.0	0.8	0.0	0.0	13.9	0.8
5	0	2.7	0.2	1.0	0.2	0.4	14.0	4.5
15	30	6.3	0.6	0.9	0.4	1.0	14.3	9.3
25	186	11.1	1.1	0.8	0.8	1.6	15.0	15.3
35	391	16.2	1.3	0.8	1.1	2.1	15.7	21.4
45	615	21.1	1.4	0.7	1.4	2.5	16.5	27.3
55	844	26.0	1.6	0.7	1.8	2.9	17.2	33.0
65	1,070	30.2	1.7	0.7	2.0	3.3	17.7	37.9
75	1,289	34.2	1.7	0.7	2.3	3.6	18.1	42.6
85	1,497	37.9	1.8	0.7	2.6	3.9	18.3	46.9
95	1,691	41.3	1.8	0.7	2.8	4.2	18.5	50.8
105	1,869	44.4	1.9	0.7	3.0	4.4	18.5	54.4
115	2,030	47.2	1.9	0.7	3.2	4.7	18.6	57.6
125	2,171	49.6	2.0	0.7	3.3	4.9	18.6	60.4

B16.— Regional estimates of timber volume and carbon stocks for oak-pine stands with afforestation of land in the Northern Prairie States

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.2	0.0	0.0	27.1	4.2
5	0.0	5.1	0.4	4.2	0.4	3.8	27.2	13.9
15	4.5	13.8	1.2	4.3	1.0	10.3	27.9	30.6
25	28.4	29.8	2.6	3.6	2.1	15.6	29.1	53.6
35	57.9	47.4	3.4	3.3	3.3	19.9	30.6	77.2
45	86.7	63.3	4.0	3.1	4.4	23.5	32.1	98.2
55	113.2	77.0	4.4	2.9	5.3	26.6	33.5	116.2
65	137.1	89.4	4.7	2.9	6.2	29.2	34.5	132.5
75	158.1	98.9	5.0	2.8	6.8	31.6	35.2	145.1
85	176.0	106.8	5.2	2.7	7.4	33.6	35.7	155.7
95	190.8	113.3	5.4	2.7	7.8	35.4	35.9	164.6
105	202.4	118.3	5.5	2.7	8.2	37.0	36.0	171.7
115	210.9	121.9	5.6	2.7	8.4	38.4	36.1	177.1
125	216.1	124.1	5.7	2.7	8.6	39.7	36.1	180.8
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.7	0.0	0.0	11.0	1.7
5	0	2.1	0.2	1.7	0.1	1.6	11.0	5.6
15	65	5.6	0.5	1.7	0.4	4.2	11.3	12.4
25	406	12.1	1.0	1.5	0.8	6.3	11.8	21.7
35	828	19.2	1.4	1.3	1.3	8.0	12.4	31.3
45	1,239	25.6	1.6	1.2	1.8	9.5	13.0	39.7
55	1,618	31.2	1.8	1.2	2.2	10.8	13.5	47.0
65	1,959	36.2	1.9	1.2	2.5	11.8	14.0	53.6
75	2,259	40.0	2.0	1.1	2.8	12.8	14.2	58.7
85	2,515	43.2	2.1	1.1	3.0	13.6	14.4	63.0
95	2,727	45.8	2.2	1.1	3.2	14.3	14.5	66.6
105	2,893	47.9	2.2	1.1	3.3	15.0	14.6	69.5
115	3,014	49.3	2.3	1.1	3.4	15.6	14.6	71.7
125	3,088	50.2	2.3	1.1	3.5	16.1	14.6	73.2

B17.— Regional estimates of timber volume and carbon stocks for Douglas-fir stands with afforestation of land in the Pacific Northwest, East

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	m^3*/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.6	0.0	0.0	71.1	4.6
5	0.0	2.7	0.3	4.4	0.3	5.2	71.3	12.7
15	3.8	8.7	0.9	4.1	0.9	13.0	73.1	27.5
25	47.7	38.3	3.8	3.7	3.9	18.6	76.3	68.3
35	119.0	75.1	7.5	3.6	7.7	22.9	80.2	116.7
45	184.7	104.0	10.0	3.5	10.7	26.2	84.2	154.3
55	241.8	127.3	10.9	3.4	13.1	28.9	87.7	183.6
65	290.9	146.4	11.5	3.4	15.0	31.1	90.4	207.5
75	332.7	162.2	12.0	3.4	16.6	33.0	92.3	227.2
85	368.3	175.3	12.4	3.4	18.0	34.5	93.4	243.6
95	398.6	186.2	12.7	3.4	19.1	35.9	94.1	257.2
105	424.4	195.4	13.0	3.3	20.0	37.0	94.5	268.7
115	446.4	203.1	13.2	3.3	20.8	38.0	94.6	278.4
125	465.2	209.6	13.3	3.3	21.5	39.0	94.7	286.7
years	ft^3*/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.9	0.0	0.0	28.8	1.9
5	0	1.1	0.1	1.8	0.1	2.1	28.9	5.2
15	54	3.5	0.4	1.7	0.4	5.2	29.6	11.1
25	682	15.5	1.5	1.5	1.6	7.5	30.9	27.7
35	1,701	30.4	3.0	1.4	3.1	9.3	32.5	47.2
45	2,639	42.1	4.1	1.4	4.3	10.6	34.1	62.5
55	3,456	51.5	4.4	1.4	5.3	11.7	35.5	74.3
65	4,157	59.3	4.7	1.4	6.1	12.6	36.6	84.0
75	4,755	65.6	4.9	1.4	6.7	13.3	37.3	91.9
85	5,264	70.9	5.0	1.4	7.3	14.0	37.8	98.6
95	5,697	75.4	5.1	1.4	7.7	14.5	38.1	104.1
105	6,065	79.1	5.2	1.4	8.1	15.0	38.2	108.8
115	6,379	82.2	5.3	1.4	8.4	15.4	38.3	112.7
125	6,648	84.8	5.4	1.3	8.7	15.8	38.3	116.0

B18.— Regional estimates of timber volume and carbon stocks for fir-spruce-mountain hemlock stands with afforestation of land in the Pacific Northwest, East

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m³/hectare*	------------------------------------ *tonnes carbon/hectare* ------------------------------------						
0	0.0	0.0	0.0	4.8	0.0	0.0	46.6	4.8
5	0.0	3.1	0.3	4.1	0.3	5.2	46.8	13.0
15	0.0	5.8	0.6	3.7	0.6	13.0	47.9	23.7
25	15.2	15.5	1.6	3.2	1.6	18.6	50.0	40.5
35	52.1	33.9	3.4	2.8	3.6	22.9	52.6	66.6
45	97.4	53.0	5.3	2.6	5.6	26.2	55.2	92.7
55	144.4	71.3	7.1	2.5	7.6	28.9	57.5	117.5
65	189.7	88.3	8.8	2.4	9.4	31.1	59.3	140.0
75	231.5	103.3	10.3	2.4	11.0	33.0	60.5	160.0
85	268.7	116.4	11.6	2.3	12.4	34.5	61.3	177.3
95	301.0	127.6	12.8	2.3	13.6	35.9	61.7	192.0
105	328.2	136.9	13.7	2.3	14.5	37.0	62.0	204.4
115	350.6	144.4	14.4	2.2	15.3	38.0	62.1	214.4
125	368.3	150.3	15.0	2.2	16.0	39.0	62.1	222.5
years	*ft³/acre*	-------------------------------------- *tonnes carbon/acre* --------------------------------------						
0	0	0.0	0.0	1.9	0.0	0.0	18.9	1.9
5	0	1.3	0.1	1.7	0.1	2.1	18.9	5.3
15	0	2.3	0.2	1.5	0.2	5.2	19.4	9.6
25	217	6.3	0.6	1.3	0.7	7.5	20.3	16.4
35	745	13.7	1.4	1.1	1.5	9.3	21.3	27.0
45	1,392	21.4	2.1	1.1	2.3	10.6	22.4	37.5
55	2,063	28.9	2.9	1.0	3.1	11.7	23.3	47.5
65	2,711	35.7	3.6	1.0	3.8	12.6	24.0	56.7
75	3,308	41.8	4.2	1.0	4.4	13.3	24.5	64.7
85	3,840	47.1	4.7	0.9	5.0	14.0	24.8	71.7
95	4,302	51.6	5.2	0.9	5.5	14.5	25.0	77.7
105	4,691	55.4	5.5	0.9	5.9	15.0	25.1	82.7
115	5,010	58.4	5.8	0.9	6.2	15.4	25.1	86.8
125	5,264	60.8	6.1	0.9	6.5	15.8	25.1	90.0

B19.— Regional estimates of timber volume and carbon stocks for lodgepole pine stands with afforestation of land in the Pacific Northwest, East

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.8	0.0	0.0	39.0	4.8
5	0.0	1.9	0.2	4.8	0.2	2.4	39.1	9.5
15	6.6	8.1	0.8	3.5	0.8	6.4	40.1	19.6
25	40.8	24.3	2.4	2.6	2.3	9.8	41.9	41.4
35	81.7	40.1	4.0	2.3	3.7	12.6	44.1	62.8
45	120.5	54.0	5.4	2.2	5.0	14.9	46.2	81.5
55	156.3	64.5	6.4	2.1	6.0	17.0	48.1	95.9
65	189.3	73.6	7.4	2.0	6.9	18.7	49.6	108.5
75	219.9	81.7	8.2	1.9	7.6	20.3	50.7	119.7
85	248.0	88.9	8.9	1.9	8.3	21.7	51.3	129.6
95	274.0	95.4	9.5	1.9	8.9	22.9	51.7	138.5
105	298.2	101.2	10.1	1.8	9.4	24.0	51.9	146.6
115	320.5	106.5	10.6	1.8	9.9	25.0	52.0	153.8
125	341.2	111.4	10.9	1.8	10.4	25.8	52.0	160.3
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	2.0	0.0	0.0	15.8	2.0
5	0	0.8	0.1	2.0	0.1	1.0	15.8	3.8
15	95	3.3	0.3	1.4	0.3	2.6	16.2	7.9
25	583	9.8	1.0	1.1	0.9	4.0	17.0	16.8
35	1,168	16.2	1.6	0.9	1.5	5.1	17.8	25.4
45	1,722	21.8	2.2	0.9	2.0	6.0	18.7	33.0
55	2,234	26.1	2.6	0.8	2.4	6.9	19.5	38.8
65	2,706	29.8	3.0	0.8	2.8	7.6	20.1	43.9
75	3,142	33.1	3.3	0.8	3.1	8.2	20.5	48.4
85	3,544	36.0	3.6	0.8	3.3	8.8	20.8	52.4
95	3,916	38.6	3.9	0.8	3.6	9.3	20.9	56.1
105	4,261	41.0	4.1	0.7	3.8	9.7	21.0	59.3
115	4,580	43.1	4.3	0.7	4.0	10.1	21.0	62.2
125	4,876	45.1	4.4	0.7	4.2	10.5	21.0	64.9

B20.— Regional estimates of timber volume and carbon stocks for ponderosa pine stands with afforestation of land in the Pacific Northwest, East

Age	Mean volume	Mean carbon density						
		Live Tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.8	0.0	0.0	38.0	4.8
5	0.0	3.3	0.3	4.6	0.3	2.4	38.1	10.8
15	4.1	7.9	0.8	3.8	0.8	6.4	39.1	19.7
25	21.6	17.3	1.7	3.2	1.8	9.8	40.8	33.7
35	40.8	26.2	2.6	2.9	2.7	12.6	42.9	47.0
45	61.4	34.9	3.3	2.8	3.6	14.9	45.1	59.4
55	83.3	43.6	3.7	2.6	4.5	17.0	46.9	71.5
65	106.0	52.5	4.2	2.5	5.4	18.7	48.4	83.3
75	129.3	61.3	4.6	2.4	6.3	20.3	49.4	94.9
85	153.0	70.0	4.9	2.4	7.2	21.7	50.0	106.2
95	176.8	78.6	5.3	2.3	8.1	22.9	50.3	117.2
105	200.4	87.0	5.6	2.3	9.0	24.0	50.5	127.7
115	223.6	95.1	5.9	2.2	9.8	25.0	50.6	137.9
125	246.0	102.8	6.1	2.2	10.6	25.8	50.7	147.6
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.9	0.0	0.0	15.4	1.9
5	0	1.3	0.1	1.8	0.1	1.0	15.4	4.4
15	59	3.2	0.3	1.5	0.3	2.6	15.8	8.0
25	309	7.0	0.7	1.3	0.7	4.0	16.5	13.7
35	583	10.6	1.1	1.2	1.1	5.1	17.4	19.0
45	878	14.1	1.3	1.1	1.5	6.0	18.2	24.0
55	1,190	17.7	1.5	1.1	1.8	6.9	19.0	28.9
65	1,515	21.2	1.7	1.0	2.2	7.6	19.6	33.7
75	1,848	24.8	1.8	1.0	2.6	8.2	20.0	38.4
85	2,187	28.3	2.0	1.0	2.9	8.8	20.2	43.0
95	2,527	31.8	2.1	0.9	3.3	9.3	20.4	47.4
105	2,864	35.2	2.3	0.9	3.6	9.7	20.5	51.7
115	3,195	38.5	2.4	0.9	4.0	10.1	20.5	55.8
125	3,515	41.6	2.5	0.9	4.3	10.5	20.5	59.7

B21.— Regional estimates of timber volume and carbon stocks for alder-maple stands with afforestation of land in the Pacific Northwest, West

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	------------ *tonnes carbon/hectare* ------------						
0	0.0	0.0	0.0	4.7	0.0	0.0	86.4	4.7
5	0.0	8.0	0.8	4.7	0.8	1.8	86.7	16.1
15	49.5	31.0	3.1	3.7	2.9	4.4	88.9	45.2
25	229.7	99.4	9.9	2.8	9.4	6.2	92.8	127.8
35	380.8	153.8	15.4	2.5	14.6	7.6	97.6	193.9
45	513.7	200.8	20.1	2.4	19.0	8.6	102.4	250.9
55	633.3	242.5	22.2	2.3	23.0	9.4	106.7	299.4
65	742.1	280.1	23.9	2.2	26.5	10.1	109.9	342.8
75	842.1	314.4	25.3	2.2	29.8	10.7	112.2	382.4
85	934.5	346.0	26.6	2.1	32.8	11.1	113.6	418.6
95	1,020.3	375.2	27.7	2.1	35.5	11.5	114.5	452.0
105	1,100.3	402.2	28.7	2.0	38.1	11.9	114.9	483.0
115	1,175.0	427.4	29.6	2.1	40.5	12.2	115.1	511.8
125	1,244.9	450.9	30.4	2.3	42.7	12.4	115.2	538.7
years	*ft^3/acre*	------------ *tonnes carbon/acre* ------------						
0	0	0.0	0.0	1.9	0.0	0.0	35.0	1.9
5	0	3.2	0.3	1.9	0.3	0.7	35.1	6.5
15	708	12.6	1.3	1.5	1.2	1.8	36.0	18.3
25	3,282	40.2	4.0	1.1	3.8	2.5	37.6	51.7
35	5,442	62.3	6.2	1.0	5.9	3.1	39.5	78.5
45	7,342	81.3	8.1	1.0	7.7	3.5	41.5	101.5
55	9,050	98.1	9.0	0.9	9.3	3.8	43.2	121.1
65	10,605	113.3	9.7	0.9	10.7	4.1	44.5	138.7
75	12,034	127.2	10.3	0.9	12.1	4.3	45.4	154.7
85	13,355	140.0	10.8	0.9	13.3	4.5	46.0	169.4
95	14,582	151.8	11.2	0.8	14.4	4.7	46.3	182.9
105	15,725	162.8	11.6	0.8	15.4	4.8	46.5	195.4
115	16,792	173.0	12.0	0.9	16.4	4.9	46.6	207.1
125	17,791	182.5	12.3	0.9	17.3	5.0	46.6	218.0

B22.— Regional estimates of timber volume and carbon stocks for Douglas-fir stands with afforestation of land in the Pacific Northwest, West

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.6	0.0	0.0	71.1	4.6
5	0.0	8.4	0.8	4.5	0.8	3.6	71.3	18.1
15	37.4	30.3	3.0	3.9	3.0	10.0	73.1	50.3
25	208.9	107.1	10.7	3.4	10.7	15.4	76.3	147.3
35	391.8	181.6	17.4	3.2	18.2	20.2	80.2	240.6
45	554.7	246.1	21.2	3.1	24.6	24.4	84.2	319.4
55	698.4	302.2	24.1	3.0	30.2	28.0	87.7	387.5
65	826.0	351.4	26.4	3.0	35.1	31.3	90.4	447.2
75	939.9	394.9	28.4	2.9	39.5	34.2	92.3	500.0
85	1,042.1	433.7	30.1	2.9	43.4	36.9	93.4	547.0
95	1,134.5	468.6	31.6	2.9	46.9	39.3	94.1	589.1
105	1,218.3	500.1	32.9	2.9	50.0	41.4	94.5	627.2
115	1,294.7	528.7	34.0	2.9	52.9	43.4	94.6	661.8
125	1,364.7	554.8	35.0	2.8	55.5	45.3	94.7	693.4
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.9	0.0	0.0	28.8	1.9
5	0	3.4	0.3	1.8	0.3	1.5	28.9	7.3
15	535	12.3	1.2	1.6	1.2	4.0	29.6	20.3
25	2,985	43.3	4.3	1.4	4.3	6.2	30.9	59.6
35	5,600	73.5	7.1	1.3	7.3	8.2	32.5	97.4
45	7,927	99.6	8.6	1.3	10.0	9.9	34.1	129.2
55	9,981	122.3	9.7	1.2	12.2	11.3	35.5	156.8
65	11,804	142.2	10.7	1.2	14.2	12.7	36.6	181.0
75	13,432	159.8	11.5	1.2	16.0	13.9	37.3	202.3
85	14,893	175.5	12.2	1.2	17.6	14.9	37.8	221.3
95	16,213	189.6	12.8	1.2	19.0	15.9	38.1	238.4
105	17,411	202.4	13.3	1.2	20.2	16.8	38.2	253.8
115	18,503	213.9	13.8	1.2	21.4	17.6	38.3	267.8
125	19,503	224.5	14.2	1.1	22.5	18.3	38.3	280.6

B23.— Regional estimates of timber volume and carbon stocks for Douglas-fir stands with afforestation of land in the Pacific Northwest, West; volumes are for high-productivity sites (growth rate greater than 165 cubic feet wood/acre/year) with high-intensity management (replanting with genetically improved stock, fertilization, and precommercial thinning)

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.6	0.0	0.0	71.1	4.6
5	0.0	9.5	0.9	4.4	0.9	3.6	71.3	19.3
15	19.8	23.4	2.3	4.0	2.3	10.0	73.1	42.0
25	169.7	84.6	8.5	3.5	8.5	15.4	76.3	120.5
35	445.7	187.4	10.0	3.2	18.7	20.2	80.2	239.6
45	718.8	286.2	10.6	3.0	28.6	24.4	84.2	352.8
55	924.1	359.4	10.9	3.0	35.9	28.0	87.7	437.2
65	1,086.5	416.7	11.1	2.9	41.7	31.3	90.4	503.6
75	1,225.8	465.6	11.2	2.9	46.6	34.2	92.3	560.5
85	1,346.8	507.8	11.3	2.9	50.8	36.9	93.4	609.7
95	1,452.4	544.6	11.4	2.8	54.5	39.3	94.1	652.5
105	1,544.4	576.5	11.5	2.9	57.6	41.4	94.5	690.0
115	1,544.4	576.5	11.5	2.9	57.6	43.4	94.6	692.0
125	1,544.4	576.5	11.5	2.9	57.6	45.3	94.7	693.8
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.9	0.0	0.0	28.8	1.9
5	0	3.8	0.4	1.8	0.4	1.5	28.9	7.8
15	283	9.5	0.9	1.6	0.9	4.0	29.6	17.0
25	2,425	34.2	3.4	1.4	3.4	6.2	30.9	48.8
35	6,370	75.9	4.1	1.3	7.6	8.2	32.5	97.0
45	10,272	115.8	4.3	1.2	11.6	9.9	34.1	142.8
55	13,207	145.4	4.4	1.2	14.5	11.3	35.5	176.9
65	15,527	168.6	4.5	1.2	16.9	12.7	36.6	203.8
75	17,518	188.4	4.5	1.2	18.8	13.9	37.3	226.8
85	19,248	205.5	4.6	1.2	20.6	14.9	37.8	246.7
95	20,756	220.4	4.6	1.2	22.0	15.9	38.1	264.1
105	22,072	233.3	4.7	1.2	23.3	16.8	38.2	279.2
115	22,072	233.3	4.7	1.2	23.3	17.6	38.3	280.0
125	22,072	233.3	4.7	1.2	23.3	18.3	38.3	280.8

B24.— Regional estimates of timber volume, and carbon stocks for fir-spruce-mountain hemlock stands with afforestation of land in the Pacific Northwest, West

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.8	0.0	0.0	46.6	4.8
5	0.0	3.2	0.3	4.8	0.3	5.5	46.8	14.0
15	8.2	11.6	1.2	3.9	1.0	13.6	47.9	31.4
25	62.3	42.5	4.3	3.2	3.8	19.4	50.0	73.2
35	145.5	84.3	8.4	2.8	7.6	23.8	52.6	126.9
45	238.7	128.7	12.9	2.6	11.5	27.2	55.2	183.0
55	333.9	168.2	16.8	2.5	15.1	29.9	57.5	232.5
65	427.0	205.1	20.5	2.5	18.4	32.1	59.3	278.5
75	515.8	239.2	23.9	2.4	21.4	33.9	60.5	320.8
85	599.0	270.3	27.0	2.3	24.2	35.4	61.3	359.3
95	676.0	298.5	29.8	2.3	26.8	36.8	61.7	394.2
105	746.6	323.9	32.4	2.3	29.0	37.9	62.0	425.5
115	810.8	346.7	34.1	2.3	31.1	38.9	62.1	453.0
125	869.1	367.2	35.1	2.2	32.9	39.8	62.1	477.2
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.9	0.0	0.0	18.9	1.9
5	0	1.3	0.1	1.9	0.1	2.2	18.9	5.7
15	117	4.7	0.5	1.6	0.4	5.5	19.4	12.7
25	890	17.2	1.7	1.3	1.5	7.9	20.3	29.6
35	2,080	34.1	3.4	1.1	3.1	9.6	21.3	51.3
45	3,412	52.1	5.2	1.1	4.7	11.0	22.4	74.0
55	4,772	68.1	6.8	1.0	6.1	12.1	23.3	94.1
65	6,103	83.0	8.3	1.0	7.4	13.0	24.0	112.7
75	7,371	96.8	9.7	1.0	8.7	13.7	24.5	129.8
85	8,560	109.4	10.9	0.9	9.8	14.3	24.8	145.4
95	9,661	120.8	12.1	0.9	10.8	14.9	25.0	159.5
105	10,670	131.1	13.1	0.9	11.7	15.3	25.1	172.2
115	11,588	140.3	13.8	0.9	12.6	15.7	25.1	183.3
125	12,421	148.6	14.2	0.9	13.3	16.1	25.1	193.1

B25.— Regional estimates of timber volume and carbon stocks for hemlock-Sitka spruce stands with afforestation of land in the Pacific Northwest, West

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.7	0.0	0.0	87.3	4.7
5	0.0	5.9	0.6	4.7	0.6	3.6	87.6	15.3
15	33.7	22.5	2.2	4.1	2.2	10.0	89.8	41.0
25	184.1	78.0	7.8	3.1	7.7	15.4	93.7	112.1
35	350.8	139.8	14.0	2.7	13.8	20.2	98.5	190.5
45	516.7	201.6	20.2	2.5	19.9	24.4	103.4	268.5
55	678.7	256.6	25.7	2.4	25.3	28.0	107.7	338.0
65	835.1	309.1	30.9	2.3	30.5	31.3	111.0	404.1
75	985.6	359.2	35.9	2.2	35.4	34.2	113.3	467.0
85	1,129.8	406.7	40.1	2.2	40.1	36.9	114.7	526.0
95	1,267.4	451.8	42.8	2.3	44.5	39.3	115.6	580.7
105	1,398.3	494.4	45.2	2.5	48.7	41.4	116.0	632.3
115	1,522.4	534.7	47.4	2.7	52.7	43.4	116.2	680.9
125	1,639.6	572.6	49.4	2.9	56.4	45.3	116.3	726.6
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.9	0.0	0.0	35.3	1.9
5	0	2.4	0.2	1.9	0.2	1.5	35.4	6.2
15	482	9.1	0.9	1.6	0.9	4.0	36.3	16.6
25	2,631	31.6	3.2	1.3	3.1	6.2	37.9	45.3
35	5,013	56.6	5.7	1.1	5.6	8.2	39.9	77.1
45	7,385	81.6	8.2	1.0	8.0	9.9	41.8	108.7
55	9,699	103.9	10.4	1.0	10.2	11.3	43.6	136.8
65	11,935	125.1	12.5	0.9	12.3	12.7	44.9	163.6
75	14,086	145.4	14.5	0.9	14.3	13.9	45.8	189.0
85	16,146	164.6	16.2	0.9	16.2	14.9	46.4	212.8
95	18,113	182.8	17.3	0.9	18.0	15.9	46.8	235.0
105	19,983	200.1	18.3	1.0	19.7	16.8	46.9	255.9
115	21,757	216.4	19.2	1.1	21.3	17.6	47.0	275.6
125	23,432	231.7	20.0	1.2	22.8	18.3	47.1	294.0

B26.— Regional estimates of timber volume and carbon stocks for hemlock-Sitka spruce stands with afforestation of land in the Pacific Northwest, West; volumes are for high productivity sites (growth rate greater than 225 cubic feet wood/acre/year)

Age	Mean volume	Mean carbon density: Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.7	0.0	0.0	87.3	4.7
5	0.0	5.9	0.6	4.7	0.6	3.6	87.6	15.3
15	80.3	36.4	3.6	3.7	3.6	10.0	89.8	57.2
25	221.7	90.4	9.0	3.0	8.9	15.4	93.7	126.8
35	413.7	161.0	16.1	2.7	15.9	20.2	98.5	215.8
45	669.6	253.6	25.4	2.4	25.0	24.4	103.4	330.7
55	903.9	332.1	33.2	2.3	32.7	28.0	107.7	428.3
65	1,119.3	403.3	39.9	2.2	39.8	31.3	111.0	516.4
75	1,318.1	468.3	43.7	2.3	46.2	34.2	113.3	594.8
85	1,502.0	528.1	47.1	2.6	52.1	36.9	114.7	666.7
95	1,672.1	583.0	50.0	2.9	57.5	39.3	115.6	732.7
105	1,829.1	633.5	52.6	3.2	62.5	41.4	116.0	793.1
115	1,973.0	679.5	54.9	3.4	67.0	43.4	116.2	848.2
125	2,103.3	721.0	56.9	3.6	71.1	45.3	116.3	897.8
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.9	0.0	0.0	35.3	1.9
5	0	2.4	0.2	1.9	0.2	1.5	35.4	6.2
15	1,148	14.7	1.5	1.5	1.5	4.0	36.3	23.2
25	3,169	36.6	3.7	1.2	3.6	6.2	37.9	51.3
35	5,912	65.1	6.5	1.1	6.4	8.2	39.9	87.3
45	9,570	102.6	10.3	1.0	10.1	9.9	41.8	133.8
55	12,918	134.4	13.4	0.9	13.2	11.3	43.6	173.3
65	15,996	163.2	16.1	0.9	16.1	12.7	44.9	209.0
75	18,837	189.5	17.7	0.9	18.7	13.9	45.8	240.7
85	21,465	213.7	19.0	1.1	21.1	14.9	46.4	269.8
95	23,896	235.9	20.2	1.2	23.3	15.9	46.8	296.5
105	26,140	256.4	21.3	1.3	25.3	16.8	46.9	321.0
115	28,197	275.0	22.2	1.4	27.1	17.6	47.0	343.2
125	30,059	291.8	23.0	1.5	28.8	18.3	47.1	363.3

B27.— Regional estimates of timber volume and carbon stocks for mixed conifer stands with afforestation of land in the Pacific Southwest

Age	Mean volume	Mean carbon density						
		Live Tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.8	0.0	0.0	37.4	4.8
5	0.0	4.2	0.3	4.8	0.4	5.2	37.5	14.8
15	2.0	8.1	0.8	4.8	0.8	13.0	38.4	27.4
25	11.1	14.6	1.5	6.9	1.5	18.6	40.1	43.0
35	24.4	22.3	2.2	4.9	2.2	22.9	42.2	54.5
45	44.5	32.9	3.3	3.6	3.3	26.2	44.3	69.4
55	71.9	46.5	4.7	2.8	4.7	28.9	46.1	87.5
65	106.6	62.8	6.3	2.2	6.3	31.1	47.5	108.7
75	147.9	81.4	8.1	1.8	8.2	33.0	48.5	132.5
85	195.4	102.0	10.2	1.5	10.2	34.5	49.1	158.5
95	248.3	124.2	12.4	1.3	12.4	35.9	49.5	186.2
105	305.6	147.5	14.8	1.1	14.8	37.0	49.7	215.2
115	366.7	171.8	17.2	1.0	17.2	38.0	49.7	245.2
125	430.5	196.6	19.7	1.0	19.7	39.0	49.8	275.9
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.9	0.0	0.0	15.1	1.9
5	0	1.7	0.1	1.9	0.2	2.1	15.2	6.0
15	29	3.3	0.3	1.9	0.3	5.2	15.5	11.1
25	159	5.9	0.6	2.8	0.6	7.5	16.2	17.4
35	349	9.0	0.9	2.0	0.9	9.3	17.1	22.1
45	636	13.3	1.3	1.5	1.3	10.6	17.9	28.1
55	1,028	18.8	1.9	1.1	1.9	11.7	18.7	35.4
65	1,523	25.4	2.5	0.9	2.6	12.6	19.2	44.0
75	2,114	33.0	3.3	0.7	3.3	13.3	19.6	53.6
85	2,793	41.3	4.1	0.6	4.1	14.0	19.9	64.1
95	3,548	50.2	5.0	0.5	5.0	14.5	20.0	75.3
105	4,368	59.7	6.0	0.5	6.0	15.0	20.1	87.1
115	5,240	69.5	7.0	0.4	7.0	15.4	20.1	99.2
125	6,152	79.6	8.0	0.4	8.0	15.8	20.1	111.7

B28.— Regional estimates of timber volume and carbon stocks for fir-spruce-mountain hemlock stands with afforestation of land in the Pacific Southwest

Age	Mean volume	Mean carbon density						
		Live Tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m³/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.8	0.0	0.0	38.9	4.8
5	0.0	3.2	0.3	4.8	0.3	5.2	39.1	13.8
15	2.0	7.9	0.8	4.2	0.9	13.0	40.0	26.7
25	13.7	17.3	1.7	3.4	1.9	18.6	41.8	43.0
35	32.4	29.5	3.0	2.9	3.2	22.9	43.9	61.5
45	58.8	45.2	4.5	2.6	4.9	26.2	46.1	83.5
55	94.0	63.1	6.3	2.4	6.9	28.9	48.0	107.6
65	136.7	83.5	8.4	2.2	9.1	31.1	49.5	134.3
75	185.6	105.7	10.6	2.1	11.5	33.0	50.5	162.7
85	239.2	128.9	12.9	2.0	14.0	34.5	51.2	192.4
95	296.6	153.0	15.3	1.9	16.6	35.9	51.5	222.6
105	356.8	177.4	17.7	1.8	19.3	37.0	51.7	253.3
115	419.1	202.0	20.2	1.8	22.0	38.0	51.8	284.0
125	482.7	226.6	22.7	1.7	24.6	39.0	51.9	314.6
years	*ft³/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.9	0.0	0.0	15.8	1.9
5	0	1.3	0.1	1.9	0.1	2.1	15.8	5.6
15	28	3.2	0.3	1.7	0.3	5.2	16.2	10.8
25	196	7.0	0.7	1.4	0.8	7.5	16.9	17.4
35	463	11.9	1.2	1.2	1.3	9.3	17.8	24.9
45	840	18.3	1.8	1.1	2.0	10.6	18.7	33.8
55	1,343	25.5	2.6	1.0	2.8	11.7	19.4	43.5
65	1,954	33.8	3.4	0.9	3.7	12.6	20.0	54.3
75	2,652	42.8	4.3	0.8	4.6	13.3	20.4	65.9
85	3,419	52.2	5.2	0.8	5.7	14.0	20.7	77.8
95	4,239	61.9	6.2	0.8	6.7	14.5	20.9	90.1
105	5,099	71.8	7.2	0.7	7.8	15.0	20.9	102.5
115	5,989	81.8	8.2	0.7	8.9	15.4	21.0	114.9
125	6,899	91.7	9.2	0.7	10.0	15.8	21.0	127.3

B29.— Regional estimates of timber volume and carbon stocks for western oak stands with afforestation of land in the Pacific Southwest

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.7	0.0	0.0	20.7	4.7
5	0.0	2.6	0.2	4.6	0.1	3.7	20.8	11.3
15	0.0	5.7	0.6	4.5	0.2	9.8	21.3	20.8
25	1.0	8.8	0.9	4.4	0.4	14.4	22.2	28.8
35	25.9	30.6	3.1	4.2	1.3	18.1	23.4	57.3
45	76.3	65.1	4.5	4.1	2.7	21.1	24.5	97.5
55	127.8	98.3	5.4	4.0	4.1	23.6	25.5	135.3
65	174.4	124.0	6.0	4.0	5.1	25.6	26.3	164.8
75	215.0	145.3	6.5	4.0	6.0	27.4	26.9	189.2
85	249.4	162.7	6.8	4.0	6.8	29.0	27.2	209.2
95	278.4	177.1	7.1	4.0	7.4	30.3	27.4	225.8
105	302.8	189.0	7.3	3.9	7.8	31.5	27.5	239.6
115	323.3	198.8	7.4	3.9	8.3	32.6	27.5	251.0
125	340.6	207.0	7.6	3.9	8.6	33.5	27.6	260.6
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.9	0.0	0.0	8.4	1.9
5	0	1.1	0.1	1.9	0.0	1.5	8.4	4.6
15	0	2.3	0.2	1.8	0.1	3.9	8.6	8.4
25	15	3.6	0.4	1.8	0.1	5.8	9.0	11.7
35	370	12.4	1.2	1.7	0.5	7.3	9.5	23.2
45	1,090	26.3	1.8	1.7	1.1	8.5	9.9	39.4
55	1,826	39.8	2.2	1.6	1.7	9.5	10.3	54.8
65	2,493	50.2	2.4	1.6	2.1	10.4	10.6	66.7
75	3,072	58.8	2.6	1.6	2.4	11.1	10.9	76.6
85	3,564	65.9	2.8	1.6	2.7	11.7	11.0	84.7
95	3,979	71.7	2.9	1.6	3.0	12.3	11.1	91.4
105	4,328	76.5	2.9	1.6	3.2	12.7	11.1	97.0
115	4,620	80.5	3.0	1.6	3.3	13.2	11.1	101.6
125	4,868	83.8	3.1	1.6	3.5	13.6	11.2	105.5

B30.— Regional estimates of timber volume and carbon stocks for Douglas-fir stands with afforestation of land in the Rocky Mountain, North

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m³/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.7	0.0	0.0	29.1	4.7
5	0.0	2.7	0.3	4.7	0.2	5.2	29.2	13.0
15	1.1	6.1	0.6	4.7	0.4	13.0	30.0	24.8
25	19.7	21.5	2.2	3.4	1.3	18.6	31.3	47.0
35	57.1	44.3	4.4	2.7	2.8	22.9	32.9	77.0
45	100.9	66.5	6.7	2.3	4.1	26.2	34.5	105.8
55	145.9	87.2	8.7	2.1	5.4	28.9	35.9	132.3
65	189.3	105.9	10.1	1.9	6.6	31.1	37.1	155.6
75	229.7	122.5	10.7	1.8	7.6	33.0	37.8	175.6
85	266.3	137.0	11.2	1.8	8.5	34.5	38.3	193.0
95	298.6	149.4	11.6	1.7	9.3	35.9	38.6	207.9
105	326.6	159.9	12.0	1.7	9.9	37.0	38.7	220.5
115	350.1	168.6	12.2	1.6	10.5	38.0	38.8	231.0
125	369.5	175.7	12.4	1.6	10.9	39.0	38.8	239.6
years	*ft³/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.9	0.0	0.0	11.8	1.9
5	0	1.1	0.1	1.9	0.1	2.1	11.8	5.2
15	16	2.5	0.2	1.9	0.2	5.2	12.1	10.0
25	281	8.7	0.9	1.4	0.5	7.5	12.7	19.0
35	816	17.9	1.8	1.1	1.1	9.3	13.3	31.2
45	1,442	26.9	2.7	0.9	1.7	10.6	14.0	42.8
55	2,085	35.3	3.5	0.8	2.2	11.7	14.5	53.6
65	2,705	42.9	4.1	0.8	2.7	12.6	15.0	63.0
75	3,283	49.6	4.3	0.7	3.1	13.3	15.3	71.1
85	3,806	55.4	4.5	0.7	3.4	14.0	15.5	78.1
95	4,268	60.5	4.7	0.7	3.8	14.5	15.6	84.1
105	4,667	64.7	4.8	0.7	4.0	15.0	15.7	89.2
115	5,003	68.2	4.9	0.7	4.2	15.4	15.7	93.5
125	5,280	71.1	5.0	0.7	4.4	15.8	15.7	97.0

B31.— Regional estimates of timber volume and carbon stocks for fir-spruce-mountain hemlock stands with afforestation of land in the Rocky Mountain, North

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	------------------------------------ *tonnes carbon/hectare* ------------------------------------						
0	0.0	0.0	0.0	4.7	0.0	0.0	33.1	4.7
5	0.0	3.1	0.3	4.7	0.3	5.2	33.2	13.6
15	0.0	5.8	0.6	4.7	0.6	13.0	34.0	24.7
25	18.2	17.0	1.7	3.4	1.7	18.6	35.5	42.4
35	61.6	38.1	3.8	2.7	3.8	22.9	37.4	71.2
45	113.8	59.5	5.9	2.3	6.0	26.2	39.2	100.0
55	167.2	80.0	8.0	2.1	8.0	28.9	40.8	127.0
65	218.2	98.6	9.9	2.0	9.9	31.1	42.1	151.4
75	264.6	115.0	11.5	1.9	11.6	33.0	43.0	172.9
85	305.4	129.1	12.9	1.8	13.0	34.5	43.5	191.3
95	340.2	140.9	14.1	1.8	14.2	35.9	43.8	206.8
105	368.8	150.5	15.0	1.7	15.1	37.0	44.0	219.4
115	391.6	158.0	15.8	1.7	15.9	38.0	44.1	229.4
125	408.8	163.7	16.4	1.7	16.4	39.0	44.1	237.1
years	*ft^3/acre*	------------------------------------ *tonnes carbon/acre* ------------------------------------						
0	0	0.0	0.0	1.9	0.0	0.0	13.4	1.9
5	0	1.3	0.1	1.9	0.1	2.1	13.4	5.5
15	0	2.3	0.2	1.9	0.2	5.2	13.8	10.0
25	260	6.9	0.7	1.4	0.7	7.5	14.4	17.2
35	880	15.4	1.5	1.1	1.5	9.3	15.1	28.8
45	1,626	24.1	2.4	0.9	2.4	10.6	15.9	40.4
55	2,390	32.4	3.2	0.9	3.3	11.7	16.5	51.4
65	3,118	39.9	4.0	0.8	4.0	12.6	17.0	61.3
75	3,782	46.5	4.7	0.8	4.7	13.3	17.4	70.0
85	4,365	52.2	5.2	0.7	5.2	14.0	17.6	77.4
95	4,862	57.0	5.7	0.7	5.7	14.5	17.7	83.7
105	5,271	60.9	6.1	0.7	6.1	15.0	17.8	88.8
115	5,596	63.9	6.4	0.7	6.4	15.4	17.8	92.8
125	5,842	66.2	6.6	0.7	6.7	15.8	17.8	95.9

B32.— Regional estimates of timber volume and carbon stocks for lodgepole pine stands with afforestation of land in the Rocky Mountain, North

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m³/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.8	0.0	0.0	27.9	4.8
5	0.0	1.9	0.1	4.8	0.1	2.4	28.0	9.2
15	0.2	4.1	0.3	4.8	0.2	6.4	28.7	15.9
25	15.9	14.3	1.4	3.5	0.8	9.8	29.9	29.8
35	51.6	29.9	3.0	2.4	1.7	12.6	31.5	49.6
45	94.3	45.8	4.6	1.9	2.7	14.9	33.0	69.9
55	138.8	59.4	5.9	1.7	3.4	17.0	34.4	87.5
65	182.1	71.6	7.2	1.5	4.2	18.7	35.5	103.2
75	223.1	82.5	8.3	1.4	4.8	20.3	36.2	117.3
85	261.0	92.1	9.2	1.4	5.3	21.7	36.7	129.7
95	295.3	100.5	10.1	1.3	5.8	22.9	36.9	140.6
105	325.9	107.8	10.7	1.3	6.3	24.0	37.1	150.0
115	353.2	114.2	11.1	1.2	6.6	25.0	37.1	158.1
125	377.3	119.7	11.5	1.2	6.9	25.8	37.2	165.2
years	*ft³/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.9	0.0	0.0	11.3	1.9
5	0	0.8	0.0	1.9	0.0	1.0	11.3	3.7
15	3	1.7	0.1	1.9	0.1	2.6	11.6	6.4
25	227	5.8	0.6	1.4	0.3	4.0	12.1	12.1
35	737	12.1	1.2	1.0	0.7	5.1	12.7	20.1
45	1,348	18.5	1.9	0.8	1.1	6.0	13.4	28.3
55	1,983	24.0	2.4	0.7	1.4	6.9	13.9	35.4
65	2,603	29.0	2.9	0.6	1.7	7.6	14.4	41.8
75	3,189	33.4	3.3	0.6	1.9	8.2	14.6	47.5
85	3,730	37.3	3.7	0.6	2.2	8.8	14.8	52.5
95	4,220	40.7	4.1	0.5	2.4	9.3	14.9	56.9
105	4,658	43.6	4.3	0.5	2.5	9.7	15.0	60.7
115	5,048	46.2	4.5	0.5	2.7	10.1	15.0	64.0
125	5,392	48.4	4.6	0.5	2.8	10.5	15.0	66.8

B33.— Regional estimates of timber volume and carbon stocks for ponderosa pine stands with afforestation of land in the Rocky Mountain, North

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.8	0.0	0.0	25.7	4.8
5	0.0	3.3	0.2	4.8	0.3	2.4	25.8	10.9
15	1.3	6.3	0.6	4.3	0.6	6.4	26.5	18.2
25	18.6	15.9	1.6	3.2	1.4	9.8	27.6	31.8
35	51.8	30.9	3.0	2.5	2.7	12.6	29.0	51.6
45	89.4	46.1	3.9	2.2	4.0	14.9	30.5	71.1
55	127.1	60.4	4.5	2.0	5.3	17.0	31.7	89.2
65	162.2	73.3	5.1	1.9	6.4	18.7	32.7	105.4
75	193.8	84.6	5.5	1.8	7.4	20.3	33.4	119.6
85	221.0	94.2	5.8	1.7	8.2	21.7	33.8	131.6
95	243.7	102.0	6.1	1.7	8.9	22.9	34.1	141.6
105	261.8	108.2	6.3	1.6	9.5	24.0	34.2	149.6
115	275.6	112.9	6.4	1.6	9.9	25.0	34.3	155.7
125	285.1	116.1	6.5	1.6	10.1	25.8	34.3	160.2
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.9	0.0	0.0	10.4	1.9
5	0	1.3	0.1	1.9	0.1	1.0	10.4	4.4
15	19	2.6	0.2	1.8	0.2	2.6	10.7	7.4
25	266	6.4	0.6	1.3	0.6	4.0	11.2	12.9
35	740	12.5	1.2	1.0	1.1	5.1	11.8	20.9
45	1,278	18.6	1.6	0.9	1.6	6.0	12.3	28.8
55	1,816	24.5	1.8	0.8	2.1	6.9	12.8	36.1
65	2,318	29.7	2.0	0.8	2.6	7.6	13.2	42.7
75	2,769	34.2	2.2	0.7	3.0	8.2	13.5	48.4
85	3,159	38.1	2.4	0.7	3.3	8.8	13.7	53.3
95	3,483	41.3	2.5	0.7	3.6	9.3	13.8	57.3
105	3,742	43.8	2.5	0.7	3.8	9.7	13.8	60.5
115	3,938	45.7	2.6	0.6	4.0	10.1	13.9	63.0
125	4,075	47.0	2.6	0.6	4.1	10.5	13.9	64.8

B34.— Regional estimates of timber volume and carbon stocks for aspen-birch stands with afforestation of land in the Rocky Mountain, South

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	------------ *tonnes carbon/hectare* ------------						
0	0.0	0.0	0.0	4.7	0.0	0.0	44.1	4.7
5	0.0	3.1	0.3	4.7	0.2	3.7	44.2	12.1
15	0.0	6.4	0.6	4.7	0.4	9.8	45.4	22.0
25	6.3	13.9	1.4	4.8	0.9	14.4	47.4	35.3
35	22.7	25.7	2.6	4.5	1.7	18.1	49.8	52.5
45	45.0	38.8	3.9	4.3	2.5	21.1	52.3	70.5
55	70.7	52.3	5.2	4.2	3.4	23.6	54.4	88.6
65	98.1	64.7	6.5	4.1	4.2	25.6	56.1	105.0
75	126.5	76.6	7.7	4.0	4.9	27.4	57.3	120.6
85	155.0	88.0	8.8	3.9	5.7	29.0	58.0	135.3
95	183.1	98.8	9.9	3.9	6.3	30.3	58.4	149.2
105	210.5	108.8	10.9	3.8	7.0	31.5	58.6	162.1
115	236.8	118.3	11.8	3.8	7.6	32.6	58.7	174.0
125	261.8	127.0	12.4	3.8	8.2	33.5	58.8	184.8
years	*ft^3/acre*	------------ *tonnes carbon/acre* ------------						
0	0	0.0	0.0	1.9	0.0	0.0	17.8	1.9
5	0	1.2	0.1	1.9	0.1	1.5	17.9	4.9
15	0	2.6	0.3	1.9	0.2	3.9	18.4	8.9
25	90	5.6	0.6	1.9	0.4	5.8	19.2	14.3
35	324	10.4	1.0	1.8	0.7	7.3	20.2	21.3
45	643	15.7	1.6	1.7	1.0	8.5	21.1	28.5
55	1,010	21.2	2.1	1.7	1.4	9.5	22.0	35.9
65	1,402	26.2	2.6	1.6	1.7	10.4	22.7	42.5
75	1,808	31.0	3.1	1.6	2.0	11.1	23.2	48.8
85	2,215	35.6	3.6	1.6	2.3	11.7	23.5	54.8
95	2,617	40.0	4.0	1.6	2.6	12.3	23.6	60.4
105	3,008	44.0	4.4	1.6	2.8	12.7	23.7	65.6
115	3,384	47.9	4.8	1.5	3.1	13.2	23.8	70.4
125	3,741	51.4	5.0	1.5	3.3	13.6	23.8	74.8

B35.— Regional estimates of timber volume and carbon stocks for Douglas-fir stands with afforestation of land in the Rocky Mountain, South

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.8	0.0	0.0	23.2	4.8
5	0.0	2.6	0.3	4.8	0.2	5.2	23.3	13.1
15	1.6	7.2	0.7	4.8	0.6	13.0	23.8	26.3
25	15.3	19.8	2.0	4.4	1.5	18.6	24.9	46.2
35	39.1	37.2	3.7	2.0	2.8	22.9	26.2	68.6
45	66.2	54.6	5.5	1.2	4.2	26.2	27.5	91.7
55	93.9	71.6	7.2	0.9	5.5	28.9	28.6	114.1
65	120.8	85.9	8.6	0.7	6.6	31.1	29.5	132.9
75	146.1	98.8	9.9	0.6	7.6	33.0	30.1	149.8
85	169.5	110.3	11.0	0.6	8.5	34.5	30.5	164.9
95	190.7	120.6	12.1	0.6	9.2	35.9	30.7	178.3
105	209.8	129.5	12.9	0.6	9.9	37.0	30.8	190.0
115	227.0	137.5	13.3	0.7	10.5	38.0	30.9	200.1
125	242.3	144.4	13.8	0.7	11.1	39.0	30.9	208.9
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	2.0	0.0	0.0	9.4	2.0
5	0	1.1	0.1	2.0	0.1	2.1	9.4	5.3
15	23	2.9	0.3	2.0	0.2	5.2	9.7	10.6
25	219	8.0	0.8	1.8	0.6	7.5	10.1	18.7
35	559	15.0	1.5	0.8	1.2	9.3	10.6	27.8
45	946	22.1	2.2	0.5	1.7	10.6	11.1	37.1
55	1,342	29.0	2.9	0.4	2.2	11.7	11.6	46.2
65	1,726	34.8	3.5	0.3	2.7	12.6	11.9	53.8
75	2,088	40.0	4.0	0.2	3.1	13.3	12.2	60.6
85	2,422	44.7	4.5	0.2	3.4	14.0	12.3	66.7
95	2,726	48.8	4.9	0.2	3.7	14.5	12.4	72.2
105	2,999	52.4	5.2	0.3	4.0	15.0	12.5	76.9
115	3,244	55.6	5.4	0.3	4.3	15.4	12.5	81.0
125	3,463	58.5	5.6	0.3	4.5	15.8	12.5	84.6

B36.— Regional estimates of timber volume and carbon stocks for fir-spruce-mountain hemlock stands with afforestation of land in the Rocky Mountain, South

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.8	0.0	0.0	23.6	4.8
5	0.0	1.8	0.2	4.8	0.1	5.2	23.7	12.1
15	0.0	4.0	0.4	4.8	0.3	13.0	24.3	22.5
25	8.5	12.0	1.2	4.3	0.9	18.6	25.3	37.0
35	27.7	24.4	2.4	2.8	1.9	22.9	26.7	54.5
45	49.5	36.7	3.7	2.3	2.9	26.2	28.0	71.7
55	71.9	48.7	4.9	1.9	3.8	28.9	29.1	88.2
65	94.1	58.6	5.9	1.7	4.6	31.1	30.0	101.9
75	115.7	67.8	6.8	1.6	5.3	33.0	30.6	114.4
85	136.5	76.2	7.6	1.5	6.0	34.5	31.0	125.8
95	156.4	84.0	8.4	1.4	6.6	35.9	31.3	136.3
105	175.2	91.2	9.1	1.3	7.2	37.0	31.4	145.8
115	193.0	97.8	9.8	1.3	7.7	38.0	31.4	154.6
125	209.6	103.8	10.4	1.2	8.2	39.0	31.5	162.6
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	2.0	0.0	0.0	9.6	2.0
5	0	0.7	0.1	2.0	0.1	2.1	9.6	4.9
15	0	1.6	0.2	2.0	0.1	5.2	9.8	9.1
25	122	4.8	0.5	1.7	0.4	7.5	10.3	15.0
35	396	9.9	1.0	1.1	0.8	9.3	10.8	22.1
45	708	14.8	1.5	0.9	1.2	10.6	11.3	29.0
55	1,028	19.7	2.0	0.8	1.6	11.7	11.8	35.7
65	1,345	23.7	2.4	0.7	1.9	12.6	12.1	41.2
75	1,654	27.4	2.7	0.6	2.2	13.3	12.4	46.3
85	1,951	30.8	3.1	0.6	2.4	14.0	12.6	50.9
95	2,235	34.0	3.4	0.6	2.7	14.5	12.7	55.1
105	2,504	36.9	3.7	0.5	2.9	15.0	12.7	59.0
115	2,758	39.6	4.0	0.5	3.1	15.4	12.7	62.6
125	2,995	42.0	4.2	0.5	3.3	15.8	12.7	65.8

B37.— Regional estimates of timber volume and carbon stocks for lodgepole pine stands with afforestation of land in the Rocky Mountain, South

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.8	0.0	0.0	20.2	4.8
5	0.0	2.1	0.2	4.8	0.2	2.4	20.3	9.7
15	0.0	4.3	0.4	4.8	0.4	6.4	20.8	16.4
25	5.0	9.2	0.9	4.8	0.9	9.8	21.7	25.5
35	18.3	16.9	1.7	3.4	1.7	12.6	22.8	36.2
45	37.0	25.9	2.6	2.5	2.5	14.9	24.0	48.4
55	58.5	34.1	3.4	2.0	3.4	17.0	25.0	59.9
65	81.2	42.0	4.2	1.7	4.1	18.7	25.7	70.8
75	104.1	49.5	4.9	1.5	4.9	20.3	26.3	81.1
85	126.7	56.4	5.6	1.4	5.6	21.7	26.6	90.7
95	148.3	62.8	6.3	1.3	6.2	22.9	26.8	99.4
105	168.6	68.6	6.9	1.2	6.8	24.0	26.9	107.4
115	187.3	73.8	7.4	1.1	7.3	25.0	26.9	114.5
125	204.1	78.3	7.8	1.1	7.7	25.8	27.0	120.8
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.9	0.0	0.0	8.2	1.9
5	0	0.9	0.1	1.9	0.1	1.0	8.2	3.9
15	0	1.7	0.2	1.9	0.2	2.6	8.4	6.6
25	71	3.7	0.4	1.9	0.4	4.0	8.8	10.3
35	262	6.8	0.7	1.4	0.7	5.1	9.2	14.6
45	529	10.5	1.0	1.0	1.0	6.0	9.7	19.6
55	836	13.8	1.4	0.8	1.4	6.9	10.1	24.2
65	1,160	17.0	1.7	0.7	1.7	7.6	10.4	28.7
75	1,488	20.0	2.0	0.6	2.0	8.2	10.6	32.8
85	1,810	22.8	2.3	0.6	2.2	8.8	10.8	36.7
95	2,120	25.4	2.5	0.5	2.5	9.3	10.8	40.2
105	2,410	27.8	2.8	0.5	2.7	9.7	10.9	43.5
115	2,677	29.8	3.0	0.5	2.9	10.1	10.9	46.3
125	2,917	31.7	3.2	0.4	3.1	10.5	10.9	48.9

B38.— Regional estimates of timber volume and carbon stocks for ponderosa pine stands with afforestation of land in the Rocky Mountain, South

Age	Mean volume	Mean carbon density						
		Live Tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.8	0.0	0.0	18.1	4.8
5	0.0	1.8	0.2	4.8	0.2	2.4	18.1	9.4
15	0.0	3.7	0.4	4.8	0.3	6.4	18.6	15.6
25	4.4	9.4	0.9	4.8	0.8	9.8	19.4	25.7
35	16.2	18.6	1.9	2.9	1.5	12.6	20.4	37.5
45	32.2	28.8	2.7	2.1	2.4	14.9	21.4	50.9
55	50.3	38.2	3.0	1.7	3.1	17.0	22.3	63.1
65	69.3	47.1	3.3	1.5	3.9	18.7	23.0	74.5
75	88.4	55.5	3.6	1.3	4.6	20.3	23.5	85.2
85	107.2	63.2	3.8	1.2	5.2	21.7	23.8	95.1
95	125.5	70.4	4.0	1.1	5.8	22.9	24.0	104.2
105	143.0	77.1	4.1	1.0	6.3	24.0	24.0	112.5
115	159.5	83.2	4.3	1.0	6.8	25.0	24.1	120.2
125	175.1	88.8	4.4	0.9	7.3	25.8	24.1	127.2
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	2.0	0.0	0.0	7.3	2.0
5	0	0.7	0.1	2.0	0.1	1.0	7.3	3.8
15	0	1.5	0.1	2.0	0.1	2.6	7.5	6.3
25	63	3.8	0.4	2.0	0.3	4.0	7.9	10.4
35	231	7.5	0.8	1.2	0.6	5.1	8.3	15.2
45	460	11.7	1.1	0.9	1.0	6.0	8.7	20.6
55	719	15.5	1.2	0.7	1.3	6.9	9.0	25.5
65	990	19.1	1.4	0.6	1.6	7.6	9.3	30.2
75	1,263	22.4	1.5	0.5	1.8	8.2	9.5	34.5
85	1,532	25.6	1.5	0.5	2.1	8.8	9.6	38.5
95	1,793	28.5	1.6	0.4	2.3	9.3	9.7	42.2
105	2,043	31.2	1.7	0.4	2.6	9.7	9.7	45.5
115	2,280	33.7	1.7	0.4	2.8	10.1	9.7	48.6
125	2,503	35.9	1.8	0.4	3.0	10.5	9.8	51.5

B39.— Regional estimates of timber volume and carbon stocks for loblolly-shortleaf pine stands with afforestation of land in the Southeast

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.2	0.0	0.0	54.7	4.2
5	0.0	11.1	0.7	4.0	0.9	3.2	54.9	19.8
10	19.1	22.6	1.3	3.6	1.8	5.5	55.4	34.8
15	36.7	31.3	1.6	3.4	2.5	7.3	56.3	46.1
20	60.4	40.8	1.9	3.2	3.3	8.7	57.4	57.9
25	85.5	50.3	2.1	3.1	4.1	9.8	58.7	69.4
30	108.7	58.2	2.3	3.1	4.7	10.7	60.2	79.0
35	131.2	65.6	2.4	3.0	5.3	11.5	61.8	87.9
40	152.3	72.5	2.5	3.0	5.9	12.2	63.3	96.1
45	172.3	78.9	2.7	2.9	6.4	12.7	64.8	103.6
50	191.4	85.0	2.7	2.9	6.9	13.2	66.2	110.7
55	208.4	90.3	2.8	2.9	7.3	13.7	67.5	116.9
60	223.9	95.1	2.9	2.8	7.7	14.1	68.6	122.6
65	238.4	99.6	2.9	2.8	8.1	14.4	69.6	127.8
70	252.9	104.0	3.0	2.8	8.4	14.7	70.4	133.0
75	264.6	107.6	3.0	2.8	8.7	15.0	71.0	137.1
80	277.1	111.4	3.1	2.8	9.0	15.2	71.5	141.5
85	289.5	115.1	3.1	2.8	9.3	15.5	71.9	145.8
90	299.6	118.2	3.2	2.7	9.6	15.7	72.2	149.3
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.7	0.0	0.0	22.1	1.7
5	0	4.5	0.3	1.6	0.4	1.3	22.2	8.0
10	273	9.2	0.5	1.4	0.7	2.2	22.4	14.1
15	525	12.7	0.7	1.4	1.0	2.9	22.8	18.7
20	863	16.5	0.8	1.3	1.3	3.5	23.2	23.4
25	1,222	20.4	0.9	1.3	1.6	4.0	23.8	28.1
30	1,554	23.5	0.9	1.2	1.9	4.3	24.4	32.0
35	1,875	26.6	1.0	1.2	2.2	4.7	25.0	35.6
40	2,177	29.3	1.0	1.2	2.4	4.9	25.6	38.9
45	2,462	31.9	1.1	1.2	2.6	5.2	26.2	41.9
50	2,736	34.4	1.1	1.2	2.8	5.4	26.8	44.8
55	2,978	36.5	1.1	1.2	3.0	5.5	27.3	47.3
60	3,200	38.5	1.2	1.1	3.1	5.7	27.8	49.6
65	3,407	40.3	1.2	1.1	3.3	5.8	28.2	51.7
70	3,614	42.1	1.2	1.1	3.4	6.0	28.5	53.8
75	3,782	43.5	1.2	1.1	3.5	6.1	28.7	55.5
80	3,960	45.1	1.3	1.1	3.7	6.2	28.9	57.3
85	4,138	46.6	1.3	1.1	3.8	6.3	29.1	59.0
90	4,281	47.8	1.3	1.1	3.9	6.3	29.2	60.4

B40.— Regional estimates of timber volume and carbon stocks for loblolly-shortleaf pine stands with afforestation of land in the Southeast; volumes are for high productivity sites (growth rate greater than 85 cubic feet wood/acre/year) with high intensity management (replanting with genetically improved stock)

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.1	0.0	0.0	54.7	4.1
5	0.0	11.0	0.7	4.0	0.4	3.2	54.9	19.3
10	47.7	31.9	1.4	3.8	1.2	5.5	55.4	43.8
15	146.5	67.4	1.9	3.7	2.5	7.3	56.3	82.9
20	244.8	102.3	2.1	3.7	3.8	8.7	57.4	120.6
25	315.2	124.2	2.3	3.7	4.7	9.8	58.7	144.6
30	347.3	134.1	2.4	3.7	5.0	10.7	60.2	155.8
35	351.5	135.4	2.4	3.7	5.1	11.5	61.8	158.0
40	355.0	136.5	2.4	3.7	5.1	12.2	63.3	159.8
45	358.5	137.5	2.4	3.6	5.2	12.7	64.8	161.4
50	362.0	138.6	2.4	3.6	5.2	13.2	66.2	163.1
55	362.0	138.6	2.4	3.6	5.2	13.7	67.5	163.5
60	362.0	138.6	2.4	3.6	5.2	14.1	68.6	163.9
65	362.0	138.6	2.4	3.6	5.2	14.4	69.6	164.2
70	362.0	138.6	2.4	3.6	5.2	14.7	70.4	164.5
75	362.0	138.6	2.4	3.6	5.2	15.0	71.0	164.8
80	362.0	138.6	2.4	3.6	5.2	15.2	71.5	165.1
85	362.0	138.6	2.4	3.6	5.2	15.5	71.9	165.3
90	362.0	138.6	2.4	3.6	5.2	15.7	72.2	165.5
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.7	0.0	0.0	22.1	1.7
5	0	4.5	0.3	1.6	0.2	1.3	22.2	7.8
10	682	12.9	0.6	1.6	0.5	2.2	22.4	17.7
15	2,094	27.3	0.8	1.5	1.0	2.9	22.8	33.5
20	3,498	41.4	0.9	1.5	1.5	3.5	23.2	48.8
25	4,504	50.3	0.9	1.5	1.9	4.0	23.8	58.5
30	4,963	54.3	1.0	1.5	2.0	4.3	24.4	63.1
35	5,024	54.8	1.0	1.5	2.1	4.7	25.0	63.9
40	5,074	55.2	1.0	1.5	2.1	4.9	25.6	64.7
45	5,124	55.7	1.0	1.5	2.1	5.2	26.2	65.3
50	5,174	56.1	1.0	1.5	2.1	5.4	26.8	66.0
55	5,174	56.1	1.0	1.5	2.1	5.5	27.3	66.2
60	5,174	56.1	1.0	1.5	2.1	5.7	27.8	66.3
65	5,174	56.1	1.0	1.5	2.1	5.8	28.2	66.5
70	5,174	56.1	1.0	1.5	2.1	6.0	28.5	66.6
75	5,174	56.1	1.0	1.5	2.1	6.1	28.7	66.7
80	5,174	56.1	1.0	1.5	2.1	6.2	28.9	66.8
85	5,174	56.1	1.0	1.5	2.1	6.3	29.1	66.9
90	5,174	56.1	1.0	1.5	2.1	6.3	29.2	67.0

B41.— Regional estimates of timber volume and carbon stocks for longleaf-slash pine stands with afforestation of land in the Southeast

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.2	0.0	0.0	82.5	4.2
5	0.0	5.3	0.4	4.2	0.4	3.2	82.8	13.6
10	19.1	14.1	0.9	3.8	1.1	5.5	83.6	25.4
15	36.7	21.4	1.0	3.6	1.7	7.3	84.9	34.9
20	60.4	30.4	1.1	3.4	2.5	8.7	86.6	46.0
25	85.5	39.2	1.1	3.3	3.2	9.8	88.6	56.6
30	108.7	47.2	1.2	3.2	3.8	10.7	90.9	66.1
35	131.2	54.8	1.2	3.1	4.4	11.5	93.2	75.1
40	152.3	61.9	1.3	3.0	5.0	12.2	95.5	83.4
45	172.3	68.5	1.3	3.0	5.6	12.7	97.8	91.1
50	191.4	74.8	1.3	2.9	6.1	13.2	99.9	98.4
55	208.4	80.4	1.3	2.9	6.5	13.7	101.8	104.8
60	223.9	85.4	1.3	2.9	6.9	14.1	103.5	110.6
65	238.4	90.1	1.4	2.9	7.3	14.4	105.0	116.1
70	252.9	94.8	1.4	2.8	7.7	14.7	106.2	121.4
75	264.6	98.6	1.4	2.8	8.0	15.0	107.1	125.8
80	277.1	102.6	1.4	2.8	8.3	15.2	107.9	130.3
85	289.5	106.6	1.4	2.8	8.6	15.5	108.5	134.9
90	299.6	109.8	1.4	2.8	8.9	15.7	109.0	138.5
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.7	0.0	0.0	33.4	1.7
5	0	2.2	0.2	1.7	0.2	1.3	33.5	5.5
10	273	5.7	0.3	1.5	0.5	2.2	33.8	10.3
15	525	8.7	0.4	1.4	0.7	2.9	34.4	14.1
20	863	12.3	0.4	1.4	1.0	3.5	35.0	18.6
25	1,222	15.9	0.5	1.3	1.3	4.0	35.9	22.9
30	1,554	19.1	0.5	1.3	1.5	4.3	36.8	26.7
35	1,875	22.2	0.5	1.3	1.8	4.7	37.7	30.4
40	2,177	25.0	0.5	1.2	2.0	4.9	38.7	33.7
45	2,462	27.7	0.5	1.2	2.2	5.2	39.6	36.9
50	2,736	30.3	0.5	1.2	2.5	5.4	40.4	39.8
55	2,978	32.5	0.5	1.2	2.6	5.5	41.2	42.4
60	3,200	34.6	0.5	1.2	2.8	5.7	41.9	44.8
65	3,407	36.5	0.6	1.2	3.0	5.8	42.5	47.0
70	3,614	38.4	0.6	1.1	3.1	6.0	43.0	49.1
75	3,782	39.9	0.6	1.1	3.2	6.1	43.4	50.9
80	3,960	41.5	0.6	1.1	3.4	6.2	43.7	52.7
85	4,138	43.1	0.6	1.1	3.5	6.3	43.9	54.6
90	4,281	44.4	0.6	1.1	3.6	6.3	44.1	56.1

B42.— Regional estimates of timber volume and carbon stocks for longleaf-slash pine stands with afforestation of land in the Southeast; volumes are for high productivity sites (growth rate greater than 85 cubic feet wood/acre/year) with high intensity management (replanting with genetically improved stock)

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.1	0.0	0.0	82.5	4.1
5	0.0	8.8	0.4	4.0	0.3	3.2	82.8	16.7
10	47.7	27.2	0.8	3.9	1.0	5.5	83.6	38.4
15	146.5	60.1	0.8	3.8	2.2	7.3	84.9	74.2
20	244.8	91.2	0.9	3.7	3.4	8.7	86.6	107.9
25	315.2	113.5	0.9	3.7	4.2	9.8	88.6	132.1
30	347.3	122.8	0.9	3.7	4.6	10.7	90.9	142.7
35	351.5	124.0	0.9	3.7	4.6	11.5	93.2	144.8
40	355.0	125.0	0.9	3.7	4.7	12.2	95.5	146.5
45	358.5	126.0	0.9	3.7	4.7	12.7	97.8	148.1
50	362.0	127.0	0.9	3.7	4.8	13.2	99.9	149.6
55	362.0	127.0	0.9	3.7	4.8	13.7	101.8	150.1
60	362.0	127.0	0.9	3.7	4.8	14.1	103.5	150.4
65	362.0	127.0	0.9	3.7	4.8	14.4	105.0	150.8
70	362.0	127.0	0.9	3.7	4.8	14.7	106.2	151.1
75	362.0	127.0	0.9	3.7	4.8	15.0	107.1	151.4
80	362.0	127.0	0.9	3.7	4.8	15.2	107.9	151.6
85	362.0	127.0	0.9	3.7	4.8	15.5	108.5	151.9
90	362.0	127.0	0.9	3.7	4.8	15.7	109.0	152.1
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.7	0.0	0.0	33.4	1.7
5	0	3.6	0.2	1.6	0.1	1.3	33.5	6.8
10	682	11.0	0.3	1.6	0.4	2.2	33.8	15.5
15	2,094	24.3	0.3	1.5	0.9	2.9	34.4	30.0
20	3,498	36.9	0.4	1.5	1.4	3.5	35.0	43.6
25	4,504	45.9	0.4	1.5	1.7	4.0	35.9	53.5
30	4,963	49.7	0.4	1.5	1.9	4.3	36.8	57.7
35	5,024	50.2	0.4	1.5	1.9	4.7	37.7	58.6
40	5,074	50.6	0.4	1.5	1.9	4.9	38.7	59.3
45	5,124	51.0	0.4	1.5	1.9	5.2	39.6	59.9
50	5,174	51.4	0.4	1.5	1.9	5.4	40.4	60.6
55	5,174	51.4	0.4	1.5	1.9	5.5	41.2	60.7
60	5,174	51.4	0.4	1.5	1.9	5.7	41.9	60.9
65	5,174	51.4	0.4	1.5	1.9	5.8	42.5	61.0
70	5,174	51.4	0.4	1.5	1.9	6.0	43.0	61.1
75	5,174	51.4	0.4	1.5	1.9	6.1	43.4	61.3
80	5,174	51.4	0.4	1.5	1.9	6.2	43.7	61.4
85	5,174	51.4	0.4	1.5	1.9	6.3	43.9	61.5
90	5,174	51.4	0.4	1.5	1.9	6.3	44.1	61.5

B43.— Regional estimates of timber volume and carbon stocks for oak-gum-cypress stands with afforestation of land in the Southeast

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m³/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	1.8	0.0	0.0	118.5	1.8
5	0.0	6.7	0.7	1.9	0.4	1.1	118.9	10.9
10	9.8	18.8	1.9	1.8	1.2	2.1	120.1	25.8
15	19.9	28.3	2.4	1.7	1.8	3.0	121.9	37.2
20	32.7	38.0	2.8	1.7	2.4	3.7	124.4	48.6
25	45.4	46.8	3.1	1.6	3.0	4.4	127.2	58.9
30	58.1	54.0	3.4	1.6	3.4	5.0	130.5	67.5
35	73.4	62.3	3.6	1.6	4.0	5.5	133.8	77.0
40	92.2	71.9	3.9	1.6	4.6	6.0	137.2	88.0
45	110.7	80.9	4.2	1.6	5.1	6.4	140.4	98.2
50	128.1	89.0	4.4	1.5	5.7	6.8	143.5	107.4
55	146.3	97.3	4.6	1.5	6.2	7.2	146.2	116.7
60	166.1	105.9	4.7	1.5	6.7	7.5	148.7	126.4
65	186.4	114.5	4.9	1.5	7.3	7.8	150.7	136.1
70	205.7	122.5	5.1	1.5	7.8	8.1	152.4	145.0
75	222.5	129.3	5.2	1.5	8.2	8.4	153.8	152.6
80	237.9	135.4	5.3	1.5	8.6	8.6	155.0	159.4
85	257.3	142.9	5.5	1.5	9.1	8.9	155.8	167.8
90	278.9	151.2	5.6	1.5	9.6	9.1	156.5	177.0
years	*ft³/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	0.7	0.0	0.0	48.0	0.7
5	0	2.7	0.3	0.8	0.2	0.5	48.1	4.4
10	140	7.6	0.8	0.7	0.5	0.9	48.6	10.4
15	284	11.5	1.0	0.7	0.7	1.2	49.3	15.1
20	467	15.4	1.1	0.7	1.0	1.5	50.3	19.7
25	649	18.9	1.3	0.7	1.2	1.8	51.5	23.8
30	830	21.9	1.4	0.7	1.4	2.0	52.8	27.3
35	1,049	25.2	1.5	0.6	1.6	2.2	54.2	31.2
40	1,318	29.1	1.6	0.6	1.9	2.4	55.5	35.6
45	1,582	32.7	1.7	0.6	2.1	2.6	56.8	39.7
50	1,830	36.0	1.8	0.6	2.3	2.8	58.1	43.5
55	2,091	39.4	1.8	0.6	2.5	2.9	59.2	47.2
60	2,374	42.9	1.9	0.6	2.7	3.1	60.2	51.2
65	2,664	46.3	2.0	0.6	2.9	3.2	61.0	55.1
70	2,940	49.6	2.1	0.6	3.2	3.3	61.7	58.7
75	3,180	52.3	2.1	0.6	3.3	3.4	62.3	61.8
80	3,400	54.8	2.2	0.6	3.5	3.5	62.7	64.5
85	3,677	57.8	2.2	0.6	3.7	3.6	63.1	67.9
90	3,986	61.2	2.3	0.6	3.9	3.7	63.3	71.6

B44.—Regional estimates of timber volume and carbon stocks for oak-hickory stands with afforestation of land in the Southeast

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.2	0.0	0.0	33.9	4.2
5	0.0	8.1	0.8	4.2	0.5	1.1	34.1	14.7
10	11.7	21.0	2.1	3.8	1.2	2.1	34.4	30.2
15	21.2	30.3	2.5	3.5	1.8	3.0	34.9	41.0
20	33.8	40.0	2.8	3.3	2.4	3.7	35.6	52.2
25	46.6	49.5	3.0	3.2	2.9	4.4	36.4	63.1
30	60.2	57.5	3.2	3.1	3.4	5.0	37.4	72.3
35	76.3	66.6	3.4	3.0	4.0	5.5	38.3	82.5
40	94.3	76.2	3.6	2.9	4.5	6.0	39.3	93.3
45	114.1	86.4	3.8	2.9	5.1	6.4	40.2	104.6
50	133.0	95.8	4.0	2.8	5.7	6.8	41.1	115.1
55	151.4	104.8	4.1	2.8	6.2	7.2	41.9	125.0
60	168.9	113.0	4.2	2.7	6.7	7.5	42.6	134.2
65	185.6	120.8	4.3	2.7	7.2	7.8	43.2	142.8
70	201.5	128.0	4.4	2.7	7.6	8.1	43.7	150.8
75	215.7	134.4	4.5	2.6	8.0	8.4	44.1	157.9
80	229.4	140.5	4.6	2.6	8.3	8.6	44.4	164.6
85	242.5	146.2	4.6	2.6	8.7	8.9	44.6	171.0
90	254.1	151.3	4.7	2.6	9.0	9.1	44.8	176.6
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.7	0.0	0.0	13.7	1.7
5	0	3.3	0.3	1.7	0.2	0.5	13.8	6.0
10	167	8.5	0.8	1.5	0.5	0.9	13.9	12.2
15	303	12.3	1.0	1.4	0.7	1.2	14.1	16.6
20	483	16.2	1.1	1.3	1.0	1.5	14.4	21.1
25	666	20.1	1.2	1.3	1.2	1.8	14.7	25.5
30	860	23.3	1.3	1.3	1.4	2.0	15.1	29.3
35	1,091	26.9	1.4	1.2	1.6	2.2	15.5	33.4
40	1,348	30.8	1.5	1.2	1.8	2.4	15.9	37.8
45	1,630	35.0	1.5	1.2	2.1	2.6	16.3	42.4
50	1,901	38.8	1.6	1.1	2.3	2.8	16.6	46.6
55	2,164	42.4	1.7	1.1	2.5	2.9	16.9	50.6
60	2,414	45.7	1.7	1.1	2.7	3.1	17.2	54.3
65	2,652	48.9	1.7	1.1	2.9	3.2	17.5	57.8
70	2,880	51.8	1.8	1.1	3.1	3.3	17.7	61.0
75	3,082	54.4	1.8	1.1	3.2	3.4	17.8	63.9
80	3,278	56.8	1.8	1.1	3.4	3.5	18.0	66.6
85	3,465	59.2	1.9	1.0	3.5	3.6	18.1	69.2
90	3,632	61.2	1.9	1.0	3.6	3.7	18.1	71.5

B45.— Regional estimates of timber volume and carbon stocks for oak-pine stands with afforestation of land in the Southeast

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	m^3*/hectare*	------------	------------	------------	*tonnes carbon/hectare*	------------	------------	------------
0	0.0	0.0	0.0	4.2	0.0	0.0	46.1	4.2
5	0.0	7.4	0.6	4.1	0.5	3.1	46.2	15.6
10	13.6	19.6	1.2	3.6	1.2	5.1	46.7	30.8
15	27.8	29.3	1.6	3.5	1.9	6.6	47.4	42.8
20	43.9	39.0	1.9	3.4	2.5	7.7	48.3	54.5
25	59.3	46.8	2.1	3.3	3.0	8.5	49.5	63.7
30	77.2	55.4	2.3	3.2	3.5	9.2	50.7	73.7
35	96.8	64.4	2.5	3.2	4.1	9.8	52.0	83.9
40	117.2	73.4	2.7	3.1	4.7	10.2	53.3	94.1
45	136.4	81.6	2.8	3.1	5.2	10.6	54.6	103.3
50	154.1	88.9	2.9	3.1	5.6	11.0	55.8	111.5
55	171.4	96.0	3.0	3.0	6.1	11.3	56.8	119.4
60	189.6	103.2	3.1	3.0	6.6	11.5	57.8	127.4
65	204.5	109.1	3.2	3.0	6.9	11.8	58.6	134.0
70	218.8	114.6	3.3	3.0	7.3	12.0	59.2	140.1
75	234.5	120.6	3.4	2.9	7.7	12.1	59.8	146.7
80	247.6	125.5	3.5	2.9	8.0	12.3	60.2	152.2
85	259.4	129.9	3.5	2.9	8.2	12.5	60.6	157.1
90	272.3	134.7	3.6	2.9	8.5	12.6	60.8	162.3
years	ft^3*/acre*	------------	------------	------------	*tonnes carbon/acre*	------------	------------	------------
0	0	0.0	0.0	1.7	0.0	0.0	18.6	1.7
5	0	3.0	0.3	1.7	0.2	1.2	18.7	6.3
10	195	7.9	0.5	1.5	0.5	2.1	18.9	12.5
15	397	11.9	0.6	1.4	0.8	2.7	19.2	17.3
20	628	15.8	0.8	1.4	1.0	3.1	19.6	22.0
25	848	19.0	0.8	1.3	1.2	3.5	20.0	25.8
30	1,104	22.4	0.9	1.3	1.4	3.7	20.5	29.8
35	1,384	26.1	1.0	1.3	1.7	4.0	21.0	34.0
40	1,675	29.7	1.1	1.3	1.9	4.1	21.6	38.1
45	1,950	33.0	1.1	1.2	2.1	4.3	22.1	41.8
50	2,202	36.0	1.2	1.2	2.3	4.4	22.6	45.1
55	2,450	38.8	1.2	1.2	2.5	4.6	23.0	48.3
60	2,710	41.8	1.3	1.2	2.7	4.7	23.4	51.6
65	2,923	44.1	1.3	1.2	2.8	4.8	23.7	54.2
70	3,127	46.4	1.3	1.2	2.9	4.8	24.0	56.7
75	3,352	48.8	1.4	1.2	3.1	4.9	24.2	59.4
80	3,539	50.8	1.4	1.2	3.2	5.0	24.4	61.6
85	3,707	52.6	1.4	1.2	3.3	5.0	24.5	63.6
90	3,891	54.5	1.4	1.2	3.5	5.1	24.6	65.7

B46.— Regional estimates of timber volume and carbon stocks for elm-ash-cottonwood stands with afforestation of land in the South Central

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m³/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.2	0.0	0.0	37.4	4.2
5	0.0	8.6	0.9	4.9	0.6	1.1	37.5	16.0
10	11.7	18.3	1.8	4.1	1.2	2.1	37.9	27.6
15	21.2	27.0	2.7	3.7	1.8	3.0	38.5	38.2
20	33.8	36.3	3.3	3.5	2.4	3.7	39.2	49.1
25	46.6	45.1	3.6	3.3	3.0	4.4	40.2	59.4
30	60.2	53.8	3.8	3.2	3.6	5.0	41.2	69.4
35	76.3	63.3	4.1	3.1	4.2	5.5	42.2	80.2
40	94.3	73.3	4.4	2.9	4.9	6.0	43.3	91.5
45	114.1	83.8	4.6	2.9	5.6	6.4	44.3	103.3
50	133.0	95.1	4.8	2.8	6.3	6.8	45.3	115.9
55	151.4	104.2	5.0	2.7	6.9	7.2	46.2	126.0
60	168.9	112.7	5.1	2.7	7.5	7.5	46.9	135.5
65	185.6	120.7	5.3	2.6	8.0	7.8	47.6	144.5
70	201.5	128.4	5.4	2.6	8.5	8.1	48.1	153.0
75	215.7	135.1	5.5	2.6	9.0	8.4	48.6	160.6
80	229.4	141.6	5.6	2.5	9.4	8.6	48.9	167.8
85	242.5	147.8	5.7	2.5	9.8	8.9	49.2	174.7
90	254.1	153.4	5.8	2.5	10.2	9.1	49.4	180.9
years	*ft³/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.7	0.0	0.0	15.1	1.7
5	0	3.5	0.3	2.0	0.2	0.5	15.2	6.5
10	167	7.4	0.7	1.7	0.5	0.9	15.3	11.2
15	303	10.9	1.1	1.5	0.7	1.2	15.6	15.5
20	483	14.7	1.3	1.4	1.0	1.5	15.9	19.9
25	666	18.3	1.4	1.3	1.2	1.8	16.3	24.0
30	860	21.8	1.6	1.3	1.4	2.0	16.7	28.1
35	1,091	25.6	1.7	1.2	1.7	2.2	17.1	32.4
40	1,348	29.7	1.8	1.2	2.0	2.4	17.5	37.0
45	1,630	33.9	1.9	1.2	2.3	2.6	17.9	41.8
50	1,901	38.5	1.9	1.1	2.6	2.8	18.3	46.9
55	2,164	42.2	2.0	1.1	2.8	2.9	18.7	51.0
60	2,414	45.6	2.1	1.1	3.0	3.1	19.0	54.8
65	2,652	48.9	2.1	1.1	3.2	3.2	19.3	58.5
70	2,880	52.0	2.2	1.0	3.5	3.3	19.5	61.9
75	3,082	54.7	2.2	1.0	3.6	3.4	19.7	65.0
80	3,278	57.3	2.3	1.0	3.8	3.5	19.8	67.9
85	3,465	59.8	2.3	1.0	4.0	3.6	19.9	70.7
90	3,632	62.1	2.3	1.0	4.1	3.7	20.0	73.2

B47.— Regional estimates of timber volume and carbon stocks for loblolly-shortleaf pine stands with afforestation of land in the South Central

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	m^3*/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.2	0.0	0.0	31.4	4.2
5	0.0	10.8	0.7	4.7	0.7	3.2	31.5	20.1
10	19.1	23.1	1.3	3.9	1.6	5.5	31.8	35.4
15	36.7	32.4	1.6	3.5	2.2	7.3	32.3	47.0
20	60.4	42.2	1.8	3.3	2.9	8.7	33.0	58.9
25	85.5	52.0	2.0	3.1	3.6	9.8	33.7	70.5
30	108.7	59.6	2.1	3.0	4.1	10.7	34.6	79.5
35	131.2	66.6	2.3	2.9	4.6	11.5	35.5	87.8
40	152.3	73.1	2.3	2.9	5.0	12.2	36.4	95.4
45	172.3	79.0	2.4	2.8	5.4	12.7	37.2	102.4
50	191.4	84.7	2.5	2.8	5.8	13.2	38.0	108.9
55	208.4	89.6	2.6	2.7	6.1	13.7	38.8	114.6
60	223.9	94.0	2.6	2.7	6.4	14.1	39.4	119.8
65	238.4	98.1	2.7	2.6	6.7	14.4	40.0	124.5
70	252.9	102.2	2.7	2.6	7.0	14.7	40.4	129.2
75	264.6	105.5	2.7	2.6	7.2	15.0	40.8	133.0
80	277.1	108.9	2.8	2.6	7.4	15.2	41.1	136.9
85	289.5	112.3	2.8	2.6	7.7	15.5	41.3	140.8
90	299.6	115.1	2.8	2.5	7.9	15.7	41.5	144.0
years	ft^3*/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.7	0.0	0.0	12.7	1.7
5	0	4.4	0.3	1.9	0.3	1.3	12.8	8.1
10	273	9.4	0.5	1.6	0.6	2.2	12.9	14.3
15	525	13.1	0.6	1.4	0.9	2.9	13.1	19.0
20	863	17.1	0.7	1.3	1.2	3.5	13.3	23.8
25	1,222	21.1	0.8	1.3	1.4	4.0	13.7	28.5
30	1,554	24.1	0.9	1.2	1.6	4.3	14.0	32.2
35	1,875	27.0	0.9	1.2	1.8	4.7	14.4	35.5
40	2,177	29.6	0.9	1.2	2.0	4.9	14.7	38.6
45	2,462	32.0	1.0	1.1	2.2	5.2	15.1	41.4
50	2,736	34.3	1.0	1.1	2.3	5.4	15.4	44.1
55	2,978	36.3	1.0	1.1	2.5	5.5	15.7	46.4
60	3,200	38.1	1.1	1.1	2.6	5.7	16.0	48.5
65	3,407	39.7	1.1	1.1	2.7	5.8	16.2	50.4
70	3,614	41.4	1.1	1.1	2.8	6.0	16.4	52.3
75	3,782	42.7	1.1	1.1	2.9	6.1	16.5	53.8
80	3,960	44.1	1.1	1.0	3.0	6.2	16.6	55.4
85	4,138	45.5	1.1	1.0	3.1	6.3	16.7	57.0
90	4,281	46.6	1.1	1.0	3.2	6.3	16.8	58.3

B48.— Regional estimates of timber volume and carbon stocks for loblolly-shortleaf pine stands with afforestation of land in the South Central; volumes are for high-productivity sites (growth rate greater than 120 cubic feet wood/acre/year) with high-intensity management (replanting with genetically improved stock)

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.1	0.0	0.0	31.4	4.1
5	0.0	10.8	0.4	4.1	0.4	3.2	31.5	18.9
10	47.7	34.2	0.9	3.9	1.3	5.5	31.8	45.7
15	146.5	68.7	1.0	3.8	2.7	7.3	32.3	83.4
20	244.8	99.2	1.1	3.7	3.8	8.7	33.0	116.5
25	315.2	118.3	1.1	3.7	4.6	9.8	33.7	137.6
30	347.3	126.8	1.1	3.7	4.9	10.7	34.6	147.3
35	351.5	127.9	1.1	3.7	5.0	11.5	35.5	149.2
40	355.0	128.8	1.1	3.7	5.0	12.2	36.4	150.8
45	358.5	129.8	1.1	3.7	5.0	12.7	37.2	152.4
50	362.0	130.7	1.1	3.7	5.1	13.2	38.0	153.8
55	362.0	130.7	1.1	3.7	5.1	13.7	38.8	154.2
60	362.0	130.7	1.1	3.7	5.1	14.1	39.4	154.6
65	362.0	130.7	1.1	3.7	5.1	14.4	40.0	155.0
70	362.0	130.7	1.1	3.7	5.1	14.7	40.4	155.3
75	362.0	130.7	1.1	3.7	5.1	15.0	40.8	155.6
80	362.0	130.7	1.1	3.7	5.1	15.2	41.1	155.8
85	362.0	130.7	1.1	3.7	5.1	15.5	41.3	156.0
90	362.0	130.7	1.1	3.7	5.1	15.7	41.5	156.2
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.7	0.0	0.0	12.7	1.7
5	0	4.4	0.2	1.6	0.2	1.3	12.8	7.6
10	682	13.8	0.3	1.6	0.5	2.2	12.9	18.5
15	2,094	27.8	0.4	1.5	1.1	2.9	13.1	33.8
20	3,498	40.1	0.4	1.5	1.6	3.5	13.3	47.1
25	4,504	47.9	0.4	1.5	1.9	4.0	13.7	55.7
30	4,963	51.3	0.5	1.5	2.0	4.3	14.0	59.6
35	5,024	51.8	0.5	1.5	2.0	4.7	14.4	60.4
40	5,074	52.1	0.5	1.5	2.0	4.9	14.7	61.0
45	5,124	52.5	0.5	1.5	2.0	5.2	15.1	61.7
50	5,174	52.9	0.5	1.5	2.0	5.4	15.4	62.2
55	5,174	52.9	0.5	1.5	2.0	5.5	15.7	62.4
60	5,174	52.9	0.5	1.5	2.0	5.7	16.0	62.6
65	5,174	52.9	0.5	1.5	2.0	5.8	16.2	62.7
70	5,174	52.9	0.5	1.5	2.0	6.0	16.4	62.8
75	5,174	52.9	0.5	1.5	2.0	6.1	16.5	63.0
80	5,174	52.9	0.5	1.5	2.0	6.2	16.6	63.1
85	5,174	52.9	0.5	1.5	2.0	6.3	16.7	63.1
90	5,174	52.9	0.5	1.5	2.0	6.3	16.8	63.2

B49.— Regional estimates of timber volume and carbon stocks for oak-gum-cypress stands with afforestation of land in the South Central

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	1.8	0.0	0.0	39.6	1.8
5	0.0	5.4	0.5	2.1	0.3	1.1	39.7	9.5
10	9.8	17.8	1.8	1.8	1.1	2.1	40.1	24.7
15	19.9	28.4	2.8	1.7	1.8	3.0	40.7	37.8
20	32.7	39.3	3.2	1.7	2.5	3.7	41.5	50.4
25	45.4	48.8	3.4	1.6	3.1	4.4	42.5	61.3
30	58.1	57.2	3.5	1.6	3.6	5.0	43.6	70.9
35	73.4	66.9	3.6	1.6	4.2	5.5	44.7	81.8
40	92.2	76.9	3.7	1.6	4.9	6.0	45.8	93.0
45	110.7	86.1	3.7	1.5	5.4	6.4	46.9	103.3
50	128.1	94.4	3.8	1.5	6.0	6.8	47.9	112.6
55	146.3	102.8	3.9	1.5	6.5	7.2	48.8	121.9
60	166.1	111.6	3.9	1.5	7.0	7.5	49.7	131.6
65	186.4	120.3	4.0	1.5	7.6	7.8	50.3	141.2
70	205.7	128.3	4.0	1.5	8.1	8.1	50.9	150.0
75	222.5	135.1	4.1	1.5	8.5	8.4	51.4	157.6
80	237.9	141.2	4.1	1.5	8.9	8.6	51.8	164.4
85	257.3	148.8	4.1	1.5	9.4	8.9	52.0	172.6
90	278.9	157.0	4.2	1.4	9.9	9.1	52.3	181.6
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	0.7	0.0	0.0	16.0	0.7
5	0	2.2	0.2	0.8	0.1	0.5	16.1	3.9
10	140	7.2	0.7	0.7	0.5	0.9	16.2	10.0
15	284	11.5	1.1	0.7	0.7	1.2	16.5	15.3
20	467	15.9	1.3	0.7	1.0	1.5	16.8	20.4
25	649	19.7	1.4	0.7	1.2	1.8	17.2	24.8
30	830	23.1	1.4	0.7	1.5	2.0	17.6	28.7
35	1,049	27.1	1.4	0.6	1.7	2.2	18.1	33.1
40	1,318	31.1	1.5	0.6	2.0	2.4	18.5	37.6
45	1,582	34.9	1.5	0.6	2.2	2.6	19.0	41.8
50	1,830	38.2	1.5	0.6	2.4	2.8	19.4	45.6
55	2,091	41.6	1.6	0.6	2.6	2.9	19.8	49.3
60	2,374	45.2	1.6	0.6	2.9	3.1	20.1	53.3
65	2,664	48.7	1.6	0.6	3.1	3.2	20.4	57.1
70	2,940	51.9	1.6	0.6	3.3	3.3	20.6	60.7
75	3,180	54.7	1.6	0.6	3.5	3.4	20.8	63.8
80	3,400	57.2	1.7	0.6	3.6	3.5	20.9	66.5
85	3,677	60.2	1.7	0.6	3.8	3.6	21.1	69.9
90	3,986	63.5	1.7	0.6	4.0	3.7	21.1	73.5

B50.— Regional estimates of timber volume and carbon stocks for oak-hickory stands with afforestation of land in the South Central

Age	Mean volume	Mean carbon density: Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m³/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.2	0.0	0.0	29.0	4.2
5	0.0	9.7	0.9	4.7	0.6	1.1	29.1	17.1
10	11.7	20.9	1.9	4.0	1.4	2.1	29.4	30.3
15	21.2	30.1	2.1	3.6	2.0	3.0	29.8	40.8
20	33.8	39.5	2.3	3.4	2.6	3.7	30.4	51.6
25	46.6	48.2	2.4	3.3	3.2	4.4	31.1	61.5
30	60.2	56.6	2.6	3.1	3.8	5.0	31.9	71.0
35	76.3	65.6	2.7	3.0	4.4	5.5	32.7	81.2
40	94.3	76.2	2.8	2.9	5.1	6.0	33.5	92.9
45	114.1	85.7	2.9	2.8	5.7	6.4	34.3	103.6
50	133.0	94.7	3.0	2.8	6.3	6.8	35.1	113.6
55	151.4	103.3	3.0	2.7	6.9	7.2	35.8	123.1
60	168.9	111.3	3.1	2.7	7.4	7.5	36.4	132.0
65	185.6	118.8	3.2	2.6	7.9	7.8	36.9	140.4
70	201.5	126.0	3.2	2.6	8.4	8.1	37.3	148.3
75	215.7	132.3	3.2	2.6	8.8	8.4	37.6	155.3
80	229.4	138.3	3.3	2.5	9.2	8.6	37.9	162.0
85	242.5	144.0	3.3	2.5	9.6	8.9	38.1	168.3
90	254.1	149.1	3.3	2.5	9.9	9.1	38.3	174.0
years	*ft³/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.7	0.0	0.0	11.7	1.7
5	0	3.9	0.4	1.9	0.3	0.5	11.8	6.9
10	167	8.5	0.8	1.6	0.6	0.9	11.9	12.2
15	303	12.2	0.9	1.5	0.8	1.2	12.1	16.5
20	483	16.0	0.9	1.4	1.1	1.5	12.3	20.9
25	666	19.5	1.0	1.3	1.3	1.8	12.6	24.9
30	860	22.9	1.0	1.3	1.5	2.0	12.9	28.7
35	1,091	26.6	1.1	1.2	1.8	2.2	13.2	32.9
40	1,348	30.8	1.1	1.2	2.0	2.4	13.6	37.6
45	1,630	34.7	1.2	1.2	2.3	2.6	13.9	41.9
50	1,901	38.3	1.2	1.1	2.5	2.8	14.2	46.0
55	2,164	41.8	1.2	1.1	2.8	2.9	14.5	49.8
60	2,414	45.0	1.3	1.1	3.0	3.1	14.7	53.4
65	2,652	48.1	1.3	1.1	3.2	3.2	14.9	56.8
70	2,880	51.0	1.3	1.1	3.4	3.3	15.1	60.0
75	3,082	53.5	1.3	1.0	3.6	3.4	15.2	62.8
80	3,278	56.0	1.3	1.0	3.7	3.5	15.3	65.5
85	3,465	58.3	1.3	1.0	3.9	3.6	15.4	68.1
90	3,632	60.3	1.4	1.0	4.0	3.7	15.5	70.4

B51.— Regional estimates of timber volume and carbon stocks for oak-pine stands with afforestation of land in the South Central

Age	Mean volume	Mean carbon density						
		Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Total nonsoil
years	*m^3/hectare*	*tonnes carbon/hectare*						
0	0.0	0.0	0.0	4.2	0.0	0.0	31.3	4.2
5	0.0	8.7	0.7	4.4	0.6	3.1	31.4	17.5
10	13.6	21.4	1.4	3.7	1.5	5.1	31.7	33.1
15	27.8	31.9	1.7	3.5	2.3	6.6	32.2	46.0
20	43.9	41.8	2.0	3.3	3.0	7.7	32.8	57.8
25	59.3	50.9	2.2	3.2	3.7	8.5	33.6	68.5
30	77.2	59.2	2.5	3.1	4.3	9.2	34.4	78.2
35	96.8	67.9	2.6	3.0	4.9	9.8	35.3	88.2
40	117.2	76.5	2.8	2.9	5.5	10.2	36.2	98.1
45	136.4	84.4	3.0	2.9	6.1	10.6	37.0	107.0
50	154.1	91.4	3.1	2.8	6.6	11.0	37.9	115.0
55	171.4	98.2	3.2	2.8	7.1	11.3	38.6	122.6
60	189.6	105.2	3.3	2.8	7.6	11.5	39.2	130.4
65	204.5	110.7	3.4	2.7	8.0	11.8	39.8	136.7
70	218.8	116.0	3.5	2.7	8.4	12.0	40.2	142.6
75	234.5	121.8	3.6	2.7	8.8	12.1	40.6	149.0
80	247.6	126.5	3.6	2.7	9.2	12.3	40.9	154.2
85	259.4	130.7	3.7	2.7	9.5	12.5	41.1	158.9
90	272.3	135.2	3.8	2.6	9.8	12.6	41.3	164.0
years	*ft^3/acre*	*tonnes carbon/acre*						
0	0	0.0	0.0	1.7	0.0	0.0	12.7	1.7
5	0	3.5	0.3	1.8	0.3	1.2	12.7	7.1
10	195	8.6	0.6	1.5	0.6	2.1	12.8	13.4
15	397	12.9	0.7	1.4	0.9	2.7	13.0	18.6
20	628	16.9	0.8	1.3	1.2	3.1	13.3	23.4
25	848	20.6	0.9	1.3	1.5	3.5	13.6	27.7
30	1,104	24.0	1.0	1.2	1.7	3.7	13.9	31.7
35	1,384	27.5	1.1	1.2	2.0	4.0	14.3	35.7
40	1,675	31.0	1.1	1.2	2.2	4.1	14.6	39.7
45	1,950	34.2	1.2	1.2	2.5	4.3	15.0	43.3
50	2,202	37.0	1.3	1.2	2.7	4.4	15.3	46.5
55	2,450	39.7	1.3	1.1	2.9	4.6	15.6	49.6
60	2,710	42.6	1.3	1.1	3.1	4.7	15.9	52.8
65	2,923	44.8	1.4	1.1	3.2	4.8	16.1	55.3
70	3,127	47.0	1.4	1.1	3.4	4.8	16.3	57.7
75	3,352	49.3	1.4	1.1	3.6	4.9	16.4	60.3
80	3,539	51.2	1.5	1.1	3.7	5.0	16.5	62.4
85	3,707	52.9	1.5	1.1	3.8	5.0	16.6	64.3
90	3,891	54.7	1.5	1.1	4.0	5.1	16.7	66.4

APPENDIX C

Scenarios of Harvest and Carbon Accumulation in Harvested Wood Products[3,4]

Carbon Stocks on Forest Land and in Harvested Wood Products After Clearcut Harvest

- C1. Maple-beech-birch, Northeast
- C2. Oak-hickory, Northeast
- C3. Spruce-balsam fir, Northeast
- C4. Aspen-birch, Northern Lake States
- C5. Maple-beech-birch, Northern Lake States
- C6. White-red-jack pine, Northern Lake States
- C7. Elm-ash-cottonwood, Northern Prairie States
- C8. Oak-hickory, Northern Prairie States
- C9. Douglas-fir, Pacific Northwest, East
- C10. Ponderosa pine, Pacific Northwest, East
- C11. Alder-maple, Pacific Northwest, West
- C12. Douglas-fir, high productivity and management intensity, Pacific Northwest, West
- C13. Hemlock-Sitka spruce, high productivity, Pacific Northwest, West
- C14. Mixed conifer, Pacific Southwest
- C15. Western oak, Pacific Southwest
- C16. Douglas-fir, Rocky Mountain, North
- C17. Lodgepole pine, Rocky Mountain, North
- C18. Fir-spruce-mountain hemlock, Rocky Mountain, South
- C19. Ponderosa pine, Rocky Mountain, South
- C20. Loblolly-shortleaf pine, high productivity and management intensity, Southeast
- C21. Oak-gum-cypress, Southeast
- C22. Oak-hickory, Southeast
- C23. Oak-pine, Southeast
- C24. Loblolly-shortleaf pine, high productivity and management intensity, South Central
- C25. Oak-gum-cypress, South Central
- C26. Oak-hickory, South Central
- C27. Oak-pine, South Central

[3] Note carbon mass is in metric tons (tonnes) in all tables, and age refers to stand age.
[4] These tables are example harvest scenarios; they are not recommendations for timing of harvest.

C1.— Regional estimates of timber volume, carbon stocks, and carbon in harvested wood products on forest land after clearcut harvest for maple-beech-birch stands in the Northeast

	Mean volume		Mean carbon density										
Age	Inventory	Harvested	Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Products in use	In landfills	Emitted with energy capture	Emitted without energy capture	Emitted at harvest
years	-------- m^3/*hectare* -------		---------- *tonnes carbon/hectare* ----------										
0	0.0		0.0	0.0	2.1	0.0	0.0	52.2					
5	0.0		7.4	0.7	2.1	0.5	4.2	52.3					
15	28.0		31.8	3.2	1.9	2.3	10.8	53.7					
25	58.1		53.2	5.3	1.8	3.8	15.8	56.0					
35	89.6		72.8	6.0	1.7	5.2	19.7	58.9					
45	119.1		87.8	6.6	1.7	6.2	22.7	61.8					
55	146.6		101.1	7.0	1.7	7.2	25.3	64.4					
65	0.0	172.1	0.0	0.0	2.1	32.0	27.7	66.3	34.5	0.0	39.7	14.1	7.5
5	0.0		7.4	0.7	2.1	21.7	20.3	67.1	22.9	4.7	43.1	17.5	
15	28.0		31.8	3.2	1.9	11.5	16.3	68.2	13.2	8.1	46.2	20.7	
25	58.1		53.2	5.3	1.8	7.8	17.6	68.9	10.3	8.8	47.1	22.0	
35	89.6		72.8	6.0	1.7	6.9	20.3	69.2	8.7	9.1	47.5	22.9	
45	119.1		87.8	6.6	1.7	7.0	23.0	69.4	7.6	9.4	47.8	23.5	
55	146.6		101.1	7.0	1.7	7.5	25.3	69.5	6.7	9.6	47.9	24.0	
65	0.0	172.1	0.0	0.0	2.1	32.0	27.7	69.5	40.4	9.8	87.8	38.5	7.7
years	--------- ft^3/*acre* ----------		---------- *tonnes carbon/acre* ----------										
0	0		0.0	0.0	0.8	0.0	0.0	21.1					
5	0		3.0	0.3	0.8	0.2	1.7	21.2					
15	400		12.9	1.3	0.8	0.9	4.4	21.7					
25	830		21.5	2.1	0.7	1.5	6.4	22.7					
35	1,280		29.5	2.4	0.7	2.1	8.0	23.8					
45	1,702		35.5	2.7	0.7	2.5	9.2	25.0					
55	2,095		40.9	2.8	0.7	2.9	10.2	26.0					
65	0	2,460	0.0	0.0	0.8	13.0	11.2	26.8	13.9	0.0	16.1	5.7	3.0
5	0		3.0	0.3	0.8	8.8	8.2	27.2	9.3	1.9	17.5	7.1	
15	400		12.9	1.3	0.8	4.7	6.6	27.6	5.3	3.3	18.7	8.4	
25	830		21.5	2.1	0.7	3.2	7.1	27.9	4.2	3.6	19.0	8.9	
35	1,280		29.5	2.4	0.7	2.8	8.2	28.0	3.5	3.7	19.2	9.3	
45	1,702		35.5	2.7	0.7	2.8	9.3	28.1	3.1	3.8	19.3	9.5	
55	2,095		40.9	2.8	0.7	3.0	10.3	28.1	2.7	3.9	19.4	9.7	
65	0	2,460	0.0	0.0	0.8	13.0	11.2	28.1	16.4	4.0	35.5	15.6	3.1

C2.— Regional estimates of timber volume, carbon stocks, and carbon in harvested wood products on forest land after clearcut harvest for oak-hickory stands in the Northeast

	Mean volume		Mean carbon density										
Age	Inventory	Harvested	Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Products in use	In landfills	Emitted with energy capture	Emitted without energy capture	Emitted at harvest
years	*m^3/hectare*		*tonnes carbon/hectare*										
0	0.0		0.0	0.0	2.1	0.0	0.0	39.8					
5	0.0		6.9	0.7	2.1	0.5	0.9	39.9					
15	54.5		43.0	3.6	1.9	2.9	2.5	40.9					
25	95.7		71.9	4.0	1.9	4.9	3.9	42.7					
35	135.3		96.2	4.2	1.8	6.6	5.2	44.9					
45	173.3		118.2	4.5	1.8	8.1	6.3	47.2					
55	209.6		136.8	4.6	1.8	9.4	7.2	49.1					
65	0.0	244.3	0.0	0.0	2.1	46.7	8.2	50.6	45.0	0.0	57.5	17.8	2.2
5	0.0		6.9	0.7	2.1	31.4	5.7	51.2	30.6	6.3	61.6	21.8	
15	54.5		43.0	3.6	1.9	16.5	4.1	52.1	18.0	11.3	65.3	25.7	
25	95.7		71.9	4.0	1.9	10.8	4.5	52.6	13.8	12.7	66.6	27.3	
35	135.3		96.2	4.2	1.8	9.2	5.3	52.8	11.4	13.3	67.3	28.4	
45	173.3		118.2	4.5	1.8	9.2	6.3	53.0	9.7	13.7	67.7	29.2	
55	209.6		136.8	4.6	1.8	9.9	7.3	53.0	8.4	14.0	68.0	29.9	
65	0.0	244.3	0.0	0.0	2.1	46.7	8.2	53.1	52.4	14.3	125.7	48.2	2.4
years	*ft^3/acre*		*tonnes carbon/acre*										
0	0		0.0	0.0	0.8	0.0	0.0	16.1					
5	0		2.8	0.3	0.8	0.2	0.4	16.2					
15	779		17.4	1.4	0.8	1.2	1.0	16.6					
25	1,368		29.1	1.6	0.7	2.0	1.6	17.3					
35	1,934		38.9	1.7	0.7	2.7	2.1	18.2					
45	2,477		47.8	1.8	0.7	3.3	2.5	19.1					
55	2,996		55.4	1.9	0.7	3.8	2.9	19.9					
65	0	3,492	0.0	0.0	0.8	18.9	3.3	20.5	18.2	0.0	23.3	7.2	0.9
5	0		2.8	0.3	0.8	12.7	2.3	20.7	12.4	2.5	24.9	8.8	
15	779		17.4	1.4	0.8	6.7	1.7	21.1	7.3	4.6	26.4	10.4	
25	1,368		29.1	1.6	0.7	4.4	1.8	21.3	5.6	5.1	26.9	11.0	
35	1,934		38.9	1.7	0.7	3.7	2.2	21.4	4.6	5.4	27.2	11.5	
45	2,477		47.8	1.8	0.7	3.7	2.6	21.4	3.9	5.5	27.4	11.8	
55	2,996		55.4	1.9	0.7	4.0	2.9	21.5	3.4	5.7	27.5	12.1	
65	0	3,492	0.0	0.0	0.8	18.9	3.3	21.5	21.2	5.8	50.9	19.5	1.0

C3.— Regional estimates of timber volume, carbon stocks, and carbon in harvested wood products on forest land after clearcut harvest for spruce-balsam fir stands in the Northeast

	Mean volume		Mean carbon density										
Age	Inventory	Harvested	Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Products in use	In landfills	Emitted with energy capture	Emitted without energy capture	Emitted at harvest
years	----- m^3/*hectare* -------		---------- *tonnes carbon/hectare* ----------										
0	0.0		0.0	0.0	2.1	0.0	0.0	73.5					
5	0.0		7.0	0.7	1.8	0.6	5.0	73.7					
15	11.5		20.1	2.0	1.6	1.9	13.0	75.6					
25	29.1		32.5	3.3	1.5	3.0	19.0	78.9					
35	51.6		45.7	4.6	1.4	4.2	23.7	83.0					
45	76.9		57.4	5.7	1.4	5.3	27.5	87.1					
55	102.6		68.7	6.9	1.4	6.3	30.7	90.7					
65	0.0	126.4	0.0	0.0	2.1	20.3	33.7	93.5	23.6	0.0	22.2	11.1	14.8
5	0.0		7.0	0.7	1.8	16.0	23.6	94.5	13.4	3.5	25.8	14.2	
15	11.5		20.1	2.0	1.6	10.6	18.6	96.1	5.7	5.6	28.8	16.9	
25	29.1		32.5	3.3	1.5	8.0	20.7	97.0	4.1	5.6	29.3	17.9	
35	51.6		45.7	4.6	1.4	7.1	24.2	97.5	3.5	5.4	29.5	18.6	
45	76.9		57.4	5.7	1.4	6.9	27.7	97.8	3.0	5.4	29.6	19.0	
55	102.6		68.7	6.9	1.4	7.3	30.7	97.9	2.6	5.3	29.6	19.3	
65	0.0	126.4	0.0	0.0	2.1	20.3	33.7	98.0	26.0	5.4	51.9	30.7	15.4
years	-------- ft^3/*acre* ----------		---------- *tonnes carbon/acre* ----------										
0	0		0.0	0.0	0.9	0.0	0.0	29.7					
5	0		2.8	0.3	0.7	0.3	2.0	29.8					
15	164		8.1	0.8	0.6	0.8	5.2	30.6					
25	416		13.2	1.3	0.6	1.2	7.7	31.9					
35	738		18.5	1.9	0.6	1.7	9.6	33.6					
45	1,099		23.2	2.3	0.6	2.1	11.1	35.2					
55	1,466		27.8	2.8	0.6	2.6	12.4	36.7					
65	0	1,807	0.0	0.0	0.9	8.2	13.6	37.8	9.6	0.0	9.0	4.5	6.0
5	0		2.8	0.3	0.7	6.5	9.5	38.3	5.4	1.4	10.5	5.7	
15	164		8.1	0.8	0.6	4.3	7.5	38.9	2.3	2.3	11.6	6.8	
25	416		13.2	1.3	0.6	3.2	8.4	39.3	1.7	2.3	11.9	7.3	
35	738		18.5	1.9	0.6	2.9	9.8	39.5	1.4	2.2	11.9	7.5	
45	1,099		23.2	2.3	0.6	2.8	11.2	39.6	1.2	2.2	12.0	7.7	
55	1,466		27.8	2.8	0.6	2.9	12.4	39.6	1.1	2.2	12.0	7.8	
65	0	1,807	0.0	0.0	0.9	8.2	13.6	39.6	10.5	2.2	21.0	12.4	6.2

C4.— Regional estimates of timber volume, carbon stocks, and carbon in harvested wood products on forest land after clearcut harvest for aspen-birch stands in the Northern Lake States

	Mean volume		Mean carbon density										
Age	Inventory	Harvested	Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Products in use	In landfills	Emitted with energy capture	Emitted without energy capture	Emitted at harvest
years	------ m^3/*hectare*-------		------ *tonnes carbon/hectare* ------										
0	0.0		0.0	0.0	2.0	0.0	0.0	109.6					
5	0.0		7.3	0.5	2.1	0.6	1.6	109.9					
15	2.9		13.9	1.4	2.1	1.1	4.0	112.7					
25	21.5		26.8	2.7	2.1	2.2	5.8	117.6					
35	47.2		40.8	4.1	2.0	3.3	7.3	123.7					
45	72.8		53.5	5.3	2.0	4.3	8.4	129.8					
55	0.0	97.1	0.0	0.0	2.0	13.4	10.2	135.2	12.7	0.0	12.1	4.8	32.4
5	0.0		7.3	0.5	2.1	9.5	7.5	137.4	8.7	1.6	13.3	6.0	
15	2.9		13.9	1.4	2.1	5.0	6.0	140.9	5.4	2.8	14.3	7.1	
25	21.5		26.8	2.7	2.1	3.9	6.5	143.3	4.3	3.1	14.6	7.6	
35	47.2		40.8	4.1	2.0	4.0	7.5	144.7	3.7	3.2	14.8	7.9	
45	72.8		53.5	5.3	2.0	4.6	8.5	145.4	3.2	3.3	14.9	8.1	
55	0.0	97.1	0.0	0.0	2.0	13.4	10.2	145.8	15.5	3.4	27.1	13.1	32.5
years	--------ft^3/*acre* ---------		------ *tonnes carbon/acre* ------										
0	0		0.0	0.0	0.8	0.0	0.0	44.3					
5	0		3.0	0.2	0.8	0.2	0.6	44.5					
15	42		5.6	0.6	0.8	0.5	1.6	45.6					
25	307		10.9	1.1	0.8	0.9	2.4	47.6					
35	674		16.5	1.6	0.8	1.3	2.9	50.1					
45	1,041		21.6	2.2	0.8	1.7	3.4	52.5					
55	0	1,388	0.0	0.0	0.8	5.4	4.1	54.7	5.1	0.0	4.9	1.9	13.1
5	0		3.0	0.2	0.8	3.8	3.0	55.6	3.5	0.6	5.4	2.4	
15	42		5.6	0.6	0.8	2.0	2.4	57.0	2.2	1.1	5.8	2.9	
25	307		10.9	1.1	0.8	1.6	2.6	58.0	1.7	1.2	5.9	3.1	
35	674		16.5	1.6	0.8	1.6	3.0	58.5	1.5	1.3	6.0	3.2	
45	1,041		21.6	2.2	0.8	1.9	3.4	58.8	1.3	1.3	6.0	3.3	
55	0	1,388	0.0	0.0	0.8	5.4	4.1	59.0	6.3	1.4	11.0	5.3	13.2

C5.— Regional estimates of timber volume, carbon stocks, and carbon in harvested wood products on forest land after clearcut harvest for maple-beech-birch stands in the Northern Lake States

	Mean volume		Mean carbon density										
Age	Inventory	Harvested	Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Products in use	In landfills	Emitted with energy capture	Emitted without energy capture	Emitted at harvest
years	*m³/hectare*		*tonnes carbon/hectare*										
0	0.0		0.0	0.0	2.1	0.0	0.0	100.7					
5	0.0		5.1	0.5	2.0	0.4	4.2	101.0					
15	4.3		13.4	1.3	1.7	1.0	10.8	103.6					
25	24.6		30.3	3.0	1.6	2.3	15.8	108.1					
35	48.1		47.7	4.0	1.5	3.6	19.7	113.7					
45	72.5		62.9	4.4	1.4	4.8	22.7	119.3					
55	96.9		77.3	4.7	1.4	5.9	25.3	124.3					
65	0.0	121.3	0.0	0.0	2.1	19.5	27.7	128.1	19.0	0.0	19.0	7.2	37.1
5	0.0		5.1	0.5	2.0	13.3	20.3	129.5	13.3	2.4	20.7	8.9	
15	4.3		13.4	1.3	1.7	6.7	16.3	131.7	8.3	4.3	22.2	10.5	
25	24.6		30.3	3.0	1.6	4.8	17.6	132.9	6.6	4.8	22.6	11.2	
35	48.1		47.7	4.0	1.5	4.7	20.3	133.6	5.6	5.1	22.9	11.6	
45	72.5		62.9	4.4	1.4	5.2	23.0	134.0	4.9	5.3	23.1	12.0	
55	96.9		77.3	4.7	1.4	6.1	25.3	134.2	4.3	5.5	23.2	12.3	
65	0.0	121.3	0.0	0.0	2.1	19.5	27.7	134.2	22.9	5.6	42.3	19.8	37.2
years	*ft³/acre*		*tonnes carbon/acre*										
0	0		0.0	0.0	0.9	0.0	0.0	40.8					
5	0		2.1	0.2	0.8	0.2	1.7	40.9					
15	62		5.4	0.5	0.7	0.4	4.4	41.9					
25	351		12.2	1.2	0.6	0.9	6.4	43.8					
35	688		19.3	1.6	0.6	1.5	8.0	46.0					
45	1,036		25.4	1.8	0.6	1.9	9.2	48.3					
55	1,385		31.3	1.9	0.6	2.4	10.2	50.3					
65	0	1,733	0.0	0.0	0.9	7.9	11.2	51.8	7.7	0.0	7.7	2.9	15.0
5	0		2.1	0.2	0.8	5.4	8.2	52.4	5.4	1.0	8.4	3.6	
15	62		5.4	0.5	0.7	2.7	6.6	53.3	3.3	1.7	9.0	4.3	
25	351		12.2	1.2	0.6	1.9	7.1	53.8	2.7	2.0	9.2	4.5	
35	688		19.3	1.6	0.6	1.9	8.2	54.1	2.3	2.1	9.3	4.7	
45	1,036		25.4	1.8	0.6	2.1	9.3	54.2	2.0	2.1	9.3	4.9	
55	1,385		31.3	1.9	0.6	2.5	10.3	54.3	1.7	2.2	9.4	5.0	
65	0	1,733	0.0	0.0	0.9	7.9	11.2	54.3	9.3	2.3	17.1	8.0	15.1

C6.— Regional estimates of timber volume, carbon stocks, and carbon in harvested wood products on forest land after clearcut harvest for white-red-jack pine stands in the Northern Lake States

	Mean volume		Mean carbon density										
Age	Inventory	Harvested	Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Products in use	In landfills	Emitted with energy capture	Emitted without energy capture	Emitted at harvest
years	*-------- m^3/hectare -------*		*tonnes carbon/hectare*										
0	0.0		0.0	0.0	2.0	0.0	0.0	90.6					
5	0.0		0.4	0.0	2.0	0.0	3.1	90.9					
15	6.6		8.0	0.8	2.0	0.6	7.1	93.2					
25	48.1		35.4	3.5	2.0	2.5	9.4	97.3					
35	104.7		62.9	4.9	2.0	4.5	11.0	102.3					
45	158.9		85.8	5.5	2.0	6.2	12.2	107.4					
55	0.0	209.1	0.0	0.0	2.0	25.5	13.8	111.8	25.0	0.0	20.5	9.1	37.9
5	0.0		0.4	0.0	2.0	19.3	10.7	113.7	16.8	3.3	23.2	11.3	
15	6.6		8.0	0.8	2.0	11.6	9.4	116.6	9.7	5.8	25.7	13.4	
25	48.1		35.4	3.5	2.0	8.8	10.1	118.5	7.4	6.5	26.4	14.3	
35	104.7		62.9	4.9	2.0	8.1	11.2	119.6	6.1	6.8	26.7	14.9	
45	158.9		85.8	5.5	2.0	8.2	12.2	120.3	5.2	7.0	27.0	15.4	
55	0.0	209.1	0.0	0.0	2.0	25.5	13.8	120.6	29.5	7.2	47.6	24.8	39.1
years	*----------- ft^3/acre ---------*		*tonnes carbon/acre*										
0	0		0.0	0.0	0.8	0.0	0.0	36.7					
5	0		0.2	0.0	0.8	0.0	1.3	36.8					
15	94		3.3	0.3	0.8	0.2	2.9	37.7					
25	688		14.3	1.4	0.8	1.0	3.8	39.4					
35	1,496		25.5	2.0	0.8	1.8	4.5	41.4					
45	2,271		34.7	2.2	0.8	2.5	4.9	43.5					
55	0	2,988	0.0	0.0	0.8	10.3	5.6	45.3	10.1	0.0	8.3	3.7	15.3
5	0		0.2	0.0	0.8	7.8	4.3	46.0	6.8	1.3	9.4	4.6	
15	94		3.3	0.3	0.8	4.7	3.8	47.2	3.9	2.4	10.4	5.4	
25	688		14.3	1.4	0.8	3.6	4.1	48.0	3.0	2.6	10.7	5.8	
35	1,496		25.5	2.0	0.8	3.3	4.6	48.4	2.5	2.7	10.8	6.0	
45	2,271		34.7	2.2	0.8	3.3	5.0	48.7	2.1	2.8	10.9	6.2	
55	0	2,988	0.0	0.0	0.8	10.3	5.6	48.8	12.0	2.9	19.3	10.1	15.8

C7.— Regional estimates of timber volume, carbon stocks, and carbon in harvested wood products on forest land after clearcut harvest for elm-ash-cottonwood stands in the Northern Prairie States

	Mean volume		Mean carbon density										
Age	Inventory	Harvested	Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Products in use	In landfills	Emitted with energy capture	Emitted without energy capture	Emitted at harvest
years	-------- *m^3/hectare* -------		------------ *tonnes carbon/hectare* ------------										
0	0.0		0.0	0.0	2.1	0.0	0.0	63.6					
5	0.0		3.9	0.4	2.1	0.3	4.2	63.8					
15	0.0		8.7	0.9	2.7	0.6	10.8	65.4					
25	5.8		15.5	1.6	2.4	1.1	15.8	68.3					
35	21.8		27.7	2.8	2.2	1.9	19.7	71.8					
45	45.1		43.2	4.3	2.0	3.0	22.7	75.4					
55	0.0	73.0	0.0	0.0	2.1	11.3	27.7	78.5	10.0	0.0	10.9	3.9	31.2
5	0.0		3.9	0.4	2.1	7.7	20.3	79.8	7.0	1.3	11.7	4.7	
15	0.0		8.7	0.9	2.7	3.9	16.3	81.8	4.3	2.5	12.5	5.5	
25	5.8		15.5	1.6	2.4	2.5	17.6	83.1	3.4	2.8	12.7	5.9	
35	21.8		27.7	2.8	2.2	2.5	20.3	84.0	2.8	2.9	12.9	6.1	
45	45.1		43.2	4.3	2.0	3.3	23.0	84.4	2.4	3.1	13.0	6.3	
55	0.0	73.0	0.0	0.0	2.1	11.3	27.7	84.6	12.2	3.1	23.9	10.4	31.4
years	---------- *ft^3/acre* ----------		------------ *tonnes carbon/acre* ------------										
0	0		0.0	0.0	0.8	0.0	0.0	25.7					
5	0		1.6	0.2	0.8	0.1	1.7	25.8					
15	0		3.5	0.4	1.1	0.2	4.4	26.5					
25	83		6.3	0.6	1.0	0.4	6.4	27.6					
35	312		11.2	1.1	0.9	0.8	8.0	29.1					
45	644		17.5	1.7	0.8	1.2	9.2	30.5					
55	0	1,043	0.0	0.0	0.8	4.6	11.2	31.8	4.1	0.0	4.4	1.6	12.6
5	0		1.6	0.2	0.8	3.1	8.2	32.3	2.8	0.5	4.7	1.9	
15	0		3.5	0.4	1.1	1.6	6.6	33.1	1.8	1.0	5.0	2.2	
25	83		6.3	0.6	1.0	1.0	7.1	33.6	1.4	1.1	5.2	2.4	
35	312		11.2	1.1	0.9	1.0	8.2	34.0	1.1	1.2	5.2	2.5	
45	644		17.5	1.7	0.8	1.3	9.3	34.2	1.0	1.2	5.3	2.6	
55	0	1,043	0.0	0.0	0.8	4.6	11.2	34.2	4.9	1.3	9.7	4.2	12.7

C8.— Regional estimates of timber volume, carbon stocks, and carbon in harvested wood products on forest land after clearcut harvest for oak-hickory stands in the Northern Prairie States

	Mean volume		Mean carbon density										
Age	Inventory	Harvested	Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Products in use	In landfills	Emitted with energy capture	Emitted without energy capture	Emitted at harvest
years	------ m^3/*hectare*-------		------------ *tonnes carbon/hectare* ------------										
0	0.0		0.0	0.0	2.1	0.0	0.0	34.5					
5	0.0		6.7	0.6	2.4	0.5	0.9	34.6					
15	2.1		15.6	1.6	2.1	1.1	2.5	35.4					
25	13.0		27.5	2.7	2.0	1.9	3.9	37.0					
35	27.4		40.0	3.2	1.9	2.7	5.2	38.9					
45	43.0		52.2	3.6	1.8	3.5	6.3	40.8					
55	59.1		64.3	3.9	1.8	4.3	7.2	42.5					
65	0.0	74.9	0.0	0.0	2.1	14.1	8.2	43.8	13.2	0.0	13.9	5.1	37.1
5	0.0		6.7	0.6	2.4	9.8	5.7	44.3	9.2	1.7	15.0	6.2	
15	2.1		15.6	1.6	2.1	5.2	4.1	45.1	5.7	3.1	16.0	7.3	
25	13.0		27.5	2.7	2.0	3.7	4.5	45.5	4.5	3.5	16.4	7.8	
35	27.4		40.0	3.2	1.9	3.5	5.3	45.7	3.8	3.7	16.5	8.1	
45	43.0		52.2	3.6	1.8	3.9	6.3	45.9	3.3	3.9	16.7	8.3	
55	59.1		64.3	3.9	1.8	4.5	7.3	45.9	2.9	4.0	16.8	8.5	
65	0.0	74.9	0.0	0.0	2.1	14.1	8.2	45.9	15.8	4.1	30.7	13.8	37.2
years	--------ft^3/*acre* ---------		------------ *tonnes carbon/acre* ------------										
0	0		0.0	0.0	0.8	0.0	0.0	13.9					
5	0		2.7	0.2	1.0	0.2	0.4	14.0					
15	30		6.3	0.6	0.9	0.4	1.0	14.3					
25	186		11.1	1.1	0.8	0.8	1.6	15.0					
35	391		16.2	1.3	0.8	1.1	2.1	15.7					
45	615		21.1	1.4	0.7	1.4	2.5	16.5					
55	844		26.0	1.6	0.7	1.8	2.9	17.2					
65	0	1,070	0.0	0.0	0.8	5.7	3.3	17.7	5.4	0.0	5.6	2.1	15.0
5	0		2.7	0.2	1.0	4.0	2.3	17.9	3.7	0.7	6.1	2.5	
15	30		6.3	0.6	0.9	2.1	1.7	18.2	2.3	1.3	6.5	3.0	
25	186		11.1	1.1	0.8	1.5	1.8	18.4	1.8	1.4	6.6	3.1	
35	391		16.2	1.3	0.8	1.4	2.2	18.5	1.5	1.5	6.7	3.3	
45	615		21.1	1.4	0.7	1.6	2.6	18.6	1.3	1.6	6.7	3.4	
55	844		26.0	1.6	0.7	1.8	2.9	18.6	1.2	1.6	6.8	3.5	
65	0	1,070	0.0	0.0	0.8	5.7	3.3	18.6	6.4	1.6	12.4	5.6	15.1

C9.— Regional estimates of timber volume, carbon stocks, and carbon in harvested wood products on forest land after clearcut harvest for Douglas-fir stands in the Pacific Northwest, East

	Mean volume		Mean carbon density										
Age	Inventory	Harvested	Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Products in use	In landfills	Emitted with energy capture	Emitted without energy capture	Emitted at harvest
years	------ *m^3/hectare* ------		------ *tonnes carbon/hectare* ------										
0	0.0		0.0	0.0	4.6	0.0	0.0	71.1					
5	0.0		2.7	0.3	4.4	0.3	5.2	71.3					
15	3.8		8.7	0.9	4.1	0.9	13.0	73.1					
25	47.7		38.3	3.8	3.7	3.9	18.6	76.3					
35	119.0		75.1	7.5	3.6	7.7	22.9	80.2					
45	184.7		104.0	10.0	3.5	10.7	26.2	84.2					
55	241.8		127.3	10.9	3.4	13.1	28.9	87.7					
65	290.9		146.4	11.5	3.4	15.0	31.1	90.4					
75	0.0	332.7	0.0	0.0	4.6	26.0	37.2	92.3	41.1	0.0	27.3	16.1	74.9
5	0.0		2.7	0.3	4.4	22.5	35.4	92.9	31.8	4.2	29.9	18.6	
15	3.8		8.7	0.9	4.1	17.2	32.9	93.8	22.6	8.2	32.3	21.3	
25	47.7		38.3	3.8	3.7	15.9	31.8	94.3	18.5	9.9	33.3	22.8	
35	119.0		75.1	7.5	3.6	16.5	31.6	94.6	15.8	11.0	33.9	23.9	
45	184.7		104.0	10.0	3.5	17.1	32.0	94.7	13.7	11.8	34.2	24.8	
55	241.8		127.3	10.9	3.4	17.8	32.7	94.7	12.1	12.4	34.5	25.6	
65	290.9		146.4	11.5	3.4	18.5	33.6	94.8	10.7	12.9	34.6	26.2	
75	0.0	332.7	0.0	0.0	4.6	26.0	37.2	94.8	50.7	13.4	62.0	42.9	79.1

Continued

C9.—Continued

	Mean volume		Mean carbon density										
Age	Inventory	Harvested	Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Products in use	In landfills	Emitted with energy capture	Emitted without energy capture	Emitted at harvest
years	------- *ft³/acre* --------		-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	*tonnes carbon/acre*	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------
0	0		0.0	0.0	1.9	0.0	0.0	28.8					
5	0		1.1	0.1	1.8	0.1	2.1	28.9					
15	54		3.5	0.4	1.7	0.4	5.2	29.6					
25	682		15.5	1.5	1.5	1.6	7.5	30.9					
35	1,701		30.4	3.0	1.4	3.1	9.3	32.5					
45	2,639		42.1	4.1	1.4	4.3	10.6	34.1					
55	3,456		51.5	4.4	1.4	5.3	11.7	35.5					
65	4,157		59.3	4.7	1.4	6.1	12.6	36.6					
75	0	4,755	0.0	0.0	1.9	10.5	15.1	37.3	16.6	0.0	11.1	6.5	30.3
5	0		1.1	0.1	1.8	9.1	14.3	37.6	12.9	1.7	12.1	7.5	
15	54		3.5	0.4	1.7	7.0	13.3	38.0	9.1	3.3	13.1	8.6	
25	682		15.5	1.5	1.5	6.4	12.9	38.2	7.5	4.0	13.5	9.2	
35	1,701		30.4	3.0	1.4	6.7	12.8	38.3	6.4	4.5	13.7	9.7	
45	2,639		42.1	4.1	1.4	6.9	12.9	38.3	5.5	4.8	13.9	10.0	
55	3,456		51.5	4.4	1.4	7.2	13.2	38.3	4.9	5.0	14.0	10.3	
65	4,157		59.3	4.7	1.4	7.5	13.6	38.3	4.3	5.2	14.0	10.6	
75	0	4,755	0.0	0.0	1.9	10.5	15.1	38.3	20.5	5.4	25.1	17.4	32.0

C10.— Regional estimates of timber volume, carbon stocks, and carbon in harvested wood products on forest land after clearcut harvest for ponderosa pine stands in the Pacific Northwest, East

	Mean volume		Mean carbon density										
Age	Inventory	Harvested	Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Products in use	In landfills	Emitted with energy capture	Emitted without energy capture	Emitted at harvest
years	------ *m*^{3}*/hectare* ------		---------- *tonnes carbon/hectare* ----------										
0	0.0		0.0	0.0	4.8	0.0	0.0	38.0					
5	0.0		3.3	0.3	4.6	0.3	2.4	38.1					
15	4.1		7.9	0.8	3.8	0.8	6.4	39.1					
25	21.6		17.3	1.7	3.2	1.8	9.8	40.8					
35	40.8		26.2	2.6	2.9	2.7	12.6	42.9					
45	61.4		34.9	3.3	2.8	3.6	14.9	45.1					
55	83.3		43.6	3.7	2.6	4.5	17.0	46.9					
65	106.0		52.5	4.2	2.5	5.4	18.7	48.4					
75	0.0	129.3	0.0	0.0	4.8	9.6	24.1	49.4	14.4	0.0	9.4	5.6	27.0
5	0.0		3.3	0.3	4.6	8.5	22.0	49.7	11.1	1.5	10.3	6.5	
15	4.1		7.9	0.8	3.8	6.8	19.4	50.2	7.9	2.9	11.2	7.5	
25	21.6		17.3	1.7	3.2	6.2	18.3	50.5	6.5	3.5	11.5	8.0	
35	40.8		26.2	2.6	2.9	5.9	18.2	50.6	5.5	3.8	11.7	8.3	
45	61.4		34.9	3.3	2.8	6.0	18.7	50.7	4.8	4.1	11.8	8.7	
55	83.3		43.6	3.7	2.6	6.3	19.4	50.7	4.2	4.3	11.9	8.9	
65	106.0		52.5	4.2	2.5	6.7	20.4	50.7	3.8	4.5	12.0	9.2	
75	0.0	129.3	0.0	0.0	4.8	9.6	24.1	50.7	17.7	4.7	21.4	15.0	29.0

Continued

C10.—Continued

	Mean volume		Mean carbon density										
Age	Inventory	Harvested	Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Products in use	In landfills	Emitted with energy capture	Emitted without energy capture	Emitted at harvest
years	------- ft^3*/acre* --------		---------- *tonnes carbon/acre* ----------										
0	0		0.0	0.0	1.9	0.0	0.0	15.4					
5	0		1.3	0.1	1.8	0.1	1.0	15.4					
15	59		3.2	0.3	1.5	0.3	2.6	15.8					
25	309		7.0	0.7	1.3	0.7	4.0	16.5					
35	583		10.6	1.1	1.2	1.1	5.1	17.4					
45	878		14.1	1.3	1.1	1.5	6.0	18.2					
55	1,190		17.7	1.5	1.1	1.8	6.9	19.0					
65	1,515		21.2	1.7	1.0	2.2	7.6	19.6					
75	0	1,848	0.0	0.0	1.9	3.9	9.8	20.0	5.8	0.0	3.8	2.3	10.9
5	0		1.3	0.1	1.8	3.5	8.9	20.1	4.5	0.6	4.2	2.6	
15	59		3.2	0.3	1.5	2.8	7.8	20.3	3.2	1.2	4.5	3.0	
25	309		7.0	0.7	1.3	2.5	7.4	20.4	2.6	1.4	4.7	3.2	
35	583		10.6	1.1	1.2	2.4	7.4	20.5	2.2	1.6	4.7	3.4	
45	878		14.1	1.3	1.1	2.4	7.6	20.5	1.9	1.7	4.8	3.5	
55	1,190		17.7	1.5	1.1	2.5	7.9	20.5	1.7	1.8	4.8	3.6	
65	1,515		21.2	1.7	1.0	2.7	8.2	20.5	1.5	1.8	4.8	3.7	
75	0	1,848	0.0	0.0	1.9	3.9	9.8	20.5	7.2	1.9	8.7	6.1	11.7

C11.— Regional estimates of timber volume, carbon stocks, and carbon in harvested wood products on forest land after clearcut harvest for alder-maple stands in the Pacific Northwest, West

	Mean volume		Mean carbon density										
Age	Inventory	Harvested	Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Products in use	In landfills	Emitted with energy capture	Emitted without energy capture	Emitted at harvest
years	----- *m³/hectare* -------		------- *tonnes carbon/hectare* -------										
0	0.0		0.0	0.0	4.7	0.0	0.0	86.4					
5	0.0		8.0	0.8	4.7	0.8	1.8	86.7					
15	49.5		31.0	3.1	3.7	2.9	4.4	88.9					
25	229.7		99.4	9.9	2.8	9.4	6.2	92.8					
35	380.8		153.8	15.4	2.5	14.6	7.6	97.6					
45	0.0	513.7	0.0	0.0	4.7	32.2	9.3	102.4	42.6	0.0	95.0	16.6	50.6
5	0.0		8.0	0.8	4.7	22.0	3.9	104.6	30.3	5.4	98.7	19.8	
15	49.5		31.0	3.1	3.7	12.3	4.5	108.4	18.8	10.1	102.1	23.1	
25	229.7		99.4	9.9	2.8	13.5	6.2	111.2	14.5	11.7	103.3	24.7	
35	380.8		153.8	15.4	2.5	16.4	7.6	113.0	11.8	12.5	103.9	25.8	
45	0.0	513.7	0.0	0.0	4.7	32.2	9.3	114.1	52.6	13.1	199.3	43.3	51.4
years	------ *ft³/acre* ---------		------- *tonnes carbon/acre* -------										
0	0		0.0	0.0	1.9	0.0	0.0	35.0					
5	0		3.2	0.3	1.9	0.3	0.7	35.1					
15	708		12.6	1.3	1.5	1.2	1.8	36.0					
25	3,282		40.2	4.0	1.1	3.8	2.5	37.6					
35	5,442		62.3	6.2	1.0	5.9	3.1	39.5					
45	0	7,342	0.0	0.0	1.9	13.0	3.8	41.5	17.2	0.0	38.4	6.7	20.5
5	0		3.2	0.3	1.9	8.9	1.6	42.3	12.2	2.2	39.9	8.0	
15	708		12.6	1.3	1.5	5.0	1.8	43.9	7.6	4.1	41.3	9.3	
25	3,282		40.2	4.0	1.1	5.5	2.5	45.0	5.9	4.7	41.8	10.0	
35	5,442		62.3	6.2	1.0	6.6	3.1	45.7	4.8	5.1	42.1	10.4	
45	0	7,342	0.0	0.0	1.9	13.0	3.8	46.2	21.3	5.3	80.7	17.5	20.8

C12.— Regional estimates of timber volume, carbon stocks, and carbon in harvested wood products on forest land after clearcut harvest for Douglas-fir stands in the Pacific Northwest, West; volumes are for high-productivity sites (growth rate greater than 165 cubic feet wood/acre/year) with high-intensity management (replanting with genetically improved stock, fertilization, and precommercial thinning)

	Mean volume		Mean carbon density										
Age	Inventory	Harvested	Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Products in use	In landfills	Emitted with energy capture	Emitted without energy capture	Emitted at harvest
years	---- m^3*/hectare* --------		---------- *tonnes carbon/hectare* ----------										
0	0.0		0.0	0.0	4.6	0.0	0.0	71.1					
5	0.0		9.5	0.9	4.4	0.9	3.6	71.3					
15	19.8		23.4	2.3	4.0	2.3	10.0	73.1					
25	169.7		84.6	8.5	3.5	8.5	15.4	76.3					
35	445.7		187.4	10.0	3.2	18.7	20.2	80.2					
45	0.0	718.8	0.0	0.0	4.6	49.3	27.5	84.2	100.1	0.0	57.0	31.8	82.6
5	0.0		9.5	0.9	4.4	43.1	23.7	86.0	76.9	10.9	63.0	38.0	
15	19.8		23.4	2.3	4.0	33.3	20.7	89.2	53.3	21.6	68.9	45.1	
25	169.7		84.6	8.5	3.5	31.2	21.2	91.4	42.5	26.1	71.2	49.0	
35	445.7		187.4	10.0	3.2	35.4	23.3	92.9	35.6	28.8	72.6	51.8	
45	0.0	718.8	0.0	0.0	4.6	49.3	27.5	93.8	130.6	30.7	130.5	85.9	96.5
years	-------- ft^3*/acre* --------		---------- *tonnes carbon/acre* ----------										
0	0		0.0	0.0	1.9	0.0	0.0	28.8					
5	0		3.8	0.4	1.8	0.4	1.5	28.9					
15	283		9.5	0.9	1.6	0.9	4.0	29.6					
25	2,425		34.2	3.4	1.4	3.4	6.2	30.9					
35	6,370		75.9	4.1	1.3	7.6	8.2	32.5					
45	0	10,272	0.0	0.0	1.9	19.9	11.1	34.1	40.5	0.0	23.1	12.9	33.4
5	0		3.8	0.4	1.8	17.5	9.6	34.8	31.1	4.4	25.5	15.4	
15	283		9.5	0.9	1.6	13.5	8.4	36.1	21.6	8.7	27.9	18.3	
25	2,425		34.2	3.4	1.4	12.6	8.6	37.0	17.2	10.6	28.8	19.8	
35	6,370		75.9	4.1	1.3	14.3	9.4	37.6	14.4	11.7	29.4	21.0	
45	0	10,272	0.0	0.0	1.9	19.9	11.1	38.0	52.9	12.4	52.8	34.8	39.0

C13.— Regional estimates of timber volume, carbon stocks, and carbon in harvested wood products on forest land after clearcut harvest for hemlock-Sitka spruce stands in the Pacific Northwest, West; volumes are for high productivity sites (growth rate greater than 225 cubic feet wood/acre/year)

	Mean volume		Mean carbon density										
Age	Inventory	Harvested	Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Products in use	In landfills	Emitted with energy capture	Emitted without energy capture	Emitted at harvest
years	----- *m³/hectare* ------		---------- *tonnes carbon/hectare* ----------										
0	0.0		0.0	0.0	4.7	0.0	0.0	87.3					
5	0.0		5.9	0.6	4.7	0.6	3.6	87.6					
15	80.3		36.4	3.6	3.7	3.6	10.0	89.8					
25	221.7		90.4	9.0	3.0	8.9	15.4	93.7					
35	413.7		161.0	16.1	2.7	15.9	20.2	98.5					
45	0.0	669.6	0.0	0.0	4.7	42.7	27.5	103.4	85.8	0.0	49.3	27.3	93.4
5	0.0		5.9	0.6	4.7	37.1	23.7	105.6	65.8	9.4	54.5	32.7	
15	80.3		36.4	3.6	3.7	30.4	20.7	109.5	45.5	18.5	59.6	38.8	
25	221.7		90.4	9.0	3.0	28.6	21.2	112.3	36.3	22.4	61.6	42.1	
35	413.7		161.0	16.1	2.7	30.3	23.3	114.1	30.4	24.7	62.8	44.6	
45	0.0	669.6	0.0	0.0	4.7	42.7	27.5	115.2	111.8	26.3	112.9	73.8	105.6
years	-------- *ft³/acre*--------		---------- *tonnes carbon/acre* ----------										
0	0		0.0	0.0	1.9	0.0	0.0	35.3					
5	0		2.4	0.2	1.9	0.2	1.5	35.4					
15	1,148		14.7	1.5	1.5	1.5	4.0	36.3					
25	3,169		36.6	3.7	1.2	3.6	6.2	37.9					
35	5,912		65.1	6.5	1.1	6.4	8.2	39.9					
45	0	9,570	0.0	0.0	1.9	17.3	11.1	41.8	34.7	0.0	20.0	11.1	37.8
5	0		2.4	0.2	1.9	15.0	9.6	42.8	26.6	3.8	22.1	13.2	
15	1,148		14.7	1.5	1.5	12.3	8.4	44.3	18.4	7.5	24.1	15.7	
25	3,169		36.6	3.7	1.2	11.6	8.6	45.4	14.7	9.1	24.9	17.0	
35	5,912		65.1	6.5	1.1	12.3	9.4	46.2	12.3	10.0	25.4	18.0	
45	0	9,570	0.0	0.0	1.9	17.3	11.1	46.6	45.3	10.6	45.7	29.9	42.7

C14.— Regional estimates of timber volume, carbon stocks, and carbon in harvested wood products on forest land after clearcut harvest for mixed conifer stands in the Pacific Southwest

	Mean volume		Mean carbon density										
Age	Inventory	Harvested	Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Products in use	In landfills	Emitted with energy capture	Emitted without energy capture	Emitted at harvest
years	*m³/hectare*		*tonnes carbon/hectare*										
0	0.0		0.0	0.0	4.8	0.0	0.0	37.4					
5	0.0		4.2	0.3	4.8	0.4	5.2	37.5					
15	2.0		8.1	0.8	4.8	0.8	13.0	38.4					
25	11.1		14.6	1.5	6.9	1.5	18.6	40.1					
35	24.4		22.3	2.2	4.9	2.2	22.9	42.2					
45	44.5		32.9	3.3	3.6	3.3	26.2	44.3					
55	71.9		46.5	4.7	2.8	4.7	28.9	46.1					
65	106.6		62.8	6.3	2.2	6.3	31.1	47.5					
75	0.0	147.9	0.0	0.0	4.8	12.0	37.2	48.5	17.3	0.0	12.2	6.3	42.7
5	0.0		4.2	0.3	4.8	10.7	35.4	48.8	13.3	1.9	13.2	7.3	
15	2.0		8.1	0.8	4.8	8.4	32.9	49.3	9.3	3.7	14.3	8.5	
25	11.1		14.6	1.5	6.9	7.0	31.8	49.6	7.4	4.5	14.7	9.1	
35	24.4		22.3	2.2	4.9	6.3	31.6	49.7	6.2	4.9	15.0	9.6	
45	44.5		32.9	3.3	3.6	6.3	32.0	49.8	5.3	5.3	15.2	10.0	
55	71.9		46.5	4.7	2.8	6.9	32.7	49.8	4.7	5.5	15.3	10.3	
65	106.6		62.8	6.3	2.2	7.9	33.6	49.8	4.1	5.7	15.4	10.5	
75	0.0	147.9	0.0	0.0	4.8	12.0	37.2	49.8	20.9	5.9	27.6	17.0	45.6

Continued

C14.—Continued

	Mean volume		Mean carbon density										
Age	Inventory	Harvested	Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Products in use	In landfills	Emitted with energy capture	Emitted without energy capture	Emitted at harvest
years	------- *ft^3/acre* --------		---------- *tonnes carbon/acre* ----------										
0	0		0.0	0.0	1.9	0.0	0.0	15.1					
5	0		1.7	0.1	1.9	0.2	2.1	15.2					
15	29		3.3	0.3	1.9	0.3	5.2	15.5					
25	159		5.9	0.6	2.8	0.6	7.5	16.2					
35	349		9.0	0.9	2.0	0.9	9.3	17.1					
45	636		13.3	1.3	1.5	1.3	10.6	17.9					
55	1,028		18.8	1.9	1.1	1.9	11.7	18.7					
65	1,523		25.4	2.5	0.9	2.6	12.6	19.2					
75	0	2,114	0.0	0.0	1.9	4.9	15.1	19.6	7.0	0.0	4.9	2.5	17.3
5	0		1.7	0.1	1.9	4.3	14.3	19.8	5.4	0.8	5.4	3.0	
15	29		3.3	0.3	1.9	3.4	13.3	20.0	3.7	1.5	5.8	3.4	
25	159		5.9	0.6	2.8	2.8	12.9	20.1	3.0	1.8	6.0	3.7	
35	349		9.0	0.9	2.0	2.6	12.8	20.1	2.5	2.0	6.1	3.9	
45	636		13.3	1.3	1.5	2.5	12.9	20.1	2.2	2.1	6.1	4.0	
55	1,028		18.8	1.9	1.1	2.8	13.2	20.1	1.9	2.2	6.2	4.2	
65	1,523		25.4	2.5	0.9	3.2	13.6	20.2	1.7	2.3	6.2	4.3	
75	0	2,114	0.0	0.0	1.9	4.9	15.1	20.2	8.5	2.4	11.2	6.9	18.4

C15.— Regional estimates of timber volume, carbon stocks, and carbon in harvested wood products on forest land after clearcut harvest for western oak stands in the Pacific Southwest

	Mean volume		Mean carbon density										
Age	Inventory	Harvested	Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Products in use	In landfills	Emitted with energy capture	Emitted without energy capture	Emitted at harvest
years	------ *m³/hectare* ------		---------- *tonnes carbon/hectare* ----------										
0	0.0		0.0	0.0	4.7	0.0	0.0	20.7					
5	0.0		2.6	0.2	4.6	0.1	3.7	20.8					
15	0.0		5.7	0.6	4.5	0.2	9.8	21.3					
25	1.0		8.8	0.9	4.4	0.4	14.4	22.2					
35	25.9		30.6	3.1	4.2	1.3	18.1	23.4					
45	76.3		65.1	4.5	4.1	2.7	21.1	24.5					
55	127.8		98.3	5.4	4.0	4.1	23.6	25.5					
65	174.4		124.0	6.0	4.0	5.1	25.6	26.3					
75	0.0	215.0	0.0	0.0	4.7	13.3	31.7	26.9	19.5	0.0	52.4	7.8	59.7
5	0.0		2.6	0.2	4.6	8.9	28.4	27.1	14.7	2.3	53.7	9.1	
15	0.0		5.7	0.6	4.5	4.1	24.6	27.3	9.8	4.4	55.1	10.4	
25	1.0		8.8	0.9	4.4	2.1	23.4	27.5	7.6	5.4	55.7	11.1	
35	25.9		30.6	3.1	4.2	2.0	23.5	27.5	6.2	5.9	56.0	11.6	
45	76.3		65.1	4.5	4.1	3.0	24.3	27.6	5.2	6.3	56.2	12.0	
55	127.8		98.3	5.4	4.0	4.2	25.5	27.6	4.5	6.5	56.4	12.4	
65	174.4		124.0	6.0	4.0	5.2	26.8	27.6	3.9	6.7	56.5	12.7	
75	0.0	215.0	0.0	0.0	4.7	13.3	31.7	27.6	22.9	6.9	109.0	20.7	60.4

Continued

C15.—Continued

	Mean volume		Mean carbon density										
Age	Inventory	Harvested	Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Products in use	In landfills	Emitted with energy capture	Emitted without energy capture	Emitted at harvest
years	------- ft^3/*acre* --------		---------- *tonnes carbon/acre* ----------										
0	0		0.0	0.0	1.9	0.0	0.0	8.4					
5	0		1.1	0.1	1.9	0.0	1.5	8.4					
15	0		2.3	0.2	1.8	0.1	3.9	8.6					
25	15		3.6	0.4	1.8	0.1	5.8	9.0					
35	370		12.4	1.2	1.7	0.5	7.3	9.5					
45	1,090		26.3	1.8	1.7	1.1	8.5	9.9					
55	1,826		39.8	2.2	1.6	1.7	9.5	10.3					
65	2,493		50.2	2.4	1.6	2.1	10.4	10.6					
75	0	3,072	0.0	0.0	1.9	5.4	12.8	10.9	7.9	0.0	21.2	3.2	24.1
5	0		1.1	0.1	1.9	3.6	11.5	10.9	5.9	0.9	21.7	3.7	
15	0		2.3	0.2	1.8	1.7	10.0	11.1	4.0	1.8	22.3	4.2	
25	15		3.6	0.4	1.8	0.8	9.5	11.1	3.1	2.2	22.5	4.5	
35	370		12.4	1.2	1.7	0.8	9.5	11.1	2.5	2.4	22.7	4.7	
45	1,090		26.3	1.8	1.7	1.2	9.8	11.2	2.1	2.5	22.8	4.9	
55	1,826		39.8	2.2	1.6	1.7	10.3	11.2	1.8	2.6	22.8	5.0	
65	2,493		50.2	2.4	1.6	2.1	10.9	11.2	1.6	2.7	22.9	5.1	
75	0	3,072	0.0	0.0	1.9	5.4	12.8	11.2	9.3	2.8	44.1	8.4	24.4

C16.— Regional estimates of timber volume, carbon stocks, and carbon in harvested wood products on forest land after clearcut harvest for Douglas-fir stands in the Rocky Mountain, North

	Mean volume		Mean carbon density										
Age	Inventory	Harvested	Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Products in use	In landfills	Emitted with energy capture	Emitted without energy capture	Emitted at harvest
years	------ m^3/*hectare* ------		--- *tonnes carbon/hectare* ---										
0	0.0		0.0	0.0	4.7	0.0	0.0	29.1					
5	0.0		2.7	0.3	4.7	0.2	5.2	29.2					
15	1.1		6.1	0.6	4.7	0.4	13.0	30.0					
25	19.7		21.5	2.2	3.4	1.3	18.6	31.3					
35	57.1		44.3	4.4	2.7	2.8	22.9	32.9					
45	100.9		66.5	6.7	2.3	4.1	26.2	34.5					
55	145.9		87.2	8.7	2.1	5.4	28.9	35.9					
65	189.3		105.9	10.1	1.9	6.6	31.1	37.1					
75	0.0	229.7	0.0	0.0	4.7	22.4	37.2	37.8	40.7	0.0	31.8	8.1	30.6
5	0.0		2.7	0.3	4.7	20.2	35.4	38.1	31.2	4.4	35.1	9.9	
15	1.1		6.1	0.6	4.7	16.3	32.9	38.5	21.5	8.8	38.3	12.0	
25	19.7		21.5	2.2	3.4	14.0	31.8	38.7	17.2	10.7	39.6	13.3	
35	57.1		44.3	4.4	2.7	12.8	31.6	38.8	14.3	11.8	40.3	14.2	
45	100.9		66.5	6.7	2.3	12.1	32.0	38.8	12.3	12.5	40.8	15.1	
55	145.9		87.2	8.7	2.1	11.8	32.7	38.8	10.7	13.1	41.1	15.8	
65	189.3		105.9	10.1	1.9	11.6	33.6	38.8	9.4	13.6	41.3	16.4	
75	0.0	229.7	0.0	0.0	4.7	22.4	37.2	38.8	49.1	13.9	73.2	25.1	36.3

Continued

C16.—Continued

	Mean volume		Mean carbon density										
Age	Inventory	Harvested	Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Products in use	In landfills	Emitted with energy capture	Emitted without energy capture	Emitted at harvest
years	------- ft^3/*acre* --------		------- *tonnes carbon/acre* -------										
0	0		0.0	0.0	1.9	0.0	0.0	11.8					
5	0		1.1	0.1	1.9	0.1	2.1	11.8					
15	16		2.5	0.2	1.9	0.2	5.2	12.1					
25	281		8.7	0.9	1.4	0.5	7.5	12.7					
35	816		17.9	1.8	1.1	1.1	9.3	13.3					
45	1,442		26.9	2.7	0.9	1.7	10.6	14.0					
55	2,085		35.3	3.5	0.8	2.2	11.7	14.5					
65	2,705		42.9	4.1	0.8	2.7	12.6	15.0					
75	0	3,283	0.0	0.0	1.9	9.1	15.1	15.3	16.5	0.0	12.9	3.3	12.4
5	0		1.1	0.1	1.9	8.2	14.3	15.4	12.6	1.8	14.2	4.0	
15	16		2.5	0.2	1.9	6.6	13.3	15.6	8.7	3.6	15.5	4.9	
25	281		8.7	0.9	1.4	5.6	12.9	15.6	6.9	4.3	16.0	5.4	
35	816		17.9	1.8	1.1	5.2	12.8	15.7	5.8	4.8	16.3	5.8	
45	1,442		26.9	2.7	0.9	4.9	12.9	15.7	5.0	5.1	16.5	6.1	
55	2,085		35.3	3.5	0.8	4.8	13.2	15.7	4.3	5.3	16.6	6.4	
65	2,705		42.9	4.1	0.8	4.7	13.6	15.7	3.8	5.5	16.7	6.6	
75	0	3,283	0.0	0.0	1.9	9.1	15.1	15.7	19.9	5.6	29.6	10.2	14.7

C17.— Regional estimates of timber volume, carbon stocks, and carbon in harvested wood products on forest land after clearcut harvest for lodgepole pine stands in the Rocky Mountain, North

	Mean volume		Mean carbon density										
Age	Inventory	Harvested	Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Products in use	In landfills	Emitted with energy capture	Emitted without energy capture	Emitted at harvest
years	------ m^3*/hectare* ------		---------- *tonnes carbon/hectare* ----------										
0	0.0		0.0	0.0	4.8	0.0	0.0	27.9					
5	0.0		1.9	0.1	4.8	0.1	2.4	28.0					
15	0.2		4.1	0.3	4.8	0.2	6.4	28.7					
25	15.9		14.3	1.4	3.5	0.8	9.8	29.9					
35	51.6		29.9	3.0	2.4	1.7	12.6	31.5					
45	94.3		45.8	4.6	1.9	2.7	14.9	33.0					
55	138.8		59.4	5.9	1.7	3.4	17.0	34.4					
65	182.1		71.6	7.2	1.5	4.2	18.7	35.5					
75	0.0	223.1	0.0	0.0	4.8	17.7	24.1	36.2	32.3	0.0	25.6	6.4	6.4
5	0.0		1.9	0.1	4.8	15.9	22.0	36.5	24.8	3.5	28.2	7.9	
15	0.2		4.1	0.3	4.8	12.8	19.4	36.8	17.1	7.0	30.7	9.5	
25	15.9		14.3	1.4	3.5	10.8	18.3	37.0	13.6	8.5	31.8	10.5	
35	51.6		29.9	3.0	2.4	9.6	18.2	37.1	11.4	9.3	32.4	11.3	
45	94.3		45.8	4.6	1.9	8.9	18.7	37.1	9.8	9.9	32.7	11.9	
55	138.8		59.4	5.9	1.7	8.4	19.4	37.2	8.5	10.4	33.0	12.5	
65	182.1		71.6	7.2	1.5	8.1	20.4	37.2	7.5	10.8	33.1	13.0	
75	0.0	223.1	0.0	0.0	4.8	17.7	24.1	37.2	39.0	11.1	58.8	19.9	10.6

Continued

C17.—Continued

	Mean volume		Mean carbon density										
Age	Inventory	Harvested	Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Products in use	In landfills	Emitted with energy capture	Emitted without energy capture	Emitted at harvest
years	------- *ft^3/acre* --------		---------- *tonnes carbon/acre* ----------										
0	0		0.0	0.0	1.9	0.0	0.0	11.3					
5	0		0.8	0.0	1.9	0.0	1.0	11.3					
15	3		1.7	0.1	1.9	0.1	2.6	11.6					
25	227		5.8	0.6	1.4	0.3	4.0	12.1					
35	737		12.1	1.2	1.0	0.7	5.1	12.7					
45	1,348		18.5	1.9	0.8	1.1	6.0	13.4					
55	1,983		24.0	2.4	0.7	1.4	6.9	13.9					
65	2,603		29.0	2.9	0.6	1.7	7.6	14.4					
75	0	3,189	0.0	0.0	1.9	7.2	9.8	14.6	13.1	0.0	10.4	2.6	2.6
5	0		0.8	0.0	1.9	6.4	8.9	14.8	10.0	1.4	11.4	3.2	
15	3		1.7	0.1	1.9	5.2	7.8	14.9	6.9	2.8	12.4	3.9	
25	227		5.8	0.6	1.4	4.4	7.4	15.0	5.5	3.4	12.8	4.3	
35	737		12.1	1.2	1.0	3.9	7.4	15.0	4.6	3.8	13.1	4.6	
45	1,348		18.5	1.9	0.8	3.6	7.6	15.0	3.9	4.0	13.2	4.8	
55	1,983		24.0	2.4	0.7	3.4	7.9	15.0	3.4	4.2	13.3	5.1	
65	2,603		29.0	2.9	0.6	3.3	8.2	15.0	3.0	4.4	13.4	5.3	
75	0	3,189	0.0	0.0	1.9	7.2	9.8	15.0	15.8	4.5	23.8	8.1	4.3

C18.— Regional estimates of timber volume, carbon stocks, and carbon in harvested wood products on forest land after clearcut harvest for fir-spruce-mountain hemlock stands in the Rocky Mountain, South

	Mean volume		Mean carbon density										
Age	Inventory	Harvested	Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Products in use	In landfills	Emitted with energy capture	Emitted without energy capture	Emitted at harvest
years	------ m^3*/hectare* ------		------ *tonnes carbon/hectare* ------										
0	0.0		0.0	0.0	4.8	0.0	0.0	23.6					
5	0.0		1.8	0.2	4.8	0.1	5.2	23.7					
15	0.0		4.0	0.4	4.8	0.3	13.0	24.3					
25	8.5		12.0	1.2	4.3	0.9	18.6	25.3					
35	27.7		24.4	2.4	2.8	1.9	22.9	26.7					
45	49.5		36.7	3.7	2.3	2.9	26.2	28.0					
55	71.9		48.7	4.9	1.9	3.8	28.9	29.1					
65	94.1		58.6	5.9	1.7	4.6	31.1	30.0					
75	0.0	115.7	0.0	0.0	4.8	11.3	37.2	30.6	16.4	0.0	14.8	3.4	26.5
5	0.0		1.8	0.2	4.8	10.2	35.4	30.9	12.6	1.8	16.1	4.1	
15	0.0		4.0	0.4	4.8	8.3	32.9	31.2	8.7	3.6	17.4	5.0	
25	8.5		12.0	1.2	4.3	7.3	31.8	31.3	6.9	4.3	17.9	5.5	
35	27.7		24.4	2.4	2.8	7.0	31.6	31.4	5.7	4.8	18.2	5.9	
45	49.5		36.7	3.7	2.3	6.9	32.0	31.4	4.9	5.1	18.4	6.2	
55	71.9		48.7	4.9	1.9	7.0	32.7	31.5	4.3	5.3	18.6	6.5	
65	94.1		58.6	5.9	1.7	7.1	33.6	31.5	3.8	5.5	18.6	6.7	
75	0.0	115.7	0.0	0.0	4.8	11.3	37.2	31.5	19.8	5.6	33.5	10.3	30.2

Continued

C18.—Continued

	Mean volume		Mean carbon density										
Age	Inventory	Harvested	Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Products in use	In landfills	Emitted with energy capture	Emitted without energy capture	Emitted at harvest
years	------- *ft*^{3}*/acre* --------		--------- *tonnes carbon/acre* ---------										
0	0		0.0	0.0	2.0	0.0	0.0	9.6					
5	0		0.7	0.1	2.0	0.1	2.1	9.6					
15	0		1.6	0.2	2.0	0.1	5.2	9.8					
25	122		4.8	0.5	1.7	0.4	7.5	10.3					
35	396		9.9	1.0	1.1	0.8	9.3	10.8					
45	708		14.8	1.5	0.9	1.2	10.6	11.3					
55	1,028		19.7	2.0	0.8	1.6	11.7	11.8					
65	1,345		23.7	2.4	0.7	1.9	12.6	12.1					
75	0	1,654	0.0	0.0	2.0	4.6	15.1	12.4	6.6	0.0	6.0	1.4	10.7
5	0		0.7	0.1	2.0	4.1	14.3	12.5	5.1	0.7	6.5	1.7	
15	0		1.6	0.2	2.0	3.4	13.3	12.6	3.5	1.4	7.0	2.0	
25	122		4.8	0.5	1.7	3.0	12.9	12.7	2.8	1.7	7.3	2.2	
35	396		9.9	1.0	1.1	2.8	12.8	12.7	2.3	1.9	7.4	2.4	
45	708		14.8	1.5	0.9	2.8	12.9	12.7	2.0	2.0	7.5	2.5	
55	1,028		19.7	2.0	0.8	2.8	13.2	12.7	1.7	2.1	7.5	2.6	
65	1,345		23.7	2.4	0.7	2.9	13.6	12.7	1.5	2.2	7.5	2.7	
75	0	1,654	0.0	0.0	2.0	4.6	15.1	12.7	8.0	2.3	13.5	4.2	12.2

C19.— Regional estimates of timber volume, carbon stocks, and carbon in harvested wood products on forest land after clearcut harvest for ponderosa pine stands in the Rocky Mountain, South

	Mean volume		Mean carbon density										
Age	Inventory	Harvested	Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Products in use	In landfills	Emitted with energy capture	Emitted without energy capture	Emitted at harvest
years	------ m^3/*hectare* ------		---------- *tonnes carbon/hectare* ----------										
0	0.0		0.0	0.0	4.8	0.0	0.0	18.1					
5	0.0		1.8	0.2	4.8	0.2	2.4	18.1					
15	0.0		3.7	0.4	4.8	0.3	6.4	18.6					
25	4.4		9.4	0.9	4.8	0.8	9.8	19.4					
35	16.2		18.6	1.9	2.9	1.5	12.6	20.4					
45	32.2		28.8	2.7	2.1	2.4	14.9	21.4					
55	50.3		38.2	3.0	1.7	3.1	17.0	22.3					
65	69.3		47.1	3.3	1.5	3.9	18.7	23.0					
75	0.0	88.4	0.0	0.0	4.8	9.7	24.1	23.5	14.2	0.0	11.1	2.8	18.5
5	0.0		1.8	0.2	4.8	8.8	22.0	23.6	10.9	1.6	12.2	3.5	
15	0.0		3.7	0.4	4.8	7.1	19.4	23.9	7.5	3.1	13.3	4.2	
25	4.4		9.4	0.9	4.8	6.2	18.3	24.0	6.0	3.7	13.8	4.6	
35	16.2		18.6	1.9	2.9	5.8	18.2	24.1	5.0	4.1	14.1	5.0	
45	32.2		28.8	2.7	2.1	5.8	18.7	24.1	4.3	4.4	14.2	5.3	
55	50.3		38.2	3.0	1.7	5.9	19.4	24.1	3.7	4.6	14.3	5.5	
65	69.3		47.1	3.3	1.5	6.0	20.4	24.1	3.3	4.7	14.4	5.7	
75	0.0	88.4	0.0	0.0	4.8	9.7	24.1	24.1	17.1	4.9	25.5	8.8	21.3

Continued

C19.—Continued

	Mean volume		Mean carbon density										
Age	Inventory	Harvested	Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Products in use	In landfills	Emitted with energy capture	Emitted without energy capture	Emitted at harvest
years	------- ft^3*/acre* --------		---------- *tonnes carbon/acre* ----------										
0	0		0.0	0.0	2.0	0.0	0.0	7.3					
5	0		0.7	0.1	2.0	0.1	1.0	7.3					
15	0		1.5	0.1	2.0	0.1	2.6	7.5					
25	63		3.8	0.4	2.0	0.3	4.0	7.9					
35	231		7.5	0.8	1.2	0.6	5.1	8.3					
45	460		11.7	1.1	0.9	1.0	6.0	8.7					
55	719		15.5	1.2	0.7	1.3	6.9	9.0					
65	990		19.1	1.4	0.6	1.6	7.6	9.3					
75	0	1,263	0.0	0.0	2.0	3.9	9.8	9.5	5.8	0.0	4.5	1.2	7.5
5	0		0.7	0.1	2.0	3.5	8.9	9.6	4.4	0.6	4.9	1.4	
15	0		1.5	0.1	2.0	2.9	7.8	9.7	3.0	1.2	5.4	1.7	
25	63		3.8	0.4	2.0	2.5	7.4	9.7	2.4	1.5	5.6	1.9	
35	231		7.5	0.8	1.2	2.4	7.4	9.7	2.0	1.7	5.7	2.0	
45	460		11.7	1.1	0.9	2.3	7.6	9.8	1.7	1.8	5.8	2.1	
55	719		15.5	1.2	0.7	2.4	7.9	9.8	1.5	1.9	5.8	2.2	
65	990		19.1	1.4	0.6	2.4	8.2	9.8	1.3	1.9	5.8	2.3	
75	0	1,263	0.0	0.0	2.0	3.9	9.8	9.8	6.9	2.0	10.3	3.6	8.6

C20.— Regional estimates of timber volume, carbon stocks, and carbon in harvested wood products on forest land after clearcut harvest for loblolly-shortleaf pine stands in the Southeast; volumes are for high productivity sites (growth rate greater than 85 cubic feet wood/acre/year) with high intensity management (replanting with genetically improved stock)

	Mean volume		Mean carbon density										
Age	Inventory	Harvested	Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Products in use	In landfills	Emitted with energy capture	Emitted without energy capture	Emitted at harvest
years	----- *m*^{3}*/hectare* ------		---------- *tonnes carbon/hectare* ----------										
0	0.0		0.0	0.0	4.1	0.0	0.0	54.7					
5	0.0		11.0	0.7	4.0	0.4	3.2	54.9					
10	47.7		31.9	1.4	3.8	1.2	5.5	55.4					
15	146.5		67.4	1.9	3.7	2.5	7.3	56.3					
20	244.8		102.3	2.1	3.7	3.8	8.7	57.4					
25	0.0	315.2	0.0	0.0	4.1	20.4	12.2	58.7	41.1	0.0	30.3	14.2	22.2
5	0.0		11.0	0.7	4.0	15.9	6.5	60.2	26.9	5.4	35.2	18.3	
10	47.7		31.9	1.4	3.8	12.9	6.4	61.8	19.1	8.0	37.9	20.7	
15	146.5		67.4	1.9	3.7	11.4	7.5	63.3	15.2	9.2	39.3	22.1	
20	244.8		102.3	2.1	3.7	10.5	8.7	64.8	13.2	9.6	39.9	23.0	
25	0.0	315.2	0.0	0.0	4.1	20.4	12.2	66.2	53.0	9.9	70.6	37.9	27.3
years	------- *ft*^{3}*/acre* --------		---------- *tonnes carbon/acre* ----------										
0	0		0.0	0.0	1.7	0.0	0.0	22.1					
5	0		4.5	0.3	1.6	0.2	1.3	22.2					
10	682		12.9	0.6	1.6	0.5	2.2	22.4					
15	2,094		27.3	0.8	1.5	1.0	2.9	22.8					
20	3,498		41.4	0.9	1.5	1.5	3.5	23.2					
25	0	4,504	0.0	0.0	1.7	8.3	4.9	23.8	16.6	0.0	12.3	5.8	9.0
5	0		4.5	0.3	1.6	6.4	2.6	24.4	10.9	2.2	14.2	7.4	
10	682		12.9	0.6	1.6	5.2	2.6	25.0	7.7	3.2	15.3	8.4	
15	2,094		27.3	0.8	1.5	4.6	3.0	25.6	6.1	3.7	15.9	8.9	
20	3,498		41.4	0.9	1.5	4.3	3.5	26.2	5.3	3.9	16.2	9.3	
25	0	4,504	0.0	0.0	1.7	8.3	4.9	26.8	21.4	4.0	28.6	15.3	11.0

C21.— Regional estimates of timber volume, carbon stocks, and carbon in harvested wood products on forest land after clearcut harvest for oak-gum-cypress stands in the Southeast

	Mean volume		Mean carbon density										
Age	Inventory	Harvested	Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Products in use	In landfills	Emitted with energy capture	Emitted without energy capture	Emitted at harvest
years	------ m^3/*hectare* ------		------ *tonnes carbon/hectare* ------										
0	0.0		0.0	0.0	1.8	0.0	0.0	118.5					
5	0.0		6.7	0.7	1.9	0.4	1.1	118.9					
10	9.8		18.8	1.9	1.8	1.2	2.1	120.1					
15	19.9		28.3	2.4	1.7	1.8	3.0	121.9					
20	32.7		38.0	2.8	1.7	2.4	3.7	124.4					
25	45.4		46.8	3.1	1.6	3.0	4.4	127.2					
30	58.1		54.0	3.4	1.6	3.4	5.0	130.5					
35	73.4		62.3	3.6	1.6	4.0	5.5	133.8					
40	92.2		71.9	3.9	1.6	4.6	6.0	137.2					
45	110.7		80.9	4.2	1.6	5.1	6.4	140.4					
50	0.0	128.1	0.0	0.0	1.8	10.2	6.0	143.5	14.5	0.0	15.5	6.0	53.4
5	0.0		6.7	0.7	1.9	6.2	2.4	146.2	9.4	2.1	17.0	7.5	
10	9.8		18.8	1.9	1.8	4.5	2.4	148.7	6.6	3.1	17.8	8.4	
15	19.9		28.3	2.4	1.7	3.7	3.0	150.7	5.2	3.6	18.3	8.9	
20	32.7		38.0	2.8	1.7	3.5	3.8	152.4	4.4	3.8	18.5	9.3	
25	45.4		46.8	3.1	1.6	3.6	4.4	153.8	3.9	3.9	18.7	9.5	
30	58.1		54.0	3.4	1.6	3.8	5.0	155.0	3.5	4.0	18.8	9.7	
35	73.4		62.3	3.6	1.6	4.2	5.5	155.8	3.2	4.0	18.8	9.9	
40	92.2		71.9	3.9	1.6	4.7	6.0	156.5	3.0	4.1	18.9	10.0	
45	110.7		80.9	4.2	1.6	5.2	6.4	156.9	2.8	4.1	18.9	10.2	
50	0.0	128.1	0.0	0.0	1.8	10.2	6.0	157.3	17.0	4.2	34.4	16.3	53.4

Continued

C21.—Continued

	Mean volume		Mean carbon density										
Age	Inventory	Harvested	Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Products in use	In landfills	Emitted with energy capture	Emitted without energy capture	Emitted at harvest
years	------- *ft³/acre* --------		------------------------ *tonnes carbon/acre* ------------------------										
0	0		0.0	0.0	0.7	0.0	0.0	48.0					
5	0		2.7	0.3	0.8	0.2	0.5	48.1					
10	140		7.6	0.8	0.7	0.5	0.9	48.6					
15	284		11.5	1.0	0.7	0.7	1.2	49.3					
20	467		15.4	1.1	0.7	1.0	1.5	50.3					
25	649		18.9	1.3	0.7	1.2	1.8	51.5					
30	830		21.9	1.4	0.7	1.4	2.0	52.8					
35	1,049		25.2	1.5	0.6	1.6	2.2	54.2					
40	1,318		29.1	1.6	0.6	1.9	2.4	55.5					
45	1,582		32.7	1.7	0.6	2.1	2.6	56.8					
50	0	1,830	0.0	0.0	0.7	4.1	2.4	58.1	5.9	0.0	6.3	2.4	21.6
5	0		2.7	0.3	0.8	2.5	1.0	59.2	3.8	0.8	6.9	3.0	
10	140		7.6	0.8	0.7	1.8	1.0	60.2	2.7	1.3	7.2	3.4	
15	284		11.5	1.0	0.7	1.5	1.2	61.0	2.1	1.4	7.4	3.6	
20	467		15.4	1.1	0.7	1.4	1.5	61.7	1.8	1.5	7.5	3.7	
25	649		18.9	1.3	0.7	1.5	1.8	62.3	1.6	1.6	7.6	3.8	
30	830		21.9	1.4	0.7	1.5	2.0	62.7	1.4	1.6	7.6	3.9	
35	1,049		25.2	1.5	0.6	1.7	2.2	63.1	1.3	1.6	7.6	4.0	
40	1,318		29.1	1.6	0.6	1.9	2.4	63.3	1.2	1.6	7.6	4.1	
45	1,582		32.7	1.7	0.6	2.1	2.6	63.5	1.1	1.7	7.7	4.1	
50	0	1,830	0.0	0.0	0.7	4.1	2.4	63.7	6.9	1.7	13.9	6.6	21.6

C22.— Regional estimates of timber volume, carbon stocks, and carbon in harvested wood products on forest land after clearcut harvest for oak-hickory stands in the Southeast

	Mean volume		Mean carbon density										
Age	Inventory	Harvested	Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Products in use	In landfills	Emitted with energy capture	Emitted without energy capture	Emitted at harvest
years	----- m^3/*hectare* -------		---------- *tonnes carbon/hectare* ----------										
0	0.0		0.0	0.0	4.2	0.0	0.0	33.9					
5	0.0		8.1	0.8	4.2	0.5	1.1	34.1					
10	11.7		21.0	2.1	3.8	1.2	2.1	34.4					
15	21.2		30.3	2.5	3.5	1.8	3.0	34.9					
20	33.8		40.0	2.8	3.3	2.4	3.7	35.6					
25	46.6		49.5	3.0	3.2	2.9	4.4	36.4					
30	60.2		57.5	3.2	3.1	3.4	5.0	37.4					
35	76.3		66.6	3.4	3.0	4.0	5.5	38.3					
40	94.3		76.2	3.6	2.9	4.5	6.0	39.3					
45	114.1		86.4	3.8	2.9	5.1	6.4	40.2					
50	0.0	133.0	0.0	0.0	4.2	10.8	6.0	41.1	15.7	0.0	17.9	6.8	53.7
5	0.0		8.1	0.8	4.2	6.7	2.4	41.9	10.1	2.3	19.5	8.5	
10	11.7		21.0	2.1	3.8	4.8	2.4	42.6	7.0	3.5	20.5	9.4	
15	21.2		30.3	2.5	3.5	3.8	3.0	43.2	5.4	4.0	21.0	10.0	
20	33.8		40.0	2.8	3.3	3.5	3.8	43.7	4.6	4.3	21.2	10.4	
25	46.6		49.5	3.0	3.2	3.6	4.4	44.1	4.0	4.4	21.4	10.6	
30	60.2		57.5	3.2	3.1	3.8	5.0	44.4	3.6	4.5	21.5	10.9	
35	76.3		66.6	3.4	3.0	4.2	5.5	44.6	3.3	4.5	21.6	11.1	
40	94.3		76.2	3.6	2.9	4.6	6.0	44.8	3.0	4.6	21.6	11.2	
45	114.1		86.4	3.8	2.9	5.2	6.4	44.9	2.8	4.6	21.7	11.4	
50	0.0	133.0	0.0	0.0	4.2	10.8	6.0	45.0	18.2	4.6	39.6	18.3	53.7

Continued

C22.—Continued

Age	Mean volume: Inventory	Mean volume: Harvested	Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Products in use	In landfills	Emitted with energy capture	Emitted without energy capture	Emitted at harvest
years	------ *ft³/acre* ----------		----------	----------	----------	----------	----------	*tonnes carbon/acre*	----------	----------	----------	----------	----------
0	0		0.0	0.0	1.7	0.0	0.0	13.7					
5	0		3.3	0.3	1.7	0.2	0.5	13.8					
10	167		8.5	0.8	1.5	0.5	0.9	13.9					
15	303		12.3	1.0	1.4	0.7	1.2	14.1					
20	483		16.2	1.1	1.3	1.0	1.5	14.4					
25	666		20.1	1.2	1.3	1.2	1.8	14.7					
30	860		23.3	1.3	1.3	1.4	2.0	15.1					
35	1,091		26.9	1.4	1.2	1.6	2.2	15.5					
40	1,348		30.8	1.5	1.2	1.8	2.4	15.9					
45	1,630		35.0	1.5	1.2	2.1	2.6	16.3					
50	0	1,901	0.0	0.0	1.7	4.4	2.4	16.6	6.3	0.0	7.3	2.8	21.7
5	0		3.3	0.3	1.7	2.7	1.0	16.9	4.1	0.9	7.9	3.4	
10	167		8.5	0.8	1.5	1.9	1.0	17.2	2.8	1.4	8.3	3.8	
15	303		12.3	1.0	1.4	1.5	1.2	17.5	2.2	1.6	8.5	4.1	
20	483		16.2	1.1	1.3	1.4	1.5	17.7	1.9	1.7	8.6	4.2	
25	666		20.1	1.2	1.3	1.5	1.8	17.8	1.6	1.8	8.6	4.3	
30	860		23.3	1.3	1.3	1.5	2.0	18.0	1.5	1.8	8.7	4.4	
35	1,091		26.9	1.4	1.2	1.7	2.2	18.1	1.3	1.8	8.7	4.5	
40	1,348		30.8	1.5	1.2	1.9	2.4	18.1	1.2	1.8	8.8	4.5	
45	1,630		35.0	1.5	1.2	2.1	2.6	18.2	1.1	1.9	8.8	4.6	
50	0	1,901	0.0	0.0	1.7	4.4	2.4	18.2	7.4	1.9	16.0	7.4	21.7

C23.— Regional estimates of timber volume, carbon stocks, and carbon in harvested wood products on forest land after clearcut harvest for oak-pine stands in the Southeast

	Mean volume		Mean carbon density										
Age	Inventory	Harvested	Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Products in use	In landfills	Emitted with energy capture	Emitted without energy capture	Emitted at harvest
years	----- *m³/hectare* -------		------------------- *tonnes carbon/hectare* -------------------										
0	0.0		0.0	0.0	4.2	0.0	0.0	46.1					
5	0.0		7.4	0.6	4.1	0.5	3.1	46.2					
10	13.6		19.6	1.2	3.6	1.2	5.1	46.7					
15	27.8		29.3	1.6	3.5	1.9	6.6	47.4					
20	43.9		39.0	1.9	3.4	2.5	7.7	48.3					
25	59.3		46.8	2.1	3.3	3.0	8.5	49.5					
30	77.2		55.4	2.3	3.2	3.5	9.2	50.7					
35	96.8		64.4	2.5	3.2	4.1	9.8	52.0					
40	117.2		73.4	2.7	3.1	4.7	10.2	53.3					
45	136.4		81.6	2.8	3.1	5.2	10.6	54.6					
50	0.0	154.1	0.0	0.0	4.2	11.3	10.3	55.8	19.5	0.0	17.6	7.2	41.4
5	0.0		7.4	0.6	4.1	9.0	5.8	56.8	13.0	2.6	19.6	9.1	
10	13.6		19.6	1.2	3.6	7.7	5.9	57.8	9.4	3.9	20.8	10.2	
15	27.8		29.3	1.6	3.5	6.7	6.8	58.6	7.6	4.5	21.4	10.9	
20	43.9		39.0	1.9	3.4	6.2	7.7	59.2	6.5	4.8	21.7	11.3	
25	59.3		46.8	2.1	3.3	5.8	8.6	59.8	5.9	5.0	21.9	11.6	
30	77.2		55.4	2.3	3.2	5.6	9.2	60.2	5.3	5.1	22.0	11.9	
35	96.8		64.4	2.5	3.2	5.7	9.8	60.6	4.9	5.2	22.1	12.1	
40	117.2		73.4	2.7	3.1	5.9	10.2	60.8	4.5	5.3	22.2	12.3	
45	136.4		81.6	2.8	3.1	6.1	10.6	61.0	4.2	5.3	22.2	12.5	
50	0.0	154.1	0.0	0.0	4.2	11.3	10.3	61.1	23.5	5.4	39.9	19.9	42.1

Continued

C23.—Continued

Age	Mean volume		Mean carbon density										
Age	Inventory	Harvested	Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Products in use	In landfills	Emitted with energy capture	Emitted without energy capture	Emitted at harvest
years	------ *ft³/acre* ----------		---------- *tonnes carbon/acre* ----------										
0	0		0.0	0.0	1.7	0.0	0.0	18.6					
5	0		3.0	0.3	1.7	0.2	1.2	18.7					
10	195		7.9	0.5	1.5	0.5	2.1	18.9					
15	397		11.9	0.6	1.4	0.8	2.7	19.2					
20	628		15.8	0.8	1.4	1.0	3.1	19.6					
25	848		19.0	0.8	1.3	1.2	3.5	20.0					
30	1,104		22.4	0.9	1.3	1.4	3.7	20.5					
35	1,384		26.1	1.0	1.3	1.7	4.0	21.0					
40	1,675		29.7	1.1	1.3	1.9	4.1	21.6					
45	1,950		33.0	1.1	1.2	2.1	4.3	22.1					
50	0	2,202	0.0	0.0	1.7	4.6	4.2	22.6	7.9	0.0	7.1	2.9	16.8
5	0		3.0	0.3	1.7	3.6	2.4	23.0	5.3	1.0	7.9	3.7	
10	195		7.9	0.5	1.5	3.1	2.4	23.4	3.8	1.6	8.4	4.1	
15	397		11.9	0.6	1.4	2.7	2.7	23.7	3.1	1.8	8.7	4.4	
20	628		15.8	0.8	1.4	2.5	3.1	24.0	2.6	1.9	8.8	4.6	
25	848		19.0	0.8	1.3	2.3	3.5	24.2	2.4	2.0	8.9	4.7	
30	1,104		22.4	0.9	1.3	2.3	3.7	24.4	2.2	2.1	8.9	4.8	
35	1,384		26.1	1.0	1.3	2.3	4.0	24.5	2.0	2.1	8.9	4.9	
40	1,675		29.7	1.1	1.3	2.4	4.1	24.6	1.8	2.1	9.0	5.0	
45	1,950		33.0	1.1	1.2	2.5	4.3	24.7	1.7	2.2	9.0	5.1	
50	0	2,202	0.0	0.0	1.7	4.6	4.2	24.7	9.5	2.2	16.1	8.1	17.0

C24.— Regional estimates of timber volume, carbon stocks, and carbon in harvested wood products on forest land after clearcut harvest for loblolly-shortleaf pine stands in the South Central; volumes are for high-productivity sites (growth rate greater than 120 cubic feet wood/acre/year) with high-intensity management (replanting with genetically improved stock)

	Mean volume		Mean carbon density										
Age	Inventory	Harvested	Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Products in use	In landfills	Emitted with energy capture	Emitted without energy capture	Emitted at harvest
years	*m^3/hectare*		*tonnes carbon/hectare*										
0	0.0		0.0	0.0	4.1	0.0	0.0	31.4					
5	0.0		10.8	0.4	4.1	0.4	3.2	31.5					
10	47.7		34.2	0.9	3.9	1.3	5.5	31.8					
15	146.5		68.7	1.0	3.8	2.7	7.3	32.3					
20	244.8		99.2	1.1	3.7	3.8	8.7	33.0					
25	0.0	315.2	0.0	0.0	4.1	20.4	12.2	33.7	39.7	0.0	27.3	15.0	18.8
5	0.0		10.8	0.4	4.1	15.8	6.5	34.6	27.1	4.9	31.4	18.7	
10	47.7		34.2	0.9	3.9	13.0	6.4	35.5	20.1	7.4	33.8	20.9	
15	146.5		68.7	1.0	3.8	11.5	7.5	36.4	16.4	8.5	34.9	22.2	
20	244.8		99.2	1.1	3.7	10.5	8.7	37.2	14.5	9.1	35.5	23.0	
25	0.0	315.2	0.0	0.0	4.1	20.4	12.2	38.0	52.8	9.4	63.2	38.7	23.8
years	*ft^3/acre*		*tonnes carbon/acre*										
0	0		0.0	0.0	1.7	0.0	0.0	12.7					
5	0		4.4	0.2	1.6	0.2	1.3	12.8					
10	682		13.8	0.3	1.6	0.5	2.2	12.9					
15	2,094		27.8	0.4	1.5	1.1	2.9	13.1					
20	3,498		40.1	0.4	1.5	1.6	3.5	13.3					
25	0	4,504	0.0	0.0	1.7	8.2	4.9	13.7	16.1	0.0	11.1	6.1	7.6
5	0		4.4	0.2	1.6	6.4	2.6	14.0	11.0	2.0	12.7	7.6	
10	682		13.8	0.3	1.6	5.2	2.6	14.4	8.1	3.0	13.7	8.4	
15	2,094		27.8	0.4	1.5	4.6	3.0	14.7	6.7	3.4	14.1	9.0	
20	3,498		40.1	0.4	1.5	4.2	3.5	15.1	5.9	3.7	14.4	9.3	
25	0	4,504	0.0	0.0	1.7	8.2	4.9	15.4	21.4	3.8	25.6	15.7	9.6

C25.— Regional estimates of timber volume, carbon stocks, and carbon in harvested wood products on forest land after clearcut harvest for oak-gum-cypress stands in the South Central

	Mean volume		Mean carbon density										
Age	Inventory	Harvested	Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Products in use	In landfills	Emitted with energy capture	Emitted without energy capture	Emitted at harvest
years	------- *m^3/hectare* -----		---------- *tonnes carbon/hectare* ----------										
0	0.0		0.0	0.0	1.8	0.0	0.0	39.6					
5	0.0		5.4	0.5	2.1	0.3	1.1	39.7					
10	9.8		17.8	1.8	1.8	1.1	2.1	40.1					
15	19.9		28.4	2.8	1.7	1.8	3.0	40.7					
20	32.7		39.3	3.2	1.7	2.5	3.7	41.5					
25	45.4		48.8	3.4	1.6	3.1	4.4	42.5					
30	58.1		57.2	3.5	1.6	3.6	5.0	43.6					
35	73.4		66.9	3.6	1.6	4.2	5.5	44.7					
40	92.2		76.9	3.7	1.6	4.9	6.0	45.8					
45	110.7		86.1	3.7	1.5	5.4	6.4	46.9					
50	0.0	128.1	0.0	0.0	1.8	10.8	6.0	47.9	14.5	0.0	16.0	6.5	57.0
5	0.0		5.4	0.5	2.1	6.5	2.4	48.8	9.4	2.1	17.5	7.9	
10	9.8		17.8	1.8	1.8	4.6	2.4	49.7	6.6	3.2	18.3	8.8	
15	19.9		28.4	2.8	1.7	3.8	3.0	50.3	5.2	3.7	18.8	9.3	
20	32.7		39.3	3.2	1.7	3.6	3.8	50.9	4.4	3.9	19.0	9.7	
25	45.4		48.8	3.4	1.6	3.7	4.4	51.4	3.9	4.0	19.2	9.9	
30	58.1		57.2	3.5	1.6	4.0	5.0	51.8	3.5	4.1	19.3	10.1	
35	73.4		66.9	3.6	1.6	4.4	5.5	52.0	3.2	4.1	19.3	10.3	
40	92.2		76.9	3.7	1.6	5.0	6.0	52.3	2.9	4.2	19.4	10.4	
45	110.7		86.1	3.7	1.5	5.5	6.4	52.4	2.7	4.2	19.4	10.6	
50	0.0	128.1	0.0	0.0	1.8	10.8	6.0	52.5	17.0	4.3	35.5	17.2	57.0

Continued

C25.—Continued

	Mean volume		Mean carbon density										
Age	Inventory	Harvested	Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Products in use	In landfills	Emitted with energy capture	Emitted without energy capture	Emitted at harvest
years	------ *ft³/acre* ---------		---------- *tonnes carbon/acre* ----------										
0	0		0.0	0.0	0.7	0.0	0.0	16.0					
5	0		2.2	0.2	0.8	0.1	0.5	16.1					
10	140		7.2	0.7	0.7	0.5	0.9	16.2					
15	284		11.5	1.1	0.7	0.7	1.2	16.5					
20	467		15.9	1.3	0.7	1.0	1.5	16.8					
25	649		19.7	1.4	0.7	1.2	1.8	17.2					
30	830		23.1	1.4	0.7	1.5	2.0	17.6					
35	1,049		27.1	1.4	0.6	1.7	2.2	18.1					
40	1,318		31.1	1.5	0.6	2.0	2.4	18.5					
45	1,582		34.9	1.5	0.6	2.2	2.6	19.0					
50	0	1,830	0.0	0.0	0.7	4.4	2.4	19.4	5.9	0.0	6.5	2.6	23.1
5	0		2.2	0.2	0.8	2.6	1.0	19.8	3.8	0.8	7.1	3.2	
10	140		7.2	0.7	0.7	1.9	1.0	20.1	2.7	1.3	7.4	3.6	
15	284		11.5	1.1	0.7	1.5	1.2	20.4	2.1	1.5	7.6	3.8	
20	467		15.9	1.3	0.7	1.5	1.5	20.6	1.8	1.6	7.7	3.9	
25	649		19.7	1.4	0.7	1.5	1.8	20.8	1.6	1.6	7.8	4.0	
30	830		23.1	1.4	0.7	1.6	2.0	20.9	1.4	1.7	7.8	4.1	
35	1,049		27.1	1.4	0.6	1.8	2.2	21.1	1.3	1.7	7.8	4.2	
40	1,318		31.1	1.5	0.6	2.0	2.4	21.1	1.2	1.7	7.9	4.2	
45	1,582		34.9	1.5	0.6	2.2	2.6	21.2	1.1	1.7	7.9	4.3	
50	0	1,830	0.0	0.0	0.7	4.4	2.4	21.3	6.9	1.7	14.4	7.0	23.1

C26.— Regional estimates of timber volume, carbon stocks, and carbon in harvested wood products on forest land after clearcut harvest for oak-hickory stands in the South Central

	Mean volume		Mean carbon density										
Age	Inventory	Harvested	Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Products in use	In landfills	Emitted with energy capture	Emitted without energy capture	Emitted at harvest
years	------ m^3/*hectare* ------		------ *tonnes carbon/hectare* ------										
0	0.0		0.0	0.0	4.2	0.0	0.0	29.0					
5	0.0		9.7	0.9	4.7	0.6	1.1	29.1					
10	11.7		20.9	1.9	4.0	1.4	2.1	29.4					
15	21.2		30.1	2.1	3.6	2.0	3.0	29.8					
20	33.8		39.5	2.3	3.4	2.6	3.7	30.4					
25	46.6		48.2	2.4	3.3	3.2	4.4	31.1					
30	60.2		56.6	2.6	3.1	3.8	5.0	31.9					
35	76.3		65.6	2.7	3.0	4.4	5.5	32.7					
40	94.3		76.2	2.8	2.9	5.1	6.0	33.5					
45	114.1		85.7	2.9	2.8	5.7	6.4	34.3					
50	0.0	133.0	0.0	0.0	4.2	11.7	6.0	35.1	16.0	0.0	18.9	7.5	49.5
5	0.0		9.7	0.9	4.7	7.3	2.4	35.8	10.0	2.4	20.6	9.2	
10	11.7		20.9	1.9	4.0	5.2	2.4	36.4	6.8	3.6	21.6	10.3	
15	21.2		30.1	2.1	3.6	4.2	3.0	36.9	5.2	4.1	22.1	10.9	
20	33.8		39.5	2.3	3.4	3.9	3.8	37.3	4.4	4.3	22.4	11.2	
25	46.6		48.2	2.4	3.3	3.9	4.4	37.6	3.8	4.4	22.5	11.5	
30	60.2		56.6	2.6	3.1	4.2	5.0	37.9	3.4	4.4	22.7	11.7	
35	76.3		65.6	2.7	3.0	4.6	5.5	38.1	3.1	4.5	22.7	11.9	
40	94.3		76.2	2.8	2.9	5.2	6.0	38.3	2.9	4.5	22.8	12.1	
45	114.1		85.7	2.9	2.8	5.8	6.4	38.4	2.7	4.5	22.8	12.3	
50	0.0	133.0	0.0	0.0	4.2	11.7	6.0	38.5	18.4	4.6	41.8	19.8	49.5

Continued

C26.—Continued

Age	Mean volume: Inventory	Mean volume: Harvested	Mean carbon density: Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Products in use	In landfills	Emitted with energy capture	Emitted without energy capture	Emitted at harvest
years	------- ft^3/*acre* ---------		---------- *tonnes carbon/acre* ----------										
0	0		0.0	0.0	1.7	0.0	0.0	11.7					
5	0		3.9	0.4	1.9	0.3	0.5	11.8					
10	167		8.5	0.8	1.6	0.6	0.9	11.9					
15	303		12.2	0.9	1.5	0.8	1.2	12.1					
20	483		16.0	0.9	1.4	1.1	1.5	12.3					
25	666		19.5	1.0	1.3	1.3	1.8	12.6					
30	860		22.9	1.0	1.3	1.5	2.0	12.9					
35	1,091		26.6	1.1	1.2	1.8	2.2	13.2					
40	1,348		30.8	1.1	1.2	2.0	2.4	13.6					
45	1,630		34.7	1.2	1.2	2.3	2.6	13.9					
50	0	1,901	0.0	0.0	1.7	4.7	2.4	14.2	6.5	0.0	7.6	3.0	20.0
5	0		3.9	0.4	1.9	2.9	1.0	14.5	4.1	1.0	8.3	3.7	
10	167		8.5	0.8	1.6	2.1	1.0	14.7	2.8	1.4	8.8	4.2	
15	303		12.2	0.9	1.5	1.7	1.2	14.9	2.1	1.7	9.0	4.4	
20	483		16.0	0.9	1.4	1.6	1.5	15.1	1.8	1.7	9.1	4.6	
25	666		19.5	1.0	1.3	1.6	1.8	15.2	1.6	1.8	9.1	4.7	
30	860		22.9	1.0	1.3	1.7	2.0	15.3	1.4	1.8	9.2	4.8	
35	1,091		26.6	1.1	1.2	1.9	2.2	15.4	1.3	1.8	9.2	4.8	
40	1,348		30.8	1.1	1.2	2.1	2.4	15.5	1.2	1.8	9.2	4.9	
45	1,630		34.7	1.2	1.2	2.3	2.6	15.5	1.1	1.8	9.2	5.0	
50	0	1,901	0.0	0.0	1.7	4.7	2.4	15.6	7.5	1.9	16.9	8.0	20.0

C27.— Regional estimates of timber volume, carbon stocks, and carbon in harvested wood products on forest land after clearcut harvest for oak-pine stands in the South Central

	Mean volume		Mean carbon density										
Age	Inventory	Harvested	Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Products in use	In landfills	Emitted with energy capture	Emitted without energy capture	Emitted at harvest
years	------ m^3/*hectare* ------		---------- *tonnes carbon/hectare* ----------										
0	0.0		0.0	0.0	4.2	0.0	0.0	31.3					
5	0.0		8.7	0.7	4.4	0.6	3.1	31.4					
10	13.6		21.4	1.4	3.7	1.5	5.1	31.7					
15	27.8		31.9	1.7	3.5	2.3	6.6	32.2					
20	43.9		41.8	2.0	3.3	3.0	7.7	32.8					
25	59.3		50.9	2.2	3.2	3.7	8.5	33.6					
30	77.2		59.2	2.5	3.1	4.3	9.2	34.4					
35	96.8		67.9	2.6	3.0	4.9	9.8	35.3					
40	117.2		76.5	2.8	2.9	5.5	10.2	36.2					
45	136.4		84.4	3.0	2.9	6.1	10.6	37.0					
50	0.0	154.1	0.0	0.0	4.2	12.4	10.3	37.9	19.7	0.0	17.4	8.2	42.8
5	0.0		8.7	0.7	4.4	10.0	5.8	38.6	13.2	2.6	19.4	10.1	
10	13.6		21.4	1.4	3.7	8.6	5.9	39.2	9.6	3.9	20.6	11.3	
15	27.8		31.9	1.7	3.5	7.7	6.8	39.8	7.7	4.5	21.2	11.9	
20	43.9		41.8	2.0	3.3	7.1	7.7	40.2	6.7	4.8	21.5	12.4	
25	59.3		50.9	2.2	3.2	6.7	8.6	40.6	6.0	4.9	21.6	12.7	
30	77.2		59.2	2.5	3.1	6.6	9.2	40.9	5.5	5.0	21.8	13.0	
35	96.8		67.9	2.6	3.0	6.7	9.8	41.1	5.1	5.1	21.9	13.2	
40	117.2		76.5	2.8	2.9	6.9	10.2	41.3	4.7	5.2	21.9	13.4	
45	136.4		84.4	3.0	2.9	7.1	10.6	41.4	4.4	5.3	22.0	13.6	
50	0.0	154.1	0.0	0.0	4.2	12.4	10.3	41.5	23.8	5.4	39.4	22.0	43.6

Continued

C27.—Continued

	Mean volume		Mean carbon density										
Age	Inventory	Harvested	Live tree	Standing dead tree	Under-story	Down dead wood	Forest floor	Soil organic	Products in use	In landfills	Emitted with energy capture	Emitted without energy capture	Emitted at harvest
years	------- *ft³/acre* ---------		------- *tonnes carbon/acre* -------										
0	0		0.0	0.0	1.7	0.0	0.0	12.7					
5	0		3.5	0.3	1.8	0.3	1.2	12.7					
10	195		8.6	0.6	1.5	0.6	2.1	12.8					
15	397		12.9	0.7	1.4	0.9	2.7	13.0					
20	628		16.9	0.8	1.3	1.2	3.1	13.3					
25	848		20.6	0.9	1.3	1.5	3.5	13.6					
30	1,104		24.0	1.0	1.2	1.7	3.7	13.9					
35	1,384		27.5	1.1	1.2	2.0	4.0	14.3					
40	1,675		31.0	1.1	1.2	2.2	4.1	14.6					
45	1,950		34.2	1.2	1.2	2.5	4.3	15.0					
50	0	2,202	0.0	0.0	1.7	5.0	4.2	15.3	8.0	0.0	7.0	3.3	17.3
5	0		3.5	0.3	1.8	4.0	2.4	15.6	5.3	1.0	7.9	4.1	
10	195		8.6	0.6	1.5	3.5	2.4	15.9	3.9	1.6	8.3	4.6	
15	397		12.9	0.7	1.4	3.1	2.7	16.1	3.1	1.8	8.6	4.8	
20	628		16.9	0.8	1.3	2.9	3.1	16.3	2.7	1.9	8.7	5.0	
25	848		20.6	0.9	1.3	2.7	3.5	16.4	2.4	2.0	8.8	5.1	
30	1,104		24.0	1.0	1.2	2.7	3.7	16.5	2.2	2.0	8.8	5.3	
35	1,384		27.5	1.1	1.2	2.7	4.0	16.6	2.1	2.1	8.8	5.4	
40	1,675		31.0	1.1	1.2	2.8	4.1	16.7	1.9	2.1	8.9	5.4	
45	1,950		34.2	1.2	1.2	2.9	4.3	16.8	1.8	2.1	8.9	5.5	
50	0	2,202	0.0	0.0	1.7	5.0	4.2	16.8	9.6	2.2	16.0	8.9	17.6

Appendix D

Detailed Information on Development and Use of Tables for Calculating Carbon in Harvested Wood Products (Tables 4 through 9)

This appendix features detailed information on the source of coefficients for Tables 4 through 9. This will help users in adapting carbon calculations to specific needs. Information is organized by the three starting points: primary wood products (Tables D1 through D5), industrial roundwood (principally Tables D6 and D7), and forest ecosystems (principally Tables D8 through D12).

The choice of starting points depends on the available wood products information. For example, a landowner may want to know potential carbon sequestration for a given area of forest. This is addressed by the principally land-based estimate that starts from a measure of trees in a forest, specifically growing-stock volume. Alternatively, a measure of wood removed at harvest, such as logs transported to mills for processing, volume or mass of industrial roundwood, is another starting point. Finally, a starting point with relatively precise information is based on quantities of primary wood products. These latter two starting points can be considered product-based. Data on roundwood and primary products are often available as State-level or regional statistics.

The methods for these three starting points will result in identical core results, if consistent data are available corresponding to the starting points. This is because estimates of the disposition—or fate—of carbon in products over time are based on likely uses and longevity of primary wood products. Thus, the data and assumptions on primary wood products serve as the model for the disposition of carbon over time. These data and assumptions are discussed below in the section on primary wood products. All additional calculations associated with the other two starting points (industrial roundwood or forest ecosystem) are based on linking inputs to the disposition of these primary wood products. If industrial roundwood is the starting point, or input quantity, then the disposition of carbon is calculated by linking carbon in roundwood to the separate primary wood product classifications. Similarly, volume of merchantable wood in forests is linked to quantities of roundwood before calculating the disposition of carbon over time. These links can include some additional output estimates which are not associated with all three starting points, such as the fraction of emitted carbon associated with energy recapture. Data and assumptions used to link the different inputs to a common quantity of harvested wood are presented below in the section on industrial roundwood and the section on forest ecosystem.

Primary Wood Products

Primary wood products are the initial results of processing at mills; examples of primary products include lumber, panels, and paper. These primary products are usually incorporated into end-use products with the long-term disposition of carbon classified as remaining in use, in landfills, or emitted to the atmosphere following burning or decomposition. Calculations are in three parts: 1) converting quantity of primary product to quantity of carbon, 2) determining the fraction of carbon in primary product in use as a function of time since production, and 3) determining the fraction of carbon in primary product in landfills as a function of time since production. These steps correspond to Tables 7, 8, and 9, respectively. Total carbon emissions to the atmosphere for a given year are the difference between the initial quantity of carbon in primary wood products and the sum of carbon in use or in landfills.

Carbon in primary wood products is based on conversion factors in Table 7, which were computed using data in Table D1. Specific carbon content of wood fiber in solid wood products (those in Table D1) is 50 percent, and the carbon content of air dry weight paper is 45 percent. Table D1 includes factors to convert the customary units used for each primary product to a standard mass and volume for calculating carbon mass of the wood fibers.

The fractions of primary wood products remaining in use for a given number of years after production in Table 8 were developed by first allocating the primary product to a number of end-uses and then determining the fraction remaining in each end use over time. The allocation of primary products to end uses is presented in Table D2. The fraction remaining in use over time is determined using first-order decay functions and the half-lives presented in Table D3. The fraction of primary products (and thus the fraction of carbon) remaining in use can be calculated by the following:

[Equation D1]

Fraction of carbon in solid wood products remaining in use in year n

$$
\begin{aligned}
&= (\text{fraction used in single family houses}) \times e^{(- n \times \ln(2)/\ \text{half-life for sf houses})}\\
&+ (\text{fraction used in multifamily houses}) \times e^{(- n\times\ln(2)/\ \text{half-life for mf houses})}\\
&+ (\text{fraction used in mobile homes}) \times e^{(- n\times\ln(2)/\ \text{half-life mobile homes})}\\
&+ (\text{fraction used in repair and alteration}) \times e^{(- n\times\ln(2)/\ \text{half-life repair})}\\
&+ (\text{fraction used in nonresidential except railroads}) \times e^{(- n\times\ln(2)/\ \text{half-life non res ex rr})}\\
&+ (\text{fraction used in railroad ties}) \times e^{(- n\times\ln(2)/\ \text{half-life rr ties})}\\
&+ (\text{fraction used in railroad cars}) \times e^{(- n\times\ln(2)/\ \text{half-life rr cars})}\\
&+ (\text{fraction used in household furniture}) \times e^{(- n\times\ln(2)/\ \text{half-life hh furn})}\\
&+ (\text{fraction used in commercial furniture}) \times e^{(- n\times\ln(2)/\ \text{half-life com furn})}\\
&+ (\text{fraction used in other manufacturing}) \times e^{(- n\times\ln(2)/\ \text{half-life oth manf})}\\
&+ (\text{fraction used in wood containers}) \times e^{(- n\times\ln(2)/\ \text{half-life wood cont})}\\
&+ (\text{fraction used in pallets}) \times e^{(- n\times\ln(2)/\ \text{half-life pallets})}\\
&+ (\text{fraction used in dunnage}) \times e^{(- n\times\ln(2)/\ \text{half-life dunnage})}\\
&+ (\text{fraction used in other uses}) \times e^{(- n\times\ln(2)/\ \text{half-life other uses})}\\
&+ (\text{fraction used in exports}) \times e^{(- n\times\ln(2)/\ \text{half-life exports})}
\end{aligned}
$$

[Equation D2]

Fraction of paper products remaining in use in year n

$$= e^{(- n\times\ln(2)/\ \text{half-life for paper})}$$

The fractions of paper in use, as provided in Table 8, are based on Equation D2 and the assumption that some paper is recycled. To include the effects of recycling in these calculations, the following general assumptions are necessary: an average half-life of paper products, a rate of paper recovery and recycling, and the efficiency of reuse of paper fibers (Skog and Nicholson 1998, Row and Phelps 1996). We use a half-life of 2.6 years, a paper recovery rate of 0.48, and an efficiency of reuse of 0.70.[5]

The difference between a fraction of paper in use calculated by Equation D2 for a particular year and the fraction from the previous year represents the amount of paper discarded during that year.

[5]Klungness, J. 2005. Personal communication.Chemical Engineer, USDA Forest Service, Forest Products Lab, One Gifford Pinchot Drive, Madison, WI 53726-2398.

We assume that 48 percent of the discarded paper is recycled and 70 percent of the fibers in recycled paper are recovered and incorporated into new paper products. This represents a net recovery of 33.6 percent of fibers from discarded paper. The fraction of these recycled fibers remaining in use in subsequent years also is determined according to Equation D2. This sequence of calculations can be repeated for the fraction of paper discarded each year. Thus, the summed remaining fractions of the original paper and all subsequently recycled fractions are included in Table 8. All these successive calculations pertain to the original paper fibers produced from wood at the beginning of the first year, yet none of the fiber from the original paper production is expected to remain in paper products beyond five rounds of recycling.[5] Therefore, the estimates provided in Table 8 are based on five rounds of recycling, because beyond this point the effects of additional rounds are negligible. Thus, each fiber has the potential to be included in the recycling process up to five times. However, if the fiber is in the 66.4 percent (1- 0.336) of discarded paper that is lost during recycling, there is no potential for additional recycling because it is no longer in the system.

The fractions of primary wood product remaining in landfills for a given number of years after production in Table 9 were developed by determining the fraction discarded to landfills each year and then determining the part of those fractions remaining in landfills over subsequent years. Thus, Table 9 is based on years since production but accounts for both rate of disposal to landfills and cumulative effect of residence times in landfills. Allocation to landfills occurs in two parts: 1) the fraction discarded at year n after production is the difference in the in-use fractions between two successive years from Table 8, that is, fraction at year n minus fraction at year n-1; and 2) the part of the discarded fraction that is placed in landfills is determined by fractions in Table D4 (the fractions for the year 2002). The fraction going to landfills is further divided into nondegradable and degradable pools, which are supplied in Table D5. The nondegradable pool is sequestered permanently. The fraction of the degradable pool remaining in subsequent years is determined by first-order decay, that is, fraction remaining=exp(-years×ln(2)/half-life), and the half-life is shown in Table D5.

Example calculations and applications of selected factors in Tables 7, 8, and 9—disposition from primary wood products

This set of example calculations determines the disposition of carbon in a primary wood product at 3 and 100 years after production. The product for this example is 320,000 ft^2 of ⅜-inch softwood plywood. These calculations are possible with factors from Tables 7, 8, and 9, but this example illustrates the foundation for those factors by using Tables D1 through D5. Note that some of these calculations are spreadsheet-intensive, so we show only enough work to illustrate the basic process.

Specifically, we calculate:

1) Initial quantity of carbon in the primary wood product (Table D1, used to make Table 7)
2) Amount of this carbon in single-family houses at years 3 and 100 (Equation D1 and Tables D2 and D3; this is an applications example)
3) Amount of this carbon in use in all end-use products at years 3 and 100 (Equation D1 and Tables D2 and D3; resulting fractions presented in Table 8)
4) Amount of this carbon in landfills from all end-use products at years 3 and 100 (Tables 8, D4, and D5; resulting fractions presented in Table 9)

Part 1: Initial quantity of carbon, from Table D1:

$320{,}000\ ft^2 \times 31.25\ ft^3/1{,}000\ ft^2 \times 35.0\ lb/ft^2 \times 0.95 = 332{,}500$ lb of wood fiber

$332{,}500\ lb \times 0.5 \times (1\ \text{short ton} / 2000\ lb) = 83.13$ tons of carbon

$332{,}500\ lb \times 0.5 \times (1\ \text{metric ton} / 2204.62\ lb) = 75.41$ t of carbon

Note this is the only table that includes non-metric units.

Part 2: Amount of softwood plywood carbon in single-family houses at years 3 and 100, from Equation D1 and Tables D2 and D3:

In single-family houses at 3 years

$= 75.41 \times 0.334 \times \exp(-3\times\ln(2)/100) = 24.67$ t

In single-family houses at 100 years

$= 75.41 \times 0.334 \times \exp(-100\times\ln(2)/100) = 12.59$ t

Part 3: Amount of softwood plywood carbon in use in all end-use products at years 3 and 100, from Equation D1 and Tables D2 and D3:

Amount of carbon in use at 3 years (showing the 15 terms from Equation D1)

$= 75.41 \times (0.327 + 0.032 + 0.029 + 0.227 + 0.087 + 0.000 + 0.001 + 0.043 + 0.047 + 0.070 + 0.006 + 0.018 + 0.000 + 0.008 + 0.036) = 75.41 \times 0.930 = 70.1$ t

Amount of carbon in use at 100 years (showing the 15 terms from Equation D1)

$= 75.41 \times (0.167 + 0.012 + 0.000 + 0.024 + 0.032 + 0.000 + 0.000 + 0.005 + 0.005 + 0.000 + 0.000 + 0.000 + 0.000 + 0.000 + 0.000) = 75.41 \times 0.245 = 18.5$ t

Note that the sum of terms from equation D1 is the fraction remaining in use at the end of a given year. These fractions are calculated and provided in Table 8, for example the fractions 0.930 and 0.245, which are for years 3 and 100, respectively.

Part 4: Amount of carbon in landfills from all end-use products at years 3 and 100, from Tables 8, D4, and D5:

Note that the amount of carbon in landfills at the end of year 3 is a sum from material discarded in each of the years, that is: from year 1, the nondegradable fraction of carbon discarded in year 1 plus the remaining part of the degradable fraction after two years of decay; from year 2, the nondegradable fraction of carbon discarded in year 2 plus the remaining part of the degradable fraction after one year of decay; and from year 3, the carbon discarded to landfills in year 3.

Coefficients from Table 8 are necessary because the amount discarded each year is based on the difference between the amounts in use at the start and end of each year. By multiplying 75.41 by the first four softwood plywood coefficients in Table 8, we obtain in-use stocks of 75.41, 73.60, 71.79, and 70.13 t carbon, which represent the time of processing (the beginning of year 1) and the ends of years 1, 2, and 3, respectively.

Nondegradable fraction from year 1

$= (75.41-73.60) \times 0.67 \times 0.77 = 0.9337$ t

Degradable fraction from year 1 remaining at year 3
= (75.41-73.60) × 0.67 × (1-0.77) × exp(-2×ln(2)/14) = 0.2526 t
Nondegradable fraction from year 2
= (73.60-71.79) × 0.67 × 0.77 = 0.9337 t
Degradable fraction from year 2 remaining at year 3
= (73.60-71.79) × 0.67 × (1-0.77) × exp(-1×ln(2)/14) = 0.2654 t
Nondegradable fraction from year 3
= (71.79-70.13) × 0.67 × 0.77 = 0.8559 t
Degradable fraction from year 3 remaining at year 3
= (71.79-70.13) × 0.67 × (1-0.77) × exp(-0×ln(2)/14) = 0.2557 t

Thus, total carbon in landfills at the end of the third year = 3.5 t.

Note that the fraction of softwood plywood in landfills at the end of year 3 in Table 9 can be determined from the previous series of calculations by changing the first factor in each line to represent the relative amount discarded each year rather than the absolute amount. The calculations are:
Nondegradable fraction from year 1
= (1-0.976) × 0.67 × 0.77 = 0.0124
Degradable fraction from year 1 remaining at year 3
= (1-0.976) × 0.67 × (1-0.77) × exp(-2×ln(2)/14) = 0.0034
Nondegradable fraction from year 2
= (0.976-0.952) × 0.67 × 0.77 = 0.0124
Degradable fraction from year 2 remaining at year 3
= (0.976-0.952) × 0.67 × (1-0.77) × exp(-1×ln(2)/14) = 0.0035
Nondegradable fraction from year 3
= (0.952-0.930) × 0.67 × 0.77 = 0.0114
Degradable fraction from year 3 remaining at year 3
= (0.952-0.930) × 0.67 × (1-0.77) × exp(-0×ln(2)/14) = 0.0034

Thus, total fraction in landfills at year the end of the third year = 0.047. The difference between this value and the 0.046 in Table 9 is due to rounding.

Net flux of carbon to landfills at year 3 is the difference between the previous values and similar calculations for year 2, or more simply from Table 9:

75.41 × (0.046 - 0.032) = 1.06 t in year 3

A similar series of calculations can be repeated for year 100, or more simply from Tables 8 and 9: the amount of carbon in landfills at 100 years = 75.41 × 0.400 = 3.2 t, and the flux of carbon in landfills at 100 years = 75.41 × (0.400-0.394)/5 = 0.09 t in year 100.

Industrial Roundwood

Industrial roundwood is basically harvested logs brought to mills for processing. Roundwood, as used here, refers to wood that is processed to primary wood products; it excludes bark or roundwood that is identified as fuelwood. Input values for calculations from this starting point are carbon mass of roundwood logs grouped by categories defined for Table 6. The links between these inputs and the disposition of carbon in primary wood products are the allocation patterns described in Tables D6 and D7.

Carbon mass of industrial roundwood logs is categorized as softwood or hardwood and saw logs or pulpwood. However, if roundwood data are not classified according to type or size of logs, this appendix includes factors for distributing roundwood to appropriate categories according to regional averages. Additionally, roundwood data in the form of volume of wood can be converted to carbon with average values for specific gravity of softwood or hardwood species. These factors are included in Tables 4 or D8. See additional discussion of their use in the section on Forest Ecosystem.

Average disposition patterns of industrial roundwood carbon by region and roundwood category are presented in Table 6. These values were developed from regional average allocation of industrial roundwood to primary wood products in Table D6. Disposition of carbon allocated to primary wood products then follows the patterns described above by Tables 8 and 9, which allocate carbon to in-use or landfill classifications. The balance of carbon originally in roundwood but no longer in use or in landfills is emitted to the atmosphere. The fraction emitted to the atmosphere that occurs with energy recapture is calculated using Table D7 (Birdsey 1996). These fractions for primary products are pooled within regions to allocate industrial roundwood carbon for up to four categories per region. These fractional values are displayed in Table 6, which is the resulting net effect of linking information in Tables D6, 8, 9, and D7.

Example calculations related to constructing and applying Table 6—disposition from industrial roundwood

This example calculates the disposition of carbon in industrial roundwood. We calculate the disposition of carbon at 15 years after harvest and the processing of 10,000 m^3 of hardwood saw logs from a maple-beech-birch forest in the Northeast. The example demonstrates the basic set of calculations used to develop and apply Table 6. It is limited in scope because factorial combinations of year, roundwood categories, and classifications for the disposition of carbon in harvested wood products can require a sequence of many repeated spreadsheet calculations.

We calculate:

1) Carbon mass based on volume of saw logs
2) The allocation of carbon from saw logs at year 15—the allocation values in Table 6
3) The disposition of carbon—apply the allocation factors from Table 6 to carbon mass from step 1

Part 1: The carbon mass of roundwood can be determined using the volume. The product of volume of roundwood and specific gravity (from Tables 4 or D8) is mass; 50 percent of this is carbon mass. Based on specific gravity from Table 4, total carbon for this example is:

$$= 10{,}000 \times 0.518 \times 0.5 = 2{,}590 \text{ t}$$

Part 2: The allocation of industrial roundwood logs to primary wood products according to region and category are provided in Table D6. The fractions of primary products remaining in use or in landfills at a given year are provided in Tables 8 and 9, respectively. The fraction of emitted carbon associated with energy recapture is from Table D7. The calculations for hardwood saw logs from the Northeast at 15 years are:

Fraction of carbon in products in use (summed products from Table D6 and Table 8)
$= (0 \times 0.698) + (0.492 \times 0.456) + (0 \times 0.724) + (0 \times 0.799) + ((0.005 + 0.022) \times 0.647)$
$+ (0.038 \times 0.420) + (0.058 \times 0.040)$
$= 0 + 0.224 + 0 + 0 + 0.017 + 0.016 + 0.002 = 0.260$

Fraction of carbon in landfills (summed products from Table D6 and Table 9)
$= (0 \times 0.187) + (0.492 \times 0.334) + (0 \times 0.171) + (0 \times 0.124) + ((0.005 + 0.022) \times 0.218)$
$+ (0.038 \times 0.357) + (0.058 \times 0.253)$
$= 0 + 0.164 + 0 + 0 + 0.006 + 0.014 + 0.015 = 0.198$

Fraction of carbon emitted by year 15 (one minus the fractions in use or in landfills)
$= 1 – 0.260 – 0.198 = 0.542$
Fraction of carbon emitted with energy recapture (from Table D7)
$= 0.542 \times 0.6143 \times \exp(-((15/6812)0.5953)) = 0.324$
Fraction of carbon emitted without energy recapture
$= 0.542 – 0.324 = 0.218$

These fractions allocate the disposition of carbon at year 15 after harvest for hardwood saw logs in the Northeast (see Table 6).

Part 3: The application of the factors from Table 6 (calculated in Step 2) to carbon in industrial roundwood (calculated in Step 1) determines the disposition of carbon at year 15, which is:

In use	$= 0.260 \times 2{,}590 = 673$ t
Landfills	$= 0.198 \times 2{,}590 = 513$ t
Emitted with energy	$= 0.324 \times 2{,}590 = 839$ t
Emitted without energy	$= 0.218 \times 2{,}590 = 565$ t

Forest Ecosystems

Wood in trees in a forest is often characterized according to the total volume of merchantable wood. Merchantable volume can be expressed per unit of forest area; in this case, we use the volume of growing stock of live trees as defined by the USDA Forest Service, Forest Inventory and Analysis Database (FIADB; Alerich and others 2005). Merchantable volume must be linked to amount of roundwood carbon to calculate the expected disposition of carbon in harvested wood products (as described above for industrial roundwood and primary wood products).

A set of regional average factors (Tables D8 through D12) is used for the calculations to transform growing-stock volume to carbon in industrial roundwood, which is then allocated to the expected disposition of carbon in primary wood products. This land-based approach for calculating the disposition of carbon in harvested wood products differs from the previously described product-based approaches in two important respects: the disposition of carbon is expressed as mass per area of forest rather than as an absolute mass, and additional carbon pools must be considered such as ecosystem carbon and carbon removed at harvest but not incorporated into wood products. Calculations can include carbon in roundwood removed as fuelwood as well as carbon in bark on roundwood. Furthermore, estimates of forest carbon at the time of harvest place constraints on quantities harvested. For instance, total carbon mass allocated to harvest, as in Table 3, is calculated from volume but is limited to a portion of live tree biomass.

The starting variable for the forest ecosystem calculation is volume at harvest (for example, 172.1 m^3/ha in Table 3). Carbon in growing-stock volume is allocated to the four categories of roundwood using the factors in Table 4. The first three factors allocate growing stock based on two separate divisions among trees contributing to stand-level growing-stock volume: first, to hardwood or softwood types, and second, to sawtimber diameter- or less-than-sawtimber diameter trees. These factors were developed from the most recent forest inventory data for each State in the FIADB and are summarized according to region and forest type. Data from the FIADB were compiled to reflect types and sizes of trees in stands that are likely to be harvested; thus, trees are classified as growing stock and stands are identified as medium- or large-diameter (Alerich and others 2005). Finally, volumes of wood are converted to carbon mass according to the specific gravity of wood. Values for specific gravity (Jenkins and others 2004) were summarized from the FIADB with the same criteria as the other factors in Table 4. Table D8 contains regional averages for the factors in Table 4. Thus, the product of growing-stock volume and the first, second, and fourth columns of factors (in Tables 4 or D8) is the average dry weight of softwood sawtimber in that growing-stock volume. To convert dry weight to carbon mass, multiply by 0.5.

The next step in the process is to calculate carbon in industrial roundwood from the previously calculated values of carbon in growing-stock volume. The definition of industrial roundwood is the same as elsewhere in this text; as such, it excludes bark and the portion of roundwood identified as fuelwood. Not all roundwood is from growing-stock volume. Similarly, not all of growing-stock volume is removed from the site of harvest as roundwood, some remains as logging residue, for example. Table 5 includes the fraction of growing-stock volume that is removed as roundwood and the ratio of industrial roundwood to growing-stock volume removed as roundwood. These factors are from Johnson (2001) and are also in Tables D9 and D10. The product of carbon in growing-stock volume and these two factors from Table 5 is the mass of carbon in industrial roundwood for each of the roundwood categories.

Fuelwood and bark on roundwood are also carbon pools removed from site at harvest. These are calculated separately because they are not part of the industrial roundwood carbon pool allocated according to Table 6. Fuelwood, as used here, is a portion of total roundwood as defined in Johnson (2001). For the harvest scenario tables (Appendix C), we assume that carbon from these pools is emitted the same year as harvest. Thus, the carbon is added to the two emitted categories at the time of harvest; all of the fuelwood and a portion of the bark on roundwood are emitted with energy capture. Tables 5 and D11 provide ratios of carbon in bark to carbon in wood summarized according to region. The ratios apply to roundwood logs and are based on biomass component equations of Jenkins and others (2003); they are summaries from the FIADB by types and sizes of stem wood and bark in stands that are likely to be harvested (as described above for Table 4). The product of carbon in roundwood and the bark ratio (from Tables 5 or D11) is carbon in bark on roundwood. Fuelwood is estimated from the ratio of fuelwood to growing-stock volume removed as roundwood (Johnson

2001), which is summarized in Tables 5 and D12. Thus, total carbon in fuelwood is the product of carbon in growing-stock volume removed as roundwood, the fuelwood ratio, and one plus the bark ratio.

Ecosystem carbon is removed, emitted, or remains on site at harvest. Thus, total non-soil carbon at the time of harvest in the Appendix C tables (the harvest scenarios) equals the non-soil carbon in the corresponding year of the Appendix B tables (afforestation). Similarly, total non-soil forest ecosystem carbon at the time of harvest in the Appendix C tables (the harvest scenarios) equals the non-soil carbon at age zero of the Appendix A tables (reforestation). The pools of carbon in down dead wood and forest floor at the time of harvest reflect logging residue. These decay over time even as new material accumulates in these pools with stand regrowth (Turner and others 1995, Johnson 2001, Smith and Heath 2002, Smith and others 2004b). The pool of carbon removed at harvest is based on regional average values and calculated as described above. The residual carbon—not on-site or removed—is assigned to the "emitted at harvest" column in Appendix C. While site disturbance associated with harvest likely results in carbon emissions, this pool is also likely to include carbon in wood removed but not classified as roundwood. The use of regional averages to allocate ecosystem and harvested carbon also suggests that values in the final column (in Appendix C) may be larger or smaller, depending on actual forests or harvests. The Appendix C tables are examples of how forest carbon stocks can include carbon in harvested wood; these are not recommendations for rotation length or timing of harvest.

The use of regional fractions or ratios to allocate carbon for a number of forest types within the region has potential for occasional extreme or unrealistic values. That is, the sum of carbon in industrial roundwood, fuelwood, and bark is limited by live tree carbon density. To avoid extreme values, some limits are set for the use of these regional averages. The fuelwood ratios used for calculating the fuelwood components of the harvest scenario tables (Appendix C) are averages by type but not size (that is, columns 3 and 6 in Table D12). We also limit the proportion of live tree carbon allocated to industrial roundwood plus bark to 66 percent, and the limit for total carbon removed (industrial roundwood, bark, and fuelwood) is 78 percent of live tree carbon. These limits are based on generalized tree biomass component equations from Jenkins and others (2003). Calculated values for carbon removed at harvest (such as for Appendix C) seldom exceed these limits, but one of the exceptions is included in the example below.

Example calculations of carbon in harvested wood products for Table 3—disposition from forest ecosystems

This example illustrates the calculations to determine the disposition of carbon in wood products for the harvest scenario tables in Appendix C. We calculate the disposition of carbon at 15 years after harvest from a maple-beech-birch forest in the Northeast (see Table 3). Most of the following example can be completed with factors in Tables 4 through 6 (as opposed to tables in this section), but it is included here because it illustrates the above discussion.

We calculate:

1) Carbon in growing-stock volume according to the industrial roundwood categories (Table 4)
2) Carbon in industrial roundwood from carbon in growing-stock volume removed as roundwood (Table 5)

3) The additional pools of carbon in fuelwood and bark on roundwood, which are assumed emitted with or without energy capture soon after harvest
4) Modifications to totals for industrial roundwood or fuelwood if necessary
5) The disposition of carbon at 15 years after harvest (Table 6)

Part 1: Carbon in growing-stock volume is calculated with the factors in Table 4, which allocates volume to four categories based on wood type and log size. The example growing-stock volume harvested in Table 3 is 172.1 m^3/ha. Three steps are needed to calculate total carbon in growing-stock volume: growing stock is allocated to softwood or hardwood; volumes are partitioned to saw logs and pulpwood; and finally, carbon mass is determined from specific gravity of wood, which is 50 percent carbon by dry weight. Thus, the softwood saw log part of growing stock = (growing-stock volume) × (softwood fraction) × (sawtimber-size fraction) × (softwood specific gravity) × (carbon fraction of wood). The calculated values from growing-stock volume are:

Softwood sawtimber carbon
= 172.1 × 0.132 × 0.604 × 0.369 × 0.5 = 2.53 t/ha
Softwood poletimber carbon
= 172.1 × 0.132 × (1 – 0.604) × 0.369 × 0.5 = 1.66 t/ha
Hardwood sawtimber carbon
= 172.1 × (1 – 0.132) × 0.526 × 0.518 × 0.5 = 20.35 t/ha
Hardwood poletimber carbon
= 172.1 × (1 – 0.132) × (1 – 0.526) × 0.518 × 0.5 = 18.34 t/ha

Total carbon stock in 172.1 m^3/ha of growing-stock volume is 42.88 t/ha.

Part 2: Carbon in roundwood, which excludes bark and fuelwood, is determined from factors in Table 5. The two factors are the fraction of growing-stock volume that is removed as roundwood, and the ratio of total industrial roundwood to growing-stock volume removed as roundwood. The calculated values for industrial roundwood are:

Softwood saw log carbon
= 2.53 × 0.948 × 0.991 = 2.38 t/ha
Softwood pulpwood carbon
= 1.66 × 0. 948 × 3.079 = 4.84 t/ha
Hardwood saw log carbon
= 20.35 × 0.879 × 0.927 = 16.58 t/ha
Hardwood pulpwood carbon
= 18.34 × 0. 879 × 2.177 = 35.09 t/ha

Thus, total carbon in industrial roundwood is 58.90 t/ha.

Part 3: Pools of carbon in bark on roundwood are based on ratios in Table 5; these are also applied to calculate bark on fuelwood. The portion of bark on industrial roundwood allocated to emitted with energy capture is according to coefficient A from Table D7. Carbon in fuelwood is calculated from factors in Table 5. The calculations are:

Softwood saw log bark carbon = 2.38 × 0.182 = 0.43 t/ha
Softwood pulpwood bark carbon = 4.84 × 0. 185 = 0.90 t/ha

Hardwood saw log bark carbon = 16.58 × 0.199 = 3.30 t/ha
Hardwood pulpwood bark carbon = 35.09 × 0. 218 = 7.65 t/ha

Thus, total carbon in bark on industrial roundwood is 12.28 t/ha.

Part of carbon in bark on industrial roundwood emitted with energy capture is
= (0.43 × 0.5582) + (0.90 × 0.6289) + (3.30 × 0.6143) + (7.65 × 0.5272)
= 6.87 t/ha
Part of carbon in bark on industrial roundwood emitted without energy capture is
= 12.28 – 6.87 = 5.41 t/ha

Softwood saw log carbon in fuelwood with bark
= 2.53 × 0.948 × 0.136 × (1 + 0.182) = 0.39 t/ha
Softwood pulpwood carbon in fuelwood with bark
= 1.66 × 0. 948 × 0.136 × (1 + 0.185) = 0.25 t/ha
Hardwood saw log carbon in fuelwood with bark
= 20.35 × 0.879 × 0.547 × (1 + 0.199) = 11.73 t/ha
Hardwood pulpwood carbon in fuelwood with bark
= 18.34 × 0. 879 × 0.547 × (1 + 0.218) = 10.74 t/ha

Thus, total carbon in fuelwood with bark is 23.11 t/ha.

Part 4: Limits are placed on values calculated for industrial roundwood and fuelwood where the regional average factors result in extreme values for some forest types (as discussed above). Based on biomass component equations, total carbon in industrial roundwood with bark is limited to 66 percent of live tree carbon density, and the sum of industrial roundwood, fuelwood, and bark is limited to 78 percent. Live tree carbon density at harvest is 113.1 t/ha (from Table B2).

The sum of industrial roundwood and bark is less than 66 percent of live tree carbon
(58.90 + 12.28) / 113.1 = 0.629

However, the sum of industrial roundwood, fuelwood, and bark is greater than 78 percent of live tree carbon
(58.90 + 12.28 + 23.11) / 113.1 = 0.834

Therefore, the seven carbon pools are reduced by the factor 0.78/0.834=0.935
Industrial roundwood softwood saw log = 2.38 × 0. 935 = 2.22 t/ha
Industrial roundwood softwood pulpwood = 4.84 × 0. 935 = 4.53 t/ha
Industrial roundwood hardwood saw log = 16.58 × 0. 935 = 15.50 t/ha
Industrial roundwood hardwood pulpwood = 35.09 × 0. 935 = 32.81 t/ha

Industrial roundwood bark emitted with energy capture = 6.87 × 0. 935 = 6.42 t/ha
Industrial roundwood bark emitted without energy capture = 5.41 × 0. 935 = 5.06 t/ha

Fuelwood with bark = 23.11 × 0. 935 = 21.61 t/ha

These modified values are used in subsequent calculations and are applied to the harvest scenario tables. Such modifications occur infrequently with the tables presented in Appendix C.

Part 5: The four pools of industrial roundwood carbon are each allocated to the four disposition categories for carbon in wood products according to Table 6. Totals are the summed products of industrial roundwood carbon and allocation at year 15. Carbon in fuelwood and bark are one-time additions to the emitted columns (in Appendix C). Thus the disposition of carbon at year 15 is calculated as:

Total industrial roundwood carbon in use
$= (2.22 \times 0.326) + (4.53 \times 0.037) + (15.50 \times 0.260) + (32.81 \times 0.252) = 13.19$ t/ha
Total industrial roundwood carbon in landfills
$= (2.22 \times 0.126) + (4.53 \times 0.128) + (15.50 \times 0.198) + (32.81 \times 0.127) = 8.10$ t/ha
Total industrial roundwood carbon emitted with energy recapture
$= (2.22 \times 0.296) + (4.53 \times 0.497) + (15.50 \times 0.324) + (32.81 \times 0.310) = 18.10$ t/ha
Total industrial roundwood carbon emitted without energy recapture
$= (2.22 \times 0.252) + (4.53 \times 0.338) + (15.50 \times 0.218) + (32.81 \times 0.311) = 15.67$ t/ha

Total carbon emitted with energy recapture is the sum of industrial roundwood, bark, and fuelwood
$= 18.10 + 6.42 + 21.61 = 46.13$ t/ha

Total carbon emitted without energy recapture is the sum of industrial roundwood and bark
$= 15.67 + 5.06 = 20.73$ t/ha

These are the carbon density values for the four harvested wood classifications at 15 years after harvest in Table 3 (that is, 13.2, 8.1, 46.1, and 20.7). The differences between values in this example and those in the table are due to rounding subtotals in this example.

Table D1.—Factors to convert solid wood products in customary units to carbon[a]

Solid wood product	Unit	Cubic feet per unit	Pounds/ cubic foot	Fraction of product that is wood fiber	Factor to convert units to tons (2000 lb) carbon	Factor to convert units to tonnes carbon
Softwood lumber/ laminated veneer lumber/ glulam lumber/ I-joists	thousand board feet	59.17	33.0	1.00	0.488	0.443
Hardwood lumber	thousand board feet	83.33	40.5	1.00	0.844	0.765
Softwood plywood	thousand square feet, 3/8-inch basis	31.25	35.0	0.95	0.260	0.236
Oriented strandboard	thousand square feet, 3/8-inch basis	31.25	40.0	0.97	0.303	0.275
Nonstructural panels (average)	thousand square feet, 3/8- inch basis	31.25	--	--	0.319	0.289
Hardwood veneer/ plywood	thousand square feet, 3/8- inch basis	31.25	42.0	0.96	0.315	0.286
Particleboard / Medium density fiberboard	thousand square feet, 3/4-inch basis	62.50	45.0	0.92	0.647	0.587
Hardboard	thousand square feet, 1/8-inch basis	10.42	60.0	0.97	0.152	0.138
Insulation board	thousand square feet, 1/2-inch basis	41.67	23.5	0.99	0.242	0.220
Other industrial products	thousand cubic feet	1.00	33.0	1.00	8.250	7.484

-- = not applicable.

[a]Factors in the last two columns are calculated by multiplying the previous three columns to provide the mass of product in pounds, the fraction of carbon in wood (assumed to be 0.5), and converting mass to tons or tonnes.

Table D2.—Fraction of solid wood product production used for various end uses in the United States, and used for export, 1998

End use	Product				
	Lumber[a]		Structural panels[b]		Non-structural panels[c]
	Softwood	Hardwood	Softwood plywood	Oriented strandboard	
New residential construction					
Single family	0.332	0.039	0.334	0.578	0.130
Multifamily	0.031	0.004	0.033	0.047	0.019
Mobile homes	0.039	0.002	0.035	0.060	0.037
Residential upkeep and improvement	0.253	0.039	0.243	0.164	0.112
New nonresidential construction					
All except railroads	0.079	0.028	0.090	0.071	0.053
Railroad ties	0.001	0.047	0.000	0.000	0.000
Railcar repair	0.000	0.008	0.001	0.000	0.000
Manufacturing					
Household furniture	0.023	0.235	0.046	0.002	0.138
Commercial furniture	0.004	0.048	0.050	0.006	0.218
Other products	0.035	0.095	0.083	0.021	0.094
Shipping					
Wooden containers	0.006	0.008	0.008	0.000	0.005
Pallets	0.037	0.349	0.025	0.001	0.001
Dunnage etc	0.002	0.007	0.000	0.000	0.000
Other uses[d]	0.126	0.007	0.009	0.041	0.139
Total domestic use	0.967	0.917	0.957	0.991	0.946
Export	0.033	0.083	0.043	0.009	0.054

[a]Includes hardwood and softwood dimension and boards, glulam, and lumber I-joist flanges.
[b]Includes softwood plywood, OSB, structural composite lumber, and I-joist webs.
[c]Includes hardwood plywood, particleboard, medium-density fiberboard, hardboard, and insulation board.
[d]Other uses for lumber and panels include: 1) upkeep and improvement of nonresidential structures, 2) roof supports and other construction in mines, 3) made-at-home projects such as furniture, boats, and picnic tables, 4) made-on-the-job products such as advertising and display structures, and 5) any other uses.
Source: Calculated from tables in McKeever (2002).

Table D3.—Half-life for products by end use

End use or product	Half-life
	years
New residential construction	
Single family	100
Multifamily	70
Mobile homes	12
Residential upkeep and improvement	30
New nonresidential construction	
All except railroads	67
Railroad ties	12
Railcar repair	12
Manufacturing	
Household furniture	30
Commercial furniture	30
Other products	12
Shipping	
Wooden containers	6
Pallets	6
Dunnage etc	6
Other uses for lumber and panels	12
Solid wood exports	12
Paper	2.6

Sources: Skog and Nicholson (1998), Row and Phelps (1996), Klungness, J. 2005. Personal communication. Chemical Engineer, USDA Forest Service, Forest Products Lab, One Gifford Pinchot Drive, Madison, WI 53726-2398.

Table D4.—Fraction of discarded wood and paper placed in landfills

Year	Wood to landfills	Paper to landfills	Year (continued)	Wood to landfills	Paper to landfills
1950	0.05	0.05	1977	0.49	0.38
1951	0.06	0.05	1978	0.55	0.43
1952	0.06	0.06	1979	0.62	0.48
1953	0.07	0.06	1980	0.68	0.52
1954	0.07	0.06	1981	0.69	0.53
1955	0.08	0.06	1982	0.71	0.53
1956	0.08	0.07	1983	0.72	0.53
1957	0.09	0.07	1984	0.73	0.54
1958	0.09	0.07	1985	0.74	0.54
1959	0.10	0.07	1986	0.76	0.54
1960	0.11	0.09	1987	0.77	0.54
1961	0.12	0.09	1988	0.78	0.54
1962	0.13	0.10	1989	0.79	0.54
1963	0.13	0.10	1990	0.74	0.54
1964	0.14	0.11	1991	0.79	0.50
1965	0.15	0.11	1992	0.71	0.48
1966	0.17	0.13	1993	0.70	0.48
1967	0.19	0.15	1994	0.70	0.44
1968	0.22	0.17	1995	0.73	0.39
1969	0.24	0.19	1996	0.71	0.37
1970	0.26	0.21	1997	0.69	0.38
1971	0.29	0.23	1998	0.68	0.39
1972	0.32	0.25	1999	0.68	0.39
1973	0.35	0.27	2000	0.67	0.37
1974	0.37	0.29	2001	0.67	0.35
1975	0.40	0.32	2002	0.67	0.34
1976	0.43	0.34			

Source: Freed, R. 2004. Personal communication. Environmental Scientist, ICF Consulting, 9300 Lee Highway, Fairfax, VA 22031.

Table D5.—Nondegradable fraction of wood and paper in landfills and half-life for degradable fraction

Nondegradable fraction in landfills[a]	
wood	0.77
paper	0.44
Half-life of degradable fraction (yr)[b]	14

[a] Source: Freed, R. and C. Mintz. 2003 (29 Aug). Letter to H. Ferland (EPA), K. Skog (USDA), T. Wirth (EPA) and E. Scheehle (EPA). Revised input data for WOODCARB. On file with: Forest Products Laboratory, One Gifford Pinchot Drive, Madison, WI 53726-2398

[b] Source: de Silva Alves and others (2000).

Table D6.—Fraction of each classification of industrial roundwood according to category as allocated to primary wood products (based on data from 2002)[a]

Region	Category[b] SW/HW	SL/PW	Softwood lumber	Hardwood lumber	Softwood plywood	Hardwood plywood[c]	Oriented strandboard	Non-structural panels	Other industrial products	Wood pulp	Fuel and other emissions
Northeast	SW	SL	0.391	0	0.004	0	0	0.020	0.083	0.072	0.431
		PW	0	0	0	0	0.010	0.016	0	0.487	0.487
	HW	SL	0	0.492	0	0.005	0	0.022	0.038	0.058	0.386
		PW	0	0	0	0	0.293	0.007	0	0.350	0.350
North Central	SW	SL	0.378	0	0	0	0	0.049	0.120	0.084	0.370
		PW	0	0	0	0	0.020	0.009	0	0.486	0.486
	HW	SL	0	0.458	0	0.006	0	0.013	0.044	0.064	0.415
		PW	0	0	0	0	0.361	0.009	0	0.315	0.315
Pacific Northwest, East	SW	All	0.422	0	0.069	0	0	0.001	0.001	0.144	0.363
Pacific Northwest, West	SW	SL	0.455	0	0.089	0	0	0.009	0.073	0.114	0.260
		PW	0	0	0	0	0	0	0	0.500	0.500
	HW	All	0	0.160	0	0.140	0	0.002	0	0.229	0.469
Pacific Southwest	SW	All	0.454	0	0	0	0	0.040	0.036	0.145	0.325
Rocky Mountain	SW	All	0.402	0	0.054	0	0	0.033	0.062	0.153	0.296
Southeast	SW	SL	0.350	0	0.076	0	0	0.027	0.054	0.129	0.364
		PW	0	0	0	0	0.103	0.004	0	0.447	0.447
	HW	SL	0	0.455	0	0.006	0	0.049	0.012	0.087	0.391
		PW	0	0	0	0	0.180	0.002	0	0.409	0.409
South Central	SW	SL	0.324	0	0.130	0	0	0.019	0.023	0.133	0.371
		PW	0	0	0	0	0.135	0.006	0	0.430	0.430
	HW	SL	0	0.434	0	0.023	0	0.025	0.003	0.102	0.413
		PW	0	0	0	0	0.160	0.001	0	0.419	0.419
West[d]	HW	All	0	0.039	0	0.301	0	0.015	0.066	0.147	0.432

[a]Data based on Adams and others (2006).

[b]SW/HW=Softwood/Hardwood, SL/PW=Saw log/Pulpwood. Saw log includes veneer logs.

[c]Hardwood plywood fractions are pooled with nonstructural panels when allocating roundwood to the primary products listed in Tables 8 and 9.

[d]West includes hardwoods in Pacific Northwest, East; Pacific Southwest; Rocky Mountain, North; and Rocky Mountain, South.

Table D7.—Coefficients for estimating fraction of emitted carbon associated with energy recapture with emission for industrial roundwood

Region	Roundwood category[a]		Coefficients[b]		
	SW/HW	SL/PW	a	b	c
Northeast	SW	SL	0.5582	2594	0.6557
		PW	0.6289	3062	0.5432
	HW	SL	0.6143	6812	0.5953
		PW	0.5272	3483	0.5364
North Central	SW	SL	0.6728	2162	0.6550
		PW	0.6284	3494	0.5117
	HW	SL	0.6097	5144	0.6236
		PW	0.5243	3399	0.5451
Pacific Northwest, East	SW	All	0.5421	1144	0.7958
Pacific Northwest, West	SW	SL	0.4823	823	0.8561
		PW	0.7040	2376	0.5184
	HW	All	0.6147	4746	0.6306
Pacific Southwest	SW	All	0.5216	1278	0.8061
Rocky Mountain	SW	All	0.7072	992	0.7353
Southeast	SW	SL	0.7149	1313	0.6051
		PW	0.6179	3630	0.5054
	HW	SL	0.5749	4574	0.5954
		PW	0.5490	3731	0.5025
South Central	SW	SL	0.6136	1264	0.6634
		PW	0.6190	3455	0.5148
	HW	SL	0.5744	4541	0.6070
		PW	0.5449	3239	0.5324
West[c]	HW	All	0.5917	6433	0.6054

[a]Applicable to industrial roundwood without bark or fuelwood, which is classified as: SW/HW=Softwood/Hardwood, SL/PW=Saw log/Pulpwood.

[b]Estimates are calculated according to: fraction $=a\times\exp(-((\text{year}/b)^{c}))$, based on proportions in Table 1.7 of Birdsey (1996). We assume that values in the Birdsey (1996) table are that portion of the growing-stock volume harvested and removed from the forest, so that the values are generally accurate when applied to roundwood categories.

[c]West includes hardwoods in Pacific Northwest, East; Pacific Southwest; Rocky Mountain, North; and Rocky Mountain, South.

Table D8.—Average regional factors to calculate carbon in growing-stock volume: softwood fraction, sawtimber-size fraction, and specific gravity[a,b]

Region	Fraction of growing-stock volume that is softwood[c]	Fraction of softwood growing-stock volume that is sawtimber-size[d]	Fraction of hardwood growing-stock volume that is sawtimber-size[d]	Specific gravity[e] of softwoods	Specific gravity[e] of hardwoods
Northeast	0.226	0.647	0.579	0.371	0.518
Northern Lake States	0.292	0.556	0.407	0.360	0.473
Northern Prairie States	0.093	0.622	0.511	0.434	0.537
Pacific Northwest, East	0.980	0.865	0.501	0.396	0.424
Pacific Northwest, West	0.890	0.911	0.538	0.426	0.415
Pacific Southwest	0.829	0.925	0.308	0.399	0.510
Rocky Mountain, North	0.983	0.734	0.442	0.394	0.389
Rocky Mountain, South	0.865	0.742	0.337	0.369	0.353
Southeast	0.423	0.612	0.512	0.462	0.508
South Central	0.358	0.693	0.523	0.463	0.529

[a]These factors correspond to the values in Table 4.

[b]Estimates based on survey data for the conterminous United States from USDA Forest Service, Forest Inventory and Analysis Program's database of forest surveys (FIADB; USDA For. Serv. 2005) and include growing-stock on timberland stands classified as medium- or large-diameter stands. Fractions are based on volumes of growing-stock trees.

[c]To calculate fraction in hardwood, subtract fraction in softwood from 1.

[d]Softwood sawtimber are trees at least 22.9 cm (9 in) d.b.h., hardwood sawtimber is at least 27.9 cm (11 in) d.b.h. To calculate fraction in less-than-sawtimber-size trees, subtract fraction in sawtimber from 1. Trees less than sawtimber-size are at least 12.7 cm (5 in) d.b.h.

[e]Average wood specific gravity is the density of wood divided by the density of water based on wood dry mass associated with green tree volume.

Table D9.—Fraction of growing-stock volume that is removed as roundwood and ratio of volume of logging residue to growing-stock volume by region and wood type[a]

Region[b]	Fraction of growing-stock volume removed as roundwood			Ratio of volume of logging residue to growing-stock volume[c]		
	Softwood	Hardwood	All	Softwood	Hardwood	All
Northeast	0.948	0.879	0.901	0.471	0.602	0.560
North Central	0.931	0.831	0.848	0.384	0.441	0.431
Pacific Coast	0.929	0.947	0.930	0.133	0.081	0.131
Rocky Mountain	0.907	0.755	0.899	0.305	0.246	0.301
South	0.891	0.752	0.840	0.090	0.254	0.149

[a]Values and classifications are based on data in Tables 2.9, 3.9, 4.9, 5.9, and 6.9 of Johnson (2001).

[b]North Central includes the Northern Prairie States and the Northern Lake States; Pacific Coast includes the Pacific Northwest (West and East) and the Pacific Southwest; Rocky Mountain includes Rocky Mountain, North and South; and South includes the Southeast and South Central.

[c]Ratios used as part of estimates of down dead wood following harvest in Appendix A and C.

Table D10.—Ratios of industrial roundwood (without fuelwood) to growing-stock volume that is removed as roundwood by category[a]

Region[c]	Industrial roundwood:growing-stock volume removed as hardwood[b]					
	Softwood			Hardwood		
	Sawtimber-size	Less than sawtimber-size	All	Sawtimber-size	Less than sawtimber-size	All
Northeast	0.991	3.079	1.253	0.927	2.177	1.076
North Central	0.985	1.285	1.077	0.960	1.387	1.071
Pacific Coast	0.965	1.099	1.005	0.721	0.324	0.606
Rocky Mountain	0.994	2.413	1.089	0.832	1.336	0.862
South	0.990	1.246	1.047	0.832	1.191	0.933

[a]Values and classifications are based on data in Tables 2.2, 3.2, 4.2, 5.2, and 6.2 of Johnson (2001).

[b]Ratios are to calculate industrial roundwood (that is, without fuelwood) and are based on volumes. The denominators are portions of growing-stock volume removed as roundwood according to wood type and size. Numerators for "less than sawtimber-size" include poletimber and nongrowing-stock sources. We assume the ratios do not include bark and use these values as a step in determining the allocation of carbon for Table 5 and Appendix C, based on growing stock.

[c]North Central includes the Northern Prairie States and the Northern Lake States; Pacific Coast includes the Pacific Northwest (West and East) and the Pacific Southwest; Rocky Mountain includes Rocky Mountain, North and South; and South includes the Southeast and South Central.

Table D11.—Regional average ratios of carbon in bark to carbon in wood according to wood type and size

Region[b]	Ratio of carbon in bark to carbon in wood[a]					
	Softwood[c]			Hardwood[d]		
	Sawtimber-size[e]	Poletimber-size[e]	All	Sawtimber-size	Poletimber-size	All
Northeast	0.182	0.185	0.183	0.199	0.218	0.205
North Central	0.182	0.185	0.183	0.199	0.218	0.206
Pacific Coast	0.181	0.185	0.181	0.197	0.219	0.203
Rocky Mountain	0.181	0.185	0.182	0.201	0.219	0.210
South	0.182	0.185	0.183	0.198	0.218	0.204

[a]Ratios are calculated from carbon mass based on biomass component equations in Jenkins and others (2003) applied to all live trees identified as growing stock on timberland stands classified as medium- or large-diameter stands in the survey data for the conterminous United States from USDA Forest Service, Forest Inventory and Analysis Program's database of forest surveys (FIADB; USDA For. Serv. 2005, Alerich and others 2005). Note that "sawtimber trees" and "poletimber trees" are not stand-level classifications as used here; these terms apply to individual trees. Carbon mass is calculated for boles from stump to 4-inch top, outside diameter.

[b]North Central includes the Northern Prairie States and the Northern Lake States; Pacific Coast includes the Pacific Northwest (West and East) and the Pacific Southwest; Rocky Mountain includes Rocky Mountain, North and South; and South includes the Southeast and South Central.

[c]Softwood sawtimber-size are trees at least 22.9 cm (9 in) d.b.h., and softwood poletimber-size trees are 12.7 to 22.6 cm (5.0 to 8.9 in) d.b.h.

[d]Hardwood sawtimber-size is at least 27.9 cm (11 in) d.b.h., and hardwood poletimber-size trees are 12.7 to 27.7 cm (5.0 to 10.9 in) d.b.h.

[e]When applying these ratios to roundwood, we assume that ratios based on sawtimber-size trees and ratios based on poletimber-size trees in the forest apply to saw log roundwood and pulpwood roundwood, respectively.

Table D12.—Ratios of total fuelwood (both growing-stock and nongrowing-stock sources) to corresponding portion of growing-stock volume that is removed as roundwood[a]

Region[c]	Fuelwood:growing-stock volume removed as hardwood[b]					
	Softwood			Hardwood		
	Sawtimber-size	Less than sawtimber-size	All	Sawtimber-size	Less than sawtimber-size	All
Northeast	0.009	1.017	0.136	0.073	4.051	0.547
North Central	0.015	0.180	0.066	0.040	1.230	0.348
Pacific Coast	0.035	0.242	0.096	0.279	2.627	0.957
Rocky Mountain	0.006	3.145	0.217	0.168	50.200	3.165
South	0.010	0.049	0.019	0.168	0.644	0.301

[a]Values and classifications are based on data in Tables 2.2, 3.2, 4.2, 5.2, and 6.2 of Johnson (2001).

[b]Ratios are to calculate fuelwood and are based on volumes. The denominators are portions of growing-stock volume removed as roundwood according to size. Numerators for "less than sawtimber-size" include poletimber and nongrowing-stock sources. We assume the ratios do not include bark and use these values as a step in determining the allocation of carbon for Table 5 and Appendix C, based on growing stock.

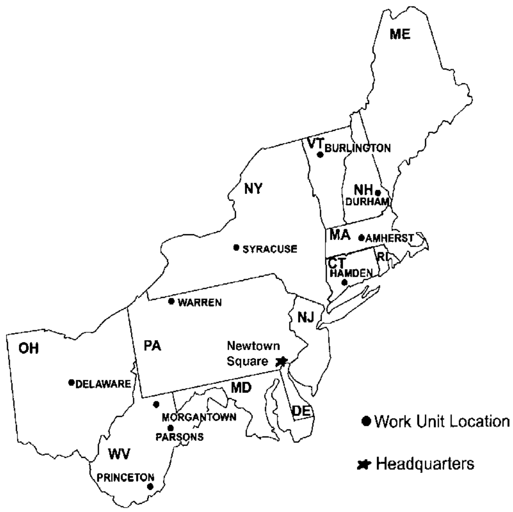
[c]North Central includes the Northern Prairie States and the Northern Lake States; Pacific Coast includes the Pacific Northwest (West and East) and the Pacific Southwest; Rocky Mountain includes Rocky Mountain, North and South; and South includes the Southeast and South Central.

Download the spreadsheet files at:
http://www.fs.fed.us/ne/durham/4104/1605b.shtml

Smith, James E.; Heath, Linda S.; Skog, Kenneth E.; Birdsey, Richard A. 2006. **Methods for calculating forest ecosystem and harvested carbon with standard estimates for forest types of the United States.** Gen. Tech. Rep. NE-343. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northeastern Research Station. 216 p.

This study presents techniques for calculating average net annual additions to carbon in forests and in forest products. Forest ecosystem carbon yield tables, representing stand-level merchantable volume and carbon pools as a function of stand age, were developed for 51 forest types within 10 regions of the United States. Separate tables were developed for afforestation and reforestation. Because carbon continues to be sequestered in harvested wood, approaches to calculate carbon sequestered in harvested forest products are included. Although these calculations are simple and inexpensive to use, the uncertainty of results obtained by using representative average values may be high relative to other techniques that use site- or project-specific data. The estimates and methods in this report are consistent with guidelines being updated for the U.S. Voluntary Reporting of Greenhouse Gases Program and with guidelines developed by the Intergovernmental Panel on Climate Change. The CD-ROM included with this publication contains a complete set of tables in spreadsheet format.

Keywords: forest carbon sequestration project, harvested wood carbon, carbon yield tables, stock change, voluntary reporting



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