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Estimates of Forest Ecosystem Carbon for Common Reforestation Scenarios in the United States

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Abstract

This document presents forest carbon stocks and stand-level total volume for common reforestation scenarios in the United States. Eight geographic regions and 13 forest types are represented. These tables complement recent estimates of forest carbon stocks in the conterminous United States (Hoover et al. 2021) and were developed with a similar approach, using the USDA Forest Service's Forest Vegetation Simulator and starting from a "bare ground" condition. The regions, types, and scenarios were selected based on data from the Forest Service and reforestation partner organizations and reflect current commonly used reforestation practices. Two sets of estimates are provided for each region and type, representing different planting densities. Although the uncertainty of results obtained by using generalized estimates may be high relative to other techniques that use site- or project-specific data, growth and yield data for reforestation projects are generally unavailable. Yield data for planted stands are often derived from timber plantations, where planting densities are higher and extensive site preparation and tending treatments are often applied. The tables presented here provide generalized regional estimates of expected carbon accumulation from reforestation projects, developed in a manner consistent with previous forest carbon lookup tables for major forest types in the conterminous United States.

Literature Cited

Hoover, C.M.; Bagdon, B.; Gagnon, A. 2021. **Standard estimates of forest ecosystem carbon for forest types of the United States.** Gen. Tech. Rep. NRS-202. Madison, WI: U.S. Department of Agriculture, Forest Service, Northern Research Station. 158 p. https://doi.org/10.2737/NRS-GTR-202.

KEY WORDS: forest carbon sequestration, carbon yield tables, carbon stock, forest carbon project, carbon estimation, tree planting

Quality Assurance

This publication conforms to the Northern Research Station's Quality Assurance Implementation Plan which requires technical and policy review for all scientific publications produced or funded by the Station. The process included a blind technical review by two reviewers, who were selected by the Assistant Director for Research and unknown to the authors. This review policy promotes the Forest Service guiding principles of using the best scientific knowledge, striving for quality and excellence, maintaining high ethical and professional standards, and being responsible and accountable for what we do.

Cover Art: Professional tree planters on the Lolo National Forest, Montana, 2020. Photo by Dave Gardner Creative/National Forest Foundation via Flickr.com.

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Estimates of Forest Ecosystem Carbon for Common Reforestation Scenarios in the United States

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Contents

Introduction

Background

The U.S. Department of Agriculture (USDA) Forest Service, Research and Development unit has a decades long history of developing methods and tools to support forest carbon estimation and management, often utilizing the extensive national dataset of forest attributes collected by the Forest Service's Forest Inventory and Analysis (FIA) program (Heath 2012).

Key contributions include fundamental methods development (Birdsey 1996), the FORCARB forest carbon estimation framework (Heath et al. 2010), and a widely used set of general forest ecosystem carbon estimates, often called "carbon lookup tables" (Smith et al. 2006). As part of the ongoing work of the Research and Development unit to support agency efforts related to forest carbon, the standard estimates of forest carbon stocks presented in Smith et al. (2006) were updated using FIA data and the Forest Service's Forest Vegetation Simulator (FVS; Dixon et al. 2002). These estimates take advantage of recent remeasurement data produced under FIA's annual inventory protocol, which was not fully implemented when Smith et al. (2006) was being developed. Use of the carbon reporting functionality in the Fire and Fuels Extension (FFE) to FVS facilitates integration with decision support systems that use FVS. The updated estimates were released in 2021 (Hoover et al. 2021) and have the same structure and format as the earlier tables; the publication includes a discussion of the differences between the two sets of estimates.

As the updated estimates were tested and reviewed, interest in the carbon implications of reforestation programs related to wildfires was growing, driven in part by the Trillion Trees Initiative (https://us.1t.org/). The original and updated forest carbon stock estimates were developed to reflect regional estimates of carbon in forests resulting from natural regeneration, and they may not accurately describe the expected carbon stock in stands replanted after wildfire or other disturbance. We developed an additional set of forest carbon stock estimates using the same general approach and common reforestation scenarios, to better reflect potential carbon sequestration from tree planting efforts. This General Technical Report thus serves as a companion document to General Technical Report NRS-202, "Standard Estimates of Forest Ecosystem Carbon for Forest Types of the United States" (Hoover et al. 2021).

Box 1: Forest Carbon Stock Estimate Reports

“GTR 343”

Smith, J.E.; Heath, L.S.; Skog, K.E.; Birdsey, R.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.

- Provides estimates of forest ecosystem carbon stocks and timber volume by forest type and U.S. geographic region for two scenarios: afforestation (stand establishment on land that was not forest) and regeneration following clearcut harvesting.
- Provides regional estimates of carbon in harvested wood products.

Gen. Tech. Rep. NRS-202

Hoover, C.M.; Bagdon, B.; Gagnon, A. 2021. **Standard estimates of forest ecosystem carbon for forest types of the United States.** Gen. Tech. Rep. NRS-202. Madison, WI: U.S. Department of Agriculture, Forest Service, Northern Research Station. 158 p. https://doi.org/10.2737/NRS-GTR-202.

- Presents updated estimates of forest ecosystem carbon for 53 forest types within 11 U.S. regions.
- Carbon yield tables represent carbon stocks and stand-level merchantable volume as a function of stand age.

This report (companion to Gen. Tech. Rep. NRS-202)

Hoover, C.M.; Smith-Mateja, E.; Balloffet, N. 2023. **Estimates of forest ecosystem carbon for common reforestation scenarios in the United States.** Gen. Tech. Rep. NRS-209. Madison, WI: U.S. Department of Agriculture, Forest Service, Northern Research Station. 45 p. https://doi.org/10.2737/NRS-GTR-209.

- Provides generalized estimates of forest carbon stocks and total volume resulting from tree planting projects using common reforestation scenarios for 13 forest types within 8 U.S. regions.
- Planting scenarios modeled (tree species and counts) are based on data from Forest Service reforestation partnership projects, 2019 through 2021, and regional silviculturists.

Methods

Carbon Pools Reported

The carbon pools reported, and their definitions, are as follows:

- Live trees: Live trees (including foliage) for which a diameter at breast height (d.b.h.) is recorded (usually ≥2.5 cm, or 1 inch), including carbon in live coarse roots (≥2 mm, or 0.08 inch). Calculated according to Jenkins et al. (2003).
- Standing dead trees: Dead trees, including coarse roots. Calculated using FVS-FFE methodology: stems (Rebain 2010), coarse roots (Jenkins et al. 2003).
- Understory vegetation: Live herbs and shrubs, calculated according to FVS-FFE methods (Rebain 2010). Live herbs and shrubs are determined from a combination of percent cover and density of dominant species and will change through time based on these stand-level changes.
- Down dead wood: All woody debris material resting on the ground, regardless of size. Calculated according to FVS-FFE methods (Rebain 2010). Note that the FFE simulates the dynamics of nonliving carbon pools, so that material transfers between pools over time as decomposition occurs.
- Forest floor: All nonliving nonwoody surface material. Calculated according to FVS-FFE methods. Unlike the live and dead tree, understory, and down dead wood pools, for which carbon is estimated as 50 percent of dry biomass, forest floor carbon is calculated as 37 percent dry biomass (Rebain 2010).
- Soil organic carbon: Belowground carbon (including fine roots ≤2 mm, or 0.08 inch) and organic carbon not included in other pools, to a depth of 1 m (3.3 feet). These estimates are computed as in Hoover et al. (2021); FVS does not estimate the soil carbon pool.

Development of Carbon Stock Estimates from Forest Vegetation Simulator Projections

These forest carbon stock estimates were produced using FVS through a multistep process which was repeated for each combination of forest type and region, using the "bare ground" simulation option and the appropriate geographic model variant with the Jenkins et al. (2003) biomass calculation option. The forest carbon stock estimates provided in Hoover et al. (2021) cover 53 forest type groups in 11 geographic regions of the conterminous United States (Fig. 1). Because tree planting projects are not implemented in all of those regions and forest types, estimates were developed for a subset of forest types and regions where projects were most commonly undertaken over the past 3 years. Forest Service staff consulted with National Forest System regional silviculturists and reforestation partners (Box 2) to select forest types and regions where planting projects are taking place and those scenarios were modeled in FVS to produce estimates of carbon and volume. Eight geographic regions (see Figure 1 for states in each region) and 13 forest types (see p. 12 in Appendix A) are covered by the planting scenarios.

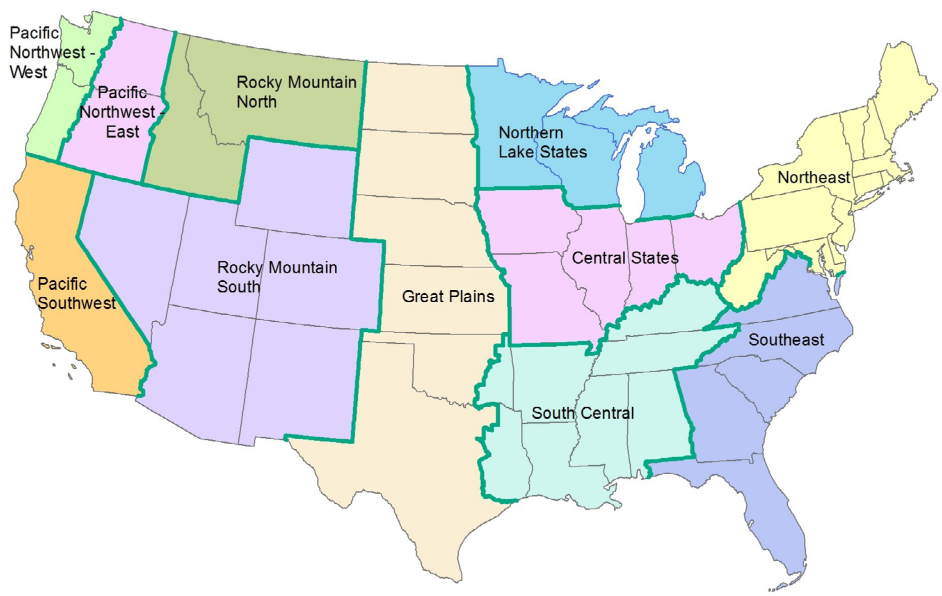

Figure 1.—Geographic regions used in this report for presenting estimates of carbon in forest ecosystems of the contiguous United States (note that the Great Plains, Central States, and Northeast are not represented in this report).

Box 2: National Reforestation Partnerships

Reforestation is a large, multiyear effort, and the Forest Service works collaboratively with trusted partners at multiple levels to accomplish more together. At the national level, the Forest Service has established partnerships to support reforestation activities, particularly in areas affected by catastrophic or natural events (or both; e.g., fire, blowdown, insects, and disease). For decades, these partnerships have enhanced the agency's ability to reforest and restore national forests across the United States (Fig. 2).

Partners, including the National Forest Foundation, Arbor Day Foundation®, American Forests™, and One Tree Planted, support critical tree planting and other reforestation projects on National Forest System lands. Collectively, with the expertise and resources of many partners, the Forest Service can nurture resilient forests today that will thrive well into the future. The following organizations are currently partnering with the Forest Service through the National Reforestation Partnership Program:

- National Forest Foundation (https://www.nationalforests.org)
- Arbor Day Foundation (https://www.arborday.org)
- American Forests (https://www.americanforests.org)
- One Tree Planted (https://onetreeplanted.org)

Source: Forest Service, National Forest System - Washington Office, Forest Management, Range Management, and Vegetation Ecology Staff

Figure 2.—Professional crew planting pine seedlings on the Flathead National Forest, Montana, 2020. Photo by Erika Williams, USDA Forest Service via Flickr.com.

The planting scenarios modeled (tree species and counts) are based on Forest Service reforestation partnership project data from the past 3 years. Simulation details are given in Appendix B. During the development process, several discussions with reforestation partners informed the choices for the simulation process. There are many factors that can potentially change the outcome of any reforestation (or afforestation) project, and our goal was to keep the estimates as straightforward and generally representative as possible, rather than developing multiple sets of estimates for each region and forest type to attempt to characterize the many factors that can affect a project. Two tables are supplied for each type and region to reflect common planting densities, and an extra set of tables is included for Douglas-fir in the Pacific Northwest, West region for higher productivity sites. The same initial assumptions were used for all planting scenarios, and are the result of discussions between Forest Service personnel and reforestation partners:

- No site preparation, competition control, or other management treatments are simulated.
- Two forest type-specific planting densities are simulated for each region and type; the number of trees planted represents the number of trees surviving at 3 to 5 years post-planting and is based on Forest Service planting data.
- Except for a few variants, FVS does not automatically include regeneration (except for stump sprouting after trees are cut). Because regeneration parameters can have a substantial impact on simulation outcomes, and vary widely depending on region, forest type, and site, no regeneration other than the initially planted seedlings is included. This approach also facilitates assessing additionality (for more on additionality, see "Discussion").
- Because conditions may vary considerably, the standing dead, down dead wood, and forest floor carbon pools are initially set to zero. The understory carbon pool is initialized with the FVS-FFE default values. Users wishing to include carbon in the dead biomass pools in year zero may refer to the appropriate set of tables in Hoover et al. (2021) and adjust accordingly.
- Estimates of soil organic carbon follow the methods in Smith et al. (2006) for the afforestation tables (the same approach is used in the updated carbon estimates in Hoover et al. 2021). Soil organic carbon is set to 75 percent of the value at stand maturity and then increases following the approach in West et al. (2004). This provides a conservative value in cases where extreme fire conditions occurred and allows for use of the estimates in afforestation projects, where the prior land use was nonforest. If site conditions warrant, users may refer to the appropriate table in Appendix A of Hoover et al. (2021) and substitute the soil organic carbon value for mature stands.

- A site productivity value, defined in this case as the input site index or habitat type appropriate to the region and forest type, was used for each simulation. Note that site productivity has a large effect on forest stand development; carbon stocks and volume can be much lower or higher than the estimates presented here, depending on site productivity.
- Estimates are given for 100 years; values after 50 years are presented in italics to emphasize that due to natural regeneration, management actions, and drought, fire, insects, disease, and other natural disturbances, projections are likely to become less realistic over time.

These stands represent common reforestation scenarios on public lands (or national forests) with multiple reforestation objectives, rather than typical artificial regeneration prescriptions for solely timber objectives, which may be used in commercial operations. As such, data are not as widely available against which to benchmark these estimates. FVS can overpredict or underpredict variables in some cases, which is why calibration is recommended. To evaluate general model behavior, predicted values for volume, diameter, basal area, and height were compared to FIA data for each region and forest type. We also referred to published growth and yield data for managed and unmanaged stands, and consulted experts as needed. Parameter adjustments were made as needed to better align the modeled estimates with this information; we adjusted parameters in 4 of 16 cases. Note that development of the FVS system is ongoing; consequently, if users run the same simulation parameters listed in Appendix B, they may get slightly different results due to updates made in the base FVS model or the variants (or both).

Forest Ecosystem Carbon Tables

The format used here mirrors that of the tables provided in the updated forest carbon estimates (Hoover et al. 2021). Estimates of carbon stocks and volume are presented in Appendix A. Each table contains carbon stock estimates by stand age for the live tree, dead tree, understory vegetation, down dead wood, forest floor, and soil organic carbon pools, as defined previously in the "Carbon Pools Reported" section. Total stand volume is also included. Each table has two sections: the first section reports values in metric units of cubic meters per hectare (m^3/hectare) and metric tons per hectare (tonnes/hectare), and the second section includes English units, cubic feet per acre (ft^3/acre) and short tons per acre (tons/acre). Two sets of tables are provided for each forest type and region, one for each of the two planting densities. Recall that the number of trees planted represents the average survival at 3 to 5 years.

In general, volume and carbon track closely; due to computational approaches, however, there may be some forest types and regions where these quantities are less closely aligned. There are several reasons for this discrepancy, all a result of the different computational methods used for the volume and carbon estimates. Volume equations in FVS are tied to the geographic variant and by default use the National Volume Estimator Library (NVEL) equations; details on volume estimation are available on the Forest Products Measurement website, https://www.fs.usda.gov/forestmanagement/products/measurement/volume/nvel/index.php. Equations from Jenkins et al. (2003) for calculating biomass are at a national scale and do not vary by geographic region. These equations, unlike most volume equations, do not include a height variable and are not species-specific. When using the tables, note that entries may appear as zero in some instances where the values are very low, because the estimates are reported to a single decimal place.

Discussion

The estimates presented here are generalized estimates of expected forest carbon stocks in commonly used reforestation scenarios in specific regions. As such, they will not represent every situation, but are useful as quick estimates of potential carbon accumulation resulting from tree planting projects. They are not appropriate for use in commercial artificial regeneration scenarios, which typically use higher planting densities and some combination of site preparation, fertilization, competition management, and precommercial thinning.

Important factors that may affect stand growth and carbon storage which are not accounted for include differences in site productivity, management treatments, natural regeneration rates, climate change, and natural disturbance such as drought, wildfire, insects and disease, and browsing by ungulates. Site productivity, as described by site index or habitat type, can greatly affect stand development in terms of both growth rate and stand stocking at maturity. The estimates provided here reflect average site productivity values for the forest type and region; users working in sites documented to have particularly high or low site productivity may choose to adjust the values accordingly.

FVS projections include mortality; the mortality model used depends on the geographic variant, but all are affected by stand density. Additional mortality, such as from insects or disease, can be simulated by using a variety of keywords. The estimates presented here include the base projections of mortality and reflect initial seedling survival rates from recent replanting projects in each region. However, if a disturbance event occurs during a particular reforestation project, these estimates are likely to overestimate carbon accumulation and may need to be adjusted to account for additional mortality.

Seedlings will naturally populate planted stands over time, which may have a considerable impact on outcomes in some regions and forest types. Natural regeneration is omitted from the simulations due to: (1) difficulty in developing an appropriate natural regeneration scenario for each region and type as seedling recruitment can vary greatly over time and space depending on a variety of factors; and (2) additionality, an important element in any project intended to mitigate climate change. Additionality refers to benefits above and beyond what would occur in the absence of the action or project (the "business as usual" scenario). Omitting natural regeneration in the estimates ensures that they reflect only the carbon resulting from the planting project.

Conclusions

These tables were developed for providing generalized estimates of expected forest carbon stocks from reforestation projects (replanting forest land that is currently not in forest cover as a result of a disturbance). However, the decision to set the dead carbon pools to zero at the beginning of the simulation and use a reduction and recovery approach for soil organic carbon enables these estimates to be used in afforestation (planting trees on land that was previously nonforest) scenarios that fit the region and forest type classifications presented here.

The values provided in Appendix A represent generalized estimates of expected forest carbon stocks and volume resulting from tree planting projects using common reforestation scenarios and are a complement to the standard forest estimates presented in Hoover et al. (2021). As with any set of generalized estimates of forest attributes, site-specific results may vary considerably because of disturbance, management, and site conditions. The longer the simulation period, the greater the likelihood that projections will become less realistic as a result of these factors; for this reason, estimates after year 50 are presented in italics and should be viewed accordingly.

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Appendix A: Forest Ecosystem Yield Tables for Reforestation Projects in Eight U.S. Regions

Tables A1 through A32 present estimates of total volume and carbon stocks for planted stands, by forest type, region, and density (trees per acre; TPA) at 3 to 5 years post-planting.

Notes: Very small values for understory carbon may appear as zero because results are reported to a single decimal place.

Values after age 50 are italicized to indicate increasing uncertainty from disturbances over time; see text for discussion.

For details on TPA, see text.

For common and scientific names of species, refer to Appendix F in the FIA Database user guide (Burrill et al. 2021), available at: https://www.fia.fs.usda.gov/library/database-documentation/current/ver90/FIADB%20User%20Guide%20P2_9-0-1_final.pdf.

Table A1.—Regional estimates of total volume and carbon stocks for planted white-red-jack pine stands in the Northern Lake States, 400 trees per acre

		Carbon density						
Age	Volume	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	0.0	0.0	0.0	90.6	0.0
10	0	0.8	0.0	0.5	0.0	0.0	91.8	1.4
20	0	7.6	0.0	0.5	0.0	0.1	95.1	8.3
30	48	26.9	0.1	0.2	0.4	0.6	99.7	28.2
40	147	53.7	0.5	0.2	1.4	1.7	104.9	57.4
50	247	82.3	2.3	0.1	2.6	3.1	109.7	90.4
60	*345*	*110.2*	*7.2*	*0.3*	*4.2*	*4.7*	*113.7*	*126.6*
70	*440*	*136.9*	*7.6*	*0.3*	*7.5*	*6.4*	*116.6*	*158.8*
80	*491*	*150.2*	*16.7*	*0.3*	*9.6*	*8.1*	*118.5*	*184.9*
90	*519*	*157.8*	*20.8*	*0.3*	*14.5*	*9.2*	*119.6*	*202.6*
100	*539*	*164.3*	*21.7*	*0.3*	*18.6*	*10.1*	*120.3*	*214.9*
years	*ft^3/acre*	*---------- tons carbon/acre ----------*						
0	0	0.0	0.0	0.0	0.0	0.0	40.4	0.0
10	0	0.4	0.0	0.2	0.0	0.0	41.0	0.6
20	0	3.4	0.0	0.2	0.0	0.1	42.4	3.7
30	692	12.0	0.1	0.1	0.2	0.3	44.5	12.6
40	2,105	23.9	0.2	0.1	0.6	0.7	46.8	25.6
50	3,531	36.7	1.0	0.0	1.1	1.4	48.9	40.3
60	*4,937*	*49.1*	*3.2*	*0.1*	*1.9*	*2.1*	*50.7*	*56.5*
70	*6,292*	*61.1*	*3.4*	*0.1*	*3.4*	*2.8*	*52.0*	*70.8*
80	*7,023*	*67.0*	*7.5*	*0.1*	*4.3*	*3.6*	*52.9*	*82.5*
90	*7,417*	*70.4*	*9.3*	*0.1*	*6.5*	*4.1*	*53.4*	*90.4*
100	*7,709*	*73.3*	*9.7*	*0.1*	*8.3*	*4.5*	*53.7*	*95.9*

Table A2.—Regional estimates of total volume and carbon stocks for planted white-red-jack pine stands in the Northern Lake States, 700 trees per acre

Age	Volume	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	0.0	0.0	0.0	90.6	0.0
10	0	1.4	0.0	0.5	0.0	0.0	91.8	2.0
20	0	13.0	0.0	0.5	0.0	0.2	95.1	13.9
30	77	45.2	0.2	0.2	0.6	1.0	99.7	47.2
40	214	79.1	4.0	0.2	2.4	2.8	104.9	88.5
50	346	115.0	6.7	0.1	5.3	4.7	109.7	131.8
60	*420*	*132.7*	*21.8*	*0.3*	*8.1*	*6.7*	*113.7*	*169.7*
70	*470*	*146.0*	*28.1*	*0.3*	*16.0*	*8.1*	*116.6*	*198.6*
80	*508*	*157.4*	*26.2*	*0.3*	*22.2*	*9.3*	*118.5*	*215.4*
90	*531*	*165.2*	*23.8*	*0.3*	*23.6*	*10.5*	*119.6*	*223.5*
100	*547*	*171.1*	*23.6*	*0.3*	*23.4*	*11.5*	*120.3*	*229.9*
years	*ft³/acre*	*tons carbon/acre*						
0	0	0.0	0.0	0.0	0.0	0.0	40.4	0.0
10	0	0.6	0.0	0.2	0.0	0.0	41.0	0.9
20	0	5.8	0.0	0.2	0.0	0.1	42.4	6.2
30	1,100	20.2	0.1	0.1	0.3	0.4	44.5	21.0
40	3,057	35.3	1.8	0.1	1.1	1.2	46.8	39.5
50	4,940	51.3	3.0	0.0	2.4	2.1	48.9	58.8
60	*6,001*	*59.2*	*9.7*	*0.1*	*3.6*	*3.0*	*50.7*	*75.7*
70	*6,710*	*65.1*	*12.5*	*0.1*	*7.1*	*3.6*	*52.0*	*88.6*
80	*7,253*	*70.2*	*11.7*	*0.1*	*9.9*	*4.2*	*52.9*	*96.1*
90	*7,595*	*73.7*	*10.6*	*0.1*	*10.5*	*4.7*	*53.4*	*99.7*
100	*7,819*	*76.3*	*10.5*	*0.1*	*10.4*	*5.1*	*53.7*	*102.5*

Table A3.—Regional estimates of total volume and carbon stocks for planted shortleaf pine stands in the South Central States, 250 trees per acre

Age	Volume	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	1.3	0.0	0.0	31.4	1.3
10	0	0.7	0.0	2.1	0.0	0.0	31.8	2.8
20	0	5.3	0.0	2.9	0.0	0.0	33.0	8.2
30	32	14.9	0.1	2.9	0.6	0.2	34.6	18.7
40	89	28.9	0.4	2.9	1.3	0.4	36.4	33.9
50	154	44.5	0.8	2.9	1.9	0.7	38.0	50.8
60	*220*	*60.4*	*1.3*	*2.9*	*2.7*	*1.1*	*39.4*	*68.2*
70	*280*	*74.4*	*1.7*	*2.9*	*3.3*	*1.4*	*40.4*	*83.8*
80	*336*	*88.0*	*2.2*	*2.9*	*3.9*	*1.8*	*41.1*	*98.8*
90	*390*	*101.2*	*2.6*	*2.9*	*4.6*	*2.2*	*41.5*	*113.5*
100	*437*	*113.0*	*3.5*	*2.9*	*4.6*	*2.7*	*41.7*	*126.6*
years	*ft³/acre*	*tons carbon/acre*						
0	0	0.0	0.0	0.6	0.0	0.0	12.7	0.6
10	0	0.3	0.0	0.9	0.0	0.0	12.8	1.2
20	2	2.3	0.0	1.3	0.0	0.0	13.3	3.7
30	459	6.6	0.1	1.3	0.3	0.1	13.9	8.3
40	1,271	12.9	0.2	1.3	0.6	0.2	14.7	15.1
50	2,206	19.9	0.4	1.3	0.9	0.3	15.3	22.7
60	*3,146*	*26.9*	*0.6*	*1.3*	*1.2*	*0.5*	*15.9*	*30.4*
70	*3,996*	*33.2*	*0.8*	*1.3*	*1.5*	*0.6*	*16.3*	*37.4*
80	*4,809*	*39.3*	*1.0*	*1.3*	*1.8*	*0.8*	*16.6*	*44.1*
90	*5,572*	*45.2*	*1.2*	*1.3*	*2.0*	*1.0*	*16.7*	*50.6*
100	*6,245*	*50.4*	*1.6*	*1.3*	*2.1*	*1.2*	*16.8*	*56.5*

Table A4.—Regional estimates of total volume and carbon stocks for planted shortleaf pine stands in the South Central States, 400 trees per acre

Age	Volume	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	1.3	0.0	0.0	31.4	1.3
10	0	1.0	0.0	2.1	0.0	0.0	31.8	3.2
20	0	8.3	0.0	2.9	0.0	0.0	33.0	11.3
30	47	22.7	0.2	2.9	0.9	0.3	34.6	27.0
40	128	41.7	0.7	2.9	2.1	0.6	36.4	47.9
50	214	61.1	1.2	2.9	3.0	1.0	38.0	69.2
60	*299*	*80.1*	*1.2*	*2.9*	*3.9*	*1.5*	*39.4*	*89.4*
70	*361*	*93.3*	*3.7*	*2.9*	*5.2*	*1.9*	*40.4*	*107.0*
80	*418*	*105.9*	*4.2*	*2.9*	*6.4*	*2.4*	*41.1*	*121.7*
90	*472*	*118.5*	*4.4*	*2.9*	*7.0*	*2.9*	*41.5*	*135.6*
100	*520*	*129.8*	*4.1*	*2.9*	*7.3*	*3.4*	*41.7*	*147.5*
years	*ft^3/acre*	*--- tons carbon/acre ---*						
0	0	0.0	0.0	0.6	0.0	0.0	12.7	0.6
10	0	0.5	0.0	0.9	0.0	0.0	12.8	1.4
20	3	3.7	0.0	1.3	0.0	0.0	13.3	5.1
30	676	10.1	0.1	1.3	0.4	0.1	13.9	12.1
40	1,836	18.6	0.3	1.3	0.9	0.3	14.7	21.4
50	3,065	27.3	0.5	1.3	1.3	0.5	15.3	30.8
60	*4,280*	*35.7*	*0.5*	*1.3*	*1.7*	*0.7*	*15.9*	*39.9*
70	*5,158*	*41.6*	*1.7*	*1.3*	*2.3*	*0.9*	*16.3*	*47.7*
80	*5,976*	*47.2*	*1.9*	*1.3*	*2.8*	*1.1*	*16.6*	*54.3*
90	*6,747*	*52.9*	*2.0*	*1.3*	*3.1*	*1.3*	*16.7*	*60.5*
100	*7,431*	*57.9*	*1.8*	*1.3*	*3.3*	*1.5*	*16.8*	*65.8*

Table A5.—Regional estimates of total volume and carbon stocks for planted longleaf pine stands in the Southeast, 250 trees per acre

Age	Volume	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	1.3	0.0	0.0	82.5	1.3
10	0	1.0	0.0	2.1	0.0	0.0	83.6	3.2
20	3	7.6	0.0	2.9	0.0	0.1	86.6	10.6
30	45	19.9	0.2	2.9	0.9	0.5	90.9	24.4
40	106	35.3	0.6	2.9	1.6	1.0	95.5	41.5
50	179	53.4	0.2	2.9	2.3	1.7	99.9	60.5
60	*238*	*67.1*	*4.0*	*2.9*	*4.0*	*2.4*	*103.5*	*80.3*
70	*293*	*79.9*	*4.4*	*2.9*	*5.7*	*3.0*	*106.2*	*95.9*
80	*341*	*92.0*	*4.7*	*2.9*	*6.2*	*3.8*	*107.9*	*109.5*
90	*378*	*101.8*	*6.5*	*2.9*	*6.4*	*4.5*	*109.0*	*122.1*
100	*387*	*104.8*	*10.0*	*2.9*	*9.3*	*5.1*	*109.5*	*132.1*
years	*ft³/acre*	*tons carbon/acre*						
0	0	0.0	0.0	0.6	0.0	0.0	36.8	0.6
10	0	0.5	0.0	0.9	0.0	0.0	37.3	1.4
20	38	3.4	0.0	1.3	0.0	0.0	38.6	4.7
30	644	8.9	0.1	1.3	0.4	0.2	40.5	10.9
40	1,515	15.8	0.3	1.3	0.7	0.5	42.6	18.5
50	2,557	23.8	0.1	1.3	1.0	0.7	44.6	27.0
60	*3,400*	*29.9*	*1.8*	*1.3*	*1.8*	*1.0*	*46.2*	*35.8*
70	*4,186*	*35.6*	*2.0*	*1.3*	*2.5*	*1.4*	*47.4*	*42.8*
80	*4,876*	*41.0*	*2.1*	*1.3*	*2.8*	*1.7*	*48.1*	*48.8*
90	*5,408*	*45.4*	*2.9*	*1.3*	*2.8*	*2.0*	*48.6*	*54.5*
100	*5,533*	*46.8*	*4.5*	*1.3*	*4.1*	*2.3*	*48.9*	*58.9*

Table A6.—Regional estimates of total volume and carbon stocks for planted longleaf pine stands in the Southeast, 400 trees per acre

Age	Volume	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	1.3	0.0	0.0	82.5	1.3
10	0	1.7	0.0	2.1	0.0	0.0	83.6	3.8
20	4	12.1	0.1	2.9	0.1	0.1	86.6	15.2
30	68	30.4	0.4	2.9	1.4	0.8	90.9	35.9
40	151	50.5	2.9	2.9	2.4	1.6	95.5	60.3
50	231	68.5	4.1	2.9	5.0	2.3	99.9	82.8
60	*309*	*86.0*	*4.7*	*2.9*	*6.3*	*3.2*	*103.5*	*103.0*
70	*347*	*93.5*	*12.6*	*2.9*	*8.8*	*4.0*	*106.2*	*121.8*
80	*366*	*97.4*	*13.0*	*2.9*	*12.9*	*4.7*	*107.9*	*130.9*
90	*378*	*100.9*	*12.4*	*2.9*	*13.3*	*5.3*	*109.0*	*134.7*
100	*387*	*103.9*	*12.0*	*2.9*	*12.2*	*6.0*	*109.5*	*137.0*
years	*ft³/acre*	---------- *tons carbon/acre* ----------						
0	0	0.0	0.0	0.6	0.0	0.0	36.8	0.6
10	0	0.7	0.0	0.9	0.0	0.0	37.3	1.7
20	60	5.4	0.0	1.3	0.0	0.1	38.6	6.8
30	970	13.6	0.2	1.3	0.6	0.4	40.5	16.0
40	2,161	22.5	1.3	1.3	1.1	0.7	42.6	26.9
50	3,300	30.6	1.8	1.3	2.2	1.0	44.6	36.9
60	*4,409*	*38.4*	*2.1*	*1.3*	*2.8*	*1.4*	*46.2*	*46.0*
70	*4,955*	*41.7*	*5.6*	*1.3*	*3.9*	*1.8*	*47.4*	*54.3*
80	*5,229*	*43.4*	*5.8*	*1.3*	*5.7*	*2.1*	*48.1*	*58.4*
90	*5,408*	*45.0*	*5.5*	*1.3*	*5.9*	*2.4*	*48.6*	*60.1*
100	*5,537*	*46.4*	*5.4*	*1.3*	*5.4*	*2.7*	*48.9*	*61.1*

Table A7.—Regional estimates of total volume and carbon stocks for planted oak-pine stands in the Southeast, 125 trees per acre

Age	Volume	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	1.3	0.0	0.0	46.1	1.3
10	0	0.3	0.0	2.1	0.0	0.0	46.7	2.5
20	0	2.9	0.0	2.9	0.0	0.0	48.3	5.8
30	10	8.7	0.1	2.9	0.4	0.1	50.7	12.2
40	43	18.0	0.2	2.9	0.9	0.3	53.3	22.3
50	81	30.7	0.5	2.9	1.3	0.5	55.8	35.9
60	*125*	*46.4*	*0.8*	*2.9*	*1.8*	*0.9*	*57.8*	*52.7*
70	*169*	*63.5*	*1.1*	*2.9*	*2.4*	*1.2*	*59.2*	*71.2*
80	*216*	*82.6*	*1.6*	*2.9*	*3.2*	*1.7*	*60.2*	*91.9*
90	*260*	*102.6*	*2.1*	*2.9*	*3.9*	*2.3*	*60.8*	*113.7*
100	*300*	*122.3*	*2.6*	*2.9*	*4.6*	*2.9*	*61.1*	*135.2*
years	*ft³/acre*	---------- *tons carbon/acre* ----------						
0	0	0.0	0.0	0.6	0.0	0.0	20.5	0.6
10	0	0.2	0.0	0.9	0.0	0.0	20.8	1.1
20	0	1.3	0.0	1.3	0.0	0.0	21.6	2.6
30	147	3.9	0.0	1.3	0.2	0.1	22.6	5.4
40	608	8.0	0.1	1.3	0.4	0.1	23.8	10.0
50	1,152	13.7	0.2	1.3	0.6	0.2	24.9	16.0
60	*1,782*	*20.7*	*0.3*	*1.3*	*0.8*	*0.4*	*25.8*	*23.5*
70	*2,421*	*28.3*	*0.5*	*1.3*	*1.1*	*0.6*	*26.4*	*31.7*
80	*3,082*	*36.8*	*0.7*	*1.3*	*1.4*	*0.8*	*26.9*	*41.0*
90	*3,713*	*45.8*	*0.9*	*1.3*	*1.7*	*1.0*	*27.1*	*50.7*
100	*4,290*	*54.6*	*1.1*	*1.3*	*2.0*	*1.3*	*27.3*	*60.3*

Table A8.—Regional estimates of total volume and carbon stocks for planted oak-pine stands in the Southeast, 200 trees per acre

		Carbon density						
Age	Volume	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	1.3	0.0	0.0	46.1	1.3
10	0	0.5	0.0	2.1	0.0	0.0	46.7	2.7
20	0	4.7	0.0	2.9	0.0	0.0	48.3	7.6
30	16	13.6	0.1	2.9	0.6	0.2	50.7	17.4
40	63	27.1	0.3	2.9	1.5	0.5	53.3	32.3
50	118	44.8	0.7	2.9	2.1	0.8	55.8	51.3
60	*179*	*66.1*	*1.1*	*2.9*	*2.9*	*1.3*	*57.8*	*74.3*
70	*238*	*88.2*	*1.6*	*2.9*	*3.8*	*1.8*	*59.2*	*98.2*
80	*297*	*111.7*	*2.1*	*2.9*	*4.7*	*2.4*	*60.2*	*123.8*
90	*349*	*134.9*	*2.7*	*2.9*	*5.6*	*3.1*	*60.8*	*149.2*
100	*387*	*154.6*	*4.8*	*2.9*	*7.0*	*3.9*	*61.1*	*173.1*
years	*ft³/acre*	---------- *tons carbon/acre* ----------						
0	0	0.0	0.0	0.6	0.0	0.0	20.5	0.6
10	0	0.2	0.0	0.9	0.0	0.0	20.8	1.2
20	0	2.1	0.0	1.3	0.0	0.0	21.6	3.4
30	226	6.1	0.1	1.3	0.3	0.1	22.6	7.8
40	905	12.1	0.2	1.3	0.7	0.2	23.8	14.4
50	16,89	20.0	0.3	1.3	0.9	0.4	24.9	22.9
60	*2,562*	*29.5*	*0.5*	*1.3*	*1.3*	*0.6*	*25.8*	*33.1*
70	*3,406*	*39.3*	*0.7*	*1.3*	*1.7*	*0.8*	*26.4*	*43.8*
80	*4,239*	*49.8*	*1.0*	*1.3*	*2.1*	*1.1*	*26.9*	*55.2*
90	*4,988*	*60.2*	*1.2*	*1.3*	*2.5*	*1.4*	*27.1*	*66.6*
100	*5,528*	*69.0*	*2.1*	*1.3*	*3.1*	*1.7*	*27.3*	*77.2*

Table A9.—Regional estimates of total volume and carbon stocks for planted oak-hickory stands in the Southeast, 125 trees per acre

		Carbon density						
Age	Volume	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	1.3	0.0	0.0	33.9	1.3
10	0	0.3	0.0	2.1	0.0	0.0	34.4	2.5
20	0	3.4	0.0	2.9	0.0	0.0	35.6	6.4
30	6	10.0	0.1	2.9	0.6	0.2	37.4	13.7
40	25	20.8	0.2	2.9	1.4	0.4	39.3	25.7
50	62	38.2	0.5	2.9	2.3	0.8	41.1	44.6
60	*104*	*61.2*	*0.8*	*2.9*	*3.0*	*1.3*	*42.6*	*69.3*
70	*151*	*89.3*	*1.4*	*2.9*	*4.0*	*2.0*	*43.7*	*99.5*
80	*203*	*121.4*	*2.1*	*2.9*	*5.2*	*2.8*	*44.4*	*134.4*
90	*255*	*155.3*	*3.1*	*2.9*	*6.6*	*3.7*	*44.8*	*171.5*
100	*307*	*190.4*	*3.8*	*2.9*	*8.0*	*4.8*	*45.0*	*209.8*
years	*ft³/acre*	*tons carbon/acre*						
0	0	0.0	0.0	0.6	0.0	0.0	15.1	0.6
10	0	0.1	0.0	0.9	0.0	0.0	15.3	1.1
20	0	1.5	0.0	1.3	0.0	0.0	15.9	2.8
30	92	4.5	0.0	1.3	0.2	0.1	16.7	6.1
40	357	9.3	0.1	1.3	0.6	0.2	17.5	11.5
50	890	17.0	0.2	1.3	1.0	0.4	18.3	19.9
60	*1,479*	*27.3*	*0.4*	*1.3*	*1.3*	*0.6*	*19.0*	*30.9*
70	*2,161*	*39.8*	*0.6*	*1.3*	*1.8*	*0.9*	*19.5*	*44.4*
80	*2,897*	*54.2*	*1.0*	*1.3*	*2.3*	*1.2*	*19.8*	*60.0*
90	*3,638*	*69.2*	*1.4*	*1.3*	*2.9*	*1.7*	*20.0*	*76.5*
100	*4,383*	*84.9*	*1.7*	*1.3*	*3.5*	*2.1*	*20.1*	*93.6*

Table A10.—Regional estimates of total volume and carbon stocks for planted oak-hickory stands in the Southeast, 200 trees per acre

Age	Volume	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	1.3	0.0	0.0	33.9	1.3
10	0	0.5	0.0	2.1	0.0	0.0	34.4	2.7
20	0	5.5	0.0	2.9	0.0	0.1	35.6	8.5
30	10	15.8	0.1	2.9	0.9	0.3	37.4	20.0
40	38	32.3	0.3	2.9	2.2	0.7	39.3	38.5
50	95	58.2	0.7	2.9	3.7	1.2	41.1	66.7
60	*155*	*91.1*	*1.3*	*2.9*	*4.9*	*2.0*	*42.6*	*102.1*
70	*221*	*129.6*	*2.0*	*2.9*	*6.3*	*3.0*	*43.7*	*143.7*
80	*279*	*164.8*	*7.4*	*2.9*	*8.8*	*4.1*	*44.4*	*187.9*
90	*329*	*197.8*	*9.7*	*2.9*	*13.1*	*5.2*	*44.8*	*228.6*
100	*371*	*226.9*	*14.3*	*2.9*	*15.5*	*6.4*	*45.0*	*266.0*
years	*ft³/acre*	*tons carbon/acre*						
0	0	0.0	0.0	0.6	0.0	0.0	15.1	0.6
10	0	0.2	0.0	0.9	0.0	0.0	15.3	1.2
20	0	2.4	0.0	1.3	0.0	0.0	15.9	3.8
30	143	7.0	0.1	1.3	0.4	0.1	16.7	8.9
40	548	14.4	0.2	1.3	1.0	0.3	17.5	17.2
50	1,353	26.0	0.3	1.3	1.6	0.5	18.3	29.8
60	*2,216*	*40.6*	*0.6*	*1.3*	*2.2*	*0.9*	*19.0*	*45.6*
70	*3,164*	*57.8*	*0.9*	*1.3*	*2.8*	*1.3*	*19.5*	*64.1*
80	*3,983*	*73.5*	*3.3*	*1.3*	*3.9*	*1.8*	*19.8*	*83.8*
90	*4,706*	*88.2*	*4.3*	*1.3*	*5.8*	*2.3*	*20.0*	*102.0*
100	*5,309*	*101.2*	*6.4*	*1.3*	*6.9*	*2.8*	*20.1*	*118.6*

Table A11.—Regional estimates of total volume and carbon stocks for planted ponderosa pine stands in the Pacific Northwest, East, 150 trees per acre

Age	Volume	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	1.1	0.0	0.0	38.0	1.1
10	1	0.4	0.0	1.1	0.0	0.0	38.5	1.5
20	5	3.3	0.0	0.8	0.0	0.1	39.9	4.2
30	24	14.1	0.0	0.8	0.1	0.2	41.8	15.2
40	59	31.6	0.1	1.1	0.4	0.6	44.0	33.7
50	105	50.8	0.3	1.1	1.0	0.9	46.0	54.1
60	*157*	*69.5*	*1.9*	*1.1*	*1.9*	*1.2*	*47.7*	*75.5*
70	*202*	*84.1*	*5.3*	*1.1*	*3.3*	*1.3*	*48.9*	*95.1*
80	*248*	*98.7*	*6.8*	*1.1*	*5.6*	*1.4*	*49.7*	*113.7*
90	*292*	*112.6*	*7.8*	*1.1*	*7.6*	*1.6*	*50.2*	*130.7*
100	*314*	*119.6*	*14.0*	*1.1*	*9.4*	*1.7*	*50.5*	*145.7*
years	*ft³/acre*	*tons carbon/acre*						
0	0	0.0	0.0	0.5	0.0	0.0	17.0	0.5
10	11	0.2	0.0	0.5	0.0	0.0	17.2	0.7
20	77	1.5	0.0	0.4	0.0	0.0	17.8	1.9
30	340	6.3	0.0	0.4	0.0	0.1	18.7	6.8
40	841	14.1	0.1	0.5	0.2	0.2	19.6	15.0
50	1,507	22.6	0.1	0.5	0.4	0.4	20.5	24.1
60	*2,247*	*31.0*	*0.8*	*0.5*	*0.8*	*0.5*	*21.3*	*33.7*
70	*2,891*	*37.5*	*2.4*	*0.5*	*1.5*	*0.6*	*21.8*	*42.4*
80	*3,546*	*44.0*	*3.0*	*0.5*	*2.5*	*0.6*	*22.2*	*50.7*
90	*4,178*	*50.2*	*3.5*	*0.5*	*3.4*	*0.7*	*22.4*	*58.3*
100	*4,491*	*53.3*	*6.2*	*0.5*	*4.2*	*0.8*	*22.5*	*65.0*

Table A12.—Regional estimates of total volume and carbon stocks for planted ponderosa pine stands in the Pacific Northwest, East, 250 trees per acre

Age	Volume	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	1.1	0.0	0.0	38.0	1.1
10	1	0.6	0.0	0.8	0.0	0.0	38.5	1.5
20	9	5.5	0.0	0.8	0.0	0.1	39.9	6.4
30	37	21.7	0.1	1.1	0.1	0.4	41.8	23.4
40	89	46.9	0.3	1.1	0.6	0.9	44.0	49.8
50	143	67.3	4.1	1.1	1.6	1.4	46.0	75.5
60	*201*	*87.5*	*5.9*	*1.1*	*4.1*	*1.6*	*47.7*	*100.2*
70	*248*	*101.9*	*10.7*	*1.1*	*6.8*	*1.8*	*48.9*	*122.2*
80	*278*	*110.3*	*16.7*	*1.1*	*10.2*	*1.8*	*49.7*	*140.2*
90	*306*	*119.1*	*18.8*	*1.1*	*14.3*	*1.9*	*50.2*	*155.2*
100	*330*	*127.5*	*19.6*	*1.1*	*17.8*	*2.0*	*50.5*	*168.0*
years	*ft^3/acre*	*tons carbon/acre*						
0	0	0.0	0.0	0.5	0.0	0.0	17.0	0.5
10	18	0.3	0.0	0.4	0.0	0.0	17.2	0.7
20	129	2.4	0.0	0.4	0.0	0.0	17.8	2.9
30	535	9.7	0.0	0.5	0.1	0.2	18.7	10.4
40	1,279	20.9	0.1	0.5	0.3	0.4	19.6	22.2
50	2,038	30.0	1.8	0.5	0.7	0.6	20.5	33.7
60	*2,878*	*39.0*	*2.7*	*0.5*	*1.8*	*0.7*	*21.3*	*44.7*
70	*3,549*	*45.4*	*4.8*	*0.5*	*3.0*	*0.8*	*21.8*	*54.5*
80	*3,973*	*49.2*	*7.5*	*0.5*	*4.5*	*0.8*	*22.2*	*62.5*
90	*4,373*	*53.1*	*8.4*	*0.5*	*6.4*	*0.8*	*22.4*	*69.2*
100	*4,715*	*56.9*	*8.7*	*0.5*	*7.9*	*0.9*	*22.5*	*75.0*

Table A13.—Regional estimates of total volume and carbon stocks for planted Douglas-fir stands in the Pacific Northwest, West, 150 trees per acre

Age	Volume	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	2.6	0.0	0.0	71.1	2.6
10	2	1.0	0.0	2.5	0.0	0.0	72.0	3.6
20	24	12.1	0.1	1.6	0.0	0.1	74.6	13.9
30	74	34.1	0.2	1.1	0.3	0.5	78.2	36.1
40	154	63.6	0.4	0.7	0.9	0.8	82.3	66.3
50	260	98.8	0.6	0.4	1.7	1.2	86.0	102.8
60	*380*	*134.3*	*0.9*	*0.4*	*2.8*	*1.6*	*89.1*	*140.0*
70	*503*	*171.0*	*1.3*	*0.4*	*4.0*	*1.9*	*91.4*	*178.6*
80	*628*	*207.2*	*1.7*	*0.4*	*5.1*	*2.3*	*92.9*	*216.7*
90	*751*	*242.7*	*2.2*	*0.4*	*6.1*	*2.7*	*93.8*	*254.1*
100	*866*	*276.8*	*2.8*	*0.4*	*7.2*	*3.0*	*94.3*	*290.3*
years	*ft³/acre*	------------------------------ *tons carbon/acre* ------------------------------						
0	0	0.0	0.0	1.1	0.0	0.0	31.7	1.1
10	26	0.5	0.0	1.1	0.0	0.0	32.1	1.6
20	340	5.4	0.0	0.7	0.0	0.0	33.3	6.2
30	1,060	15.2	0.1	0.5	0.1	0.2	34.9	16.1
40	2,194	28.4	0.2	0.3	0.4	0.4	36.7	29.6
50	3,712	44.1	0.3	0.2	0.8	0.5	38.4	45.8
60	*5,430*	*59.9*	*0.4*	*0.2*	*1.2*	*0.7*	*39.8*	*62.5*
70	*7,187*	*76.3*	*0.6*	*0.2*	*1.8*	*0.9*	*40.8*	*79.7*
80	*8,977*	*92.4*	*0.8*	*0.2*	*2.3*	*1.0*	*41.5*	*96.6*
90	*10,736*	*108.2*	*1.0*	*0.2*	*2.7*	*1.2*	*41.9*	*113.3*
100	*12,378*	*123.5*	*1.3*	*0.2*	*3.2*	*1.4*	*42.1*	*129.5*

Table A14.—Regional estimates of total volume and carbon stocks for planted Douglas-fir stands in the Pacific Northwest, West, 250 trees per acre

Age	Volume	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	2.6	0.0	0.0	71.1	2.6
10	3	1.7	0.0	2.1	0.0	0.0	72.0	3.9
20	39	19.9	0.1	0.9	0.1	0.1	74.6	21.1
30	120	54.9	0.3	0.4	0.5	0.7	78.2	56.9
40	246	100.9	0.7	0.4	1.5	1.4	82.3	104.9
50	405	150.5	1.2	0.4	3.1	2.0	86.0	157.2
60	*578*	*198.0*	*2.0*	*0.4*	*5.1*	*2.5*	*89.1*	*208.0*
70	*744*	*244.1*	*3.0*	*0.4*	*7.1*	*3.0*	*91.4*	*257.6*
80	*903*	*286.3*	*4.2*	*0.4*	*9.0*	*3.5*	*92.9*	*303.4*
90	*1,053*	*326.9*	*5.4*	*0.4*	*10.9*	*4.0*	*93.8*	*347.6*
100	*1,191*	*366.1*	*7.2*	*0.4*	*12.6*	*4.5*	*94.3*	*390.7*
years	*ft³/acre*	*tons carbon/acre*						
0	0	0.0	0.0	1.1	0.0	0.0	31.7	1.1
10	43	0.8	0.0	0.9	0.0	0.0	32.1	1.7
20	555	8.9	0.1	0.4	0.0	0.1	33.3	9.4
30	1,715	24.5	0.1	0.2	0.2	0.3	34.9	25.4
40	3,511	45.0	0.3	0.2	0.7	0.6	36.7	46.8
50	5,786	67.1	0.5	0.2	1.4	0.9	38.4	70.1
60	*8,253*	*88.3*	*0.9*	*0.2*	*2.3*	*1.1*	*39.8*	*92.8*
70	*10,629*	*108.9*	*1.3*	*0.2*	*3.1*	*1.4*	*40.8*	*114.9*
80	*12,901*	*127.7*	*1.9*	*0.2*	*4.0*	*1.6*	*41.5*	*135.3*
90	*15,045*	*145.8*	*2.4*	*0.2*	*4.9*	*1.8*	*41.9*	*155.1*
100	*17,021*	*163.3*	*3.2*	*0.2*	*5.6*	*2.0*	*42.1*	*174.3*

Table A15.—Regional estimates of total volume and carbon stocks for planted Douglas-fir stands on higher productivity sites in the Pacific Northwest, West, 250 trees per acre

		Carbon density						
Age	Volume	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	2.6	0.0	0.0	71.1	2.6
10	4	2.8	0.0	2.1	0.0	0.0	72.0	5.0
20	55	30.6	0.2	0.9	0.1	0.2	74.6	32.0
30	189	94.9	0.9	0.4	0.7	0.8	78.2	97.8
40	386	166.1	2.5	0.4	2.5	1.6	82.3	173.2
50	610	232.2	5.4	0.4	5.7	2.3	86.0	246.1
60	*817*	*289.6*	*10.3*	*0.4*	*9.5*	*3.0*	*89.1*	*312.9*
70	*1,009*	*338.0*	*16.5*	*0.4*	*13.6*	*3.6*	*91.4*	*372.2*
80	*1,162*	*380.1*	*23.8*	*0.4*	*18.9*	*4.2*	*92.9*	*427.5*
90	*1,281*	*410.6*	*32.7*	*0.4*	*23.9*	*4.8*	*93.8*	*472.4*
100	*1,333*	*418.6*	*58.2*	*0.4*	*29.7*	*5.3*	*94.3*	*512.3*
years	*ft³/acre*	*tons carbon/acre*						
0	0	0.0	0.0	1.1	0.0	0.0	31.7	1.1
10	62	1.3	0.0	0.9	0.0	0.0	32.1	2.2
20	781	13.6	0.1	0.4	0.0	0.1	33.3	14.3
30	2,708	42.3	0.4	0.2	0.3	0.3	34.9	43.6
40	5,519	74.1	1.1	0.2	1.1	0.7	36.7	77.3
50	8,716	103.6	2.4	0.2	2.5	1.0	38.4	109.8
60	*11,683*	*129.2*	*4.6*	*0.2*	*4.2*	*1.3*	*39.8*	*139.5*
70	*14,418*	*150.8*	*7.3*	*0.2*	*6.1*	*1.6*	*40.8*	*166.0*
80	*16,604*	*169.6*	*10.6*	*0.2*	*8.4*	*1.9*	*41.5*	*190.7*
90	*18,311*	*183.1*	*14.6*	*0.2*	*10.7*	*2.1*	*41.9*	*210.7*
100	*19,043*	*186.7*	*25.9*	*0.2*	*13.3*	*2.4*	*42.1*	*228.5*

Table A16.—Regional estimates of total volume and carbon stocks for planted Douglas-fir stands on higher productivity sites in the Pacific Northwest, West, 500 trees per acre

Age	Volume	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	2.6	0.0	0.0	71.1	2.6
10	9	5.7	0.0	1.3	0.0	0.1	72.0	7.1
20	95	53.9	0.4	0.4	0.2	0.3	74.6	55.3
30	325	161.9	2.3	0.4	1.3	1.4	78.2	167.4
40	621	260.7	8.1	0.4	4.7	2.9	82.3	276.8
50	824	309.3	37.1	0.4	11.2	4.0	86.0	362.0
60	*971*	*339.5*	*60.7*	*0.4*	*23.1*	*4.5*	*89.1*	*428.2*
70	*1,076*	*359.6*	*68.1*	*0.4*	*44.0*	*4.9*	*91.4*	*477.0*
80	*1,157*	*377.9*	*82.1*	*0.4*	*53.2*	*5.3*	*92.9*	*518.9*
90	*1,230*	*395.1*	*90.7*	*0.4*	*63.2*	*5.8*	*93.8*	*555.3*
100	*1,346*	*425.2*	*81.6*	*0.4*	*71.6*	*6.2*	*94.3*	*585.0*
years	*ft^3/acre*	*tons carbon/acre*						
0	0	0.0	0.0	1.1	0.0	0.0	31.7	1.1
10	124	2.5	0.0	0.6	0.0	0.0	32.1	3.2
20	1,356	24.0	0.2	0.2	0.1	0.1	33.3	24.7
30	4,651	72.2	1.0	0.2	0.6	0.6	34.9	74.6
40	8,872	116.3	3.6	0.2	2.1	1.3	36.7	123.5
50	11,782	137.9	16.5	0.2	5.0	1.8	38.4	161.5
60	*13,881*	*151.4*	*27.1*	*0.2*	*10.3*	*2.0*	*39.8*	*191.0*
70	*15,372*	*160.4*	*30.4*	*0.2*	*19.6*	*2.2*	*40.8*	*212.7*
80	*16,529*	*168.6*	*36.6*	*0.2*	*23.7*	*2.4*	*41.5*	*231.5*
90	*17,576*	*176.2*	*40.5*	*0.2*	*28.2*	*2.6*	*41.9*	*247.7*
100	*19,231*	*189.6*	*36.4*	*0.2*	*31.9*	*2.8*	*42.1*	*260.9*

Table A17.—Regional estimates of total volume and carbon stocks for planted California mixed conifer stands in the Pacific Southwest, 150 trees per acre

Age	Volume	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	1.1	0.0	0.0	37.4	1.1
10	0	0.3	0.0	0.8	0.0	0.0	37.8	1.1
20	3	2.1	0.0	0.8	0.0	0.0	39.2	3.0
30	10	6.9	0.0	0.8	0.1	0.1	41.1	8.0
40	32	20.9	0.1	0.8	0.3	0.3	43.2	22.3
50	64	39.1	0.2	0.8	0.7	0.6	45.2	41.5
60	*104*	*59.8*	*0.4*	*1.1*	*1.7*	*0.9*	*46.9*	*64.0*
70	*149*	*82.5*	*0.7*	*1.1*	*3.0*	*1.1*	*48.0*	*88.4*
80	*195*	*105.9*	*1.1*	*1.1*	*4.6*	*1.3*	*48.8*	*113.9*
90	*240*	*129.8*	*1.4*	*1.1*	*6.4*	*1.4*	*49.3*	*140.1*
100	*278*	*152.0*	*3.0*	*1.1*	*8.2*	*1.6*	*49.6*	*166.0*
years	*ft³/acre*	*tons carbon/acre*						
0	0	0.0	0.0	0.5	0.0	0.0	16.7	0.5
10	2	0.1	0.0	0.4	0.0	0.0	16.9	0.5
20	39	0.9	0.0	0.4	0.0	0.0	17.5	1.3
30	142	3.1	0.0	0.4	0.0	0.1	18.3	3.6
40	457	9.3	0.0	0.4	0.1	0.1	19.3	10.0
50	921	17.4	0.1	0.4	0.3	0.3	20.2	18.5
60	*1,490*	*26.7*	*0.2*	*0.5*	*0.7*	*0.4*	*20.9*	*28.5*
70	*2,128*	*36.8*	*0.3*	*0.5*	*1.3*	*0.5*	*21.4*	*39.4*
80	*2,787*	*47.2*	*0.5*	*0.5*	*2.0*	*0.6*	*21.8*	*50.8*
90	*3,428*	*57.9*	*0.6*	*0.5*	*2.8*	*0.6*	*22.0*	*62.5*
100	*3,977*	*67.8*	*1.3*	*0.5*	*3.7*	*0.7*	*22.1*	*74.0*

Table A18.—Regional estimates of total volume and carbon stocks for planted California mixed conifer stands in the Pacific Southwest, 250 trees per acre

Age	Volume	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	1.1	0.0	0.0	37.4	1.1
10	0	0.5	0.0	0.8	0.0	0.0	37.8	1.3
20	5	3.5	0.0	0.8	0.0	0.1	39.2	4.4
30	16	11.3	0.0	0.8	0.2	0.2	41.1	12.4
40	50	32.1	0.1	0.8	0.4	0.5	43.2	34.0
50	98	58.8	0.3	1.1	1.2	1.0	45.2	62.4
60	*156*	*88.6*	*0.7*	*1.1*	*2.7*	*1.3*	*46.9*	*94.4*
70	*212*	*116.9*	*3.0*	*1.1*	*4.8*	*1.7*	*48.0*	*127.5*
80	*258*	*141.0*	*6.7*	*1.1*	*8.1*	*1.8*	*48.8*	*158.7*
90	*302*	*165.8*	*7.7*	*1.1*	*12.4*	*2.0*	*49.3*	*189.0*
100	*342*	*190.7*	*8.0*	*1.1*	*16.4*	*2.2*	*49.6*	*218.4*
years	*ft^3/acre*	*tons carbon/acre*						
0	0	0.0	0.0	0.5	0.0	0.0	16.7	0.5
10	3	0.2	0.0	0.4	0.0	0.0	16.9	0.6
20	65	1.6	0.0	0.4	0.0	0.0	17.5	2.0
30	232	5.0	0.0	0.4	0.1	0.1	18.3	5.6
40	710	14.3	0.1	0.4	0.2	0.2	19.3	15.2
50	1,399	26.2	0.2	0.5	0.5	0.4	20.2	27.8
60	*2,229*	*39.5*	*0.3*	*0.5*	*1.2*	*0.6*	*20.9*	*42.1*
70	*3,032*	*52.2*	*1.4*	*0.5*	*2.1*	*0.7*	*21.4*	*56.9*
80	*3,689*	*62.9*	*3.0*	*0.5*	*3.6*	*0.8*	*21.8*	*70.8*
90	*4,315*	*73.9*	*3.4*	*0.5*	*5.5*	*0.9*	*22.0*	*84.3*
100	*4,885*	*85.0*	*3.6*	*0.5*	*7.3*	*1.0*	*22.1*	*97.4*

Table A19.—Regional estimates of total volume and carbon stocks for planted bigcone Douglas-fir stands in the Pacific Southwest, 150 trees per acre

		Carbon density						
Age	Volume	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	1.6	0.0	0.0	30.1	1.6
10	0	0.5	0.0	1.9	0.0	0.0	30.5	2.4
20	5	4.3	0.0	0.5	0.0	0.1	31.6	4.9
30	16	16.7	0.0	0.4	0.1	0.3	33.1	17.6
40	37	32.7	0.0	0.4	0.4	0.6	34.8	34.2
50	60	46.9	0.1	0.4	1.0	1.0	36.4	49.3
60	*83*	*59.9*	*0.1*	*0.4*	*1.6*	*1.4*	*37.7*	*63.4*
70	*109*	*74.1*	*0.2*	*0.4*	*2.4*	*1.7*	*38.7*	*78.7*
80	*139*	*89.0*	*0.2*	*0.4*	*3.2*	*2.0*	*39.3*	*94.8*
90	*172*	*104.6*	*0.3*	*0.4*	*4.1*	*2.3*	*39.7*	*111.8*
100	*210*	*122.0*	*0.4*	*0.4*	*5.1*	*2.7*	*39.9*	*130.5*
years	*ft³/acre*	*tons carbon/acre*						
0	0	0.0	0.0	0.7	0.0	0.0	13.4	0.7
10	5	0.2	0.0	0.9	0.0	0.0	13.6	1.1
20	67	1.9	0.0	0.2	0.0	0.0	14.1	2.2
30	234	7.5	0.0	0.2	0.1	0.1	14.8	7.8
40	533	14.6	0.0	0.2	0.2	0.3	15.5	15.2
50	857	20.9	0.0	0.2	0.4	0.5	16.2	22.0
60	*1,179*	*26.7*	*0.1*	*0.2*	*0.7*	*0.6*	*16.8*	*28.3*
70	*1,560*	*33.0*	*0.1*	*0.2*	*1.1*	*0.7*	*17.3*	*35.1*
80	*1,986*	*39.7*	*0.1*	*0.2*	*1.4*	*0.9*	*17.5*	*42.3*
90	*2,456*	*46.7*	*0.1*	*0.2*	*1.8*	*1.0*	*17.7*	*49.8*
100	*3,006*	*54.4*	*0.2*	*0.2*	*2.3*	*1.2*	*17.8*	*58.2*

Table A20.—Regional estimates of total volume and carbon stocks for planted bigcone Douglas-fir stands in the Pacific Southwest, 250 trees per acre

		Carbon density						
Age	Volume	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	1.6	0.0	0.0	30.1	1.6
10	1	0.8	0.0	1.5	0.0	0.0	30.5	2.3
20	7	6.6	0.0	0.4	0.0	0.1	31.6	7.2
30	24	22.8	0.0	0.4	0.2	0.5	33.1	23.9
40	55	43.7	0.0	0.4	0.6	1.0	34.8	45.7
50	95	65.4	0.1	0.4	1.5	1.5	36.4	69.0
60	*135*	*85.1*	*0.2*	*0.4*	*2.8*	*2.1*	*37.7*	*90.6*
70	*180*	*105.7*	*0.3*	*0.4*	*4.1*	*2.6*	*38.7*	*113.0*
80	*229*	*127.1*	*0.3*	*0.4*	*5.4*	*3.0*	*39.3*	*136.3*
90	*272*	*144.7*	*3.0*	*0.4*	*6.8*	*3.5*	*39.7*	*158.5*
100	*317*	*162.2*	*5.0*	*0.4*	*9.2*	*3.9*	*39.9*	*180.6*
years	*ft³/acre*	*tons carbon/acre*						
0	0	0.0	0.0	0.7	0.0	0.0	13.4	0.7
10	8	0.4	0.0	0.7	0.0	0.0	13.6	1.0
20	105	3.0	0.0	0.2	0.0	0.1	14.1	3.2
30	347	10.1	0.0	0.2	0.1	0.2	14.8	10.7
40	790	19.5	0.0	0.2	0.3	0.4	15.5	20.4
50	1,360	29.2	0.0	0.2	0.7	0.7	16.2	30.8
60	*1,933*	*38.0*	*0.1*	*0.2*	*1.2*	*0.9*	*16.8*	*40.4*
70	*2,570*	*47.1*	*0.1*	*0.2*	*1.8*	*1.1*	*17.3*	*50.4*
80	*3,270*	*56.7*	*0.2*	*0.2*	*2.4*	*1.4*	*17.5*	*60.8*
90	*3,889*	*64.6*	*1.4*	*0.2*	*3.1*	*1.6*	*17.7*	*70.7*
100	*4,526*	*72.3*	*2.2*	*0.2*	*4.1*	*1.7*	*17.8*	*80.5*

Table A21.—Regional estimates of total volume and carbon stocks for planted ponderosa pine stands in the Rocky Mountain, North, 150 trees per acre

Age	Volume	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	0.0	0.0	25.7	0.4
10	2	0.9	0.0	0.4	0.0	0.0	26.1	1.3
20	43	18.2	0.0	0.4	0.0	0.1	27.0	18.8
30	134	48.9	1.2	0.5	0.3	0.9	28.3	51.7
40	197	66.6	10.3	0.5	1.5	1.6	29.8	80.5
50	228	74.6	18.9	0.5	5.5	2.0	31.1	101.4
60	*250*	*79.9*	*23.4*	*0.5*	*11.8*	*2.2*	*32.3*	*117.6*
70	*265*	*83.9*	*24.9*	*0.5*	*18.1*	*2.3*	*33.1*	*129.7*
80	*278*	*87.5*	*25.6*	*0.4*	*23.8*	*2.4*	*33.6*	*139.8*
90	*289*	*90.7*	*25.8*	*0.4*	*28.6*	*2.5*	*34.0*	*148.1*
100	*298*	*93.7*	*25.7*	*0.4*	*32.3*	*2.7*	*34.1*	*154.8*
years	*ft^3/acre*	*tons carbon/acre*						
0	0	0.0	0.0	0.2	0.0	0.0	11.5	0.2
10	23	0.4	0.0	0.2	0.0	0.0	11.6	0.6
20	610	8.1	0.0	0.2	0.0	0.0	12.0	8.4
30	1,919	21.8	0.5	0.2	0.2	0.4	12.6	23.1
40	2,812	29.7	4.6	0.2	0.7	0.7	13.3	35.9
50	3,264	33.3	8.4	0.2	2.5	0.9	13.9	45.2
60	*3,567*	*35.6*	*10.4*	*0.2*	*5.2*	*1.0*	*14.4*	*52.5*
70	*3,791*	*37.4*	*11.1*	*0.2*	*8.1*	*1.0*	*14.8*	*57.8*
80	*3,973*	*39.0*	*11.4*	*0.2*	*10.6*	*1.1*	*15.0*	*62.3*
90	*4,128*	*40.5*	*11.5*	*0.2*	*12.8*	*1.1*	*15.2*	*66.1*
100	*4,260*	*41.8*	*11.5*	*0.2*	*14.4*	*1.2*	*15.2*	*69.0*

Table A22.—Regional estimates of total volume and carbon stocks for planted ponderosa pine stands in the Rocky Mountain, North, 250 trees per acre

Age	Volume	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	0.0	0.0	25.7	0.4
10	3	1.4	0.0	0.4	0.0	0.0	26.1	1.9
20	65	28.1	0.0	0.5	0.0	0.2	27.0	28.8
30	167	61.6	4.1	0.5	0.5	1.4	28.3	68.2
40	203	69.4	19.8	0.5	2.8	2.4	29.8	94.9
50	228	74.4	26.3	0.5	9.8	2.5	31.1	113.5
60	*247*	*78.5*	*27.6*	*0.5*	*17.9*	*2.6*	*32.3*	*126.9*
70	*263*	*82.3*	*28.5*	*0.5*	*24.6*	*2.7*	*33.1*	*138.6*
80	*276*	*85.7*	*28.3*	*0.5*	*30.5*	*2.8*	*33.6*	*147.7*
90	*287*	*88.9*	*28.0*	*0.4*	*35.0*	*3.0*	*34.0*	*155.4*
100	*296*	*91.8*	*27.4*	*0.4*	*38.5*	*3.1*	*34.1*	*161.3*
years	*ft³/acre*	*tons carbon/acre*						
0	0	0.0	0.0	0.2	0.0	0.0	11.5	0.2
10	38	0.6	0.0	0.2	0.0	0.0	11.6	0.8
20	930	12.5	0.0	0.2	0.0	0.1	12.0	12.8
30	2,386	27.5	1.8	0.2	0.2	0.6	12.6	30.4
40	2,906	31.0	8.8	0.2	1.3	1.1	13.3	42.3
50	3,260	33.2	11.7	0.2	4.4	1.1	13.9	50.6
60	*3,531*	*35.0*	*12.3*	*0.2*	*8.0*	*1.1*	*14.4*	*56.6*
70	*3,758*	*36.7*	*12.7*	*0.2*	*11.0*	*1.2*	*14.8*	*61.8*
80	*3,943*	*38.2*	*12.6*	*0.2*	*13.6*	*1.3*	*15.0*	*65.9*
90	*4,101*	*39.6*	*12.5*	*0.2*	*15.6*	*1.3*	*15.2*	*69.3*
100	*4,237*	*41.0*	*12.2*	*0.2*	*17.2*	*1.4*	*15.2*	*71.9*

Table A23.—Regional estimates of total volume and carbon stocks for planted western larch stands in the Rocky Mountain, North, 200 trees per acre

		Carbon density						
Age	Volume	Live tree	Standing dead tree	Under-story	Down Wdead wood	Forest floor	Soil organic	Total nonsoil
years	*m³/hectare*	---------- *tonnes carbon/hectare* ----------						
0	0	0.0	0.0	0.4	0.0	0.0	25.6	0.4
10	1	0.4	0.0	0.4	0.0	0.0	26.0	0.8
20	13	5.8	0.0	0.4	0.0	0.1	26.9	6.3
30	54	19.2	0.1	0.4	0.1	0.4	28.2	20.3
40	115	37.3	0.7	0.4	0.5	1.0	29.7	39.9
50	175	54.6	3.0	0.5	1.1	1.7	31.0	60.8
60	*229*	*69.6*	*7.2*	*0.5*	*2.5*	*2.3*	*32.1*	*82.0*
70	*269*	*80.7*	*11.8*	*0.5*	*5.1*	*2.8*	*33.0*	*100.8*
80	*299*	*88.5*	*15.5*	*0.5*	*8.9*	*3.0*	*33.5*	*116.3*
90	*322*	*94.8*	*18.5*	*0.5*	*13.1*	*3.2*	*33.8*	*130.0*
100	*341*	*99.8*	*20.4*	*0.5*	*17.5*	*3.4*	*34.0*	*141.6*
years	*ft³/acre*	---------- *tons carbon/acre* ----------						
0	0	0.0	0.0	0.2	0.0	0.0	11.4	0.2
10	10	0.2	0.0	0.2	0.0	0.0	11.6	0.4
20	185	2.6	0.0	0.2	0.0	0.0	12.0	2.8
30	772	8.6	0.0	0.2	0.1	0.2	12.6	9.0
40	1,639	16.6	0.3	0.2	0.2	0.5	13.2	17.8
50	2,499	24.3	1.3	0.2	0.5	0.8	13.8	27.1
60	*3,270*	*31.1*	*3.2*	*0.2*	*1.1*	*1.0*	*14.3*	*36.6*
70	*3,850*	*36.0*	*5.3*	*0.2*	*2.3*	*1.2*	*14.7*	*45.0*
80	*4,269*	*39.5*	*6.9*	*0.2*	*4.0*	*1.4*	*14.9*	*51.9*
90	*4,599*	*42.3*	*8.2*	*0.2*	*5.8*	*1.4*	*15.1*	*58.0*
100	*4,866*	*44.5*	*9.1*	*0.2*	*7.8*	*1.5*	*15.2*	*63.1*

Table A24.—Regional estimates of total volume and carbon stocks for planted western larch stands in the Rocky Mountain, North, 400 trees per acre

Age	Volume	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	0.0	0.0	25.6	0.4
10	1	0.8	0.0	0.4	0.0	0.1	26.0	1.2
20	25	11.0	0.1	0.4	0.0	0.2	26.9	11.8
30	90	32.8	0.3	0.5	0.2	0.8	28.2	34.6
40	167	55.4	3.0	0.5	0.9	1.8	29.7	61.6
50	225	71.2	9.5	0.5	2.4	2.7	31.0	86.2
60	*268*	*82.3*	*16.8*	*0.5*	*5.8*	*3.3*	*32.1*	*108.7*
70	*298*	*89.3*	*21.8*	*0.5*	*11.2*	*3.7*	*33.0*	*126.5*
80	*319*	*94.2*	*24.3*	*0.5*	*17.2*	*3.9*	*33.5*	*140.1*
90	*336*	*98.4*	*26.0*	*0.5*	*23.0*	*4.1*	*33.8*	*152.0*
100	*350*	*102.0*	*27.2*	*0.5*	*28.3*	*4.3*	*34.0*	*162.3*
years	ft³/acre	*tons carbon/acre*						
0	0	0.0	0.0	0.2	0.0	0.0	11.4	0.2
10	19	0.3	0.0	0.2	0.0	0.0	11.6	0.6
20	351	4.9	0.0	0.2	0.0	0.1	12.0	5.3
30	1,290	14.6	0.1	0.2	0.1	0.4	12.6	15.4
40	2,381	24.7	1.4	0.2	0.4	0.8	13.2	27.5
50	3,215	31.8	4.2	0.2	1.1	1.2	13.8	38.5
60	*3,835*	*36.7*	*7.5*	*0.2*	*2.6*	*1.5*	*14.3*	*48.5*
70	*4,253*	*39.8*	*9.7*	*0.2*	*5.0*	*1.6*	*14.7*	*56.4*
80	*4,557*	*42.0*	*10.8*	*0.2*	*7.7*	*1.7*	*14.9*	*62.5*
90	*4,802*	*43.9*	*11.6*	*0.2*	*10.3*	*1.8*	*15.1*	*67.8*
100	*5,009*	*45.5*	*12.2*	*0.2*	*12.6*	*1.9*	*15.2*	*72.4*

Table A25.—Regional estimates of total volume and carbon stocks for planted whitebark pine stands in the Rocky Mountain, North, 150 trees per acre

		Carbon density						
Age	Volume	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	2.6	0.0	0.0	23.6	2.6
10	0	0.1	0.0	2.6	0.0	0.0	23.9	2.7
20	1	0.7	0.0	2.6	0.0	0.0	24.8	3.3
30	4	2.6	0.0	2.6	0.0	0.1	26.0	5.2
40	13	7.4	0.0	2.5	0.0	0.1	27.3	10.2
50	28	15.2	0.1	2.3	0.1	0.3	28.6	18.0
60	*47*	*24.9*	*0.2*	*2.1*	*0.2*	*0.6*	*29.6*	*28.0*
70	*70*	*36.3*	*0.6*	*1.9*	*0.4*	*1.0*	*30.3*	*40.1*
80	*94*	*47.5*	*1.2*	*1.7*	*0.7*	*1.5*	*30.8*	*52.6*
90	*116*	*58.2*	*2.2*	*1.6*	*1.2*	*2.0*	*31.1*	*65.2*
100	*138*	*68.4*	*3.5*	*1.5*	*1.9*	*2.4*	*31.3*	*77.7*
years	*ft³/acre*	*tons carbon/acre*						
0	0	0.0	0.0	1.2	0.0	0.0	10.5	1.2
10	2	0.1	0.0	1.2	0.0	0.0	10.7	1.2
20	18	0.3	0.0	1.2	0.0	0.0	11.0	1.5
30	64	1.1	0.0	1.2	0.0	0.0	11.6	2.3
40	189	3.3	0.0	1.1	0.0	0.1	12.2	4.5
50	399	6.8	0.0	1.0	0.0	0.2	12.7	8.0
60	*672*	*11.1*	*0.1*	*0.9*	*0.1*	*0.3*	*13.2*	*12.5*
70	*1,001*	*16.2*	*0.2*	*0.8*	*0.2*	*0.5*	*13.5*	*17.9*
80	*1,336*	*21.2*	*0.5*	*0.8*	*0.3*	*0.7*	*13.8*	*23.5*
90	*1,663*	*26.0*	*1.0*	*0.7*	*0.5*	*0.9*	*13.9*	*29.1*
100	*1,978*	*30.5*	*1.5*	*0.7*	*0.8*	*1.1*	*14.0*	*34.7*

Table A26.—Regional estimates of total volume and carbon stocks for planted whitebark pine stands in the Rocky Mountain, North, 250 trees per acre

		Carbon density						
Age	Volume	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	2.6	0.0	0.0	23.6	2.6
10	0	0.2	0.0	2.6	0.0	0.0	23.9	2.8
20	2	1.2	0.0	2.6	0.0	0.0	24.8	3.9
30	7	4.2	0.0	2.6	0.0	0.1	26.0	6.9
40	21	11.9	0.1	2.2	0.1	0.2	27.3	14.5
50	43	23.6	0.2	1.9	0.1	0.5	28.6	26.4
60	*69*	*37.2*	*0.6*	*1.6*	*0.3*	*1.0*	*29.6*	*40.8*
70	*99*	*51.9*	*1.7*	*1.4*	*0.7*	*1.6*	*30.3*	*57.3*
80	*126*	*65.1*	*3.5*	*1.3*	*1.3*	*2.2*	*30.8*	*73.4*
90	*151*	*76.7*	*5.7*	*1.2*	*2.5*	*2.8*	*31.1*	*88.9*
100	*172*	*86.5*	*8.1*	*1.2*	*4.0*	*3.3*	*31.3*	*103.1*
years	*ft^3/acre*	*tons carbon/acre*						
0	0	0.0	0.0	1.2	0.0	0.0	10.5	1.2
10	4	0.1	0.0	1.2	0.0	0.0	10.7	1.3
20	28	0.5	0.0	1.2	0.0	0.0	11.0	1.7
30	105	1.9	0.0	1.1	0.0	0.0	11.6	3.1
40	299	5.3	0.0	1.0	0.0	0.1	12.2	6.4
50	611	10.5	0.1	0.9	0.1	0.2	12.7	11.8
60	*989*	*16.6*	*0.3*	*0.7*	*0.1*	*0.5*	*13.2*	*18.2*
70	*1,409*	*23.2*	*0.8*	*0.6*	*0.3*	*0.7*	*13.5*	*25.6*
80	*1,801*	*29.0*	*1.6*	*0.6*	*0.6*	*1.0*	*13.8*	*32.7*
90	*2,155*	*34.2*	*2.6*	*0.5*	*1.1*	*1.2*	*13.9*	*39.6*
100	*2,464*	*38.6*	*3.6*	*0.5*	*1.8*	*1.5*	*14.0*	*46.0*

Table A27.—Regional estimates of total volume and carbon stocks for planted ponderosa pine stands in the Rocky Mountain, South, 100 trees per acre

Age	Volume	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	1.6	0.0	0.0	18.1	1.6
10	1	0.2	0.0	2.7	0.0	0.0	18.3	3.0
20	2	1.2	0.0	0.4	0.0	0.1	19.0	1.7
30	6	4.0	0.0	0.4	0.0	0.1	19.9	4.6
40	14	9.4	0.0	0.4	0.1	0.3	20.9	10.2
50	29	18.0	0.1	0.4	0.3	0.4	21.9	19.2
60	*51*	*28.4*	*0.1*	*0.4*	*0.6*	*0.6*	*22.7*	*30.2*
70	*77*	*40.0*	*0.3*	*0.4*	*1.2*	*0.8*	*23.3*	*42.6*
80	*107*	*52.2*	*0.4*	*0.4*	*1.8*	*1.0*	*23.6*	*55.8*
90	*140*	*65.0*	*0.6*	*0.4*	*2.4*	*1.2*	*23.9*	*69.6*
100	*174*	*77.3*	*0.7*	*0.4*	*3.1*	*1.3*	*24.0*	*82.9*
years	*ft³/acre*	------------------- *tons carbon/acre* -------------------						
0	0	0.0	0.0	0.7	0.0	0.0	8.1	0.7
10	14	0.1	0.0	1.2	0.0	0.0	8.2	1.3
20	34	0.5	0.0	0.2	0.0	0.0	8.5	0.8
30	87	1.8	0.0	0.2	0.0	0.1	8.9	2.0
40	204	4.2	0.0	0.2	0.1	0.1	9.3	4.6
50	419	8.0	0.0	0.2	0.1	0.2	9.8	8.6
60	*723*	*12.7*	*0.1*	*0.2*	*0.3*	*0.3*	*10.1*	*13.5*
70	*1,100*	*17.9*	*0.1*	*0.2*	*0.5*	*0.3*	*10.4*	*19.0*
80	*1,528*	*23.3*	*0.2*	*0.2*	*0.8*	*0.4*	*10.6*	*24.9*
90	*2,000*	*29.0*	*0.2*	*0.2*	*1.1*	*0.5*	*10.7*	*31.0*
100	*2,480*	*34.5*	*0.3*	*0.2*	*1.4*	*0.6*	*10.7*	*37.0*

Table A28.—Regional estimates of total volume and carbon stocks for planted ponderosa pine stands in the Rocky Mountain, South, 200 trees per acre

		Carbon density						
Age	Volume	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	1.6	0.0	0.0	18.1	1.6
10	2	0.5	0.0	2.7	0.0	0.0	18.3	3.2
20	5	2.5	0.0	0.4	0.0	0.1	19.0	3.0
30	12	8.0	0.0	0.4	0.1	0.3	19.9	8.8
40	28	18.7	0.1	0.4	0.3	0.6	20.9	20.0
50	55	32.6	0.1	0.4	0.7	0.9	21.9	34.8
60	*89*	*48.0*	*0.3*	*0.5*	*1.4*	*1.2*	*22.7*	*51.3*
70	*131*	*64.5*	*0.4*	*0.5*	*2.3*	*1.5*	*23.3*	*69.2*
80	*177*	*81.3*	*0.7*	*0.5*	*3.3*	*1.8*	*23.6*	*87.5*
90	*227*	*98.6*	*0.9*	*0.5*	*4.3*	*2.1*	*23.9*	*106.4*
100	*279*	*115.4*	*0.9*	*0.5*	*5.3*	*2.4*	*24.0*	*124.5*
years	*ft³/acre*	*tons carbon/acre*						
0	0	0.0	0.0	0.7	0.0	0.0	8.1	0.7
10	28	0.2	0.0	1.2	0.0	0.0	8.2	1.4
20	68	1.1	0.0	0.2	0.0	0.1	8.5	1.3
30	173	3.6	0.0	0.2	0.0	0.1	8.9	3.9
40	406	8.3	0.0	0.2	0.1	0.2	9.3	8.9
50	781	14.6	0.1	0.2	0.3	0.4	9.8	15.5
60	*1,274*	*21.4*	*0.1*	*0.2*	*0.6*	*0.5*	*10.1*	*22.9*
70	*1,867*	*28.8*	*0.2*	*0.2*	*1.0*	*0.7*	*10.4*	*30.9*
80	*2,530*	*36.3*	*0.3*	*0.2*	*1.5*	*0.8*	*10.6*	*39.0*
90	*3,249*	*44.0*	*0.4*	*0.2*	*1.9*	*0.9*	*10.7*	*47.5*
100	*3,988*	*51.5*	*0.4*	*0.2*	*2.4*	*1.1*	*10.7*	*55.5*

Table A29.—Regional estimates of total volume and carbon stocks for planted fir-spruce-mountain hemlock stands in the Rocky Mountain, South, 150 trees per acre

Age	Volume	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	1.6	0.0	0.0	23.6	1.6
10	0	0.3	0.0	2.6	0.0	0.0	23.9	2.9
20	1	1.8	0.0	2.6	0.0	0.1	24.8	4.5
30	6	7.0	0.0	2.2	0.1	0.2	26.0	9.4
40	16	14.7	0.0	1.9	0.2	0.7	27.3	17.5
50	30	24.4	0.0	1.7	0.5	1.2	28.6	27.8
60	*50*	*35.4*	*0.0*	*1.5*	*0.9*	*1.8*	*29.6*	*39.7*
70	*73*	*47.5*	*0.0*	*1.4*	*1.4*	*2.3*	*30.4*	*52.5*
80	*99*	*60.0*	*0.0*	*1.3*	*1.8*	*2.8*	*30.9*	*65.9*
90	*128*	*72.8*	*0.0*	*1.2*	*2.2*	*3.3*	*31.2*	*79.4*
100	*158*	*85.4*	*0.0*	*1.1*	*2.5*	*3.8*	*31.3*	*92.9*
years	*ft³/acre*	*tons carbon/acre*						
0	0	0.0	0.0	0.7	0.0	0.0	10.5	0.7
10	2	0.1	0.0	1.1	0.0	0.0	10.7	1.3
20	20	0.8	0.0	1.1	0.0	0.0	11.0	2.0
30	83	3.1	0.0	1.0	0.0	0.1	11.6	4.2
40	227	6.6	0.0	0.8	0.1	0.3	12.2	7.8
50	435	10.9	0.0	0.8	0.2	0.5	12.7	12.4
60	*709*	*15.8*	*0.0*	*0.7*	*0.4*	*0.8*	*13.2*	*17.7*
70	*1,043*	*21.2*	*0.0*	*0.6*	*0.6*	*1.0*	*13.5*	*23.4*
80	*1,422*	*26.7*	*0.0*	*0.6*	*0.8*	*1.3*	*13.8*	*29.4*
90	*1,833*	*32.5*	*0.0*	*0.5*	*1.0*	*1.5*	*13.9*	*35.4*
100	*2,261*	*38.1*	*0.0*	*0.5*	*1.1*	*1.7*	*14.0*	*41.4*

Table A30.—Regional estimates of total volume and carbon stocks for planted fir-spruce-mountain hemlock stands in the Rocky Mountain, South, 350 trees per acre

Age	Volume	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	1.6	0.0	0.0	23.6	1.6
10	0	0.7	0.0	2.6	0.0	0.0	23.9	3.4
20	3	4.2	0.0	2.1	0.0	0.2	24.8	6.4
30	12	14.1	0.0	1.4	0.1	0.6	26.0	16.1
40	30	27.0	0.0	1.0	0.4	1.5	27.3	29.9
50	56	42.7	0.0	0.8	1.0	2.4	28.6	46.9
60	*89*	*59.8*	*0.0*	*0.6*	*1.9*	*3.4*	*29.6*	*65.7*
70	*128*	*78.0*	*0.0*	*0.4*	*2.6*	*4.4*	*30.4*	*85.4*
80	*172*	*96.4*	*0.0*	*0.4*	*3.3*	*5.3*	*30.9*	*105.4*
90	*219*	*114.7*	*0.0*	*0.4*	*3.9*	*6.2*	*31.2*	*125.2*
100	*262*	*130.4*	*1.4*	*0.4*	*4.4*	*7.1*	*31.3*	*143.7*
years	*ft³/acre*	*tons carbon/acre*						
0	0	0.0	0.0	0.7	0.0	0.0	10.5	0.7
10	5	0.3	0.0	1.1	0.0	0.0	10.7	1.5
20	47	1.9	0.0	0.9	0.0	0.1	11.0	2.9
30	175	6.3	0.0	0.6	0.1	0.3	11.6	7.2
40	431	12.0	0.0	0.5	0.2	0.7	12.2	13.3
50	800	19.1	0.0	0.3	0.5	1.1	12.7	20.9
60	*1,268*	*26.7*	*0.0*	*0.3*	*0.8*	*1.5*	*13.2*	*29.3*
70	*1,830*	*34.8*	*0.0*	*0.2*	*1.2*	*1.9*	*13.5*	*38.1*
80	*2,458*	*43.0*	*0.0*	*0.2*	*1.5*	*2.4*	*13.8*	*47.0*
90	*3,125*	*51.2*	*0.0*	*0.2*	*1.7*	*2.8*	*13.9*	*55.9*
100	*3,750*	*58.1*	*0.6*	*0.2*	*1.9*	*3.2*	*14.0*	*64.1*

Table A31.—Regional estimates of total volume and carbon stocks for planted lodgepole pine stands in the Rocky Mountain, South, 150 trees per acre

		Carbon density						
Age	Volume	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	1.6	0.0	0.0	20.2	1.6
10	0	0.2	0.0	2.6	0.0	0.0	20.5	2.8
20	1	1.1	0.0	2.6	0.0	0.1	21.2	3.8
30	6	3.7	0.0	2.6	0.0	0.2	22.3	6.5
40	15	8.2	0.0	2.5	0.1	0.4	23.4	11.2
50	28	14.8	0.0	2.3	0.3	0.6	24.5	18.1
60	*45*	*22.6*	*0.1*	*2.2*	*0.5*	*0.9*	*25.4*	*26.2*
70	*66*	*31.3*	*0.1*	*2.1*	*0.7*	*1.2*	*26.0*	*35.3*
80	*90*	*40.8*	*0.1*	*2.0*	*0.9*	*1.5*	*26.5*	*45.4*
90	*116*	*50.8*	*0.2*	*1.9*	*1.2*	*1.8*	*26.7*	*55.9*
100	*143*	*61.1*	*0.2*	*1.9*	*1.5*	*2.1*	*26.9*	*66.8*
years	*ft³/acre*	*---------- tons carbon/acre ----------*						
0	0	0.0	0.0	0.7	0.0	0.0	9.0	0.7
10	2	0.1	0.0	1.1	0.0	0.0	9.1	1.3
20	19	0.5	0.0	1.1	0.0	0.0	9.5	1.7
30	83	1.6	0.0	1.1	0.0	0.1	9.9	2.9
40	209	3.7	0.0	1.1	0.1	0.2	10.5	5.0
50	401	6.6	0.0	1.0	0.1	0.3	10.9	8.1
60	*648*	*10.1*	*0.0*	*1.0*	*0.2*	*0.4*	*11.3*	*11.7*
70	*943*	*13.9*	*0.0*	*0.9*	*0.3*	*0.5*	*11.6*	*15.8*
80	*1,285*	*18.2*	*0.1*	*0.9*	*0.4*	*0.7*	*11.8*	*20.3*
90	*1,656*	*22.7*	*0.1*	*0.9*	*0.5*	*0.8*	*11.9*	*25.0*
100	*2,051*	*27.2*	*0.1*	*0.8*	*0.7*	*0.9*	*12.0*	*29.8*

Table A32.—Regional estimates of total volume and carbon stocks for planted lodgepole pine stands in the Rocky Mountain, South, 350 trees per acre

Age	Volume	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	1.6	0.0	0.0	20.2	1.6
10	0	0.5	0.0	2.6	0.0	0.0	20.5	3.1
20	3	2.7	0.0	2.5	0.0	0.1	21.2	5.3
30	14	8.6	0.0	2.2	0.1	0.4	22.3	11.2
40	33	18.4	0.0	1.9	0.3	0.8	23.4	21.5
50	59	30.2	0.1	1.7	0.6	1.4	24.5	34.0
60	*91*	*43.5*	*0.1*	*1.5*	*1.0*	*1.9*	*25.4*	*48.1*
70	*128*	*58.0*	*0.2*	*1.4*	*1.4*	*2.5*	*26.0*	*63.5*
80	*171*	*73.6*	*0.2*	*1.2*	*1.9*	*3.0*	*26.5*	*80.1*
90	*217*	*89.6*	*0.3*	*1.1*	*2.4*	*3.6*	*26.7*	*97.0*
100	*265*	*105.7*	*0.4*	*1.0*	*2.9*	*4.1*	*26.9*	*114.1*
years	*ft³/acre*	*tons carbon/acre*						
0	0	0.0	0.0	0.7	0.0	0.0	9.0	0.7
10	4	0.2	0.0	1.1	0.0	0.0	9.1	1.4
20	44	1.2	0.0	1.1	0.0	0.1	9.5	2.4
30	194	3.8	0.0	1.0	0.0	0.2	9.9	5.0
40	468	8.2	0.0	0.8	0.1	0.4	10.5	9.6
50	840	13.5	0.0	0.7	0.3	0.6	10.9	15.1
60	*1,300*	*19.4*	*0.1*	*0.7*	*0.5*	*0.9*	*11.3*	*21.5*
70	*1,835*	*25.9*	*0.1*	*0.6*	*0.6*	*1.1*	*11.6*	*28.3*
80	*2,445*	*32.8*	*0.1*	*0.5*	*0.8*	*1.4*	*11.8*	*35.7*
90	*3,100*	*40.0*	*0.1*	*0.5*	*1.1*	*1.6*	*11.9*	*43.3*
100	*3,784*	*47.1*	*0.2*	*0.5*	*1.3*	*1.8*	*12.0*	*50.9*

Appendix B: Forest Vegetation Simulator (FVS) Input Data for Simulating Forest Carbon Stocks in Reforestation Projects

Region	Forest type	Species mix	Density at 3 to 5 years (trees per acre)	Height at 3 to 5 years (feet)	Site index by site species (base age; years) or habitat code	FVS variant	Location code
Northern Lake States	White-red-jack pine	White pine (33%) Red pine (34%) Jack pine (33%)	400 700	4	White pine (50) = 63 Red pine (50) = 63 Jack pine (50) = 51	LS	910
South Central	Shortleaf pine	Shortleaf pine (100%)	250 400	4	Shortleaf (50) = 67	SN	81001
Southeast	Longleaf pine	Longleaf pine (100%)	250 400	4	Longleaf pine (50) = 72	SN	80601
Southeast	Oak-pine	Shortleaf pine (75%) White oak (25%)	125 200	4	Shortleaf pine (50) = 67 White oak (50) = 67	SN	81102
Southeast	Oak-hickory	Red oak (50%) White oak (50%)	125 200	4	Red oak (50) = 66 White oak (50) = 66	SN	80401
Pacific Northwest, East	Ponderosa pine	Ponderosa pine (50%) Western larch (35%) Douglas-fir (15%)	150 250	4	Shortleaf pine (50) = 65 Ponderosa pine (100) = 85	SO	601
Pacific Northwest, West	Douglas-fir	Douglas-fir (45%) Western hemlock (25%) Western redcedar (25%) Sugar pine (5%)	150 250	4	Douglas-fir (100) = 140	WC	615
Pacific Northwest, West	Douglas-fir, high productivity site	Douglas-fir (100%)	250 500	5	Douglas-fir (100) = 160	WC	618
Pacific Southwest	California mixed conifer	Ponderosa pine (70%) Douglas-fir (10%) White fir (10%) Sugar pine (5%) Incense-cedar (5%)	150 250	4	Ponderosa pine (50) = 55	SO	506
Pacific Southwest	Bigcone Douglas-fir	Bigcone Douglas-fir (40%) Coulter pine (60%)	150 250	4	Ponderosa pine (100) = 85	WS	501
Rocky Mountain, North	Ponderosa pine	Ponderosa pine (100%)	150 250	4	Ponderosa pine (100) = 70 Habitat code = 130	IE	103
Rocky Mountain, North	Western larch	Western larch (50%) Ponderosa pine (25%) Western white pine (25%)	200 400	4	Ponderosa pine (50) = 40 Habitat code = 130	IE	116
Rocky Mountain, North	Whitebark pine	Whitebark pine (100%)	150 250	4	Habitat code = 850	IE	116
Rocky Mountain, South	Ponderosa pine	Ponderosa pine (50%) Southwestern white pine (25%) Douglas-fir (25%)	100 200	4	Ponderosa pine (100) = 70	CR	301
Rocky Mountain, South	Fir-spruce-mountain hemlock	Engelmann spruce (100%)	150 350	4	Engelmann (100) = 55	CR	204
Rocky Mountain, South	Lodgepole pine	Lodgepole (67%) Engelmann spruce (33%)	150 350	4	Lodgepole (100) = 55	CR	214

Note: For information on variants and their abbreviations, refer to the FVS variant map, available at: https://www.fs.usda.gov/fvs/whatis/index.shtml.

Northern Research Station

https://www.nrs.fs.usda.gov