



**Forest  
Service**

**Northern  
Research Station**

**Resource Bulletin  
NRS-6**



# **Minnesota's Forest Resources in 2005**

**Patrick D. Miles and Gary J. Brand**



Miles, Patrick D.; Brand, Gary J.

2007. **Minnesota's forest resources in 2005**. Resour. Bull. NRS-6. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 33 p.

Reports forest statistics for Minnesota based on five annual inventories from 2001 through 2005. Minnesota's total forest area is estimated at 16.3 million acres or 32 percent of the total land area of the State. The estimated total live-tree volume on forest land is 17.7 billion cubic feet or 1,085 cubic feet per acre. The estimated aboveground live-tree biomass on Minnesota's forest land is 465 million dry tons or nearly 28.5 tons per acre.

KEY WORDS: Annual inventory, forest land, timberland, forest type, volume, biomass, growth, removals, mortality, Minnesota.

---

Abstract.—In Minnesota, about 16.3 million acres, or 32 percent of the total land area is forested, according to results from the 2001-05 forest inventory of the State. The estimated total live-tree volume on forest land is 17.7 billion cubic feet or 1,085 cubic feet per acre. The estimated aboveground live-tree biomass on forest land is 465 million dry tons or approximately 28.5 tons per acre.

---

Northern Research Station  
Forest Service - U.S. Department of Agriculture  
11 Campus Boulevard, Suite 200  
Newtown Square, PA 19073  
2007

Web site: [www.nrs.fs.fed.us](http://www.nrs.fs.fed.us)



# CONTENTS

<b>Introduction</b> .....	<b>1</b>
<b>Results</b> .....	<b>1</b>
Area .....	1
Volume .....	3
Biomass .....	5
Growth, Removals, and Mortality .....	5
<b>Literature Cited</b> .....	<b>7</b>
<b>Appendix</b> .....	<b>8</b>
Inventory Methods .....	8
Sampling Phases .....	8
Phase 1 .....	8
Phase 2 .....	8
Phase 3 .....	9
<b>Table Titles</b> .....	<b>11</b>
<b>Tables</b> .....	<b>12</b>

# Minnesota's Forest Resources in 2005

## INTRODUCTION

Reports of previous Forest Inventory and Analysis (FIA) inventories of Minnesota are dated 1936, 1953, 1962, 1977, 1990, and 2003. The 2003 report (Miles et al. 2004) initiated the new FIA annual inventory system in which one-fifth of the field plots (considered one panel) are measured each year. Once a panel is measured, it is scheduled to be remeasured in 5 years. For example, in Minnesota, field plots measured in 1999 were remeasured in 2004 and field plots measured in 2000 were remeasured in 2005. The five most recent panels (from 2001, 2002, 2003, 2004, and 2005) were used to generate estimates for this report. Estimates were compiled assuming data from these five panels represent one large sample dated 2005.

All of the tables in this report and many others can be generated from tools available at the national FIA Web site (<http://www.fia.fs.fed.us>).

## RESULTS

### Area

The total land area of Minnesota is 50.9 million acres, of which 32 percent (16.3 million acres) is forest land (table 1). There are three components to forest land (fig. 1):

(1) timberland<sup>1</sup>—forest land that is not restricted from harvesting by statute, administrative regulation, or designation, and is capable of growing trees at a rate of 20 cubic feet (ft<sup>3</sup>) per acre per year; (2) reserved forest land—land that is restricted from harvesting by statute, administrative regulation, or designation (National Parks, Wilderness Areas, etc); and, (3) other forest land—low-productivity forest land that is not capable of growing trees at a rate of 20 ft<sup>3</sup>/acre/yr (usually extremely wet sites such as black spruce swamps).

### ABOUT THE AUTHORS

**Patrick D. Miles** and

**Gary J. Brand** are

Research Foresters with the Northern Research Station, St. Paul, MN.

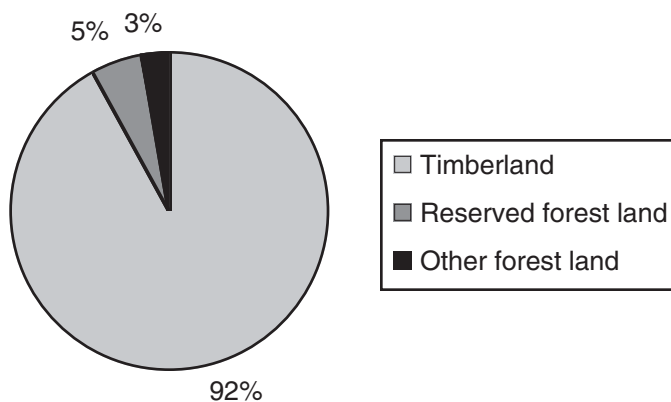


Figure 1.—Components of forest land, Minnesota, 2005.

<sup>1</sup>Timberland may not be equivalent to the area actually available for commercial timber harvesting or other access. The actual availability of land for various uses depends on owner decisions that consider economic, environmental, and social factors.

The estimated area of forest land increased from 16.2 million acres in 2003 to 16.3 million acres in 2005. During the same period, the area of timberland increased from 14.8 to 15 million acres (fig. 2).

Both private and public ownership increased slightly from 2003 to 2005 (fig. 3, table 2). Private ownership of timberland increased from 6.8 to 6.9 million acres and public ownership of timberland increased from 8.0 to 8.1 million acres from 2003 to 2005. Hardwood forest types are concentrated on private lands (51 percent) while softwood forest types are concentrated on public lands (76 percent).

The aspen-birch forest type, with 6.3 million acres of timberland (table 3), is the dominant forest type in the State (fig. 4) and is an important resource for Minnesota's forest industries. Nearly four-fifths of all the coniferous timberland in the State is in the spruce-fir forest type (3.3 million acres). The estimate of all hardwood forest types increased from 2003 to 2005, from 10.4 to 10.6 million acres. The estimate for all conifer forest types increased from 4.3 to 4.4 million acres.

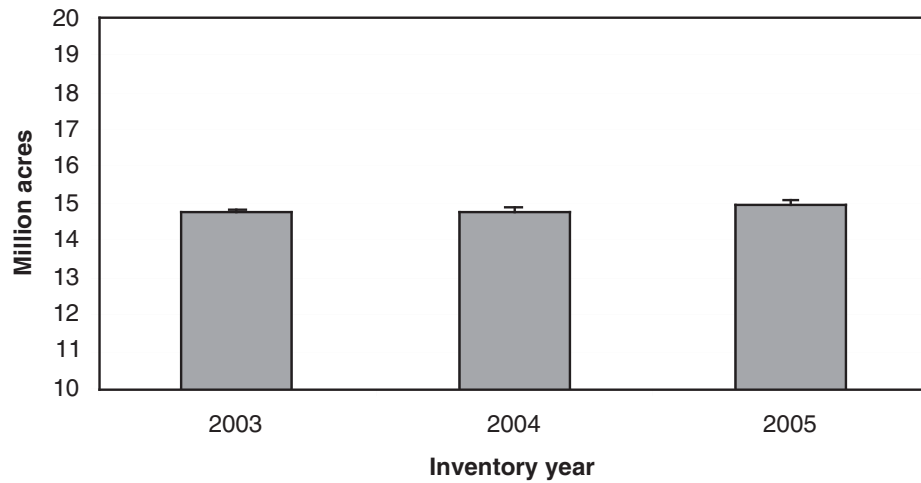


Figure 2.—Area of timberland by inventory year (accuracy brackets represent 1 standard error), Minnesota, 2003, 2004, 2005. (Note: The accuracy bracket atop each bar represents the 68-percent confidence interval (one standard deviation). In 2003, the estimate of timberland area was 14,759,800 acres plus or minus 112,200 acres.)

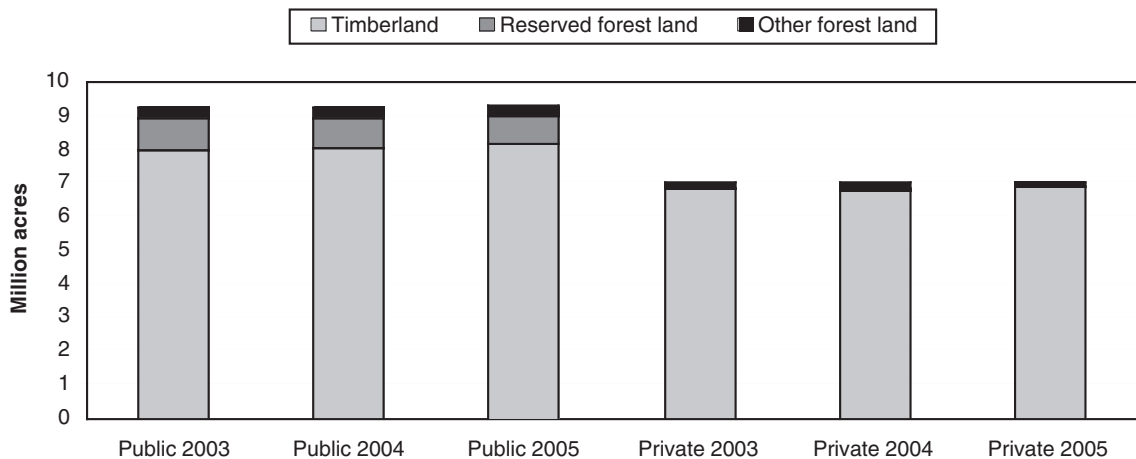


Figure 3.—Area of forest land by component and ownership, Minnesota, 2003, 2004, 2005.

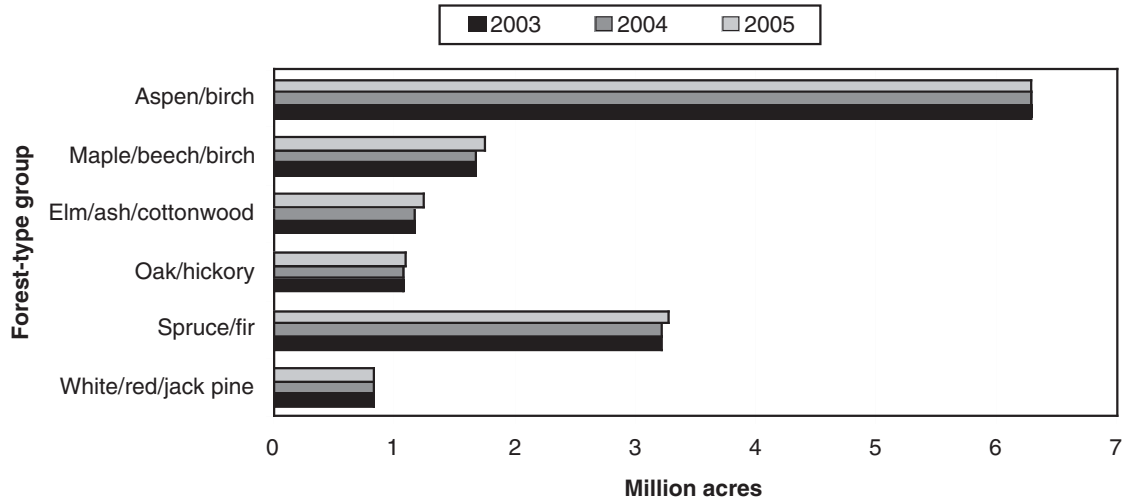


Figure 4.—Area of timberland by forest-type group, Minnesota, 2003, 2004, 2005.

## Volume

### Live-tree volume on forest land

Live-tree volume on forest land can be divided into three components (fig. 5): (1) growing-stock volume on timberland; (2) cull-tree volume on timberland; and (3) live-tree volume on reserved and other forest lands. Prior to 1999, only the first component, growing-stock volume on timberland, was reported. However, there are volumes in cull (noncommercial, rough, and rotten) trees that do not qualify as growing stock but that often are used for wood fiber and fuelwood; and trees on reserved and other forest land make important ecological contributions, e.g., wildlife habitat and soil and water protection.

With the introduction of the annualized inventory system (implemented in Minnesota in 1999) and increased interest in FIA data from an ecological perspective, a greater focus has been placed on live-tree volume. In 2005, Minnesota had 17.7 billion ft<sup>3</sup> of live-tree volume (fig. 6) on its 16.3 million acres of forest land (table 4), or 1,085 ft<sup>3</sup>/acre.

Only about 3 percent of the live-tree softwood volume was classified as cull in 2005 compared to nearly 11 percent of the hardwood volume.

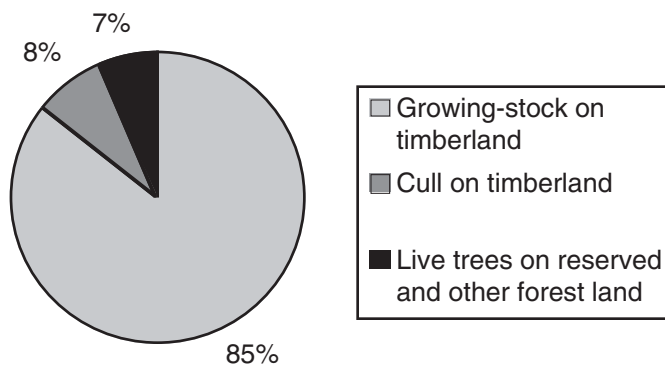


Figure 5.—Components of live-tree volume on forest land, Minnesota, 2005.

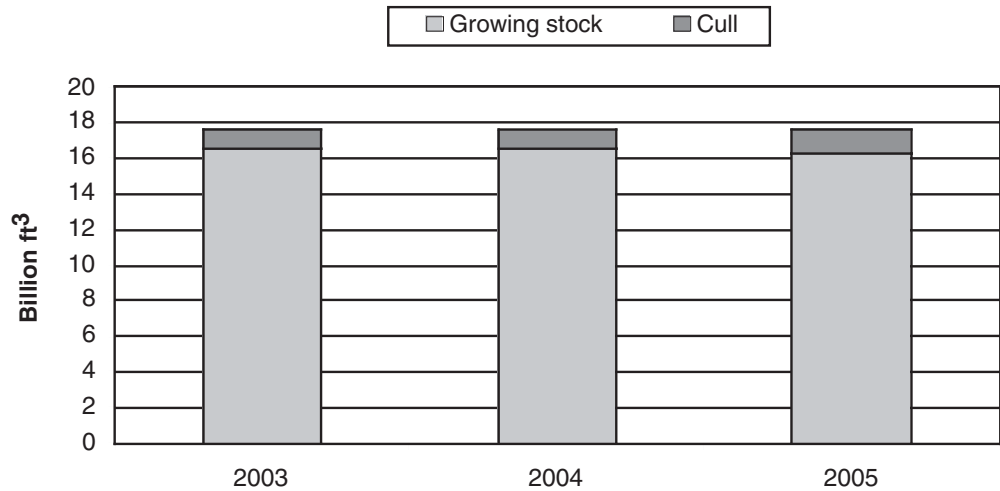


Figure 6.—Volume of live-trees on forest land by tree class, Minnesota, 2003, 2004, 2005.

### Growing-stock volume on timberland

The net volume of growing stock on timberland in Minnesota was estimated at 15.1 billion ft<sup>3</sup> on 15 million acres in 2005 (table 5), or 1,009 ft<sup>3</sup>/acre (fig. 6). There also were 1.4 billion ft<sup>3</sup> of cull trees on timberland.

In 2005, hardwoods comprised 68 percent of the growing-stock volume and 63 percent of the sawtimber volume in the State (figs. 7-8). The cottonwood-aspen species group accounted for 39 percent of the hardwood growing-stock volume, followed by eastern soft hardwoods (14 percent); other ash (11 percent);

basswood, select white oaks, and select red oaks (8 percent each); and hard and soft maples (5 percent each) (table 8).

The volume of softwood growing-stock was estimated at 4.8 billion ft<sup>3</sup> in 2005. The spruce and balsam fir species group accounted for 35 percent of the softwood volume, followed by other eastern softwoods (32 percent), eastern white and red pines (25 percent), and jack pine (8 percent).

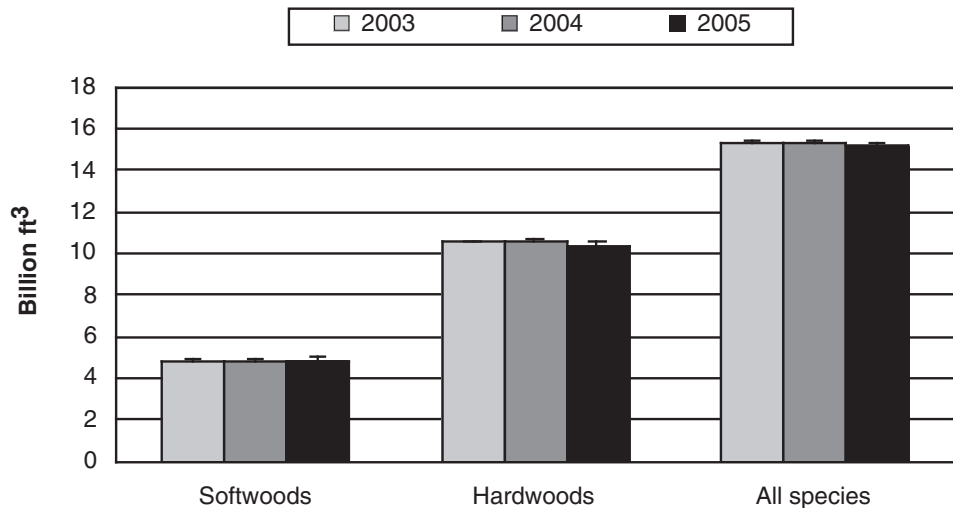


Figure 7.—Growing-stock volume by hardwood major species groups (accuracy brackets represent 1 standard error), Minnesota, 2003, 2004, 2005.

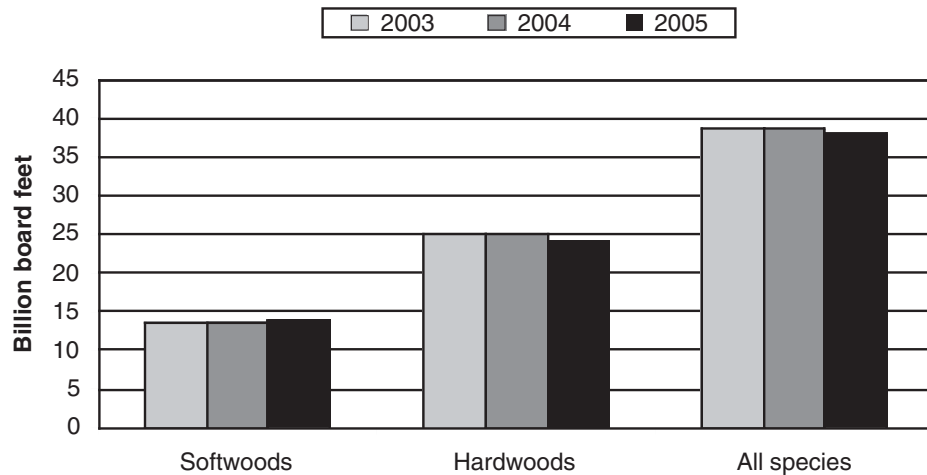


Figure 8.—Sawtimber volume by major species groups, Minnesota, 2003, 2004, 2005.

### Biomass

The total aboveground live-tree biomass on forest lands increased from an estimated 465 million dry tons in 2003 to 468 million in 2005. Biomass, measured as aboveground live-tree biomass on timberland, was estimated at 439 million dry tons in 2005 (an average of 29.3 dry tons per acre) (table 9). Biomass estimates are increasing in importance for analyses on carbon sequestration, wood fiber availability for fuel, and other issues. In 2005, 76 percent of the total biomass was in growing-stock trees, an additional 15 percent was in trees less than 5 inches d.b.h., and the remaining 9 percent in nongrowing stock trees. Three-quarters of the total biomass was composed of hardwood species. Although total biomass was split almost evenly between private (221 million dry tons) and public (218 million dry tons) timberland, softwoods comprised 35 percent of the total biomass on public lands but only 15 percent on private lands.

### Growth, Removals, and Mortality

#### Live-tree components of change on forest land

Components of change (growth, removals, and mortality) provide trend information useful for analyzing changes to the forest that have occurred between inventories. Estimates of growth, removals, and mortality for Minnesota are based solely on annual inventory plots.

Annual inventory plots measured in 1999 were remeasured in 2004 and annual inventory plots measured in 2000 were remeasured in 2005. Sampling errors are large since the sample includes only two of the five panels. See the Appendix for additional information on sampling errors.

Net average annual growth between current and previous inventories is equal to gross growth over the period less mortality over the period divided by the number of growing seasons in the period. The net average annual growth of live trees on forest land (based on the two panels measured in 1999 to 2000 and remeasured in 2004 to 2005) was 551 million  $\text{ft}^3$ , or approximately 3.1 percent of the current live-tree volume on forest land.

Average annual removals of live trees on forest land was 342 million  $\text{ft}^3$ , or nearly 1.9 percent of the current live-tree volume on forest land.

Average annual mortality includes trees that died over the period but did not die as a result of timber harvesting (mortality due to timber harvesting activities is included in removals). Average annual mortality of live trees on forest land was 302 million  $\text{ft}^3$ , or 1.7 percent of the current live-tree volume on forest land.

Average annual mortality is not presented in figure 9 because it already has been removed from gross average annual growth to compute average annual net growth.



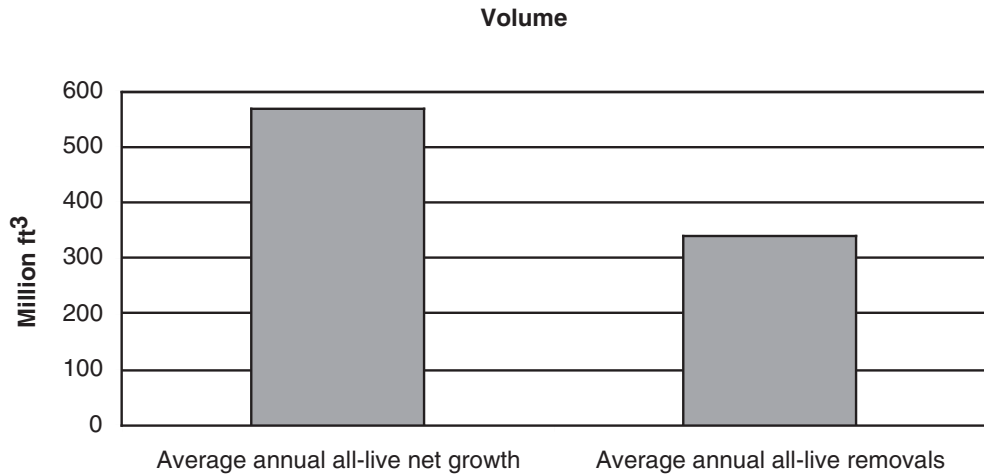


Figure 9.—Average annual net growth of live trees on forest land and average annual removals of live trees on forest land, Minnesota, 1999-2000 to 2004-2005.

#### Growing-stock tree components of change on timberland

The net average annual growth of growing stock on timberland (490 million ft<sup>3</sup>) was 3.2 percent of the current growing-stock inventory on timberland (fig. 10, table 10).

Average annual removals includes trees cut and utilized (76 percent), trees killed as a result of harvesting (9 percent), and trees removed from the timberland base as a result of land-use change (16 percent). Average

annual removals of growing stock on timberland was 311 million ft<sup>3</sup> (table 11), or 2.1 percent of the current growing-stock inventory on timberland.

Average annual mortality of growing stock on timberland was 240 million ft<sup>3</sup> (table 12), or 1.6 percent of the current growing-stock inventory on timberland. Average annual mortality is not presented in figure 10 because it already has been removed from gross growth to compute average net growth.

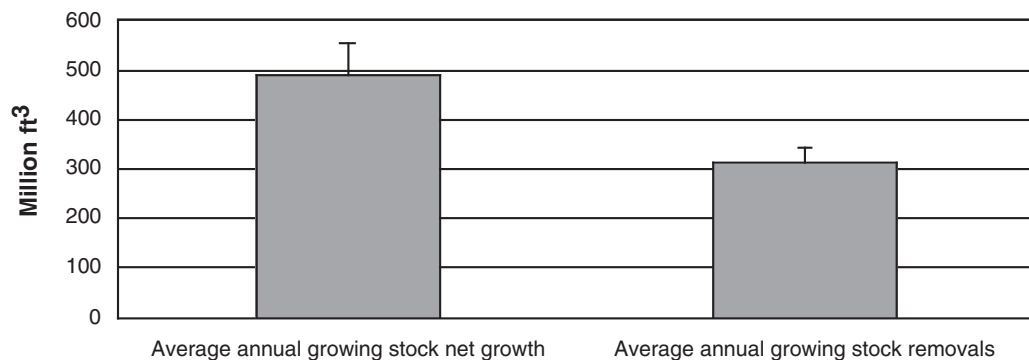


Figure 10.—Average annual net growth and average annual removals of growing stock on timberland (accuracy brackets represent 1 standard error), Minnesota, 1999-2000 to 2004-2005.

## Literature Cited

**Bechtold, W.A.; Patterson, P.L. eds. 2005.**  
*The enhanced Forest Inventory and Analysis program—national sampling design and estimation procedures.* Gen. Tech. Rep. SRS-80. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station. 85 p.

**DellaSala, D.A.; Staus, N.L.; Strittholt, J.R.; Hackman, A.; Iacobelli A. 2001.**  
*An updated protected areas database for the United States and Canada.* Natural Areas Journal. 21(2): 124-135.

**Mangold, R.D. 1998.**  
*Forest health monitoring field methods guide (national 1998).* Research Triangle Park, NC: U.S. Department of Agriculture, Forest Service, National Forest Health Monitoring Program. 429 p.

**McRoberts, R.E. 1999.**  
*Joint annual forest inventory and monitoring system, the North Central perspective.* Journal of Forestry. 97(12): 27-31.

**Miles, P.D.; Brand, G.J.; Mielke, M.E., 2004.**  
*Minnesota's forest resources in 2003.* Resour. Bull. NC-246. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Research Station. 36 p.

**Miles, P.D.; Brand, G.J.; Mielke, M.E., 2006.**  
*Minnesota's forest resources in 2004.* Resour. Bull. NC-262. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Research Station. 36 p.

## APPENDIX

### Inventory Methods

The annual inventory system was implemented in Minnesota in 1999. Under this system about one-fifth of all field plots are measured in any one year. In 2003, after 5 years, an entire inventory cycle was completed. In subsequent years, FIA reports and analyzes results as a moving 5-year average. This 2005 report is the third year of the rolling average and includes five panels of measurements collected from 2001 through 2005. The results presented in this report are estimates based on sampling techniques presented by Bechtold and Patterson (2005).

Estimates of growth, removals, and mortality for Minnesota are based solely on annual inventory plots. Annual inventory plots measured in 1999 were remeasured in 2004 and plots measured in 2000 were remeasured in 2005. Sampling errors are large since the sample includes only those plots from two of the five panels. Over the next 3 years, sampling errors for growth, removals, and mortality will be smaller as additional annual inventory plots are remeasured.

The following are sampling error estimates for the 2005 inventory: area of forest land, 0.59 percent; area of timberland, 0.67 percent; number of growing-stock trees on timberland, 1.19 percent; volume of growing stock on timberland, 1.31 percent; volume of sawtimber on timberland, 1.87 percent; average annual net growth of growing stock on timberland, 13.09 percent; average annual removals of growing stock on timberland, 10.50 percent; and average annual mortality of growing stock on timberland, 4.98 percent.

### Sampling Phases

The 2005 Minnesota survey was based on a three-phase inventory. In the first phase, classified satellite imagery was used to stratify the State and aerial photographs were used to select plots for measurement. The second phase entailed measuring the traditional FIA suite of variables; the third phase focused on a suite of forest-health variables.

Land that could not be sampled included private tracts where field personnel were unable to obtain landowner permission to measure the field plot and plots that were inaccessible because of a hazard or danger to field personnel. The methods used in preparing this report were adjusted to account for such sites. There were 23 denied access/hazardous plots in 1999, 58 in 2000, 64 in 2001, 66 in 2002, 74 in 2003, 75 in 2004, and 44 in 2005. Fewer plots were denied access plots in 1999 because only a single intensity sample was conducted that year. The sampling intensity was doubled in 2000 through 2005.

#### **Phase 1**

In Phase 1, computer-assisted classification of satellite imagery was used to form two initial strata: forest and nonforest. Pixels within 60 m (2-pixel widths) of a forest-nonforest boundary formed two additional strata: forest edge and nonforest edge. Forest pixels within 60 m on the forest side of a forest-nonforest boundary were classified into forest-edge strata. Pixels within 60 m of the boundary on the nonforest side were classified into nonforest-edge strata. All strata were divided into public or private ownership based on information available in the Protected Lands Database (DellaSala et al. 2001). Stratification and estimation were conducted separately for the Chippewa National Forest, Boundary Waters Canoe Area Wilderness, Superior National Forest excluding the Boundary Waters Canoe Area Wilderness, and Voyageurs National Park. Stratification and estimation were conducted at the FIA unit level for all other public lands and also for private lands. In the national forest stratum, forest and forest-edge strata were combined.

#### **Phase 2**

Phase 2 of the inventory consisted of the measurement of the annual sample of field plots in Minnesota. Current FIA precision standards for annual inventories require a sampling intensity of one plot for about every 6,000 acres. FIA has established a grid that divides the United States into nonoverlapping hexagons, each of which contains 5,937 acres (McRoberts 1999). A grid of field plots was established by selecting one plot from each

hexagon based on the following rules: (1) if a Forest Health Monitoring (FHM) plot (Mangold 1998) fell within a hexagon, it was selected as the grid plot; (2) if no FHM plot fell within a hexagon, the existing FIA plot from the 1990 inventory nearest the hexagon center was selected as the grid plot; and (3) if neither FHM nor existing FIA plots fell within the hexagon, a new FIA plot was established in the hexagon (McRoberts 1999). This grid of plots is designated the Federal base sample and is considered an equal probability sample; its measurement in Minnesota is funded by the Federal government.

The total Federal base sample was divided systematically into five interpenetrating, nonoverlapping subsamples or panels. Each year, the plots in a single panel are measured, and panels are selected on a 5-year, rotating basis (McRoberts 1999). For estimation purposes, the measurement of each panel of plots can be considered an independent systematic sample of all land in a state. Field crews measure vegetation on plots forested at the time of the last inventory and on plots currently classified as forest by trained photointerpreters using aerial photos or digital orthoquads.

### Phase 3

FIA has two categories of field measurements (Phase 2 field plots and Phase 3 plots) to optimize our ability to collect data when available for measurement. Both types of plot are distributed systematically both geographically and temporally. Phase 3 plots are measured with the full suite of vegetative and health variables collected as well as the full suite of measures associated with Phase 2 plots. Phase 3 plots must be measured between June 1 and August 30 to accommodate the additional measurement of nonwoody understory vegetation, ground cover, soils, and other variables. The complete 5-year annual inventory includes 783 Phase 3 plots, of which 299 were forested. On Phase 2 plots, only variables that can be measured throughout the entire year are collected. In Minnesota, the complete 5-year annual inventory includes land inventoried on 17,883 Phase 2 plots. Forest land was observed on 5,801 of these plots. Timberland was measured on 5,405 plots, reserved forest

land on 243 plots, and other forest land on 182 plots. The number of field plots represents a double intensification for the standard base Federal sample. This double intensification was made possible by additional resources provided by the State of Minnesota.

The national FIA 4-point cluster plot configuration (fig. 11) was used for data collection during the 2001-05 measurements of Minnesota. The national plot configuration requires mapping forest conditions on each plot.

The configuration consists of four subplots. The centers of subplots 2, 3, and 4 are located 120 feet from the center of subplot 1. The azimuths to subplots 2, 3, and 4 are 0, 120, and 240 degrees, respectively. Trees with a d.b.h. of 5 inches and larger are measured on a 24-foot-radius (1/24-acre) circular subplot. All trees less than 5 inches d.b.h. are measured on a 6.8-foot-radius (1/300-acre) circular microplot located 12 feet east of the center of each of the four subplots. Forest conditions that occur on any of the four subplots are recorded. Factors that differentiate forest conditions are changes in forest type, stand-size class, land use, ownership, and density. Each condition that occurs anywhere on any of the subplots is identified, described, and mapped so long as the area of the condition is at least 1 acre in size and 120 feet in width. Field plot measurements are combined with Phase 1 estimates in the compilation process and table production.

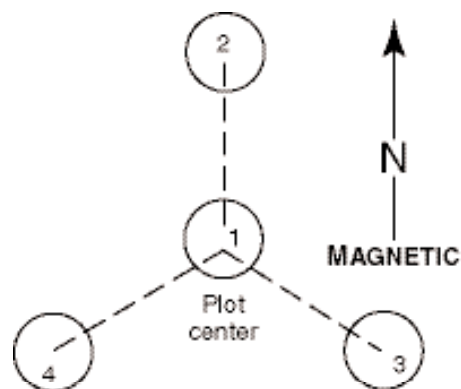


Figure 11.—Current NCFIA field plot configuration.

For additional information, contact: Program  
Manager, Forest Inventory and Analysis,  
Northern Research Station, 1992 Folwell Ave.,  
St. Paul, MN 55108 or State Forester, Division  
of Forestry, Minnesota Department of Natural  
Resources, P.O. Box 44, 500 Lafayette Road,  
St. Paul, MN 55155

## TABLE TITLES

Table 1.—Area of forest land by forest type group, forest type, and owner category, Minnesota, 2001-2005

Table 2.—Area of timberland by major forest type group, stand origin, and owner category, Minnesota, 2001-2005

Table 3.—Area of timberland by forest type group, forest type, and stand-size class, Minnesota, 2001-2005

Table 4.—Net volume of all live trees on forest land by species group, species, and owner category, Minnesota, 2001-2005

Table 5.—Net volume of all live trees and salvageable dead trees on timberland by class of timber and softwood/hardwood species category, Minnesota, 2001-2005

Table 6.—Net volume of growing stock on timberland by forest type group, forest type, and softwood/hardwood species category, Minnesota, 2001-2005

Table 7.—Net volume of growing stock on timberland by species group, species, and diameter class, Minnesota, 2001-2005

Table 8.—Net volume of sawtimber on timberland by species group, species, and diameter class, Minnesota, 2001-2005

Table 9.—All live aboveground tree biomass on timberland by owner category, softwood/hardwood species category, and tree biomass component, Minnesota, 2001-2005

Table 10.—Average annual net growth of growing stock on timberland by species group and owner category, Minnesota, 1999-2000 to 2001-2005

Table 11.—Average annual removals of growing stock on timberland by species group and owner category, Minnesota, 1999-2000 to 2001-2005

Table 12.—Average annual mortality of growing stock on timberland by species group and owner category, Minnesota, 1999-2000 to 2001-2005

## **TABLES**

Table 1. -- Area of forest land by forest type group, forest type, and owner category, Minnesota, 2001-2005

(In thousand acres)

Forest type group/ forest type	Owner category			
	All owners	Public	Private	Unidentified owner
<b>Softwood type groups</b>				
White / red / jack pine group				
Jack pine	446.1	300.4	145.7	--
Red pine	421.8	271.0	150.8	--
Eastern white pine	116.4	85.1	31.3	--
All forest types	984.3	656.4	327.8	--
Spruce / fir group				
Balsam fir	466.5	315.8	150.7	--
White spruce	119.2	81.8	37.3	--
Black spruce	1,551.4	1,298.8	252.7	--
Tamarack	952.3	752.0	200.3	--
Northern white-cedar	613.3	484.8	128.5	--
All forest types	3,702.7	2,933.3	769.5	--
Pinyon / juniper group				
Eastern redcedar	14.7	--	14.7	--
All forest types	14.7	--	14.7	--
Exotic softwoods group				
Scotch pine	5.7	--	5.7	--
All forest types	5.7	--	5.7	--
All softwood groups	4,707.4	3,589.7	1,117.6	--
<b>Hardwood type groups</b>				
Oak / pine group				
White pine / red oak / white ash	88.2	47.0	41.2	--
Eastern redcedar / hardwood	16.5	6.4	10.1	--
Other pine / hardwood	189.9	103.1	86.7	--
All forest types	294.5	156.5	138.0	--
Oak / hickory group				
Post oak / blackjack oak	62.6	9.7	52.9	--
White oak / red oak / hickory	254.7	43.7	211.0	--
White oak	13.4	--	13.4	--
Northern red oak	306.0	100.9	205.2	--
Bur oak	205.1	31.1	174.0	--
Black walnut	8.5	--	8.5	--
Red maple / oak	32.1	11.3	20.7	--
Mixed upland hardwoods	279.5	45.6	233.9	--
All forest types	1,161.9	242.3	919.6	--

(Table 1 continued on next page)



(Table 1 continued)

Forest type group/ forest type	Owner category			Unidentified owner
	All owners	Public	Private	
<b>Hardwood type groups</b>				
Elm / ash / cottonwood group				
Elm / ash / cottonwood group	1.4	--	1.4	--
Black ash / American elm / red maple	913.3	439.5	473.8	--
River birch / sycamore	27.7	23.6	4.1	--
Cottonwood	47.8	13.4	34.4	--
Willow	62.4	29.3	33.0	--
Sycamore / pecan / American elm	4.8	0.9	4.0	--
Sugarberry / hackberry / elm / green ash	207.8	29.0	178.8	--
Silver maple / American elm	41.7	7.9	33.9	--
Red maple / lowland	12.2	5.3	6.9	--
Cottonwood / willow	7.4	4.3	3.1	--
All forest types	1,326.6	553.1	773.5	--
Maple / beech / birch group				
Sugar maple / beech / yellow birch	637.0	283.4	353.6	--
Black cherry	2.6	--	2.6	--
Cherry / ash / yellow-poplar	7.0	--	7.0	--
Hard maple / basswood	896.3	343.2	553.2	--
Elm / ash / locust	194.1	35.3	158.8	--
Red maple / upland	83.5	37.7	45.8	--
All forest types	1,820.4	699.6	1,120.8	--
Aspen / birch group				
Aspen / birch group	2.8	1.3	1.5	--
Aspen	5,095.8	2,855.2	2,240.5	--
Paper birch	1,147.4	788.9	358.5	--
Balsam poplar	483.3	225.5	257.7	--
All forest types	6,729.3	3,871.0	2,858.3	--
Exotic hardwoods group				
Other exotic hardwoods	2.1	--	2.1	--
All forest types	2.1	--	2.1	--
All hardwood groups	11,334.8	5,522.5	5,812.3	--
Nonstocked	258.4	163.5	95.0	--
All forest groups	16,300.6	9,275.7	7,024.9	--

All table cells without observations in the inventory sample are indicated by --. Table value of 0.0 indicates the acres round to less than 0.1 thousand acres. Columns and rows may not add to their totals due to rounding.

Table 2. -- Area of timberland by major forest type group, stand origin, and owner category, Minnesota, 2001-2005  
(In thousand acres)

Major forest type group and stand origin	Owner category			
	All owners	Public	Private	Unidentified owner
<b>Softwood type groups</b>				
Natural	3,708.8	2,788.0	920.9	--
Planted	420.6	257.7	162.9	--
All softwood types	4,129.4	3,045.7	1,083.7	--
<b>Hardwood type groups</b>				
Natural	10,466.2	4,842.1	5,624.1	--
Planted	163.9	91.7	72.2	--
All hardwood types	10,630.2	4,933.8	5,696.4	--
Nonstocked	229.1	138.1	91.0	--
<b>All groups</b>	<b>14,988.7</b>	<b>8,117.6</b>	<b>6,871.1</b>	<b>--</b>

All table cells without observations in the inventory sample are indicated by --. Table value of 0.0 indicates the acres round to less than 0.1 thousand acres. Columns and rows may not add to their totals due to rounding.

Table 3. -- Area of timberland by forest type group, forest type, and stand-size class, Minnesota, 2001-2005

(In thousand acres)

Forest type group/ forest type	Stand-size class				
	All stands	Sawtimber	Poletimber	Sapling-seedling	Non-stocked
<b>Softwood type groups</b>					
White / red / jack pine group					
Jack pine	356.4	153.8	136.3	66.3	--
Red pine	395.4	183.3	150.2	61.9	--
Eastern white pine	77.7	65.3	5.3	7.1	--
All forest types	829.4	402.4	291.8	135.2	--
Spruce / fir group					
Balsam fir	393.4	52.1	114.8	226.5	--
White spruce	111.1	25.1	34.5	51.4	--
Black spruce	1,335.0	23.3	409.2	902.5	--
Tamarack	868.2	85.6	338.9	443.7	--
Northern white-cedar	571.9	250.7	255.4	65.8	--
All forest types	3,279.6	436.8	1,152.8	1,690.0	--
Pinyon / juniper group					
Eastern redcedar	14.7	9.0	2.3	3.4	--
All forest types	14.7	9.0	2.3	3.4	--
<b>Exotic softwoods group</b>					
Scotch pine	5.7	1.2	2.2	2.2	--
All forest types	5.7	1.2	2.2	2.2	--
All softwood groups	4,129.4	849.3	1,449.1	1,830.9	--
<b>Hardwood type groups</b>					
Oak / pine group					
White pine / red oak / white ash	73.4	40.1	23.4	9.9	--
Eastern redcedar / hardwood	10.9	3.4	6.6	0.9	--
Other pine / hardwood	167.3	85.6	39.3	42.4	--
All forest types	251.6	129.2	69.3	53.1	--
Oak / hickory group					
Post oak / blackjack oak	59.5	41.9	12.3	5.3	--
White oak / red oak / hickory	248.4	166.5	75.1	6.9	--
White oak	13.4	13.4	--	--	--
Northern red oak	292.9	223.5	58.9	10.6	--
Bur oak	169.2	126.3	36.8	6.1	--
Black walnut	8.5	5.7	2.4	0.4	--
Red maple / oak	32.1	5.4	16.1	10.6	--
Mixed upland hardwoods	278.0	137.3	96.3	44.4	--
All forest types	1,102.1	720.0	297.7	84.4	--

(Table 3 continued on next page)

(Table 3 continued)

Forest type group/ forest type	Stand-size class				
	All stands	Sawtimber	Poletimber	Sapling- seedling	Non- stocked
<b>Hardwood type groups</b>					
Elm / ash / cottonwood group					
Elm / ash / cottonwood group	1.4	--	1.4	--	--
Black ash / American elm / red maple	846.9	114.2	472.4	260.3	--
River birch / sycamore	26.2	2.9	3.8	19.4	--
Cottonwood	42.7	31.5	2.4	8.7	--
Willow	57.0	8.3	--	48.7	--
Sycamore / pecan / American elm	4.8	1.6	--	3.2	--
Sugarberry / hackberry / elm / green ash	200.8	80.8	87.2	32.8	--
Silver maple / American elm	38.6	26.0	10.2	2.4	--
Red maple / lowland	12.2	3.0	5.4	3.8	--
Cottonwood / willow	7.4	6.5	--	0.9	--
All forest types	1,238.1	274.9	582.9	380.3	--
<b>Maple / beech / birch group</b>					
Maple / beech / birch group					
Sugar maple / beech / yellow birch	594.6	241.4	270.9	82.3	--
Black cherry	2.6	--	--	2.6	--
Cherry / ash / yellow-poplar	7.0	3.2	--	3.8	--
Hard maple / basswood	875.4	546.8	292.3	36.3	--
Elm / ash / locust	186.9	85.7	79.1	22.2	--
Red maple / upland	83.5	18.2	48.4	16.8	--
All forest types	1,750.0	895.3	690.7	164.0	--
<b>Aspen / birch group</b>					
Aspen / birch group					
Aspen	2.8	0.8	1.3	0.7	--
Aspen	4,846.5	860.8	1,804.2	2,181.4	--
Paper birch	973.0	212.6	584.7	175.7	--
Balsam poplar	464.0	63.7	210.5	189.8	--
All forest types	6,286.3	1,138.0	2,600.7	2,547.6	--
<b>Exotic hardwoods group</b>					
Exotic hardwoods group					
Other exotic hardwoods	2.1	--	2.1	--	--
All forest types	2.1	--	2.1	--	--
All hardwood groups	10,630.2	3,157.3	4,243.5	3,229.4	--
Nonstocked	229.1	--	--	--	229.1
All forest groups	14,988.7	4,006.7	5,692.6	5,060.3	229.1

All table cells without observations in the inventory sample are indicated by --. Table value of 0.0 indicates the acres round to less than 0.1 thousand acres. Columns and rows may not add to their totals due to rounding.

Table 4. -- Net volume of all live trees on forest land by species group, species, and owner category, Minnesota, 2001-2005

(In thousand cubic feet)

Species group/ species	Owner category		
	All owners	Public	Private Unidentified owner
<b>Softwoods</b>			
Other yellow pines			
Scotch pine	6,338	--	6,338
All species	6,338	--	6,338
Eastern white and red pines			
Red pine	910,915	614,619	296,296
Eastern white pine	482,274	330,578	151,697
All species	1,393,189	945,196	447,993
Jack pine			
Jack pine	505,717	346,010	159,707
All species	505,717	346,010	159,707
Spruce and balsam fir			
Balsam fir	677,600	413,657	263,944
White spruce	306,125	206,288	99,838
Black spruce	863,663	694,587	169,076
All species	1,847,388	1,314,531	532,858
Other eastern softwoods			
Redcedar/juniper spp.	112	--	112
Eastern redcedar	24,733	2,202	22,531
Larch spp.	266	165	101
Tamarack (native)	672,216	472,801	199,415
Blue spruce	39	--	39
Austrian pine	1,640	--	1,640
Northern white-cedar	1,028,694	774,351	254,343
All species	1,727,700	1,249,519	478,181
Total softwoods	5,480,332	3,855,256	1,625,076
<b>Hardwoods</b>			
Select white oaks			
White oak	105,123	21,266	83,857
Swamp white oak	6,115	4,631	1,484
Bur oak	909,035	174,476	734,559
All species	1,020,273	200,373	819,900
Select red oaks			
Northern red oak	911,793	345,374	566,419
All species	911,793	345,374	566,419
Other red oaks			
Northern pin oak	85,847	9,264	76,583
Black oak	11,357	3,829	7,528
All species	97,203	13,092	84,111
Hickory			
Hickory spp.	164	81	83
Bitternut hickory	9,948	953	8,995
Shagbark hickory	19,337	1,377	17,961
All species	29,449	2,411	27,039

(Table 4 continued)

Species group/ species	Owner category			Unidentified owner
	All owners	Public	Private	
<b>Hardwoods</b>				
Yellow birch				
Yellow birch	56,477	37,122	19,355	--
All species	56,477	37,122	19,355	--
Hard maple				
Sugar maple	694,832	342,728	352,104	--
All species	694,832	342,728	352,104	--
Soft maple				
Red maple	549,833	270,895	278,937	--
Silver maple	152,911	50,486	102,425	--
All species	702,744	321,382	381,362	--
Beech				
American beech	50	--	50	--
All species	50	--	50	--
Ash				
White ash	10,528	238	10,289	--
Black ash	927,480	444,394	483,087	--
Green ash	360,469	73,008	287,461	--
All species	1,298,477	517,640	780,838	--
Cottonwood and aspen				
Cottonwood and poplar spp.	624	--	624	--
Balsam poplar	425,568	226,833	196,735	--
Eastern cottonwood	129,057	64,258	64,799	--
Bigtooth aspen	373,138	176,636	196,503	--
Quaking aspen	3,662,744	2,059,307	1,603,437	--
All species	4,591,132	2,527,035	2,064,097	--
Basswood				
American basswood	905,147	319,848	585,300	--
All species	905,147	319,848	585,300	--
Black walnut				
Black walnut	32,913	3,710	29,203	--
All species	32,913	3,710	29,203	--

(Table 4 continued on next page)

(Table 4 continued)

Species group/ species	Owner category			
	All owners	Public	Private	Unidentified owner
<b>Hardwoods</b>				
Other eastern soft hardwoods				
Boxelder	139,688	16,214	123,474	--
Paper birch	1,325,356	833,167	492,189	--
Hackberry	18,057	2,718	15,338	--
Butternut	16,582	4,057	12,525	--
Black cherry	30,693	4,834	25,859	--
Black willow	30,547	11,953	18,594	--
White willow	174	174	--	--
Elm spp.	1,630	461	1,169	--
Winged elm	31	31	--	--
American elm	201,165	46,237	154,928	--
Siberian elm	2,011	--	2,011	--
Slippery elm	40,450	2,356	38,094	--
All species	1,806,384	922,202	884,182	--
Other eastern hard hardwoods				
Sweet birch	325	--	325	--
Honeylocust	193	--	193	--
Red mulberry	146	30	116	--
Black locust	3,792	28	3,764	--
Rock elm	6,382	1,423	4,959	--
All species	10,837	1,481	9,357	--
Eastern noncommercial hardwoods				
Mountain maple	180	149	31	--
Serviceberry spp.	--	--	--	--
Common serviceberry	129	129	--	--
American hornbeam, musclewood	820	562	259	--
Hawthorn spp.	1,311	24	1,287	--
Apple spp.	379	--	379	--
Eastern hophornbeam	29,080	4,020	25,061	--
Cherry and plum spp.	91	--	91	--
Pin cherry	707	262	445	--
Chokecherry	837	748	88	--
American plum	385	76	309	--
Willow spp.	4,470	847	3,623	--
Peachleaf willow	3,030	923	2,107	--
Bebb willow	653	653	--	--
American mountain-ash	501	411	90	--
Russian-olive	28	--	28	--
Other or unknown tree	525	--	525	--
All species	43,126	8,803	34,323	--
Total hardwoods	12,200,838	5,563,199	6,637,640	--
<b>All species groups</b>	<b>17,681,170</b>	<b>9,418,455</b>	<b>8,262,716</b>	<b>--</b>

All table cells without observations in the inventory sample are indicated by --. Table value of 0 indicates the volume rounds to less than 1 thousand cubic feet. Columns and rows may not add to their totals due to rounding.

Table 5. -- Net volume of all live trees and salvageable dead trees on timberland by class of timber and softwood/hardwood species category, Minnesota, 2001-2005

(In thousand cubic feet)

Class of timber	All species	Softwood species	Hardwood species
<b>Live trees</b>			
<b>Growing-stock trees</b>			
Sawtimber	6,200,365	2,349,691	3,850,674
Saw log portion	1,761,051	316,854	1,444,197
Upper stem portion	7,961,417	2,666,545	5,294,872
Poletimber	7,164,592	2,141,599	5,022,993
<b>All growing-stock trees</b>	<b>15,126,009</b>	<b>4,808,144</b>	<b>10,317,864</b>
<b>Cull trees</b>			
Rough trees <sup>1</sup>	993,467	86,357	907,110
Sawtimber size	257,062	29,562	227,501
Poletimber size	1,250,529	115,919	1,134,610
Rotten trees <sup>1</sup>	109,498	23,551	85,947
Sawtimber size	22,117	4,155	17,962
Poletimber size	131,615	27,706	103,909
<b>All live cull trees</b>	<b>1,382,144</b>	<b>143,625</b>	<b>1,238,519</b>
<b>All live trees</b>	<b>16,508,153</b>	<b>4,951,769</b>	<b>11,556,383</b>
<b>Salvageable dead trees</b>			
Sawtimber size	69,514	28,537	40,978
Poletimber size	73,266	33,696	39,570
<b>All salvageable dead trees</b>	<b>142,780</b>	<b>62,232</b>	<b>80,548</b>
<b>All classes</b>	<b>16,650,933</b>	<b>5,014,001</b>	<b>11,636,932</b>

All table cells without observations in the inventory sample are indicated by --. Table value of 0 indicates the volume rounds to less than 1 thousand cubic feet. Columns and rows may not add to their totals due to rounding.

<sup>1</sup> Includes noncommercial species.



Table 6. -- Net volume of growing stock on timberland by forest type group, forest type, and softwood/hardwood species category, Minnesota, 2001-2005

(In thousand cubic feet)

Forest type group/ forest type	All species	Softwood species	Hardwood species
<b>Softwood type groups</b>			
White / red / jack pine group			
Jack pine	389,365	337,936	51,428
Red pine	782,094	732,031	50,063
Eastern white pine	160,629	146,878	13,751
All forest types	1,332,088	1,216,845	115,242
<b>Spruce / fir group</b>			
Balsam fir	284,676	207,868	76,808
White spruce	97,558	83,736	13,823
Black spruce	678,440	642,575	35,864
Tamarack	542,425	529,628	12,798
Northern white-cedar	882,166	801,852	80,313
All forest types	2,485,266	2,265,660	219,606
<b>Pinon / juniper group</b>			
Eastern redcedar	8,662	6,883	1,780
All forest types	8,662	6,883	1,780
<b>Exotic softwoods group</b>			
Scotch pine	7,096	7,018	78
All forest types	7,096	7,018	78
All softwood groups	3,833,111	3,496,405	336,706
<b>Hardwood type groups</b>			
<b>Oak / pine group</b>			
White pine / red oak / white ash	139,945	86,431	53,514
Eastern redcedar / hardwood	4,244	2,864	1,379
Other pine / hardwood	215,840	123,220	92,620
All forest types	360,029	212,515	147,513
<b>Oak / hickory group</b>			
Post oak / blackjack oak	82,433	1,200	81,233
White oak / red oak / hickory	309,138	5,185	303,952
White oak	19,668	1,272	18,396
Northern red oak	480,082	1,765	478,318
Bur oak	223,141	3,239	219,903
Black walnut	8,267	--	8,267
Red maple / oak	23,433	1,274	22,159
Mixed upland hardwoods	301,071	9,386	291,685
All forest types	1,447,233	23,321	1,423,912

(Table 6 continued on next page)

(Table 6 continued)

Forest type group/ forest type	All species	Softwood species	Hardwood species
<b>Hardwood type groups</b>			
Elm / ash / cottonwood group			
Elm / ash / cottonwood group	1,575	--	1,575
Black ash / American elm / red maple	824,648	100,267	724,381
River birch / sycamore	7,379	1,962	5,417
Cottonwood	84,093	444	83,649
Willow	16,153	5,193	10,960
Sycamore / pecan / American elm	1,618	890	728
Sugarberry / hackberry / elm / green ash	177,054	4,669	172,385
Silver maple / American elm	73,218	1,641	71,577
Red maple / lowland	5,683	1,695	3,988
Cottonwood / willow	17,167	--	17,167
All forest types	1,208,588	116,761	1,091,827
Maple / beech / birch group			
Sugar maple / beech / yellow birch	722,589	59,742	662,847
Black cherry	545	--	545
Cherry / ash / yellow-poplar	7,205	--	7,205
Hard maple / basswood	1,489,949	33,582	1,456,367
Elm / ash / locust	199,146	5,658	193,488
Red maple / upland	82,969	9,731	73,238
All forest types	2,502,403	108,714	2,393,689
Aspen / birch group			
Aspen / birch group	2,044	408	1,637
Aspen	4,319,555	534,382	3,785,172
Paper birch	1,080,284	257,707	822,576
Balsam poplar	359,300	48,018	311,283
All forest types	5,761,183	840,515	4,920,668
Exotic hardwoods group			
Other exotic hardwoods	549	--	549
All forest types	549	--	549
All hardwood groups	11,279,986	1,301,826	9,978,160
Nonstocked	12,912	9,913	2,999
<b>All forest groups</b>	<b>15,126,009</b>	<b>4,808,144</b>	<b>10,317,864</b>

All table cells without observations in the inventory sample are indicated by --. Table value of 0 indicates the volume rounds to less than 1 thousand cubic feet. Columns and rows may not add to their totals due to rounding.

Table 7. -- Net volume of growing stock on timberland by species group, species, and diameter class, Minnesota, 2001-2005  
(in thousand cubic feet)

Species group/ species	Diameter class (inches at breast height)										
	All classes	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+
<b>Softwoods</b>											
Other yellow pines											
Scotch pine	6,338	799	1,352	1,260	1,426	933	568	--	--	--	--
All species	6,338	799	1,352	1,260	1,426	933	568	--	--	--	--
Eastern white and red pines											
Red pine	850,145	72,913	142,921	145,245	99,351	90,743	79,773	73,160	65,700	77,683	2,654
Eastern white pine	341,818	7,098	16,146	20,678	27,976	28,182	31,472	41,493	43,114	90,750	34,908
All species	1,191,962	80,011	159,067	165,924	127,327	118,925	111,245	114,654	108,815	168,433	37,562
Jack pine											
Jack pine	402,613	53,602	85,787	99,725	80,207	50,056	24,335	3,837	5,064	--	--
All species	402,613	53,602	85,787	99,725	80,207	50,056	24,335	3,837	5,064	--	--
Spruce and balsam fir											
Balsam fir	635,087	190,708	201,818	129,262	62,821	37,562	11,527	1,394	--	--	--
White spruce	283,506	30,688	47,177	51,254	50,381	31,262	30,672	18,062	8,636	15,372	--
Black spruce	746,806	356,454	234,853	107,076	34,883	8,837	3,800	904	--	--	--
All species	1,665,399	577,845	483,848	287,592	148,084	77,662	45,999	20,361	8,636	15,372	--
Other eastern softwoods											
Redcedar/juniper spp.	112	35	77	--	--	--	--	--	--	--	--
Eastern redcedar	19,615	3,893	4,868	4,980	3,501	2,372	--	--	--	--	--
Larch spp.	131	30	101	--	--	--	--	--	--	--	--
Tamarack (native)	646,527	190,533	188,262	127,492	73,638	33,649	16,988	10,922	1,171	3,870	--
Blue spruce	39	39	--	--	--	--	--	--	--	--	--
Austrian pine	1,333	58	138	349	302	487	--	--	--	--	--
Northern white-cedar	874,075	124,373	186,882	165,326	136,728	112,581	61,489	40,559	21,610	24,528	--
All species	1,541,832	318,961	380,328	298,147	214,169	149,089	78,478	51,481	22,781	28,398	--
Total softwoods	4,808,144	1,031,218	1,110,381	852,648	571,213	396,665	260,626	190,332	145,296	212,203	37,562
<b>Hardwoods</b>											
Select white oaks											
White oak	74,845	2,362	3,647	6,926	11,195	13,637	9,571	9,688	3,750	10,170	3,898
Swamp white oak	5,827	35	--	--	--	--	562	--	1,747	--	3,483
Bur oak	705,220	54,485	85,666	108,757	106,353	83,763	73,429	65,199	41,632	84,076	6,861
All species	785,891	56,881	89,313	110,683	117,549	97,400	83,562	74,887	47,129	94,246	14,242
Select red oaks											
Northern red oak	779,956	20,088	51,372	86,665	113,541	132,376	118,046	78,016	49,273	105,464	25,115
All species	779,956	20,088	51,372	86,665	113,541	132,376	118,046	78,016	49,273	105,464	25,115

(Table 7 continued on next page)

(Table 7 continued)

Species group/ species	Diameter class (inches at breast height)											
	All classes	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+	
<b>Hardwoods</b>												
Other red oaks												
Northern pin oak	63,981	1,658	2,228	4,534	5,976	9,048	9,468	12,387	4,893	11,654	2,134	
Black oak	7,011	127	--	149	978	1,085	1,082	761	1,744	1,087	--	
All species	70,992	1,785	2,228	4,682	6,954	10,132	10,550	13,149	6,637	12,741	2,134	
Hickory												
Hickory spp.	164	83	81	--	--	--	--	--	--	--	--	
Bitternut hickory	8,834	1,535	2,505	1,653	532	2,044	564	--	--	--	--	
Shagbark hickory	18,864	2,705	2,980	3,912	4,602	4,117	548	--	--	--	--	
All species	27,862	4,323	5,566	5,566	5,134	6,161	1,112	--	--	--	--	
Yellow birch												
Yellow birch	35,611	3,510	4,951	5,207	2,564	4,812	4,319	4,574	3,545	2,131	--	
All species	35,611	3,510	4,951	5,207	2,564	4,812	4,319	4,574	3,545	2,131	--	
Hard maple												
Sugar maple	561,926	82,896	117,015	110,812	86,351	57,039	46,493	31,013	12,558	17,751	--	
All species	561,926	82,896	117,015	110,812	86,351	57,039	46,493	31,013	12,558	17,751	--	
Soft maple												
Red maple	445,136	102,621	128,037	100,891	51,732	27,706	13,635	6,091	6,545	5,447	2,480	
Silver maple	98,415	4,010	8,295	11,328	11,534	10,780	8,298	8,059	3,533	16,875	15,702	
All species	543,551	106,632	136,332	112,219	63,266	38,486	21,933	14,150	10,078	22,322	18,132	
Beech												
American beech	50	50	--	--	--	--	--	--	--	--	--	
All species	50	50	--	--	--	--	--	--	--	--	--	
Ash												
White ash	9,622	223	428	1,351	1,221	504	1,239	3,646	1,010	--	--	
Black ash	856,928	161,647	212,766	195,014	127,505	75,447	51,938	14,665	12,294	5,651	--	
Green ash	312,839	31,514	50,541	53,081	45,371	33,483	31,193	16,452	24,748	20,876	5,830	
All species	1,179,389	193,384	263,735	249,446	174,098	109,384	84,371	34,763	38,052	26,327	5,830	
Cottonwood and aspen												
Cottonwood and poplar spp.	343	61	65	217	--	--	--	--	--	--	--	
Balsam poplar	399,997	70,303	91,171	92,020	63,273	37,655	25,227	8,958	8,559	2,829	--	
Eastern cottonwood	85,707	945	1,376	2,558	5,573	3,403	8,319	6,438	4,528	28,077	23,991	
Bigtooth aspen	336,590	19,545	32,030	52,733	78,458	59,459	46,142	30,417	7,915	9,883	--	
Quaking aspen	3,237,456	419,389	520,545	617,478	589,558	515,871	286,711	164,797	67,426	52,785	2,897	
All species	4,060,093	510,244	645,987	765,007	736,861	613,388	366,399	210,608	88,429	93,583	26,888	
Basswood												
American basswood	789,388	58,245	107,606	141,095	130,342	120,845	90,495	58,467	40,747	36,715	4,831	
All species	789,388	58,245	107,606	141,095	130,342	120,845	90,495	58,467	40,747	36,715	4,831	

(Table 7 continued)

Species group/ species	Diameter class (inches at breast height)											29.0+
	All classes	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-26.9	29.0+	
<b>Hardwoods</b>												
<b>Black walnut</b>												
Black walnut	31,143	1,968	2,050	4,110	5,535	3,816	5,206	3,340	1,015	4,102	--	
All species	31,143	1,968	2,050	4,110	5,535	3,816	5,206	3,340	1,015	4,102	--	
<b>Other eastern soft hardwoods</b>												
Boxelder	73,303	13,237	16,990	15,598	9,580	7,984	5,047	1,667	3,201	--	--	
Paper birch	1,115,407	168,768	287,689	292,677	190,988	94,388	56,247	18,808	1,908	3,933	--	
Hackberry	15,499	3,399	3,941	2,969	2,193	841	583	1,568	--	--	--	
Butternut	10,960	778	1,623	3,845	2,716	494	574	--	980	--	--	
Black cherry	21,642	4,764	5,162	4,868	1,940	2,176	2,782	--	--	--	--	
Black willow	12,837	561	472	1,198	818	--	702	800	2,155	1,302	4,828	
White willow	174	--	--	174	--	--	--	--	--	--	--	
Elm spp.	461	41	213	207	--	--	--	--	--	--	--	
Winged elm	31	31	--	--	--	--	--	--	--	--	--	
American elm	160,023	35,080	40,657	31,409	17,971	13,000	8,467	5,024	1,698	6,717	--	
Siberian elm	994	120	274	183	--	417	--	--	--	--	--	
Slippery elm	33,861	4,056	8,770	8,206	5,722	2,918	579	2,213	--	1,398	--	
All species	1,445,190	230,834	365,792	361,335	231,933	122,218	74,929	30,079	9,892	13,349	4,828	
<b>Other eastern hard hardwoods</b>												
Sweet birch	325	48	277	--	--	--	--	--	--	--	--	
Honeylocust	193	--	--	193	--	--	--	--	--	--	--	
Red mulberry	64	64	--	--	--	--	--	--	--	--	--	
Black locust	1,317	102	153	118	--	483	511	--	--	--	--	
Rock elm	4,924	843	1,165	717	658	852	689	--	--	--	--	
All species	6,822	1,057	1,595	1,029	658	1,284	1,200	--	--	--	--	
<b>Total hardwoods</b>												
	10,317,864	1,271,896	1,793,242	1,957,855	1,674,786	1,320,341	908,614	553,045	307,355	428,731	101,999	
<b>All species groups</b>	15,126,009	2,303,113	2,903,624	2,810,503	2,245,998	1,717,006	1,169,239	748,378	452,651	640,934	139,561	

All table cells without observations in the inventory sample are indicated by --. Table value of 0 indicates the volume rounds to less than 1 thousand cubic feet. Columns and rows may not add to their totals due to rounding.

Table 8. -- Net volume of sawtimber on timberland by species group, species, and diameter class, Minnesota, 2001-2005

(in thousand board feet)<sup>1</sup>

Species group/ species	Diameter class (inches at breast height)									
	All classes	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+	
<b>Softwoods</b>										
Other yellow pines										
Scotch pine	20,551	5,891	6,903	4,779	2,978	--	--	--	--	
All species	20,551	5,891	6,903	4,779	2,978	--	--	--	--	
Eastern white and red pines										
Red pine	3,410,221	730,596	509,362	479,853	484,033	408,757	375,565	455,769	16,286	
Eastern white pine	1,707,660	95,092	132,496	138,650	161,282	219,575	238,463	517,877	209,225	
All species	5,117,881	825,688	641,858	618,503	595,316	628,332	609,027	973,646	225,511	
Jack pine	1,305,101	474,448	394,702	256,380	129,935	21,071	28,565	--	--	
All species	1,305,101	474,448	394,702	256,380	129,935	21,071	28,565	--	--	
Spruce and balsam fir										
Balsam fir	1,194,009	620,695	311,025	198,465	61,277	7,546	--	--	--	
White spruce	1,107,488	260,618	268,361	168,541	169,984	102,806	50,368	91,810	--	
Black spruce	821,710	558,851	187,128	48,885	21,555	5,292	--	--	--	
All species	3,123,207	1,440,165	761,514	410,891	252,816	115,644	50,368	91,810	--	
Other eastern softwoods										
Eastern redcedar	57,404	25,776	18,640	12,988	--	--	--	--	--	
Tamarack (native)	1,386,042	638,970	381,872	180,275	93,611	61,589	6,827	22,897	--	
Austrian pine	5,612	1,617	1,469	2,526	--	--	--	--	--	
Northern white-cedar	2,927,678	834,560	695,290	585,548	328,152	222,191	120,695	141,242	--	
All species	4,376,735	1,500,924	1,097,271	781,336	421,763	283,780	127,522	164,139	--	
Total softwoods	13,943,475	4,247,115	2,902,247	2,071,890	1,402,808	1,048,826	815,482	1,229,595	225,511	
<b>Hardwoods</b>										
Select white oaks										
White oak	284,583	--	45,593	59,760	43,741	45,528	18,207	51,046	20,708	
Swamp white oak	29,983	--	--	--	2,537	--	8,416	--	19,030	
Bur oak	2,102,821	--	433,828	366,240	335,016	307,125	201,271	423,068	36,272	
All species	2,417,387	--	479,421	426,000	381,294	352,653	227,894	474,114	76,010	
Select red oaks										
Northern red oak	2,858,976	--	461,186	578,458	540,302	369,791	240,480	534,083	134,175	
All species	2,858,976	--	461,186	578,458	540,302	369,791	240,480	534,083	134,175	
Other red oaks										
Northern pin oak	262,407	--	24,892	40,024	43,795	59,032	24,074	59,221	11,369	
Black oak	31,466	--	4,071	4,760	4,984	3,605	8,597	5,448	--	
All species	293,873	--	28,963	44,784	48,779	62,637	32,671	64,670	11,369	

(Table 8 continued on next page)

(Table 8 continued)

Species group/ species	All classes	Diameter class (inches at breast height)									29.0+
		9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9			
<b>Hardwoods</b>											
<b>Hickory</b>											
Bitternut hickory	12,856	--	1,986	8,318	2,552	--	--	--	--	--	--
Shagbark hickory	37,145	--	17,510	17,227	2,407	--	--	--	--	--	--
All species	50,000	--	19,497	25,545	4,958	--	--	--	--	--	--
<b>Yellow birch</b>											
Yellow birch	108,348	--	11,339	23,049	21,174	23,162	18,334	11,290	--	--	--
All species	108,348	--	11,339	23,049	21,174	23,162	18,334	11,290	--	--	--
<b>Hard maple</b>											
Sugar maple	1,141,726	--	362,182	256,737	219,240	150,533	62,357	90,677	--	--	--
All species	1,141,726	--	362,182	256,737	219,240	150,533	62,357	90,677	--	--	--
<b>Soft maple</b>											
Red maple	499,335	--	211,178	122,856	63,277	29,211	32,252	27,656	12,906	--	--
Silver maple	356,166	--	45,911	46,678	37,604	37,966	17,138	86,126	84,742	--	--
All species	855,501	--	257,089	169,535	100,881	67,177	49,390	113,781	97,648	--	--
<b>Ash</b>											
White ash	35,449	--	4,947	2,280	5,759	17,512	4,951	--	--	--	--
Black ash	1,323,208	--	556,509	351,844	250,499	72,758	62,135	29,463	--	--	--
Green ash	818,907	--	188,993	149,615	144,808	78,867	121,456	103,982	31,187	--	--
All species	2,177,564	--	750,449	503,739	401,066	169,137	188,542	133,445	31,187	--	--
<b>Cottonwood and aspen</b>											
Balsam poplar	655,151	--	266,964	170,476	118,078	43,249	42,239	14,146	--	--	--
Eastern cottonwood	388,477	--	20,476	13,628	35,397	28,503	21,092	138,895	130,487	--	--
Bigtooth aspen	1,070,594	--	336,473	272,542	220,348	149,695	39,855	51,681	--	--	--
Quaking aspen	7,646,728	--	2,515,629	2,351,839	1,356,025	801,942	335,667	269,922	15,704	--	--
All species	9,760,950	--	3,139,542	2,808,486	1,729,848	1,023,388	438,853	474,644	146,190	--	--
<b>Basswood</b>											
American basswood	2,237,112	--	556,729	551,889	427,997	284,441	202,738	187,165	26,154	--	--
All species	2,237,112	--	556,729	551,889	427,997	284,441	202,738	187,165	26,154	--	--
<b>Black walnut</b>											
Black walnut	109,533	--	24,108	17,628	25,072	16,488	5,101	21,135	--	--	--
All species	109,533	--	24,108	17,628	25,072	16,488	5,101	21,135	--	--	--

(Table 8 continued on next page)

(Table 8 continued)

Species group/ species	Diameter class (inches at breast height)									
	All classes	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+	
<b>Hardwoods</b>										
Other eastern soft hardwoods										
Boxelder	123,936	--	40,551	36,048	23,452	7,995	15,890	--	--	
Paper birch	1,582,592	--	787,817	417,538	258,975	89,386	9,180	19,695	--	
Hackberry	22,533	--	8,922	3,629	2,677	7,306	--	--	--	
Butternut	21,945	--	12,039	2,362	2,803	--	4,741	--	--	
Black cherry	30,653	--	8,291	9,665	12,697	--	--	--	--	
Black willow	52,511	--	3,048	--	3,060	3,592	10,112	6,261	26,438	
American elm	228,278	--	70,649	55,351	37,846	23,066	8,053	33,313	--	
Siberian elm	1,836	--	--	1,836	--	--	--	--	--	
Slippery elm	54,887	--	22,679	12,489	2,613	10,232	--	6,873	--	
All species	2,119,171	--	933,996	533,918	344,125	141,577	47,974	66,143	26,438	
Other eastern hard hardwoods										
Black locust	4,293	--	--	1,951	2,342	--	--	--	--	
Rock elm	9,413	--	2,617	3,661	3,135	--	--	--	--	
All species	13,705	--	2,617	5,612	5,477	--	--	--	--	
Total hardwoods	24,143,847	--	7,047,117	5,950,380	4,250,712	2,660,986	1,514,334	2,171,147	549,171	
<b>All species groups</b>	<b>38,087,322</b>	<b>4,247,115</b>	<b>9,949,363</b>	<b>8,022,270</b>	<b>5,653,520</b>	<b>3,709,812</b>	<b>2,329,817</b>	<b>3,400,742</b>	<b>774,682</b>	

All table cells without observations in the inventory sample are indicated by --. Table value of 0 indicates the volume rounds to less than 1 thousand board feet. Columns and rows may not add to their totals due to rounding.

<sup>1</sup> International 1/4-inch rule.



Table 9. -- All live aboveground tree biomass on timberland by owner category, softwood/hardwood species category, and tree biomass component, Minnesota, 2001-2005

(in thousand dry tons)

Owner category and softwood/hardwood category	Tree biomass component											
	All components			All live 1-5 inch trees			Growing-stock trees			Non-growing-stock trees		
				Total	Boles	Stumps, tops, and limbs	Total	Boles	Stumps, tops, and limbs	Total	Boles	Stumps, tops, and limbs
<b>Public</b>												
Softwoods	76,608	16,616	57,682	44,275	13,407	2,310	1,731	579				
Hardwoods	141,756	21,340	108,521	78,786	29,735	11,896	8,852	3,043				
<b>Total</b>	<b>218,364</b>	<b>37,956</b>	<b>166,203</b>	<b>123,061</b>	<b>43,142</b>	<b>14,205</b>	<b>10,583</b>	<b>3,622</b>				
<b>Private</b>												
Softwoods	33,814	5,350	27,575	21,462	6,112	890	684	206				
Hardwoods	186,894	21,256	139,411	101,020	38,391	26,227	19,542	6,684				
<b>Total</b>	<b>220,708</b>	<b>26,606</b>	<b>166,985</b>	<b>122,482</b>	<b>44,503</b>	<b>27,117</b>	<b>20,227</b>	<b>6,890</b>				
<b>All ownerships</b>												
Softwoods	110,422	21,966	85,257	65,737	19,520	3,200	2,415	785				
Hardwoods	328,650	42,596	247,931	179,806	68,125	38,122	28,395	9,727				
<b>Total</b>	<b>439,072</b>	<b>64,562</b>	<b>333,188</b>	<b>245,543</b>	<b>87,645</b>	<b>41,322</b>	<b>30,810</b>	<b>10,512</b>				

All table cells without observations in the inventory sample are indicated by --. Table value of 0 indicates the aboveground tree biomass rounds to less than 1 thousand dry tons. Columns and rows may not add to their totals due to rounding.

Table 10. -- Average annual net growth of growing stock on timberland by species group and owner category, Minnesota, 1999-2000 to 2004-2005

(In thousand cubic feet per year)

Species group	Owner category			
	All owners	Public	Private	Unidentified owner
<b>Softwoods</b>				
Other yellow pines	1,779	--	1,779	--
Eastern white and red pines	64,810	38,230	26,580	--
Jack pine	7,781	7,269	512	--
Spruce and balsam fir	36,327	23,113	13,213	--
Other eastern softwoods	36,999	24,649	12,351	--
Total softwoods	147,696	93,261	54,435	--
<b>Hardwoods</b>				
Select white oaks	27,387	5,345	22,042	--
Select red oaks	35,549	15,256	20,294	--
Other red oaks	1,791	195	1,596	--
Hickory	2,409	--	2,409	--
Yellow birch	869	589	280	--
Hard maple	16,920	11,304	5,616	--
Soft maple	28,739	11,970	16,769	--
Ash	48,167	15,252	32,916	--
Cottonwood and aspen	120,980	56,937	64,043	--
Basswood	22,144	6,776	15,367	--
Black walnut	1,135	--	1,135	--
Other eastern soft hardwoods	36,408	13,264	23,144	--
Other eastern hard hardwoods	107	--	107	--
Total hardwoods	342,605	136,888	205,717	--
<b>All species groups</b>	<b>490,301</b>	<b>230,149</b>	<b>260,152</b>	<b>--</b>

All table cells without observations in the inventory sample are indicated by --. Table value of 0 indicates the volume rounds to less than 1 thousand cubic feet. Columns and rows may not add to their totals due to rounding.

Table 11. -- Average annual removals of growing stock on timberland by species group and owner category, Minnesota, 1999-2000 to 2004-2005

(In thousand cubic feet per year)

Species group	Owner category			
	All owners	Public	Private	Unidentified owner
<b>Softwoods</b>				
Eastern white and red pines	20,230	10,561	9,670	--
Jack pine	12,645	6,982	5,663	--
Spruce and balsam fir	43,820	27,578	16,242	--
Other eastern softwoods	3,608	2,729	879	--
Total softwoods	80,303	47,849	32,454	--
<b>Hardwoods</b>				
Select white oaks	5,584	2,343	3,240	--
Select red oaks	9,604	3,664	5,940	--
Other red oaks	508	159	349	--
Yellow birch	3,726	3,726	--	--
Hard maple	2,503	1,080	1,423	--
Soft maple	16,152	3,980	12,171	--
Ash	11,000	7,189	3,812	--
Cottonwood and aspen	137,621	89,165	48,456	--
Basswood	8,915	1,844	7,070	--
Other eastern soft hardwoods	35,322	25,223	10,099	--
Total hardwoods	230,934	138,373	92,560	--
<b>All species groups</b>	311,237	186,222	125,014	--

All table cells without observations in the inventory sample are indicated by --. Table value of 0 indicates the volume rounds to less than 1 thousand cubic feet. Columns and rows may not add to their totals due to rounding.

Table 12. -- Average annual mortality of growing stock on timberland by species group and owner category, Minnesota, 1999-2000 to 2004-2005

(In thousand cubic feet per year)

Species group	Owner category			
	All owners	Public	Private	Unidentified owner
<b>Softwoods</b>				
Eastern white and red pines	5,142	3,330	1,812	--
Jack pine	11,352	5,879	5,473	--
Spruce and balsam fir	56,354	42,819	13,535	--
Other eastern softwoods	13,651	12,007	1,643	--
<b>Total softwoods</b>	<b>86,498</b>	<b>64,035</b>	<b>22,464</b>	<b>--</b>
<b>Hardwoods</b>				
Select white oaks	2,025	911	1,115	--
Select red oaks	5,567	701	4,867	--
Other red oaks	904	--	904	--
Hickory	231	--	231	--
Hard maple	3,759	1,602	2,157	--
Soft maple	4,308	1,691	2,618	--
Ash	4,800	2,445	2,355	--
Cottonwood and aspen	95,674	53,503	42,171	--
Basswood	4,427	1,347	3,080	--
Other eastern soft hardwoods	31,719	15,371	16,348	--
Other eastern hard hardwoods	24	--	24	--
<b>Total hardwoods</b>	<b>153,440</b>	<b>77,571</b>	<b>75,870</b>	<b>--</b>
<b>All species groups</b>	<b>239,939</b>	<b>141,605</b>	<b>98,333</b>	<b>--</b>

All table cells without observations in the inventory sample are indicated by --. Table value of 0 indicates the volume rounds to less than 1 thousand cubic feet. Columns and rows may not add to their totals due to rounding.



*Capitalizing on the strengths of existing science capacity in the Northeast and Midwest to attain a more integrated cohesive landscape scale research program*

---

---

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).

To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, SW, Washington, DC 20250-9410, or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

---

---